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Industrial Research in the United States during 1941

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The model of much of the industrial research of the United States is contrived to contribute to national defense, to bring about improvements in raw and finished materials therefor, to uncover succedanea for scarce goods, to develop speedily needed new processes and products. And in all this work the progress has been great, especially from the standpoint of equipment and supplies dependent upon metals, rubber, synthetic resins, textile fibers, foods, chemicals, and petroleum. The obvious national requirements and the stimulating encouragement of federal agencies such as OPM have brought about a surpassing year of research in American industries.

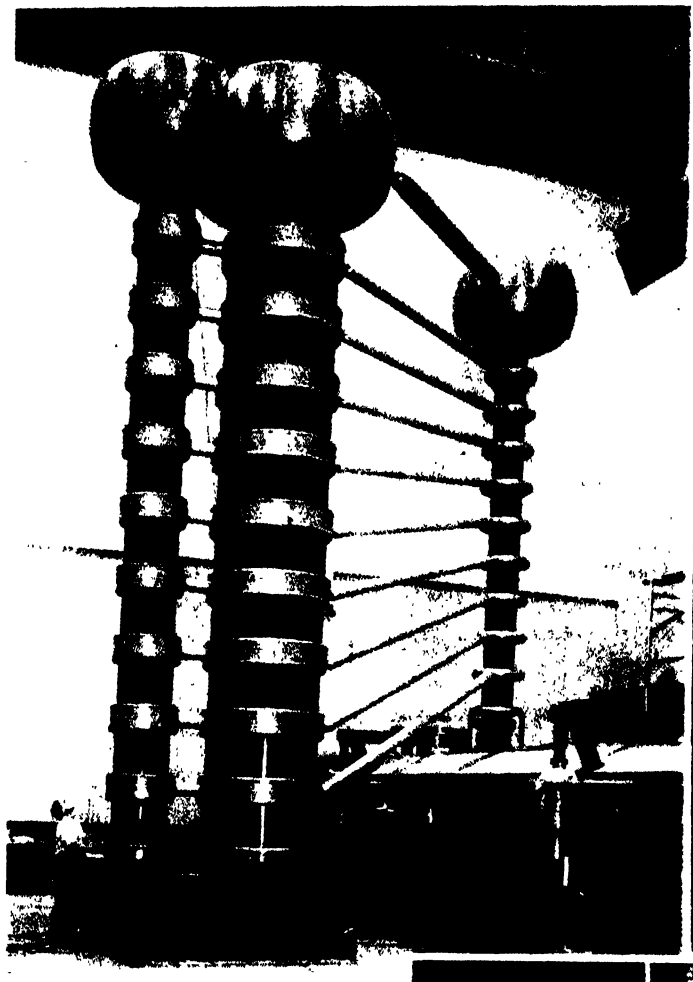
The purpose of this article is to present the important increases during 1941 in interpretative and useful wisdom coming from scientific investigations for American technology. In preparations for national defense, as in warfare, the fundamental aims of industrial research do not change in general, but its philosophy and emergent issues may be altered materially for economic and military reasons. In all the major American branches of manufacture there is intense activity; in some fields there is the necessity for secrecy. A subsequent discourse will deal with industrial research in foreign countries during he past year.

THE total expenditure for all basic production research in the United States in 1941 was about $275,000,000, or approximately 25 per cent more than in 1940. The National Resources Planning Board has reported that American companies spend 6 per cent of their net income on industrial research and have increased their investigational personnel 41 per cent in the past two years, based on a survey of 2,350 companies employing 70,033 persons engaged in research. During 1941, $117,490,000 were expended for scientific research by 1,008 American manufacturers. Of the companies included, 49 per cent gave a larger investigational budget than in 1940; 43 per cent, the same amount. According to the 1941 research budgets of 20 representative manufacturers they have spent 2 per cent of gross income from sales of nondefense products.

About 200,000 products have come from researches in the Nation's chemical laboratories since 1914. Over 39 per cent of the chemicals now listed by Monsanto were not made a decade ago. Eastman's research appropriation has increased from almost nothing in 1912 to $5,000,000; during 1929–39 Eastman's employment rose 75 per cent and $19,000,000 was added to the annual payroll. Johns-Manville is spending close to $1,000,000 a year in research. The du Pont researchers total 1,400. The cost of du Pont's construction work for 1941, both company and governmental, amounted to $213,000,000. Ford markets over 30 by-products valued at $20,000,000 a year. At Detroit Edison the annual value of material reclaimed is $35,700 per salvage department employee. Pullman and Pennsylvania Railroad joined New York Central and Chrysler in Railroad Rolling Stock Patents to expand and carry on train-car research initiated in the Chrysler laboratories. Thirty-five out of 113 trade associations affiliated with the National Association of Manufacturers conduct research; the median budget is $25,000, and two associations spend more than $100,000 a year. Seventy-four research associates, representing 25 associations, are stationed at the National Bureau of Standards. Plans have been perfected for the bureau's new $600,000 materials testing laboratory. The volume of requests for the establishment of standards covering manufactured products has increased 50 per cent. Twenty-two companies formed the National Aircraft Standards Committee.

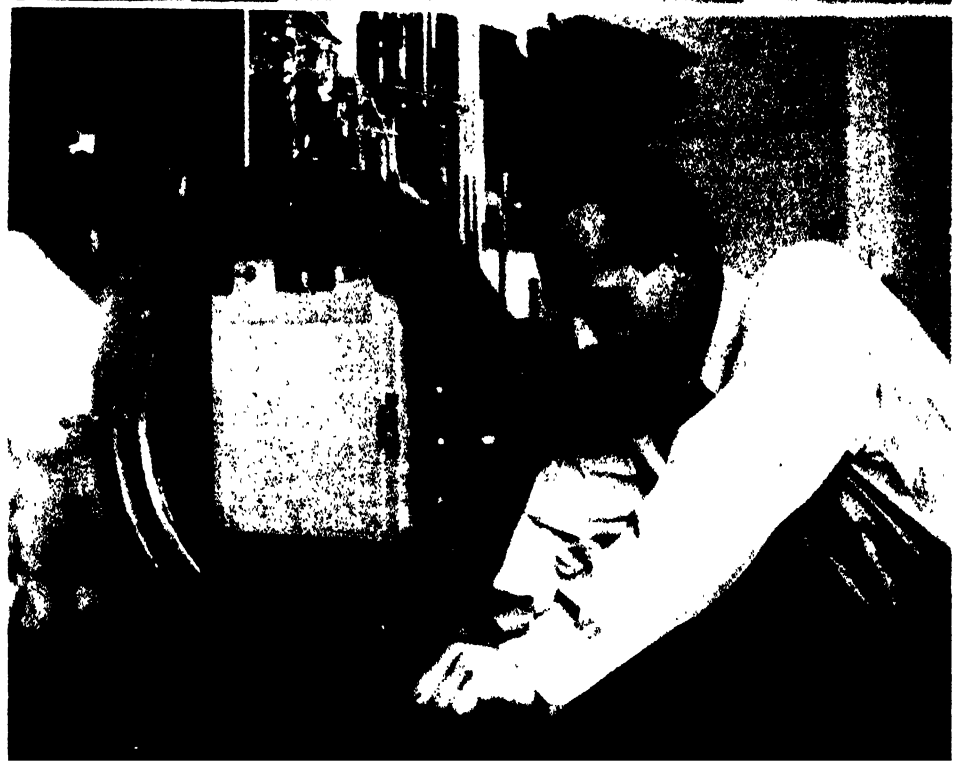
Three hundred agencies are sponsoring 810 institutional research fellowships and other grants. State universities employ about 2,100 chemists; experiment stations, 400; city-controlled educational institutions, approximately 200. Around 16,000 chemists, 15,000 engineers, 2,500 physicists, and 2,000 metallurgists are engaged in systematic industrial research. Close to 2,000 scientists are at work for the National Defense Research Committee in institutions and laboratories. Records for 1941 show that 4,472 chemists were graduated with the B.S., 910 with the M.S., and 723 with the Ph.D.—a total of 6,105. The chemical engineers for 1941 were 1,709 B.S., 183 M.S., and 23 Ph.D.—1,915 in all. And yet there are not enough men of these types. It is estimated that 1,400 out of 4,100 physicists are investigating problems of national defense. An extensive research in defense took 150 physicists from 25 universities to the M. I. T. Radiation Laboratory. Two hundred and fifty physicists were graduated; there is need for over 1,000. Metallurgists and electrical and mechanical engineers are also scarce. Pure scientific research has been decreasing in the universities, and their total resources for pure science do not reach $20,000,000 a year. More than 30,000 boys and girls, members of junior science and engineering clubs, carry on spare-time laboratory experimentation.

Research laboratories use about 5,000 chemicals and require in their operation 25,000 different instruments; they are facing the necessity of finding many substitutes during the emergency. A wave of fresh research has therefore swept through the field, dusting out some of the



Below. Gasoline consumption meter used by the National Bureau of Standards for the accurate measurement of fuel burned by cars under test.





At the National Bureau of Standards. *Above.* High-voltage laboratory. X-ray generator unit is incased in central column. Voltmeter is in column to left. The column on extreme right is one of three x-ray tubes used for standardizing dosage meters and for exploratory work and cooperative studies with the National Cancer Institute. The generator can deliver x-ray excitation current of 26 milliamperes at 1,400,000 volts. *Right.* Photochemical study of sheet materials. Light, after passing through filters to remove radiation of undesired wave lengths, strikes the sheet held in contact with the thermostated aluminum backing by air pressure. The backing removes heat resulting from light action or light degradation, thus eliminating the heat effects which usually interfere in such light studies. The moisture and oxygen content of the air around the samples of plastics and similar materials is also controlled and varied.

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dark corners. Equipment makers are supplying increasingly better tools to the industries and their workers. On July 1 two New York stations commenced commercial television broadcasting. Radio waves about 20 inches long (600 megacycles) form fingers for detecting airplanes at night or in fog. In Seattle, where the first major dress-rehearsal blackout was staged, infrared photography was tested with success. The electron microscope and the cyclotron have opened up new fields for research endeavor. There are in operation throughout the world nearly 40 cyclotrons of various sizes and 24 of these devices either were built or are being operated by specialists trained at the University of California. The betatron is a new electron-hurling machine. Hindrances to research through lacunae in 1940 and 1941 foreign periodicals have arisen but are much less serious than abroad. Microfilming is assisting in keeping unbroken the record of scientific investigation.



TVA FROM OEM

Checking electrolytic plates in the production of manganese, Electro Manganese Co., Knoxville, Tenn.

Defending the Health of Workers

The widening of the scope of Air Hygiene Foundation led to its new name, Industrial Hygiene Foundation. The budget for industrial hygiene in the National Institute of Health is close to $500,000. In general the country is well prepared to cope with health problems in war industries.

There are approximately 300,000 accidental injuries to the eye in American industry every year; the cost is approximately $33,000,000. "Three-dimensional seeing" is a way of painting plant machinery in lighter, brighter colors so that eye fatigue is lessened. Music over telephone wires is helping employees in routine factory jobs. Air-conditioning units are going into naval vessels; electrostatic precipitation is in use in several conditioners; air-conditioning systems are deodorized by activated carbon. The U. S. Bureau of Mines is studying supersonic means of clearing contaminated atmospheres and is continuing its researches on respiratory protective equipment. A. S. A. standards define the amounts of carbon monoxide, hydrogen sulfide, carbon disulfide, and benzene which may be permitted in factory air without harm to workers. The toxicology of oxides of nitrogen has been investigated. Protective measures to reduce the hazards of hydrogen selenide were discussed. The National Bureau of Standards has studied the hazards of mercury vapor in laboratories. A meter evolved at the bureau warns of unsafe conditions in handling radium.

Research indicates a tendency of bituminous coal miners to develop presilicotic and silicotic lung changes after prolonged employment. Examination of 49 men working with fuller's earth disclosed pulmonary alterations, differing from those observed in silicosis. Findings in an x-ray survey of two calcimine plants have revealed a substantial hazard. Investigation has shown that cement dust is nontoxic and that extended periods of employment in high concentrations have little or no effect. Researches were continued on the physiological aspects of arc welding. There appeared studies of workers exposed during the manufacture of Ledloy and of atmospheric concentration of lead fume associated with forging, welding, and oxygen-cutting of lead-bearing steel. Inspection of 27 lead storage battery plants in Illinois showed excessive air contamination by lead, but no cases of plumbism severe enough to cause disability were seen among 766 men employed in 6 lead storage battery factories. The prevention of chronic manganese poisoning can be accomplished by the use of effective control measures against the inhalation and ingestion of manganese compounds. The Bureau of Mines has emphasized the need for developing efficient methods of fighting fire and preventing explosions in plants producing or handling aluminum, magnesium, or zinc powder or scrap. High-melting coal-tar pitch in granules is especially effectual in extinguishing magnesium fires. Pyrene G-1 powder is intended for combating magnesium fires. A mixture of sand and powdered calcium or magnesium carbonate has been recommended for smothering magnesium-thermit.

An automatic carbon disulfide recorder was announced by American Viscose. A safety program begun 4 years ago in plants represented by the Cellulose Plastics Manufacturers' Association has cut lost-time injuries. Dermatitis was found among workers who handled viscose caps shipped in a fluid containing *p*-chloro-*m*-cresol. A survey of airplane plants employing over 100,000 men has brought out that there are many skin hazards, principally from cutting oils, thinners and solvents in paints and "dopes", plating and rustproofing of metals, fluxes in welding, and solvents for cleaning and degreasing. Experience elsewhere has demonstrated there are no health hazards in solvent degreasing if the unit is properly designed, installed, and operated. Nitroparaffins require precautions for their safe handling. Acute oral toxicity of acetic, monochloroacetic, dichloroacetic, and trichloroacetic acids has been investigated; monochloroacetic acid is the most toxic of the group. Studies have been continued on poisoning by benzene and its homologs. Mitts and Practi-Kreme are skin-protectives.

Progress in Mineral Technology

The U. S. Bureau of Mines has reported on alunite resources, limestone and dolomite, gypsum, Iceland spar and optical fluorite, froth flotation and agglomerate tabling of micas, treatment of Alabama graphite ores, and concentration of low-grade manganese ores. TVA is experimenting with clay as a source of alumina; similar research is being conducted at Columbia University.

Santocel is chemically puffed sand, a heat insulator and bulking agent. Celite 340 is a chemically treated and air-separated diatomaceous silica. Silicair is a sound insulation based on diatomaceous earth. Silica aerogel is under development as heat insulation. Cerastone is a processed sandstone for laboratory table tops. A grinder of feldspar and other materials has found that granite liners give better service than Belgian silex and some operators have discovered that steel balls

and rail liners cause less serious contamination than had hitherto been supposed. With the exception of industrial diamonds, the United States can attain self-sufficiency in all necessary abrasives. The cataphoretic velocity of purified, colloidal, mono-disperse fractions of bentonite increases with decreasing particle size; with constant particle size it decreases with increasing concentration. Mississippi bentonite is useful in preparing molds for casting metals. Florite desiccant is a Floridin drying material in regeneratable granules. The beneficiation of bauxites is under investigation. Thermally activated bauxite is used as a decolorizer in sugar refining. More careful mining and washing have characterized the clay industry in recent years. In Georgia nonwhite clays are bleached by zinc and sodium hyposulfites. Calcite for optical purposes is being mined in New Mexico. Barite deposits are of widespread occurrence in Nevada but there are few producing properties. The presence of high-grade antimony and tungsten ores has been uncovered in Idaho. The use of ferrosilicon in sink-and-float processing of iron ore is being tried. Molybdenum is being recovered from copper sulfide concentrates by Anaconda, which company has installed a new process for treating Montana manganese ore. Of three projects in Oregon, Wyoming, and Montana, two have been deemed valuable reserves of chromite. The chromite of Alaska is also of promise.

Improvements in equipment and methods of mining have continued. The trend in excavating for metal mining is toward electrification of shovels. Electric transportation, adopted at some of the larger mines, has resulted in reduced costs. Belt conveyors have proved successful in situations unfavorable to rails. The electric self-propelling churn drill dominates blast-hole work. Black powder is no longer employed in blasting in open pits, principally because of the better safety attained through the use of dynamite.



Apparatus for slacking test of coal (in foreground) in a laboratory of the U. S. Bureau of Mines at Golden, Colo. The station at Golden has been active in studies of combustion and general utilization of the low-rank western coals.

Research Accessions to Coal and Coke

Moving the wheels of the factories of the United States now requires a total of 51,154,523 h. p., a fivefold gain since the turn of the century. During the past 20 years the power-generating trend has been rapidly from steam engines to steam turbines. At the University of Maryland an investigation into the behavior of boilers is being carried on by railroads, steam-boiler manufacturers, and the U. S. Bureau of Mines. Twenty-six stove manufacturers have joined with Bituminous Coal Research in sponsoring an investigational program at Battelle Memorial Institute. For more than 15 years the American Gas Association has conducted continuous research to provide technical data requisite in developing specifications to conform with advancements in design of appliances and accessories.

The Bureau of Mines is making an investigation of coal preparation in the Alabama fields in collaboration with the University of Alabama and mine operators. Studies covering a large number of Illinois and Indiana coals have developed control of the ash characteristics by the addition of silica or lime. Of about 7,500,000 tons of subbituminous coal mined annually in Colorado, Wyoming, and Montana, approximately 50 per cent probably reaches domestic consumers, and the Bureau of Mines has looked into the utilization of this fuel in home stokers. Through proper maintenance of furnaces and more efficient firing methods home owners and operators of apartment and office buildings could save more than $150,000,000 in fuel bills each year. Proper insulation of dwellings erected during the next 10 years would result in an annual saving of $125,000,000 to the owners.

The Bureau of Mines has described the effect of particle size on the rate of oxidation of anthracite. To obtain activated carbon for water-purification purposes, only high-carbon fractions of bituminous coal refuse, which constitute a small percentage of the waste, have been utilized. Sugar-decolorizing carbons can be made from coal or coal refuse; but the lower the ash of the original raw material, the better the results to be expected. The presence of fusain is beneficial in briquet making, for it reduces the frangibility and smokiness of the product. As to colloidal fuel it is believed that the results of work so far are sufficient to establish its commercial possibilities; it is thought, however, that the search for better and cheaper ways to produce stability should be continued and that much remains to be done on grinding and mixing, atomizing, and burning. Stable suspensions of coal in gas oil or fuel oil can be produced by adding 0.05 to 0.2 per cent of the condensation product of a fatty acid (surface-active type).

In the by-product coke industry the potential annual capacity of all units is 72,073,613 tons. Koppers research on the removal of organic sulfur from coke-oven gas by a new process has been sufficiently successful to warrant the construction of a pilot plant. In another procedure chromium and molybdenum oxide catalysts abstract thiophene from hydrocarbons. Electrolysis can be used for the elimination of the organic matter in the ammoniacal liquors from by-product plants. Aromatic solvents can be made from coke-oven tar by hydrogenation. The extensive research advances in benzenoid chemistry will be discussed in a subsequent section on organic chemical technology. By the Hayes low-temperature process char for use in stokers and briquetted coke for stoves are producible. The Disco product is characterized as smokeless and easily ignitable; Disco tar acids are getting attention. The Bureau of Mines announced that its process of hydrogenation of coals, if applied to the total coal reserves of the country, could yield enough oil to supply the Nation's needs for almost 3,000 years at the present rate of consumption; bituminous coal such as that from the Pittsburgh bed could give an average of 2 tons of oil for each 3 tons of coal mined. Of interest in passing is the fact that sewage-sludge gas has recently been utilized in internal-combustion engines.

New Ceramic Products

Portland Cement. Metalox, which contains powdered iron, is stated to accelerate setting time. Certain synthetic resins are claimed to decrease surface scaling. Cement of high alkali resistance and high

early strength is said to result on addition of sodium sulfate. To increase the sulfate resistance of cements the Al_2O_3 component of the $3CaO.Al_2O_3.6H_2O$ is replaced to form hydrogarnets which contain iron or silica and are stable in such solutions. Verilite is a light-colored cement. Grainlock is a primer or base upon which to apply cement. Sand-cement mixtures are used in place of neat cement for casing jobs and especially for making plugs in side-tracking and hole-straightening operations.

Concrete. Fly-ash admixed cements have given greater resistance of concrete to freezing and thawing. Thermocrete for quickly erectable houses contains volcanic aggregate. Careystone and Panelbestos are cement-asbestos boards. Research is going forward on the use of vermiculite for light-weight concrete. Animal fats increase the shrinkage of concrete, but no similar effect has been noted with resins or mineral oil; resins are more effective in increasing durability than mineral oils. Vinsol resin is reported to reduce scale from freezing and thawing. The warping, cracking, and change of shape that occur in concrete under load are not the result of "plastic flow" but of nonuniform shrinkage. Heat-insulating air spaces are being put in walls by setting short lengths of split green cottonwood logs into wet concrete. Studies are being made of the effects of fine and coarse aggregate characteristics on the durability of concrete and of the adhesion of asphalts. Work is being continued on the physical nature of sand and gravel in different sections of the country.

Concrete Finishing Agents. Congran is a concrete hardener; Primoid and Transeal are waterproofers; Conk is a liquid for protecting concrete floors; Dye-Crete stain and Defensite coating and also Flor-Dye No-Buff are for coloring and dustproofing floors; Granitex is a dust- and oil-proofer; Stone-Kleen is a detergent; Kolor-Gran is a refinisher; Quick-Patch is a ready-mixed material for filling holes. Sy's Plug, a fiber powder, is employed to hold fastenings in concrete.

Other Building Materials. The National Bureau of Standards has reported research on action of frost on bricks, cause and correction of leaky masonry walls, and moisture-condensation in building walls. Plastoid rope is a caulking material for use in place of mortar in coping and similar joints; Hydroso, a waterproofing agent for masonry and wood; Aquanil, a waterproofer for ceramic products. A new plaster is prepared by heating gypsum in a magnesium sulfate solution. Petroleum coke is converted into graphite to produce a porous material, similar to unglazed ceramic ware, which may be made impervious by impregnating with a synthetic resin.

Refractories. The dry strength of Kentucky clays is increased, up to 27 per cent, by aging with magnesium phosphate. A high heat-duty, unfired, dry-pressed refractory may be produced from pyrophyllite and ball clay. Firebrick is made from clay and an organic filler which, upon being burnt out, gives controlled pore structure. Basic refractories are manufactured from dolomite. Stoves having glazed tile exteriors and refractory brick linings, well known in Switzerland, may come into American use.

Refractory Products. Chromlo is a chrome-base refractory for furnace linings; Insuline is a refractory in preformed panels for furnaces; Adachrome-Cote is a refractory powder for coating furnace walls; Plicast is a pulverized insulating refractory for service temperatures to 2,200° F. Silica slurry for patching reverberatory furnace roofs is often bonded by bentonite. Pal-lite is an asbestos plate to support ceramic products while being dried.

Vitreous Enamels. Blends of certain American clays have given results comparable to those obtained by the employment of Valendar clay. The micronizer is applied for increasing the fineness of clays for enamel. A pyrophyllite containing approximately 15 per cent sericite is being substituted in vitreous bodies for flint and some of the feldspar. Zirconium opacifiers are being used in place of stannic oxide in enamels and glazes; crazing is claimed to be decreased by Zircopax. Molybdenum compounds utilized with compounds of antimony are said to impart high adherence to enamels. Architex, Neopake, Pyroflex, Pyronamel, Sanifrit, Satynite, Superpake, and Synamel are enamel frits. Pemco Paradox is a low-fire white cover coat; its companion frit is Bonite, a low-fire ground coat. Flushing the melt with nitrogen has been found to remove dissolved hydrogen and to eliminate defects in enameling. Ing-Rich panels for walls are made of porcelain-enameled steel; Por-Ce-Lok is a porcelain-enameled corrugated-steel sheet for roofs and side walls; Toledohio roofing tile is iron finished on both sides with porcelain enamel. Vitroliner enameled chimney pipe has Fyrex insulation.



PITTSBURGH-CORNING CORP.

The new PC Vue Block, showing the extent of vision possible

Porcelains. Cyanite is being calcined to mullite. As topaz is readily converted to mullite at moderate temperatures, and has a low thermal expansion, it may serve the same purpose as andalusite and dumortierite in electric porcelain, particularly in spark-plug bodies. Several companies are making spark plugs by using ceramic cores containing no mica. Radiant heat lamps have speeded up glazing of electrical insulators 20 per cent. Westinghouse Prestite is a porcelain having high mechanical and dielectric strength. The production of glazed porcelain cooking ware is under study.

Glass. By a new procedure the components of a vitric batch are precipitated together. Under control sulfates are of aid in the fining of glass. Babosil is a fluxing material to introduce boric acid, alumina, and barium oxide The formation of apatite crystals is responsible for opacity in bone-ash opal glasses. Am-

monia, electrolytically introduced into soda glasses, is easily removable, leaving a glass of higher silica content. Between 500° and 580° reaction takes place between hydrogen and Pyrex. Chlorides of aluminum, vanadium, cobalt, nickel, manganese, and silicon improve the durability of glass. The glass industry may become a large market for zircon, now utilized in heat-resisting glass. Electric welding has been applied in the manufacture and repair of glass articles. Ultraviolet radiation is being used for the sanitization of bottles.

Glass Products. Pittsburgh-Corning introduced glass blocks with open ends for use as flower pots and aquariums; Vue glass block permits vision of large objects beyond the panel. A ground and polished plate glass $^{3}/_{64}$ to $^{1}/_{16}$ inch in thickness is for thin laminated products and mirrors. Silvered-glass reflectors are replacing polished aluminum in street lamps. In Flexseal, made of plastic sandwiched between two lights of glass, the plastic extends beyond the edges as a rim which can be attached to a window frame. Glass-recording disks are utilized in transcriptions for radio broadcasting. Micalex, a mixture of ground mica and glass, is available in injection-molded products. Pittglas is a hot-water-storage tank of steel coated with glass. Alubro-Weld is a blue glass for welding helmets.

Optical Glass. AFC-44 is a fog-proofing material for lenses. RCA antireflection glass is treated faintly with hydrofluoric acid. The coating of exposed optical parts of spectrographs with nonreflecting films of magnesium fluoride and of other parts with films of lithium fluoride has resulted in a doubling of the over-all light transmission. General Electric antisabotage light for protective fence lighting has a special heat-resisting lens. Neodymium is used in neophane glass for windshields and sunglasses and in glasses that are claimed to have the property of correcting incomplete color blindness. Praseodymium is employed in telescope screens. Eastman Kodak announced an optical glass made of tantalum, tungsten, and lanthanum, possessing greater light-bending power than ordinary glass.

Glass Fiber. Fiberglas is being applied in the hull insulation of battleships, in insulating oil tanks in bombers, and in sound-deadening in plant construction. Fiberglas and steel, in layers, are employed in roofs and walls. Tarpaulins made of glass fiber are lighter than canvas; glass fiber awnings are strong, easily cleaned, and decay-proof. Glass fiber curtains, tablecloths, and neckties have also been introduced. Nickel-clad steel tank cars insulated with glass fiber are in use for chemicals. Glass-fiber adhesive tape with a pressure-sensitive coating is another recent creation. Various combinations of glass fibers with plastics have been described for thermal and sound insulation. Fiberglas cloth impregnated with heat-resisting varnish is used as electric insulation; glass-covered wire is now shock-resistant.



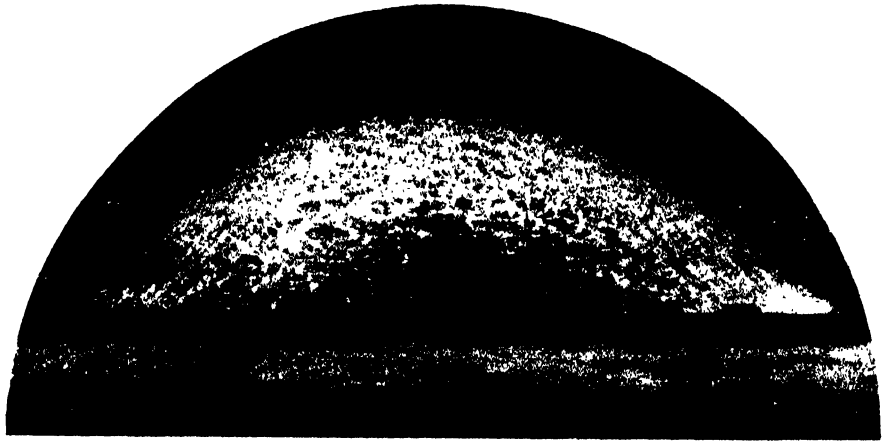
PITTSBURGH PLATE GLASS CO.

A light of Flexseal laminated glass developed for airplane windows.

Gains in Metallurgy

The National Bureau of Standards released the findings in exhaustive tests to determine the corrosion behavior of metals in soils and in other environments in which the same corrosive factors are present.

The powdered metal parts in the 1942 cars add up to only 3 pounds, but automotive engineers think that before long there will be 100 pounds in almost every model. Meantime, subsidiaries of both Chrysler and General Motors are supplying other manufacturers with powdered metal gears, bearings, and parts for airplane engines, guns, ships, and household equipment. Powder metallurgical processes lend themselves well to the production of alloys. Metal hydrides have been applied successfully in the reduction of refractory metal oxides. Substitution of 2 per cent of the iron by titanium hydride gave satisfactory results in avoiding aluminum oxide inclusions in the sintering of 10/25/65 Al-Ni-Fe magnetic alloys from powdered mixtures of the metals. Most intriguing prospective use for powdered metals is in clerical machines, where porous typefaces may soak up ink and stamp it on paper. All told, some 5,000 tons of metallic powders have been used in metallurgy this year—up 25 per cent over 1940, 100 per cent over 1936. Precautions must be exercised in preventing ignition wherever metallic powders are produced or used. Special waxes are employed for releasing sintered bearings from their molds. Porex powdered metal products can be processed into almost any shape and degree of porosity up to 50 per cent voids. Several companies have announced the production of powdered iron; one firm is making powder from iron carbonyl.



PITTSBURGH PLATE GLASS CO.

Flexseal withstands 2 tons of air pressure. The glass cracked but the vinal plastic maintained the airtight seal.

The Ferrous Realm

Iron. If air blasted into all 231 furnaces were cleaned and dehumidified, production might be boosted 10 per cent. Concentration of phosphorus on the surfaces of little air-pockets or blow-holes has been proved by radioactive tracers. New methods of dephosphorization are being applied; external desulfurization of pig iron is attracting attention. There are very limited applications of iron plating today. On the other hand, electroforming with iron and electrowinning of iron have recently met with renewed interest. Thirty-two metals have been electrodeposited from aqueous solution, but only about 15 metals are electrodeposited commercially.

Four gray-iron and malleable-iron casting manufacturers are spending in research and development 1.09 per cent of their total operating costs. Malleable cast iron made from metal initially high in hydrogen is inferior in tensile properties to metal lower in hydrogen, even though the final hydrogen content is similar. Super-Y is an alloy between malleable iron and steel. Globeloy is a cast-iron alloy containing silicon and chromium. There is a series of



Left. Unrolling white glass wool which blankets roofs and walls at bomber assembly plants being built for the Army by The Austin Co.

Below. Fiberglas curtains in the restaurant of the new Washington, D. C., National Airport

OWENS-CORNING FIBERGLAS CORP



iron-nickel-chromium alloys suitable for vacuum-tight glass-to-metal seals. A possible substitute for steel to resist deformation at 1,100° F. is iron containing molybdenum or columbium. Molybdenum silicide is an alloying agent for use in gray-iron castings. An experimental road in Minnesota is made of cast iron.

Steel. The steel capacity of the United States has increased almost 40 per cent since 1918 and fully 15 per cent since 1929. The recent advance in knowledge concerning protective furnace atmospheres has been great; continuous casting of steel is increasing; open-hearth operation is now better controlled than formerly. The American Institute of Mining and Metallurgical Engineers published a list of problems relating to the physical chemistry of steelmaking. A catalog of 1,500 tool steels was issued. One of the bigger planes, such as a transport or heavy bomber, requires at least 5 tons of high-grade alloy steels; steel accounts for almost half the weight of both the fuselage and engine. A new process for making light armor plate speedily enables the carrying out of three heats in 24 hours; the carburizing treatment is accomplished with a liquid salt bath in an electric furnace. An automatic machine shapes metal tubing to practically any contour that can be made from solid stock on a lathe.

According to Westinghouse, a $2,000,000 research program resulted in the development of Hipersil, an improved magnetic material for transformer cores which has one third greater flux-carrying capacity than the best conventional silicon steel. Chromium and phosphorus reduce the rate of corrosion of copper-silicon steels. Nickel-copper steels consistently demon-



A view in the turret lathe assembly department at the Warner & Swasey Co.'s new plant in Cleveland



Freshly baked welding rods proceeding from the oven to the inspection table in the plant of The McKay Co., York, Penna.

strate superiority over copper steel in sulfurous atmospheres and show a high degree of resistance in marine atmospheres. More than 75 per cent of cutting tools are tungsten high-speed steel. Molybdenum can be substituted in part for tungsten. Chrom-X makes possible the manufacture of high chromium steels in larger tonnages in open-hearth furnaces. Straight chromium steels have a tendency toward temper embrittlement that can be eliminated by addition of molybdenum. About 0.5 per cent of columbium removes the air-hardening characteristics of 4-6 chromium steels. Bismuth in small amount benefits the machinability of stainless steel. Chromium-nickel stainless steel is nonmagnetic. Molybdenum is finding growing application in S. A. E. steels, frequently as a partial substitute for nickel. Makers of high-pressure valves are utilizing large quantities of molybdenum steels. Ludlite wainscoting is Allegheny stainless steel on a backing of wallboard.

Ferric sulfate is being used in increasing quantities for pickling stainless steel. A new polishing rouge is based on alumina. Parts made of stainless steel can be surface-hardened by the Drever-Industrial process, claimed to form a tightly adhering, abrasion-resistant case; Super-Scottsonizing is a procedure for surface hardening 18-8 stainless steel. Metallurgical engineers have been fortunate in the variety and utility of hard materials and surface-hardening methods that have become available in recent years. Hard-surfacing metals of the Stellite type, nitrided steels, cemented carbides and borides, flame-hardening, hard chromium-plating, and induction-hardening of outer surfaces are among the best known of these recently developed aids to better design and manufacturing practice. A new addition to this field is the process for induction-hardening the internal surfaces of cylinders, tubes, and pipes. High-frequency induction heating is said to be satisfactory for localized surface hardening of crankshafts and a wide variety of machine parts. The use of urea in hardening the surface of steel has been investigated. Endogas for hardening steel is produced from air and a hydrocarbon fuel. Tantung G is a combination of tungsten and tantalum carbides in a matrix of cobalt and chromium available in standard tool bits. Attention has been given to the recovery of values from waste liquors of chromium plating.

The University of Illinois published results of an investigation on welded joints in structural steel plates. A high-speed electrical welding process results in spot welds at the rate of one a second. Strikeasy is an arc welder for bright-surfaced, thin-gage metals. Alternex is an electrode for manual arc welding; Harnimoly is a welding electrode for use on high-carbon and alloy steels that are to be hardened after completion of welding; Weldoloy includes a number of alloys in rod form for application with an acetylene torch. Spatter-Nox is claimed to reduce adhesion of weld-rod spatter to work pieces.

Physical deaeration of water by natural gas decreases corrosion of steel in contact with it. Metlseel is a coating for protecting metal parts exposed to gaseous atmospheres at heat-treating furnace temperatures. The rust-preventive Tectyl consists of lanolin with dispersing and inhibiting agents in a hydrocarbon solvent. TRamscote is a corrosion-proofing liquid for finished metal surfaces. Marlox is a plastic coating for protection against corrosion. Stanwaco is a protective application for steel water tanks. A process has been developed which results in a thin phosphate coating that will not flake away from steel on forming. Corrosil is a rust-proofing agent, converting the surface of the treated iron into phosphate. Monsanto has initiated research on the application of phosphoric acid or phosphate treatment to rolled steel strip for use in cans to evolve a process to make the employment of tin unnecessary. Irco is a zinc phosphate coating for rustproofing metals. Parco Lubrizing is a process to change the surface of steel or cast iron to a phosphate coating which absorbs and retains oil. Electro-Ebonol is for the blackening of steel, stainless steel, and other metals. Airplane engine builders are adopting a new automatic metallizing machine for spraying metals on engine cylinders.

Electroplated coatings on steel may prove valuable and economical by permitting substitution of plated steel for metals needed for other purposes. Copper-plated steel shell casings are being made. Electroplated coatings of zinc and tin can replace thicker coatings produced by hot dipping. Dross formation in hot-dip galvanizing is reduced by zinc ammonium chloride predips. Heat-treated zinc coatings on sheets and wire consist in the alloy layers mainly of $FeZn_{13}$. The Galv-Weld process renders unnecessary hot dipping in joining galvanized materials by welding. A new method of electroplating steel with zinc uses cheap sources of zinc instead of zinc anodes. Paint-bond galvanized steel sheets are said to assure effective adhesion of paint finishes. Zinc-grip-Paintgrip steel sheet has a combined Bonderized finish and zinc coating. Dymaxion is a prefabricated galvanized steel roundhouse for defense housing. Two steel companies are manufacturing tin plate by electrolytic methods wherein the thickness of tin per unit of surface is reduced below the figure possible by hot-dip methods. One of these products is finished by a brushing operation, which yields a semibright or so-called Butler finish, whereas the other has a mirror-bright surface obtained by heating the tin-coated strip under oil. Oxygen induces passivity while nitrogen increases the corrosion rate of tin. Amco metallic coating powder is intended for repairing damaged tin platings. Research is being pursued on the improvement of solder fluxes. Microplastic is a coating for plating racks.

The Province of Nonferrous Metals

Copper. To combat static electricity, copper powder is being put in flooring cements (Hubbellite) and rubber belting. The National Bureau of Standards has indicated how the texture in severely cold-rolled copper is developed. Rocan is a roofing copper. Tempobrazing is for hard-soldering cold-worked copper and copper alloys. Stearamide is used as a flux for copper. A recent development of the ethylene diamine bath has resulted in the production of copper-lead plates that are adherent to a properly treated basis

metal. Upon adding ammonium sulfate to copper amine baths bright ductile plates are obtained on electrodeposition.

Copper Alloys. Vankolite is a beryllium-copper alloy for bits; an alloy containing 2 to 2.5 per cent beryllium is used as a substitute for gold. Bon White is an immersion-type tin finish for copper and brass. Ferric sulfate is being employed in finishing brass cartridge cases. Dezincification of α-brass alloys may be suppressed by a small addition of arsenic, antimony, or phosphorus. Carbobronze is a bearing material containing 9.12 per cent copper, 8.5 per cent tin, and 0.3 per cent phosphorus. Monarch Metal is a high-lead-bearing bronze. Ledaloyl is a self-lubricating bronze carrying lead, graphite, and oil; Selflube porous bronze bearings employ powdered metal to provide a structure about 35 per cent porous. Velvetouch is a friction material consisting of powdered metals such as copper, tin, or lead, compressed, sintered, and welded to a solid metal backing. Ceko is a bronze-base repair alloy. Silicon-modified bronze can be welded to steel.

Lead. In recent years the smelting rate of blast furnaces has been increased. Norm Leadmetal is a powdered lead sealing material. Leadleaf or Metalead is a leafed metallic lead paste for use as a pigment alone or with aluminum. Roofloy is a sheet lead roofing containing small amounts of calcium, magnesium, and tin. Metro-Seal glazing tape consists of a plastic sealing compound attached to flexible lead foil strip. Tetragonal lead monoxide may be applied electrolytically to lead for protection against abrasion. A new lead-base bearing alloy contains antimony 12.5, arsenic 3, and tin 0.75 per cent. Stronger pewterware can be made from new alloys.

Zinc. Zinc, tin, and lead powders are being marketed for repairing surfaces of these metals. In cyanide zinc baths several bright plate processes have been introduced that give deposits ranging from a bright luster to a brilliant surface resembling chromium. Ebonol Z is an immersion process for the blackening of zinc and its alloys. A method has been developed for the recovery of indium from old plating solutions, but the supply of the metal is said to be adequate.

Silver. Anaconda, Phelps Dodge, and Cerro de Pasco have been seeking new industrial uses for silver. Some of their suggestions: substituting silver for copper in electrical contacts and using silver with magnesium for light-weight alloys. Automobile manufacturers are looking into silver plate as a substitute for chromium and nickel over copper. The National Academy of Sciences has proposed that silver be put to work for tin in solder. Silver has been found superior to copper as a catalyst for vapor-phase oxidations. The applications of silver and silver alloys in the new General Electric steam locomotive include plating for headlights, contacts on electric circuits, and high-ductility brazing alloys to join copper parts to steel and brass. In electric motors and generators the alloy Sil-Fos, composed of silver 15, copper 80, and phosphorus 5 per cent, is used to attach copper leads to the copper brush-holder collector rings. Storage batteries with heat-treated 4 per cent antimony–0.10 per cent silver alloy grids have proved excellent. The fungicidal properties of silver have been studied.

Aluminum. Work progressed on aluminum welding processes. Wear Ever is a slip-proof material made of carborundum grains fused into an aluminum backing. A sensitized photographic sheet comprises aluminum with an emulsion coating. It is predicted aluminum may later be used extensively in photographic and motion-picture films. The automobile industry is planning to jump into the employment of aluminum in a big way after the emergency terminates. With improved techniques a better insight is being had of the formation, structure, and properties of anodic coatings. Aluminum-beryllium alloys are being studied for suitability in pistons. The use of more manganese-aluminum alloy has been urged in place of pure aluminum for greater strength and thinner gages. Aluminum-magnesium-manganese alloys known as Navalium have good mechanical properties and resistance to corrosion. Indium has a marked influence on age-hardenable aluminum alloys. Innumerable du Pont explosive rivets of anodized aluminum alloy have been used in aircraft construction. Heat applied to the rivet head by an electric gun detonates the explosive in a cavity at the end of the shank, expanding the latter and forming a blind head in setting the rivet.

Magnesium. From $1.80 per pound in 1918, research has lowered the magnesium price close to 20 cents a pound. Dow put out 30,000,000 pounds of the metal in 1941. Sea water is used as the source of magnesium in plants in Louisiana and Texas. Production of magnesium from magnesite by an electrothermic reduction and distillation process passed the unit-plant stage. The basic idea of another process is to reduce magnesium oxide with carbon, dilute and cool the reaction products with a cold inert gas. Magnesium-thermit bombs are quite efficacious in warfare. Calcium, cerium, gallium, and thorium increase the ductility and strength of magnesium. By proper selection, surface treatment, and painting, it has been found possible to obtain satisfactory protection on magnesium alloys for several years. Wright, Ranger, and Allison airplane motors and wheels for Army bombers are made from magnesium alloy castings.

Nickel. Nickel plating is one of the most important activities in the electrodeposition field. Future developments are seen in still better corrosion protection, in perfected bright nickel, and in heavy nickel-plate adequately pliable and ductile that the plated article will withstand the same strains and stresses of fabrication to which the basis metal is submitted. KR Monel is an alloy in rod form, said to be corrosion-resistant, heat-treatable, and nonmagnetic. Zirconium is reported an efficient degasifying agent for nickel-silicon bronzes. Zirconium powder, by the way, is spoken of highly as an ammunition primer. Beryllium-nickel alloy is produced by a powder metallurgical method.



BELL TELEPHONE LABORATORIES

A study of environmental factors in the corrosion of lead cable sheath

Neutralloy is a machinable alloy with a base of 74 per cent nickel and 14 per cent chromium. Cobalt-nickel alloy plate is whiter, harder, and more corrosion-resistant than either cobalt or nickel plate. Vitallium, an alloy of cobalt, chromium, and molybdenum, first proposed for dental use, is being employed in skull repair. Cobalt is being produced at a new Union Carbide & Carbon plant in Niagara Falls.



OEM DEFENSE PHOTO BY PALMER

Inspection of a magnesium casting, a crank case blower for an aircraft engine, Ford River Rouge plant

Some Accomplishments in the Inorganic Chemical Field

Cobaltous oxide is reported effective in removing the oxygen impurity in tank nitrogen. Ozone free of oxides of nitrogen is said to be nontoxic in concentrations below 20 parts per 1,000,000. Chlorine gas in air is less germicidal than hypochlorous acid. The annual production of chlorine has reached 500,000 tons; its manufacture consumes over 2,000,000,000 kw.-hr. per year. Some of its newest uses are in the synthetic rubber industry. Dactin is an active chlorine compound for bleaching and sterilizing; Perchloron, high-test calcium hypochlorite, is another entrant in the sanitation field. The completion of several large and many small waste-treatment plants indicates the general progress made toward cleaner streams and less health hazards. No fundamentally new processes have appeared, but tendencies are toward more mechanization and broader use of physical methods. By-product utilization has been taken up aggressively. Ferric chloride is used successfully as the coagulant in several recent installations; Ferrigel is a preparation of ferric chloride, glue, and certain proteins. Another coagulant, sulfacar ($Al_2Cl_2SO_4(OH)_2$), has shown slightly better results than standard alum.

An addition to the family of hydroxylammonium salts is the chloride. At 935° a lithium chloride recovery greater than 95 per cent is obtained by passing hydrogen chloride over lepidolite. The reactions of metal oxides with sodium chloride, sulfur dioxide, air, and steam have been suggested as possible outlets for large quantities of sulfur dioxide that may be recovered from waste gases. The employment of such cheap and abundant raw materials for the production of salt cake, hydrogen chloride, chlorine, and anhydrous metal chlorides and sulfates is of future interest to the heavy chemical industry. Anhydrous reaction of sulfur trioxide on sodium chloride offers a possible means of making sodium sulfate and chlorine simultaneously. At Monahans, Tex., Ozark Chemical is recovering sodium sulfate by artificial refrigeration of a natural brine occurring underground; submerged combustion is applied to produce anhydrous sodium sulfate. Sodium sulfate-bearing brines have been discovered in southeastern New Mexico. Rem-Ox is anhydrous sodium sulfite for use in oxygen removal in boiler-plant operation. There is room for research on ammonium sulfamate as a herbicide to determine the best methods of application to specific weeds under particular local conditions. Liquid sulfur dioxide is an excellent solvent medium in conducting reactions involving the use of catalysts of the aluminum chloride type and in polymerizations. Aitch-tuess is a preparation for producing hydrogen sulfide. Fog over aerodromes can be dispersed with sulfur chloride solutions.

The production of potassium chloride has been increased. Union Potash & Chemical is making potassium sulfate from langbeinite ore. Potassium chlorate manufacture was started by Western Electrochemical. Companies near San Francisco are producing magnesium oxide for fertilizers from sea water. The use of magnesium oxide has been investigated in silica removal in conjunction with hot-process external phosphate softening. Quadrafos is Rumford sodium tetraphosphate. Methods are being developed for the production of metaphosphates of the alkali metals from their chlorides. V-90 is a coated anhydrous monocalcium phosphate. Tricalcium phosphate is being employed to free water of fluorides. A process for making phosphoric acid containing about 85 per cent phosphorus pentoxide ("superphosphoric acid") involves the absorption of phosphorus pentoxide vapor. Monsanto now has the largest elemental phosphorus plant in the world. The addition of from 2 to 10 per cent of phosphorus to propellants is claimed to eliminate gun-barrel corrosion and pitting. Many unusual phosphorus compounds are ready for application, such as the thiophosphonic acids and their derivatives. The total available phosphates are placed at more than 13,500,000,000 tons.

Activated alumina was introduced as a desiccant and catalyst. Zinc oxide, made by flash calcination of zinc sulfite, has been proposed as a heat-insulating material. Anhydrous zinc chloride has been found to be very soluble in furfural. Anhydrous sodium molybdate is being made on a commercial scale. Rhenium-bearing molybdenite occurs in northern Wisconsin. Europium compounds have been nominated for use in fluorescing tubes; erbium compounds have been mentioned as medicinal astringents. Mesothorium is preferred to radium in airplane dial paints.

Novel Methods and Materials in Organic Chemical Technology

Of so much scope has been the industrially significant synthetic research in the organic field it is very difficult, although worth the effort, to distill its essence into a succinct summary. Many organic reactions that, by older methods, require high temperatures or pressures are carried through at ordinary temperatures and pressures by electrolysis. The effect of metallic halides on the reaction of Grignard reagents and organic molecules containing functional groups is being studied. A procedure has been developed for condensing alkyl carbonates with organic esters by metal alcoholates for the convenient production of malonic esters. The use of a third component to improve the fractional distillation of binary liquid mixtures has attracted experimental interest. Resinous products derived from substituted silicon compounds have been de-

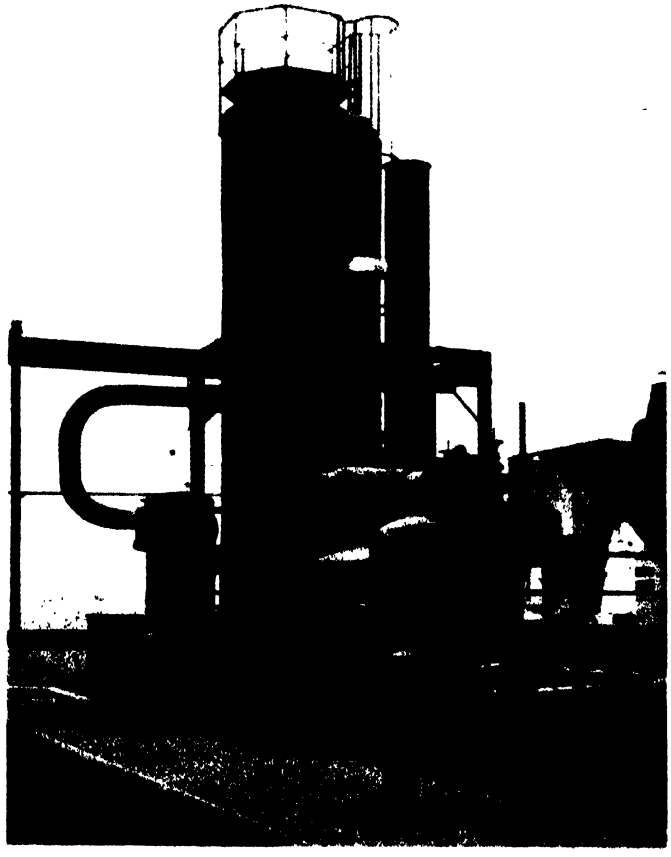
scribed. The organic chemistry of titanium offers an excellent field for research.

Alcohols, Acids, and Esters. Nitrogen dioxide and nitric acid yield the same nitroparaffins. 1,1-Dichloro-1-nitroethane is an insect fumigant. Esters of the nitroalcohols, formed by condensation of nitroparaffins with aldehydes, provide a series of solvents. Four new vinyl alcohols have been prepared. Applications have been uncovered for ethyl chlorocarbonate. There is offered stabilized chloroacetone which can be stored for months without change. Chlorinolysis of dichloropropanes is a proposed method of converting these relatively unstable compounds into more useful carbon tetrachloride, hexachloroethane, and tetrachloroethylene. Dichloroethyl formal is suggested as a high-boiling solvent for oils, fats, and resins. New methods of manufacture of propiolic acid from acetylene have stimulated attention to the potential industrial uses of this reactive compound. Hexyl ether has good antifoam properties. Secondary olefins react with acids in the presence of hydrogen fluoride to give good yields of esters. There is some evidence that long-chain organic acids and unsaturated hydrocarbons are formed during the bacterial decomposition of hydrocarbon fractions. Continued research has resulted in increased employment of the azeotropic distillation method of separating water from acetic acid. *o*-Chlorophenoxy-acetic acid and *p*-chlorophenoxy-acetic acid are Dow products. Chloroacetonitrile reacts with aromatic compounds to give aryl derivatives of acetic acid. Acetamidine can be condensed with a properly substituted ester to give the pyrimidine half of vitamin B_1. Citrazinic acid is a source of dyes. Data have been presented on 36 out of a great number of possible esters of sodium sulfosuccinic acid. Wastes from butanol-acetone fermentation are amenable to treatment by anaerobic digestion; substantial quantities of gas, suitable for engine fuel, are produced. Diisobutyl adipate and also dicyclohexyl adipate are available in semicommercial quantities. Fumaric acid has prospects in synthetic resin technology.

Synthetic Glycerol. Dichloro-*tert*-butyl alcohol, the principal product from the chlorohydrination of methallyl chloride, has been employed for the synthesis of B-methylepichlorohydrin, B-methylglycerol monochlorohydrin, B-methylglycidol, and B-methylglycerol. A similar but more complex series of compounds has been prepared from trichloro-*tert*-butyl alcohol. Synthetic glycerol, produced by hydrogenolytic processes, is impure and the isolation of C. P. grade has proved difficult. A new approach to the problem—namely, crystallization in the presence of suitable solvents—yields glycerol of purity. It is now possible by treatment with hydrogen to produce glycerol from such abundant carbohydrate materials as starch and dextrose. Shell's synthetic glycerol process has brought a number of intermediates and derivatives formerly obtainable in quantity only from glycerol itself. In the catalytic process of Battelle Memorial Institute glycerol is produced from petroleum refinery gases without high-temperature chlorination. Glycerol formal is being used as a solvent for zein as well as cellulose esters.

Fats and Fatty Acids. The annual production of deodorized fats is not less than 1,500,000,000 pounds; the neo-fat production provides an additional 30,000,000 pounds. Compounds typified by stearamide and stearonitrile are finding industrial applications, apart from being intermediates for other technical products such as higher alkyl amines and amidines. Releases on a laboratory scale of the following new chemicals were announced: lauric ethanolamide, mannitol glyceryl hydroxystearate, nonaethylene glycol monolaurate, nonaethylene glycol dilaurate, pentaerythritol monostearate, pentaerythritol distearate, pentaerythritol tetrastearate, polyglyceryl stearate, polyglyceryl hydroxystearate, and propylene glycol monostearate. Stearyl chloride is being marketed. Stearite is a stearic acid produced by selective hydrogenation. Lauric acid of low titration strength, synthetically made, is known as Lauralone. Mixed sterol glucosides have been isolated from cottonseed oil. Ascorbic acid is an effective antioxidant for certain vegetable oils, their hydrogenated products, and esters; it enhances the antioxygenic activity of tocopherols, hydroxychromans, and hydroquinones. Cottonseed-oil industrial soap is getting trial in place of olive-oil-base products. From the investigation of the saponification of fats at high temperatures in the presence of kerosene several operating difficulties in the process have been overcome. As little as 3 to 5 per cent of bentonite improves the properties of soap, but this quantity does not effect much of a saving in fat-acid content. Soaps from pyroabietic acid are more germicidal than soaps made from gum rosins, as are also soaps of tetrahydro-, dihydro-, and freshly prepared abietic acids.

Grapeseed oil is employed in cosmetic creams; sulfated hydrogenated castor oil is being used as a water-soluble ointment base. Five nitroparaffin derivatives, whose higher fatty acid soaps make up a group of emulsifying agents, are finding industrial applications. Methylmorpholine is potentially useful in preparing emulsifying agents for polishes. "Self-polishing" floor waxes of water-resistance are being manufactured with 2-amino-2-methyl-1-propanol; cosmetic creams and lotions are utilizing 2-amino-2-methyl-1,3-propanediol as the emulsifying agent. New perfume fixatives are derived from the skunk and muskrat.



ARMOUR & CO.

Refractionating tower used in neo-fat manufacture

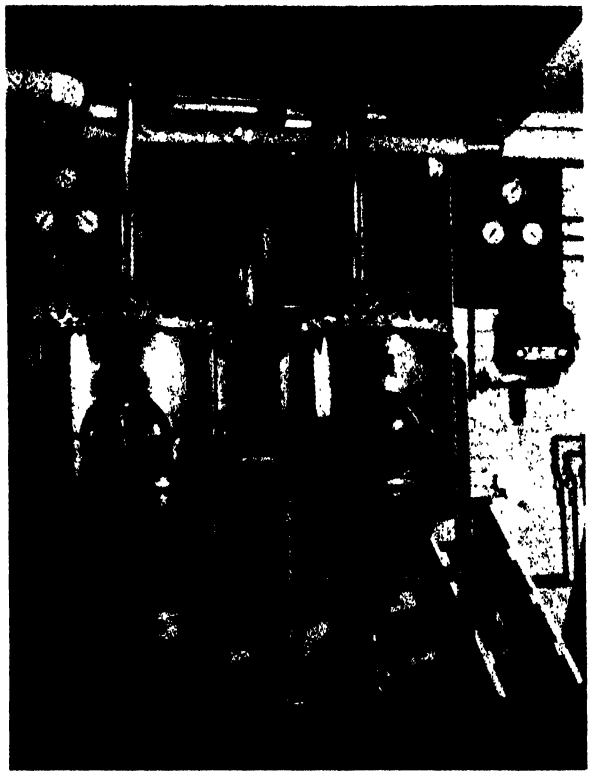
Amines and Their Kin. Amine gas-purification systems are being used to remove hydrogen sulfide or carbon dioxide from gas streams. Amination in liquid ammonia is seen as a method of importance for the preparation of primary alkyl amines. The commercial availability of monoethanolamine has led to studies of its action on plant tissues; the effect of other

commercially available organic nitrogen bases on cornstalk lignin has been investigated. Isopropylamine is offered in commercial quantities. A new synthesis of chloroalkyldialkylamines consists of treating a chloroiodoalkane with diethylamine; by reductive debenzylation of benzyldialkylamines, pure dialkylamines may be obtained readily. Monsanto is manufacturing 14 amines that are finding uses in the production of dyestuffs. Dioctylamine, a compound prepared from caprylic acid, is an insecticide. Formerly imported amino acids and peptides are being prepared at the University of California. Schwarz is manufacturing nucleic acid, its salts, glutathione, and Polidase, an enzyme.

Carbohydrates. Following the development of a method of using molds to ferment glucose into gluconic acid, federal chemists have learned that the addition of a boron compound promotes the process. At the National Bureau of Standards an investigation has been undertaken on the reactions of chlorites with carbohydrate materials. Sixteen new propionates of sugars have been synthesized. Staley is erecting a levulinic acid plant. Arlex is Atlas commercial sorbitol solution. Certain heavy metal pectates are water repellent. A San Diego producer of agar agar tripled its output of 20,000 pounds a year. Mucilages of sodium alginate can be used in pharmacy. Gelloid is a binder made from carrageen.

Some Benzenoid Chemicals. Several new phenol plants are being built. Synthesis of phenol by a method involving the partial-pressure evaporation of water of reaction as formed is said to offer advantages over customary processes. Many of the phenols can be commercially synthesized, a few of them at lower cost than the present substituted phenols. Diphenyl carbonate has been introduced as a plasticizing agent. *o*-Amylphenol is an antiskinning agent for varnishes. In commerce are phenol sulfonic acid, naphthalene sodium trisulfonate, benzene monosulfonic acid, benzene metadisulfonic acid, and catechol sulfonic acid. Butyl catechol is also on the market. Ethylpolychlorobenzene is suggested as a solvent in inks and coatings. Sodium pentachlorophenate is applied in preventing and destroying algal growth and as a mycostatic agent. Monsanto products helping to replace intermediates no longer procurable from abroad are *o*-chloroaniline, *m*-chloroaniline, *p*-chloroaniline, *p*-anisidine, *o*-nitroanisole, benzyl chloride, and *o*-aminodiphenyl. The chemical configurations of *o*-nitrodiphenyl and its reduction product, *o*-aminodiphenyl, indicate a number of possible uses in the synthesis of dyestuffs, insecticides, and plastic compositions. Santophen 7 is a mixture of *o*- and *p*-benzylphenols. Commercial availability of 2,3-hydroxy-methoxy-benzaldehyde has also been announced by Monsanto. Two new preparations, of interest as chemical intermediates, are 2,3-dimethoxy-benzaldehyde (*o*-veratraldehyde) and 2,2′-diamino-diphenyl disulfide, obtainable in experimental quantities.

The production of phenyl diethanolamine has been transformed to plant-scale operation. A catalytic process has been described in which hydroaromatic compounds containing a completely or partially saturated benzene, naphthalene, or phenanthrene nucleus are dehydrogenated to the corresponding aromatic compounds in good yields. *o*-Phenoxybenzoic acid may be used as an intermediate for miscellaneous organic syntheses; its esters may find application in the preparation of pharmaceuticals and in the formulation of resins and plastics. Work is contemplated on the reduction of naphthenic esters to naphthenyl alcohols and on their use in the preparation of high molal salt emulsifiers and detergents. The facile hydrogenation of the pyrroloid ring in indoles and phenylpyrroles is attributed to the decrease in resonance brought about by the benzenoid ring. Carbazoles are much more resistant to catalytic hydrogenation than the indoles and phenylpyrroles. Xanthone (dibenzo-γ-pyrone) is commercially available. Victor chemicals recently developed include phenyl phosphine sulfide and monophenyl phosphinic acid. Koppers is notably active in research in this whole field.



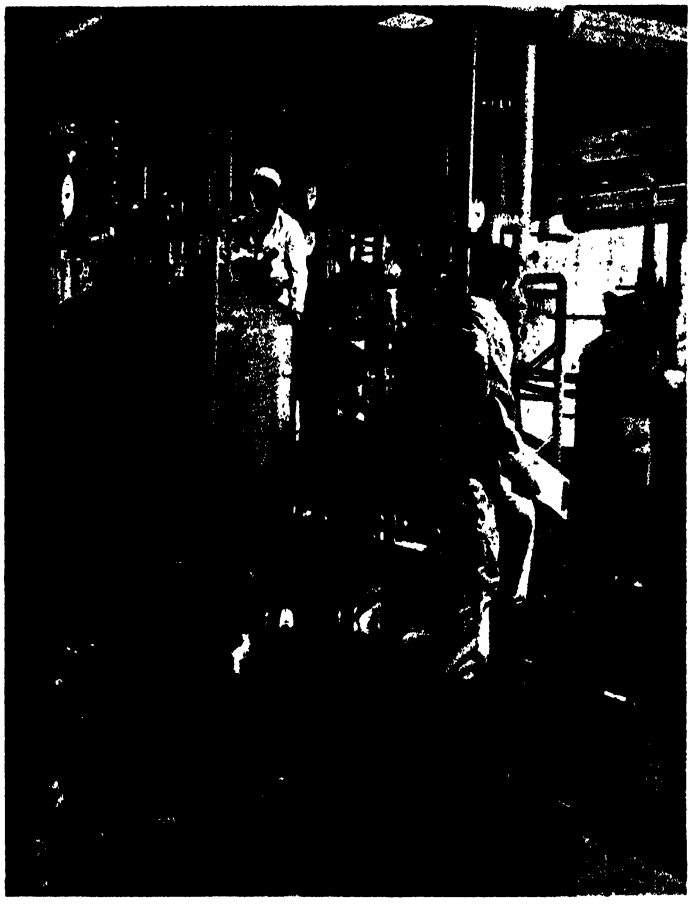
Extraction unit of pilot plant used in recovery of ursolic acid, Cranberry Canners, Inc.

The amyl naphthalenes are plasticizers, vehicles for certain types of inks, coupling agents for mineral and vegetable oils, and media for constant temperature baths; they can be nitrated or sulfonated and the sodium sulfonates of refined mixed amyl naphthalenes are wetting agents. 3-Cyanopyridine is converted to nicotinic acid by hydrolysis. A liquid-phase oxidation of heavy pyridine bases has given rise to pyridine carboxylic acids, useful in producing picolinic acid and nicotinic acid. Reilly Tar & Chemical is making acridine and α-picoline. The intramolecular condensation of *o*-formotoluide is a method for the preparation of indole. Dipicrylamine is said to act as a selective agent to extract potash from sea water.

The most effective charges for underwater destruction are no longer trinitrotoluene (trotyl) and picric acid (melinite) or mixtures of trotyl with hexanitrodiphenylamine and tetranitroaniline, but are mixtures of high-brisance pentaerythritol tetranitrate (pentrit) or trimethylenetrinitramine (hexogen) with 30 to 40 per cent trotyl.

New Phytochemicals. At Deepwater Point, the du Pont synthetic camphor plant has a capacity of about 4,500,000 pounds a year. The 6-amino and 6-hydroxy derivatives of dehydroabietic acid have been prepared by Hercules. Flexalyn is diethylene glycol diabietate; Pentalyn G is a member of the pentaerythritol abietate resin family of rosin esters, offering special viscosity characteristics. Hercules Poly-pale resin is derived from rosin through a process for polymerizing the unsaturated resin acids. Retene is being produced at Jacksonville, Fla. At the University of Oklahoma the oil of Mexican sage has been under study. The acidic constituent of the volatile oil of catnip, to which the name nepetalic acid is assigned, is a tri-substituted cyclopentane. Ursolic acid is being produced by Cranberry Canners on a pilot-plant scale; the firm can also manufacture cranberry-seed oil and a hard wax from cranberry skins. The sodium salt of ursolic acid, formerly known as malol and identical with urson and prumol, has emulsifying properties. Sitosterol has been isolated from apple and red-cherry seeds. A wax may be obtained from Arkansas green lint.

Therapeutic Agents. A division of chemotherapy has been formed by the National Institute of Health. The mono-, bromo-, and monochloro-olefins offer possibilities as agents for use in general anes-



New plant for making sulfonamide drugs, Calco Chemical Division, American Cyanamid Co.

thesia. A number of 1-dialkylamino-alkyl-2-alkyl-3-aminophthalates have been found to be strong local anesthetics. Pinacolonylbarbituric acids have lower therapeutic indexes than does amytal. Strong anticonvulsant activity is exhibited by 5-phenethyl-5-phenylhydantoin. Propylene glycol and related glycols act as bactericidal aerosols. A chlorinated dihydroxy-diphenyl-methane derivative is a germicide and fungicide. Furmerane, 2-hydroxymercurifuran, is an antiseptic. Two sulfones, 2-sulfamyl-4,4'-diaminodiphenyl-sulfone and 4-aminophenyl-5'-amino-2'-pyridylsulfone, have been observed to be highly active against experimental streptococcal and pneumococcal infections in mice. Sulfadiazine is the 2-sulfanilamidopyrimidine analog of sulfanilamide; there is also sodium sulfadiazine. 2-Sulfanilamido-4-thiazolones show chemotherapeutic activity; sulfapyrazine, sulfahydantoin, and sulfathiazoline are also therapeutically promising. Solutions of sulfanilamide and related sulfa drugs appear to act like colchicine in speeding up evolutionary changes in plants; colchicine has been used in producing apparently similar changes in animals.

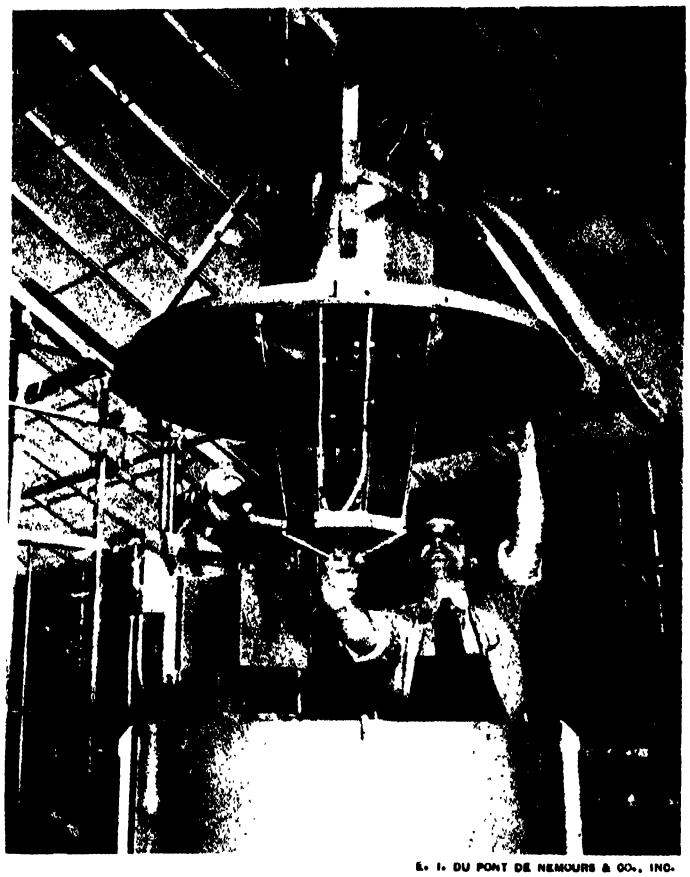
Arseno-Detoxin is said to compare favorably with the arsphenamines. Pure cacodylic acid is being manufactured. Sufficient supplies of belladonna and digitalis can be cultivated in this country to take care of civilian and military requirements, and attention is being accorded to the domestic production of ergot. The U. S. Public Health Service is working to evolve synthetic drugs to replace cinchona alkaloids. The text of the twelfth revision of the United States Pharmacopeia will become official about August 1, 1942. To a greater extent than ever before pharmacopeial recognition is being given to organic synthetics in the field of medicine, as follows: butacaine (butyn), butyl aminobenzoate (butesin), carbarsone, chloroazodine (azochloramide), dihydromorphinone hydrochloride (dilaudid), diphenylhydantoin sodium (dilantin), ergonovine maleate, ergotamine tartrate (gynergen), estradiol benzoate, estrone, eucatropine hydrochloride (euphthalmine), hexylresorcinol, menadione (vitamin K), mercurphylline (mercupurin), mersalyl (salyrgan), neostigmine (prostigmine), nicotinamide, pamaquin (plasmoquin), quinacrine (atabrine), riboflavine, sulfapyridin, sulfathiazol, sulfarsphenamine, sulfobromophthalein sodium (bromsulphalein), tetracaine hydrochloride (pontocaine), tetrachloroethylene, trichloroethylene, and tribromoethanol (avertin).

Harvest Treasures of Agricultural Research

Agriculture knows no pause in advancement. When our Nation was founded 19 people out of every 20 had to devote all their time producing food for themselves and the 20th person; today an individual on the land supports himself, 3 people in town, and contributes to the sustenance of a person overseas. There are about 250,000 known species of plants in the world, of which approximately 15,000 are native to the United States. Photosynthesis has been further elucidated by tracer studies; some phases of the process may be independent of light. The American Society of Agronomy and the National Fertilizer Association published a valuable book on the symptoms of malnutrition in plants. All four regional laboratories of the U. S. Department of Agriculture have been occupied; more than 400 persons are at work in them and the staffs are being enlarged. In the southern regional laboratory cotton, peanuts, and sweet potatoes have been selected for initial study. Chemurgists are hopeful of utilizing more and more agricultural wastes in plastics. An Inter-American Institute of Tropical Agriculture is projected as a combined school and experiment station for all the American republics.

Advances in Phytotherapy. Truck crops and farm seeds are subject to attack by more than 500 different disease organisms. Most wheat diseases can now be controlled or prevented by breeding resistant varieties. Work in plant breeding has protected sugar-cane and sugar-beet areas from threatened ruin. Applications of genetics have saved the winter lettuce industry of California. Cabbage growers have resistant varieties to combat the destructive yellows disease. The large winter-shipping tomato business and much of the tomato-juice canning industry owe their existence largely to the development of improved tomato varieties. Disease-resistant vegetables for the home garden have been described by the U. S. Department of Agriculture. The wilt disease of many plants and the bleeding canker of hardwood trees are being treated by diaminoazobenzene dihydrochloride. Calomel has been found a preventive of crown gall.

All but 10 of the 57 elements that have been found in plants may be regarded as micro or trace elements, and emission spectrography is considered a powerful tool for the investigation of agricultural problems involving them. The number of minor elements necessary for plant growth is not known; they include iron, manganese, boron, zinc, and copper. In certain regions some symptoms of minor element deficiency have been definitely established, such as zinc deficiency in pecans and prunes, and boron deficiency in sugar beets and various truck crops. In many other cases confusion is evident in the attempts to diagnose symptoms. Milorganite has been reported to correct deficiencies of copper, zinc, manganese, boron, and molybdenum in solution cultures of sunflowers and tomatoes. Es-



E. I. DU PONT DE NEMOURS & CO., INC.

This carbon-arc lamp is a near approach to natural sunlight.

Min-El is a mixture of inorganic salts for use with fertilizers.

Fertilizers. About 60,000,000 of the 360,000,000 acres of crops grown annually in the United States now require fertilizing each year, and between 7,000,000 and 9,000,000 tons of commercial fertilizers are consumed annually for this purpose. As a result of the practical application of the findings of research, more than one fourth of the nitrogen used in mixed fertilizers is supplied by ammonia liquors. Superphosphate in granular form is spread in cow barns as an antiseptic material; in combination with the ammonia it binds and with stable manure it forms a fertilizer. The double sulfate of potassium and magnesium is being shipped from Carlsbad, N. Mex., for application to citrus and other crops grown on sandy soils deficient in magnesium. Waste sulfite liquor has been shown to supply sulfur in soils lacking in that element. The use of chemical fertilizers dissolved in water as a starter solution and for liquid side-dressing of vegetable crops has been the subject of much research during the past few years. Liquid fertilizers seem to be well suited for the small garden and have also been employed successfully in greenhouses and by growers who utilize irrigation. The preparation of fertilizers in the form of pellets and cubes is said to prevent losses by dusting, to reduce fixation of phosphorus and potassium in the soil, and to facilitate deep placement in fruit and shade-tree fertilization.

Growth Regulators. Hormodin and Rootone are proprietaries containing root-formation activators. Of like purpose are Root-Gro Vitamin B_1, Tat Vitamin B_1, and Vita-B-One. Plant Dinner, Plantet, Plantabbs, Stimuplant, and 3-6-40 are chemical plant foods, some of which combine vitamin B_1 with other nutrients. Bloomlife and Floralife are employed for prolonging the life of flowers. Experimental work on factors that influence the keepability of cut flowers has been under way at the Ohio State University since 1934. Boric acid has been found useful on carnations; sugar solutions prolong the life of China asters; hydrazine sulfate is applied satisfactorily for roses and carnations. Grofast Cartridges apply vitamin B_1 to gardens and lawns by insertion into sprinkling hose. Magic Green Fingers are pieces of wood impregnated with vitamin B_1 for supplying the latter to plant soil. Naphthalene acetamide has received wide attention as a plant hormone. Parthenocarpic development of tomato fruit is induced if flowers or buds are sprayed with emulsions or solutions of β-naphthoxyacetic acid, which may be utilizable for the practical production of seedless tomatoes and possibly other seedless fruits. Rooting of numerous varieties of citrus cuttings is favored by immersing them in 0.02 per cent heteroauxin or 3-indoleacetic acid solution. This chemical also increases cotton yields. 3-Indolebutyric acid is being used as a growth promoter by pecan husbandmen. Studies of several thousand sugar-cane seedlings developing from colchicine-treated seeds have disclosed that colchicine is capable of changing the cellular and nuclear organization of the cane plant, just as it has been found to be for other agricultural plants. A natural substance that may be extracted from ripening corn pollen can produce effects on growing plants similar to, but stronger than, applications of the chemicals known as growth-regulating substances. An extract of last year's dead leaves will delay the opening of next year's buds on cut fruit-tree twigs set in it.

Cotton and Soybean Technology. The United States is embarking on a farm program designed to result in the production of over 10,000,000,000 pounds of fats and oils during the 1942–43 season. There is need for new work in the field of peanut processing, although research on perfecting peanut flour is in progress; thiamine losses up to 90 per cent occur during processing, but the nicotinic acid content is not appreciably affected. In Alabama the flame-



The du Pont Pest Control Laboratory at Wilmington, Del.

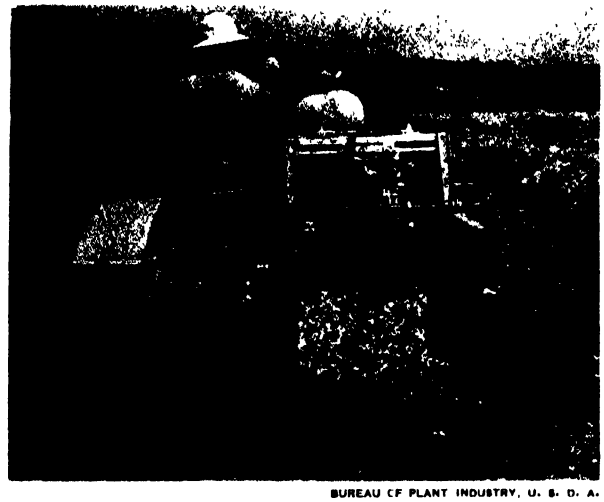


U. S. D. A. PHOTO BY PURDY

Defense helmets for civilian use, made from cotton and soybeans, being examined by H. G. Knight (left) and W. W. Skinner, Bureau of Agricultural Chemistry and Engineering

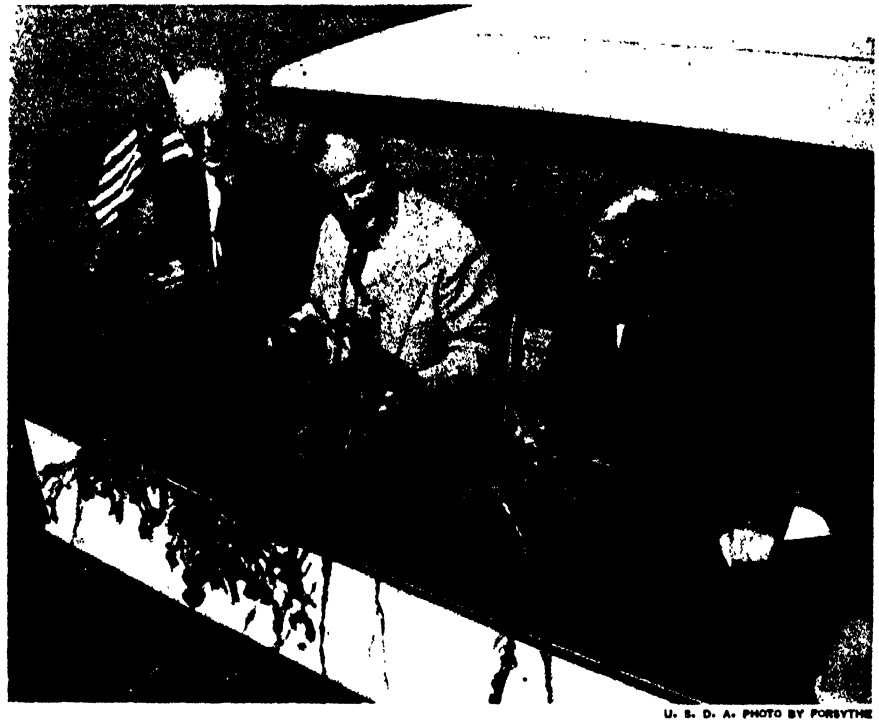
thrower has been put to use in killing grass and weeds in cultivating cotton. Smokeless powder may be made from staple cotton instead of cotton linters. A process of hulling cottonseed by steam explosion is under development. Cottonseed-oil recovery can be carried out most economically under present conditions with the use of cooker-expellers in place of hydraulic presses. While there is a slightly higher refining loss, the hexane extraction of rolled and cooked cottonseed meats yields an oil comparable to that obtained by pressing methods. Most quality characteristics studied indicate that it is more desirable to store cottonseed oil as refined than as crude oil. Reyn-O-Cell is building insulation made of fire-resistant cotton. Cotton insulation for dwellings is thought a promising use. Insulating board was made experimentally from cotton burs and stalks and gypsum. Cotton Research Foundation fostered investigations on cotton plant constituents and on properties of cotton fibers. The soybean production from the 1941 crop is estimated at about 111,000,000 bushels. Two new varieties of soybeans are being studied by the New Jersey Experiment Station. Researchers at the Wisconsin Agricultural Experiment Station have developed a new use for soybeans in the preparation of a bread for bees, of one part pollen and three parts soybean flour. Researches in refining soybean oil and in using it in combination with other oils have increased its consumption. A large soybean solvent-extraction unit has a capacity of 440 tons daily; the plant uses the Hansa-Mühle process of continuous extraction, which accounts for about two thirds of the total solvent-extraction capacity of the country. The Hildebrandt system is also utilized and new methods for solvent extraction are being devised. A recently developed process employs furfural. The treatment to which the oil is subjected during the refining processes has much to do with its stability. A distillate containing 14 per cent or more of tocopherols is readily obtainable from soybean oil. The introduction of wet toasting following extraction, to increase the palatability of soybean meal, has helped to abate the prejudice against the use of the solvent-processed product in feeds. Prosein is Glidden casein substitute made from soybean. In addition to its qualities as an adhesive equivalent for casein, new uses have been developed for soybean protein which are not in competition with casein.

Other Industrially Important Plants. Extensive experiments have been conducted in growing castor beans in Texas. The suggestion has been made that it is feasible to culture dual-purpose varieties of castor beans in the Gulf Coast region, for producing oil and cellulose. The U. S. Department of Agriculture announced a method by which 99 per cent of tung oil can be extracted from tung nuts without regrinding. At present the oil return is estimated at about $150 an acre. Perilla plantings in a tung grove in Georgia are flourishing; Texas and Arkansas produce healthy wild perilla; perilla has indeed good opportunities in the South. The production of sunflower seed this year is close to 7,000,000 pounds. Alfalfa is to



BUREAU OF PLANT INDUSTRY, U. S. D. A.

Pyrethrum harvesting machine



U. S. D. A. PHOTO BY FORSYTHE

Water chestnuts clogging the channel of the Potomac River attract the attention of Secretary of Agriculture C. R. Wickard (center), W. J. Barden, U. S. Army Engineer Corps (right), and H. G. Knight, Bureau of Agricultural Chemistry and Engineering.

be investigated by the U. S. Department of Agriculture as a source of protein and as a crop yielding carotene, chlorophyll, and hemicellulose as by-products. The same organization is studying the possibility of making commercial use of water chestnuts. The Kentucky Department of Agriculture is trying to expand the raising of coriander seed, whose output has reached 40,000 pounds. The rustic tobacco plant is said to contain several times as much nicotine as ordinary tobacco. At Columbia University the desirable tobacco fragrance was removed from cheap tobacco leaves for addition to the mild, golden leaves with little redolence favored by tobacco buyers. Basic research has been continued on products of milkweed, a plant that stands like an empty glass waiting the wine of scientific development. From the "mud" that results during the process of milling sugar cane, U. S. Department of Agriculture chemists see the possibility of recovering annually some 6,000,000 or 7,000,000 pounds of wax. A pilot plant at Lockport, La., is turning out 200 pounds a day of a plastic from bagasse. Coconut husks have a new industrial use in Puerto Rico—a source of fiber for padding in upholstery and cushions. Charcoal, formerly made from coconut shells, is being produced from wood such as Douglas fir as a result of scientific development. Black Out is a procedure for inhibiting the growth of algae by the use of finely powdered carbon suspended in water. Syn-Char is an activated charcoal for use in refrigerators.

Blossoms and Fruits of Food Investigation

The great garden of food technology blooms unceasingly through scientific cultivation. The recordable advances in food technology make a crowded manuscript full of extra-research episodes, hard to digest. Only 10 per cent of the known foods are used to any extent today. Certain indigenous foods of Europe are taking root here; within the year a number of new factories have been established to make such delicacies. Current research by the Bureau of Home Economics places special emphasis on diet as an essential of national defense. New advances have been made in infant feeding and the nourishment of 20,000,000 school children. With less than 2,000,000 babies born a year infant-food manufacturers are distending their markets with lines of products for older children. It has been predicted that the next step may be foods especially for the middle-aged and aged, an advance that may be nurtured by the growth of interest in geriatrics. Probably 60,000,000 women-working hours daily were saved in 1941 by the use of more convenient foods and better cooking devices.

Canning. There are 402 different kinds of canned food sold in the United States, 85 being vegetables, 64 soups, 55 fruits, 36 fish and other sea foods, 32 meats, 21 juices, and 109 specialties. Active in the field of research are the National Canners Association and its leading company-members.

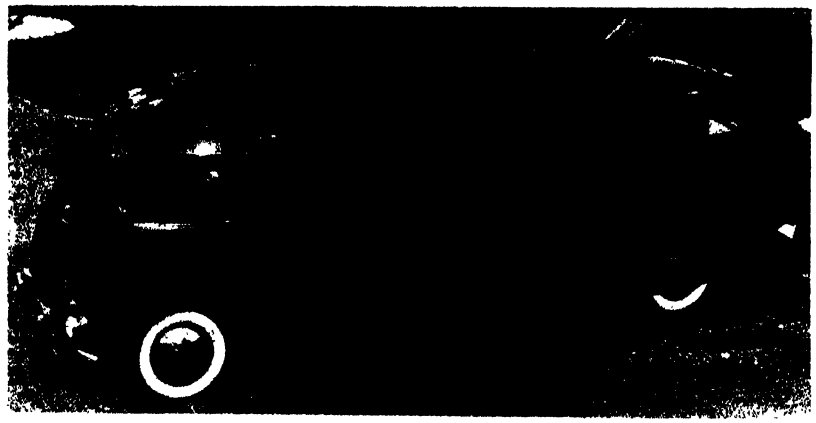
Dehydration. Fresh results of nutritional research suggest improved types of rations to prevent avitaminoses and to promote efficiency of fighting personnel. Featherweight rations for ski and parachute troops are being studied by the U. S. Army. Also in the experimental stage are thirst-quenching tablets for soldiers on the march. The production of dehydrated, concentrated food has been urged for conveyance by airplanes to Great Britain. Emergency need for concentrated foodstuffs is speeding research by the U. S. Department of Agriculture on the dehydration of vegetables, and the program may be extended to include other foods. Dehydration is superior to sundrying from the standpoint of vitamin retention. Recent advances in the dehydration of foods are likely to effect marked improvements in quality as well as vitamin contents of such products. A number of companies have been working on new processes for dehydrating fruits and vegetables. More will be related on this subject under vegetables, page 17.

Quick-Freezing. A frozen food research laboratory was completed by the Federal Government at Albany, Calif. A suspension of small ice crystals in an invert sugar solution is the typical heat-transfer medium in a new quick-freezing procedure developed at the University of Texas. Storage at 32° in a relative humidity of 65 to 75 per cent will keep in good condition, for at least a year after harvest, nuts now important on the American market. Precooked, ready-to-eat dinners are a novelty in the frozen food business; they are called "hot frost" dishes. Distribution of coffee, quick-frozen to preserve freshness, was started. The housewife of tomorrow will go to her local freezer-locker plant to buy supplementary stocks of commercially frozen meats, vegetables, and fruits. Ice for drinks and other uses is now made in tubular form, 1.75 inches in diameter.

Preservatives. The Westinghouse Sterilamp is effective in destroying airborne microorganisms and therefore serves as a sanitizing agent to maintain an essentially sterile atmosphere in which foods may be exposed or further processed. It has been estimated that molds and bacteria which attack foods levy a toll exceeding $100,000,000 a year, and broad programs aimed at reducing such spoilage losses are under way in several laboratories. Sodium pentachlorophenate (Dowicide G) has been found to inhibit mold on eggs in storage. Monochloroacetic acid is reported to be an effectual food and beverage stabilizer (0.03 to 0.05 per cent). Calcium 2-ketogluconate and licorice resin are said to be useful as food antioxidants.

Vitamins. About 50 industrial research laboratories are engaged in vitamin studies. An increase in the vitamin contents of certain useful plants is to be expected from genetic studies. Current supplies of vitamin A are more than sufficient for a minimum level of medication for the whole population; these supplies can be increased by extracting the vitamin from oils which now pass to industrial use. Improvements have been accomplished in the method for isolating carotene from dehydrated alfalfa-leaf meal by the barium hydroxide process. Provalac is a water-miscible carotene emulsion for application in fortifying foods. Carex is carrot oil in vegetable oil for the addition of color and vitamin A to food products.

It has been estimated that $300,000 went into the production of the first gram of vitamin B_1 by synthesis. In general, cooking destroys about 20 per cent of the thiamine content of vegetables and 40 per cent of the thiamine of meats; usually more than 25 per cent of the thiamine in cooked vegetables is found in the cooking water. Vitamin B_1 is heavily concentrated in tree buds just as it is in grain. Solvamin is a source of riboflavin offered the food trade. It was reported that ordinary brown sugar is rich in vitamin B_6 and biotin. Folic acid is a new member of the



The research car of S. C. Johnson & Son, Racine wax polish manufacturing firm, for use in field investigations, such as in Brazil, to locate new wax supplies

group of B vitamins. Storage and dehydration are more or less destructive to vitamin C in foods. Delsterol D-activated animal sterol is a source of vitamin D for poultry. Drisdol is a brand of vitamin D (from ergosterol) in propylene glycol. Experiments have been made on the addition of lecithin to experimental diets and an effort has been apparent to bring out the indispensability of choline as a growth factor in the human diet.

Fruits. The Washington State Apple Commission has spent $50,000 in research in the past 5 years to determine the food value of its fruit. Probably not more than 20 per cent of the apple crop is processed in any one season. McIntosh apples grown in New York seem to respond best to an atmosphere of 5 per cent carbon dioxide and 2 per cent oxygen at 40° F. and under these conditions will keep satisfactorily for at least a year. Apples packed in oiled paper avoid scald in storage. Semicommercial-scale experiments on the production of sparkling cider by the secondary fermentation of cider indicate that the speed of carbon dioxide formation can be accelerated by the addition of either apple juice or a concentrate prepared therefrom and a small amount of ammonium monohydrogen phosphate. A fruit juice concentrator of radical design was used for preparing products from apples, pears, and cherries; the volatile flavoring constituents collected are combined with the concentrate. Apple-raspberry juice was endorsed by the New York State Agricultural Experiment Station.

Mixed fruits for salads and also boysenberries are quick-frozen in Oregon. Peaches are being defuzzed by some growers in California. An endeavor is being made to find a gas which will improve the color of peaches and nectarines without damaging flavor. While approximately 600,000 tons of plums and prunes are processed annually, there is comparatively little waste because the canned and dried fruit is neither peeled nor pitted; problems facing the industry are surpluses in years of maximum production, discards from sorting tables, and nonmerchantable dried fruit. A company in California is specializing in dated prunes. A richly flavored prune concentrate was announced at the University of California.

A new type of naturally flavored preserved cherry, decorative as the true maraschino, has come from cooperation by the U. S. Department of Agriculture and the New York State Agricultural Experiment Station. The California Fig Institute handles only dried figs, represents 2,000 growers. Two million cases of canned jellied cranberry sauce are packed annually. Watermelon juice, concentrated, may soon be marketed. With better tropical American relations, the mangosteen, cherimoya, guanabana, and sapodilla are good fruits that will become known in this country. Hawaiian Papaya is quick-freezing native fruits for shipment to the United States; a new product is a nectar composed of papaya and pineapple juices. Hawaiian Pineapple has been carrying on researches since 1914 and also participates in the support of the Experiment Station of the Pineapple Producers Cooperative Association. The fate of bromelin has been followed throughout the factory operations of pineapple canning; the enzyme appears in the juice and is there remarkably resistant to heat. The dry wastes of the pineapple industry may be used as carbohydrate food for domestic animals.

The research that established the ethylene gas method of treating green-colored oranges cost about $4,000 and adds an estimated $4,000,000 to the market value of the Florida crop each year and about the same amount to California growers. Citrus fruits will not stand up well in storage if the atmosphere contains more than 6 per cent carbon dioxide or 12 per cent oxygen; high humidities have proved best for storing them. Washing the fruits before storage decreases their keeping quality. Among citrus by-products are fruit juices, vinegar, frozen fruits, alcoholic beverages, candied peel, marmalades, jellies, and orange butter. The U. S. Department of Agriculture methods of making pectin, citric acid, and orange and lemon oils are said to be worth $2,500,000 a year in added returns to citrus growers in California alone. The production of lemon oil in California amounts to 150,000 to 200,000 pounds annually. Gum guaiac and also isothymol are flavor preservatives of lemon and orange oils. All told, lemon products find some 80 industrial uses. By the Sunkist process, a carload of oranges is converted into 200 gallons of juice concentrate. High-temperature pasteurization is recommended to retain the "cloud" in orange juice, followed by rapid cooling to avoid cooked flavors. Orange juice is successfully frozen; very slight loss in vitamin C content occurs in a year's storage of the product. Heating grapefruit before pressing gets rid of most of the objectionable peel-oil taste in the juice. Naringin, which gives grapefruit its characteristic bitter flavor, can be recovered at juice plants; it has likely value in beverage manufacture and medicinals. The ugli is a triple-crossed citrus variety—tangerine, lime, and grapefruit. Deaeration of fruit juices is one of the steps essential to retention of flavor of canned juices. In fruit products sulfur dioxide has been found not only an excellent antioxidant but also a preservative of vitamin C and color. Frulite is thiourea in tablet form for use in preventing discoloration of cut or sliced fruits. Five plants in Florida are now producing between 15,000 and 18,000 tons of dried citrus pulp feed per year. Dried citrus pulp has been determined equal to dried beet pulp as a feed for milking cows, and as a result about 90 per cent of the grapefruit-cannery refuse of Florida is being utilized for this purpose.

Vegetables. Efforts are being made to process vegetables in whole form, to dehydrate them, and to conserve color and flavor. It is doubtful if the basic knowledge upon which successful vegetable dehydration is founded would have been acquired had it not been for the experience gained in the quick-freezing industry. Seven companies operating 15 plants produce dehydrated vegetables, including potato shreds and flakes, onion flakes, carrot cuts and flakes, bean and pea powders, and parsley, celery, spinach, and tomato flakes. Chips from unpeeled potatoes are being made in California; concentrated skim milk and boiled potatoes are combined to yield a new potato chip. Dehydrated potato cubes are of interest to hash canners. Potato starch is produced almost entirely from cull potatoes. Much work has been done on potato starch films. About 125 sweet potato growers have been considering the construction of a dehydration plant in Texas. A manufactory of sweet potato starch was started in Louisiana and the production of stock feed from sweet potatoes was begun in Alabama. Useful in making sweet potato starch, a new machine cuts the potatoes into chips which can be dried readily.

The flash process was adapted for use on tomato juice. Preliminary blanching is said to be of importance in conserving vitamins B_1 and C in snap beans which are to be either quick-frozen or canned. Experimental packs of asparagus with calcium chloride showed that, in contrast to the work on tomatoes and shrimps, no increase in firmness resulted. Chicken noodle, rice, and vegetable soup mixes appeared on the market; Souplet is a tablet from which vegetable broth can be made quickly. Soy grits, a coarse soy flour, is being used in dehydrated soups for the Army. Spinach, pea, carrot, and asparagus flavored ice creams entered on their careers. Commercial mushroom growers have increased their yields 50 per cent in the past decade. Trial plantings of endive, paprika, and other European specialties have been under way in Florida. Celtuce is a new vegetable, a combined celery and lettuce.

Cereal Products. Wheat in various forms contributes 25 per cent or more of the average daily caloric intake of Americans. Chlorine dioxide is a bleaching agent for flour. There are significant differences in the thiamine content of various cereals, in the thiamine content of various strains of the same cereal, and there are indications that regional differences may affect the thiamine content of a single strain. Trends in milling technology have continued toward improvement of the baking quality and nutritive value of cereal products. Wheat germ contains only 5 per cent of the total thiamine of the



Left. Plant of the U. S. Sugar Corp., Clewston, Fla. — capacity, 6,000 tons of cane a day

Below. Harvesting sugar cane in Florida



wheat kernel; all but 18 per cent of the thiamine of the wheat is lost in the manufacture of straight flour. The production of enriched bread includes the use of thiaminized flour or yeast, of vitamins and suitable iron salts for direct addition to the dough, and combinations of these procedures. Plans were made for introducing new vitamin- and mineral-enriched flour and bread to the public. The U. S. Department of Agriculture prepared an "Enrichment Primer".

General Mills reported a baking ingredient to give white bread the nutritional value of whole wheat. Continental Baking began the production of a flour by a process utilizing flotation to retain more minerals, proteins, and vitamin B_1. Peeled wheat bread is made from wheat prepared by a flotation process which removes only the thin epidermis of the berry. Calcium monophosphate enriched with thiamine hydrochloride and other vitamins of the B-complex is a flour supplement. Ferric sodium pyrophosphate containing 15 per cent of available iron has been brought out for flours. The flavor of bacon is imparted to yeast in a new preparation. Standard Brands has featured an enriched yeast. Yeasted peanut butter is a 1941 debutante. A company was organized for the manufacture of yeast from waste sulfite liquor, following the practice in two Canadian plants; it is considered possible to extract lignin and rosin besides utilizing the sugar in this way. Amino acids enhance the growth of yeast.

The macaroni industry has taken steps to tie in with the vitamin fortification program of the milling and baking trades. Wheatasoy is a breakfast food and Zoy-Koff is a coffee substitute coming from Madison College, Tenn. Yum contains wheat gluten and soybeans. "Grass bread" carrying grass powder has been introduced; in this class is Meadowkist bread. Quaker Oats has entered the manufacture of grass products (Greenmilk; Cerophyl). There is also frozen grass for chicken feed. Frozen cookie dough that can be kept a year before baking came before the public. An oat loaf was promoted in the bread field. The protein found in oat by-products is held inferior to that in the whole oat grain. Ready-to-eat cereals were presented by two companies.

Starches and Sugars. Ordinary popcorn expands from 18 to 24 times its volume upon popping, but some of the new hybrids enlarge as much as 30 times. The corn-refining industry has, during the past 10 years, consumed about 40 per cent of the corn reaching primary markets or 20 per cent of that sold off the farms, equivalent to somewhat more than 3 per cent of the total annual output. About 98 per cent of the starch manufactured in the United States is produced by the corn wet-milling industry, which sells one third of its output in the form of starch and converts the remainder into other products. Starch has been made synthetically from glucose at the University of California; the molecular structure of enzymatically synthesized starch has been studied. Starch may soon be produced commercially from kafir, research work at Kansas State College indicates. Starches can be differentiated by the rate and degree of response to the action of soybean amylase.

The sugar, pentosan, and galactan contents of edible varieties of soybeans have been determined at different stages of maturity. A low pectin content of soybeans may explain their failure to soften materially during cooking. About 40 per cent of the total sugar production of United States refiners is used in the commercial manufacture of foods and beverages. It has been proposed that to refined sugar there be added 20 per cent of its weight of skimmed milk solids to supply vitamins and minerals. Sugar is gradually finding new industrial applications, such as in the preparation of chemicals and in various other ways—for example, in steel-products technology to prevent splashed metal from solidifying on the walls of molds during pouring. Air-dried sugar-beet pulp treated with anhydrous ammonia becomes a feed high in water-soluble nitrogen. Hydrolyzates prepared from extracts of dried Jerusalem artichoke chips ferment somewhat more satisfactorily than hydrolyzed aqueous pulps of the dried chips or the fresh tubers; the solvents formed by the butyl-acetone organism from fermentations of Jerusalem artichoke extract hydrolyzates are identical with those from fermentations of corn

mash and are produced in about the same ratio. Candy manufacturers are coping with problems of rising costs, raw materials, and packing. It is claimed that chocolate of higher melting point can be obtained by hydrogenation. Oat flour is espoused to keep chocolate candy bars from softening in summer heat. University of New Hampshire scientists are hunting high-yielding sugar maples, so as to study the best manner of reproducing good stock. One fourth of all the maple syrup goes into flavoring sauces for tobacco. An alginate specialty is a stabilizer for icings and meringues.

Oils and Fats. Fluffo is a vegetable shortening. A heavy consumption of refined cottonseed oil was reported: the oil has represented 40 per cent of the total of all ingredients and 50 per cent of the fats used in the increased production of margarine, and there has been an unprecedented consumption of cottonseed salad oil. A substitute for coconut oil is a beef fat, used as a lubricant in confectionery manufacture. There has been concern about the alleged adulteration of olive oil with tea-seed oil by wholesale dealers and adulteration with peanut oil by retailers. A study of the changes in composition of ripe olives during pickling shows that little saponification occurs through action of the sodium hydroxide used to destroy oleuropein, the bitter glucoside of the olive; most of the water-solubles are nearly completely removed. Normally 600,000 to 800,000 cases of canned olives are packed and 300,000 to 500,000 gallons of olive oil are produced annually. Lard has been found superior in digestibility to hydrogenated cottonseed oil at each level of fat intake. 6-Hydroxychromans, including α-, β-, and γ-tocopherols, 5,7-dimethyltocol, 6-hydroxychromenes, 5-hydroxycoumarans, 5-hydroxycoumarones, and 5-hydroxyisocoumaranones, are effective stabilizers for lard. Lard is now packed very cold as lining for cargo holds in ships, serving as insulation for perishable foods and rendering unnecessary refrigerated chambers.

Flavors and Beverages. Vanilla beans contain a large amount of peroxidase, and a complex peroxidase system (phenol, peroxide, and enzyme) is present even after the curing process is finished. It is suggested that vanillin may be an intermediate product in the development of the desired aroma and that oxidation products of vanillin may contribute thereto. Vanilla accounts for 51.26 per cent of all ice cream flavors. A method was described for securing a larger yield of flavor from spices by an explosion process. Coffee roaster units were installed in many retail stores; vacuum-packed tea arrived. The addition of thyme leaves to tea is said to make a pleasing beverage; the various mints are also reported to improve iced teas as well as fruit juices. Tea waste, imported chiefly from British India, has been used in the manufacture of caffein; competition from caffein imported from Brazil may be encountered in 1942. Iron added to beer in the amount of 1 p. p. m. was said to cause the foam to draw away from the sides of the glass. Researches were published on the action of sunlight on beer and on tropic-stable beer. National wine consumption reached an all-time high of about 2.75 quarts per capita.

Packaging. Notable progress has been made in vegetable packaging during recent years. Many merchandising men believe the time is not far distant when all fruits and vegetables will be more carefully packaged and identified. The Can Manufacturers Institute is carrying on work including problems posed by restrictions on tin supplies as well as the use of plastics for packaging purposes. Cans are well standardized, but fruit and vegetable freezers are still experimenting with packages. In recent studies by the U. S. Department of Agriculture, specialists found wide differences in the protection afforded by various types of paperboard packages and the linings and wrappings used with them. An effort is being made to provide paper food containers that are as satisfactory as possible from the hygienic as well as other points of view. Dacca Vapo-Pak is a type of waterproof folding carton. Pertinent data have been reported on the temperature and time combinations of paraffining for treatment of paperboard. Flavorseal waxing is described as keeping fruit fresh by protecting against loss of weight and allowing adequate "breathing". Containers are sprayed with sodium hypochlorite solution to control molds, bacteria, and malodors in the fruit-packing industry. Cellophane has more than 5,000 uses in packaging. Pris-O-Matic is a cellophane candy bag. Zip-Tape openers are featured on some cellophane confectionery packages. Special cellophane packages have been developed for fresh corn. Pliofilm is being used in the packaging of dehydrated foods and soup mixes. Food bags are being made from nylon. Glass pails with wire handles for food products have been growing in popularity. Canpour, a new container, is provided with a plastic pouring spout which enables the conversion into a pitcher. Hotcans consist of one can inside another with a chemical in between, which heats on contact with the air, thereby obviating in packed foods the necessity for warming. Novel plastic containers molded in the shape of the fruits or vegetables they hold have been developed experimentally.

Milk. The addition of urea to the basal ration of cows definitely increased milk production. The economic practicability of fermenting the lactose in whey to ethyl alcohol has been studied. Pasteurization of milk causes no loss in vitamin A; fodder preservation by ensiling conserves carotene far better than ordinary drying. The proteolytic enzyme trypsin is effective for inhibiting the oxidation of milk which results in tallowy flavor. Gum guaiac exhibits antioxygenic properties in milk; crude sugar inhibits the development of copper-induced flavor. Deaeration prevents oxidized flavor and the destruction of vitamin C. Golden-V, introduced in California, is a pasteurized and homogenized grade A milk fortified by the addition of vitamins. Malted milk has lately joined the list of vitamin-enriched products. Vacreation or vacuum pasteurization of ice cream mix improves the flavor of ice cream where scored fresh. It is said ice cream manufacturers of size are using 28 different flavors to satisfy the public. The dairy industry has entered the dog food business by the introduction of evaporated milk, dextrose, and cod-liver preparations. Opro is a special food for chinchillas developed in Los Angeles. Tamanite is a surface coating to protect especially against lactic acid.

Cheese. Organoleptic evidence exists for the statement that even under modern conditions cheese-making is not by any means a fully controlled industrial process. Of late years research has made cheese manufacturing less erratic, but it is still an art that sometimes breaks down. The development of process cheese has no doubt been a factor stimulating consumption of American cheese. Cheesemakers are producing substitutes for Norway's gjetost, the blue cheeses of France and Belgium, Holland's Gouda and Edam, and Italy's asiago and provolone. Vacuum packing of cheese appears to be more satisfactory than packing in cans with a valve to allow escape of gas. The treatment of cheese with a solution of propionic acid or of the sodium or calcium salt of this acid markedly retards the development of mold.

Poultry. Much scientific work has been done in the field of poultry nutrition. At Cornell there has been evolved a low-cost process for smoking poultry which is available for general use. Chickens are now pickled in brine, seasoned, and smoked at a cost of about $2.00 per unit, compared with an average of about $7.50 for smoked turkey. Smoked duck is also available. Smoked turkey sausages and smoked turkey paté are pleasing dainties. The U. S. Department of Agriculture has shown it is possible to supply small white turkeys to fit the needs of little families. Soybean meal is a good protein source in turkey rations.

Beef. According to the U. S. Department of Agriculture, beef from cattle fattened on grass ripens as well as beef from cattle on grain and is just as juicy and flavorsome. Quick-frozen preroasted beef is being shipped from Argentina.

"Woven" steaks are made by putting slices of meat through rotating dies, converting under pressure to uniform thicknesses. One of the uses for dry-ice may be in the tenderizing of beef; the idea is that carbon dioxide will keep bacteria and mold-forming organisms from getting the oxygen necessary for their growth. The Tenderay process continued to gain favor. Macin, an enzyme from Osage orange, has been proposed for use in tenderizing meat. Wimpys are hamburgers in cans.

Pork Products. An "ice box in reverse" that ages hams in 10 to 12 weeks, instead of the year or more required by the old-time farm method, has been developed by the Maryland Agricultural Experiment Station in cooperation with the Federal Bureau of Animal Industry. That mildly cured, fine-grained ham of prewar Poland is being produced under the supervision of Polish experts.

Gelatin. The Army Quartermaster Corps has found advantageous the gelatin coating of meats. Vitamin B_1 fortified gelatin is a newcomer. Gelatin, casein, and albumen compositions are said to be softened and made elastic by tetrahydrofurfuryl alcohol and certain derivatives thereof.

Marine Foods. During the spring 23 Iceland-preserved fish items were offered in American markets. Pinch-hitting for anchovy paste is a salted salmon paste from the State of Washington. A specially prepared quick-frozen fish product comes in fillets, breaded with potatoes and corn meal, for placing immediately in the pan without preliminary defrosting. Sea Pep is a standardized sardine oil for poultry feed. Coon or bunch oysters may become of commercial value, according to a study in progress. Calcium chloride was welcomed as an addition to brine for shrimp to retard softening of the canned product. Maine rock crab will soon be on grocery shelves in cans. Nipicide is used in making antiseptic ice for the fishing industry.

Advances Relating to Natural Gas and Petroleum

Research has autographed the history of hydrocarbon technology.

Natural Gas. By examining gases removed from samples of soils, to detect hydrocarbons present, it is possible to locate underground deposits of oil and gas. The possibility of recovering methane from coal in situ before mining has been studied. The U. S Bureau of Mines reported on the flow of natural gas through high-pressure transmission lines in cooperation with the State of Oklahoma and the American Gas Association. Natural-gas hydrate, formed under pressure with water, behaves as a solid solution. The high-temperature method of gas-engine cooling has passed the experimental stage and is regarded as safely applicable to natural-gas engines of conventional design. The utilization of propane as a standby fuel for natural-gas engines was described. Propane was proposed as a refining agent for tall oil. Attention was called to the conversion of butane to 2-methylpropane, with good yields. The U. S. Government's plant in Texas produced about 14,000,000 cubic feet of helium. For 3 years the Bureau of Mines has supplied helium for use in weather-observation balloons.

Petroleum Production. Petroleum is the motive force of modern war. The total crude petroleum reserves amounted to 19,025,000,000 barrels at the beginning of 1941. Studies in the correlation of crude oils with geological environment have yielded a method for distinguishing between crudes produced from the same horizon and regarded as practically identical by true boiling-point distillation. Horizontal drilling of oil wells, after 25 years of working out the problems involved, appears to be an accomplished technique of the petroleum industry, bringing more oil production from certain types of fields and offering promise of further extension in the future. Flocculation of colloidal particles increases and deflocculation decreases the viscosity of drilling muds. Hectorite is a Californian hydrated magnesium silicate for employment in place of bentonite in muds. American Cyanamid's Aeroflo is used to control the viscosity of muds. Shell oil-base mud contains stove oil as the liquid medium; oyster shells, limestone, or barite for weighting materials and to impart initial plasterability; lampblack to give gel strength and structure; and blown asphalt to confer final plastering properties. The use of demulsifying agents in acidizing a well often brings a satisfactory pipe-line oil in a much shortened time. Brine properly conditioned is effective as a flooding medium for secondary recovery of oil. The American Petroleum Institute completed a comprehensive 10-year test of 19 protective coatings on operating pipe lines; no coating afforded complete protection to all pipe to which it was applied. The wide construction of reinforced concrete tow barges to transport petroleum products and other bulk commodities has been under consideration.

Petroleum Refining. The United States has ample refinery capacity to take care of any expected increase in demand for petroleum products. Nearly one-third of this capacity is less than four years old. As compared with 1917 there are twice as many petroleum refineries with four times the refining power: four times as much crude oil is processed and about twelve times as much motor fuel is produced; the yield of gasoline from crude oil and the output of lubricating oil are doubled; more than three times as much fuel oil is made. The U. S. Bureau of Mines published a method for reducing asphalt-bearing crude oils to straight-run asphalts by distillation at atmospheric and reduced pressures. The research sponsored jointly by the National Bureau of Standards and the American Petroleum Institute, begun 14 years ago, has led to the identification of 62 hydrocarbons in the gasoline and kerosene fractions of petroleum, as well as a large number of homogeneous fractions from lubricating oil; the findings have been reported in 79 papers. As more and more synthetic organic chemicals are being made from petroleum refinery and natural gases, engineering trends will probably continue to focus around such problems as gas handling, high temperature and pressure equipment design, fractionation, heat transfer, polymerization conditions, and safety and hygienic features.



A well in Kansas into which more than 18,000,000 barrels of oil-field waste brine have been pumped. The disposal of such brines is a troublesome problem on which the U. S. Bureau of Mines has done work. One solution is to put the brine back where it came from.

Chemical Products. Further research progress has been recorded on petroleum refining by-products as potential sources of pharmaceutical intermediaries. Aromatic solvents derived from petroleum by the Edeleanu process are said to exhibit efficiency. Several processes have been developed whereby toluene can be manufactured from petroleum. Standard Oil of California announced new outlets for its cresylic products from refinery wastes. Two benzo(h)quinoline homologs have been isolated from California petroleum. The separation of 2,3-dimethyl-4,8-diethylquinoline and the use of sulfur dioxide in segregation of a second new nitrogen base, 2,3-dimethyl-4-ethyl-8-*n*-propyl-quinoline were described.



Evaluation of aviation fuels at Bartlesville, Okla., Station, U. S. Bureau of Mines

Gasoline. Gasoline is sufficiently powerful to propel a car 450 miles to the gallon, specialists contend, if means could be devised to obtain completely efficient consumption. Twenty-five per cent of all the motor fuel produced is used by farmers. Dated gasoline is being promoted in Connecticut.

Since 1935 a committee of the American Petroleum Institute has been studying all aspects of the proposal to utilize alcohol fuels. This group has found that alcohol cannot be manufactured from farm products under present and prospective conditions for less than five to six times the cost of gasoline, and maintains that a 10 per cent mixture of alcohol with gasoline would increase the Nation's fuel bill by $690,000,000. About 20 plants are producing 100-octane aviation fuel. The largest volume of octane is made by the alkylation process, the second largest by isooctane, and the third by neohexane. Polyform units are operating in five Gulf Oil refineries. The "fluid catalyst" petroleum cracking process has been revealed by Standard Oil Development. It is said to permit more continuous cracking and lower costs than intermittent cracking using solid catalysts. The net effect of the hydroforming process is to dehydrogenate; this procedure can yield a high-grade aviation gasoline or can be modified to give a product having upward of 80 per cent aromatics.

Gasoline Treatments. Gasoline sweetened by the solutizer process exhibits improved odor, lower sulfur content, and an increase in octane number and lead susceptibility. The use of a mixed solutizer solution, a strong alkali solution containing an isobutyrate (the solutizer) and alkylphenol salts, has been proposed to reduce the removal of alkylphenols from gasoline. A process to demercaptanize gasoline employs a solvent containing caustic soda and methanol. A gasoline-sweetening plant utilizing the Linde copper-slurry process was shown in an article. A metal deactivator to increase the storage stability of petroleum distillates has as its active constituent N:N^1-disalicylidene-1:2 diaminopropane. Soybean lecithin has been put forth as an inhibitor for improving the quality of leaded gasolines; it is said to stabilize against change and to combat corrosion. Expansion of the Ethyl manufacturing plants at North Baton Rouge at a cost of $2,500,000 and the adoption of new production methods have made possible the substitution of hydrochloric acid for chlorine in the manufacture of tetraethyl lead. The use of activated glycerides is claimed to prevent precipitation of metallo-organic compounds as well as to ward off haze on exposure to light. American Cyanamid's Aeroclear is an ethyl gasoline haze inhibitor.

Gasoline Improvements. In gasoline, for both ground and air vehicles, the principal prospect of a further major improvement appears to be in degree of freedom from knock. Leaner air-fuel mixtures in modern automobile engines, as compared with those of 1927, have produced a saving of about 18 per cent in gasoline consumption. Defumer is a gasoline-engine control to eliminate fumes from exhausts as engines decelerate. The preheating of carburetor intake air and the designing of nonicing carburetors reduce the need to limit aviation fuel volatility. Means to prevent the icing of the intake systems of aircraft engines, one of the known hazards of aviation, is the object of an extensive investigation at the National Bureau of Standards. Ceilings of military planes are steadily being elevated and the factor of climb is being met by evolving more powerful engines and larger propellers; researchers are working on a 40,000-foot level. Two types of supercharge engines are under development. Compounds such as diisopropyl formal blended with aviation fuels are claimed to aid vaporization in high altitudes. Improved protective coatings for interiors of aviation fuel drums have been devised, especially to prevent the contamination of gasoline with iron rust or zinc oxide particles; resin-type coatings have received much attention.

Lubricating Oils. Simplification of motor-vehicle lubrication and improvement of lubricant service by reducing the number of types of lubricants required are being developed jointly by representatives of the petroleum and automotive industries. Higher engine temperature and pressure require an oil of greater paraffinicity and oxidation stability. This type of oil can be obtained from many crude petroleums, in good yields, by solvent extraction and by the use of additives. Addition agents are thought capable of bringing about marked changes in the degree of oxidation occurring in lubricating oils; they may also influence the direction and character of accompanying reactions. New types of metal salt addition agents for lubricating oils have been derived from alkylated phenolic compounds. Lubricating oils of superior load-carrying capacity and decreased tendency toward oxidation and carbon formation can be made by incorporating small amounts of the dialkyl esters of phthalic acid. Diethyl oxalate is employed as a corrosion inhibitor, particularly in oils compounded with metallic naphthenates, to combat piston ring sticking.

Special Lubricants. Little is known about the practical evaluation of a grease by laboratory tests. It looks as if machinery would be more and more slushed with waxy coatings. Carbowax compounds are being used with water-soluble lubricants in wire-drawing and metal extrusion. Special lubricants have been employed for use in drawing and machin-

ing aluminum and its alloys. Nonscratch 1025 is a drawing lubricant; L&H Perfected is for deepdraw work on metal sheets. Gulf Oil has two new lines of lubricating greases for ball and roller bearings. Santolube 261 is an additive for crankcase oils, an inhibitor of bearing corrosion. Lubriplate lubricants in collapsible tubes are intended for ball bearings and gears. Van Caloria lubricants vaporize above 400° F., leaving a film of colloidal graphite; Grafo assembly compound is a mixture of colloidal graphite and oil for conditioning bearings; Savamotor is a lubricating oil for crankcases of internal-combustion engines that contains graphite; a new dry lubricant is graphite in suspension in carbon tetrachloride, which evaporates upon application; Kano Ovenoil consists of colloidal graphite in a liquid carrier for use as a lubricant at temperatures to 1,800° F.

The problem of oil refining for dielectric application will be touched upon in passing. It largely centers on olefin removal without a major reduction in aromatic hydrocarbons, the presence of which is necessary to obtain maximum stability. The problem is particularly difficult because there appears to be no oil property which can be used to predict the suitability of a product for dielectric impregnating use. Novel oils, creations of organic chemistry, are watch and precision-instrument lubricants. M-56a is the new Elgin watch oil, a synthetic product. Celvacene is a vacuum grease; butyl phthalate, butyl sebacate, Amoil, and Octoil are pump lubricants. To lubricate a rotor operating in a vacuum in an x-ray tube, where oils and greases are not permissible because of their high vapor pressures, General Electric has found a thin film of barium to be the solution. Penetrant is a lubricant obtained in the Paluszek process of degumming castor oil. Degummed castor oil has a solvent action upon sludge and engine varnish.

Diesel Engines and Fuels. The Diesel-engine business, excluding navy contracts, has been about double that of 1940. The mass production of Diesel engines by the automotive industry has been urged. It is calculated that a considerable saving in weight could be accomplished with Diesel-powered airplanes if their engines were boosted with oxygen for the take-off. Feeding oxygen into the intake air of a Diesel engine has been shown to increase its power output by 60 per cent without detonation or other ill effects. In Diesel fuels a problem is to improve ignition quality, a property measured by its cetane number; certain addition agents, such as organic polysulfides, will raise this number. Technologists are working on a device that will measure the density of Diesel-engine exhaust smoke in order to gage the suitability of the oil and the condition of the engine. The Surfide process treats Diesel-engine liners in a concentrated water solution of sodium hydroxide and a small amount of sulfur to produce a wear-resistant coating. Fusol is a solvent for adding to heavy fuel oils to dissolve sludge and to combat carbon formation in preheater tubes and oil burners. The National Bureau of Fire Underwriters has issued standards for the installation of oil-burning equipment.

Waxes and Asphalts. A process for the fractional fusion of waxes was announced by Sturtevant in cooperation with Socony-Vacuum Oil. High melting-point waxes, 160° F. to 300° F., are available. The Asphalt Institute reported on typical asphalt stabilization projects, on the construction and reconstruction of highways to meet military needs, and on the choice of surfacing types for airports. The National Bureau of Standards studied asphalt-prepared roofings and shingles. All the constituents normally present in an asphalt are susceptible to photooxidation; while the resistance to this action may be increased somewhat by selection of asphalt source, it is much more important to protect an asphalt surface, as far as possible, from exposure to sunlight. U-Mix-It consists of asphalt in pulverized form for use in paints or as an adhesive binder. Wearcoat is asphalt processed to a rubber-like consistency for application as a surface seal on expansion-joint fillers. The method of mixing bitumen and latex for road use is to heat the bitumen to 150° and stir in 5 per cent of latex powder. Sulfur ground with asphalt and kerosene forms stable suspensions from which aqueous emulsions can be prepared, using a sulfonated alcohol as an emulsifying agent. Liquid esters of abietic acid are being utilized to increase the speed of penetration of asphalt into cellulosic materials.

Dendrotechnology: Science Flourishes in Sylvan Scenes

Fresh out of the laboratory wrapper, a wood-treating process speeds up the aging of hardwood by injecting synthetic resin into green wood, at the same time removing the sap and moisture. Wood impregnated with a saturated solution of calcium nitrate shrank only 7.7 per cent as much as normal wood. The chemicals that have demonstrated most promise in the seasoning of wood are urea, invert sugar, and a mixture of them. Urea has been used in the seasoning of tidewater red cypress. Other work has shown so-called degrade losses in lumber, caused by cracking and splitting, can be practically eliminated by treating the green wood with urea. A wood flour plastic is employed to plug worm holes in lumber.

Wood Preservation. In a 25-year test of shingles from different kinds of wood, creosote markedly lengthened the life of the roof. Kolineum is a refined creosote wood preservative. Penetex is a preservative for wood floors. Improvements have also been made in floor dyes. Chemonite is a preservative for wood sills, posts, and piles. Permatol is being used in treating ties and poles. Permasan 116, a pentachlorophenol preparation, is employed to guard wood against the effects of moisture, fungi, insects, and decay. Copper termite shields have been specified in some construction for national defense. Eighty-five per cent of the cross-ties now laid by railroads are treated to preserve their life, compared with about 43 per cent in 1920. Approximately 50,000,000 cross-ties are placed annually by the railroads. The American Wood-Preservers' Association issued a report on fireproofing. De-Oxo-Lin is intended to render weeds and grass fire-resistant for improving forest fire-breaks. The metal-treating of wood materials is being studied several places.

Plywood Products. Imports of balsa wood are around 6,000,000 feet annually, for use as insulation, in the construction of model airplanes, and by aircraft manufacturers for fairings and for inside walls in the passenger compartments of commercial planes. To help aircraft builders the U. S. Department of Agriculture is seeking better inspection methods for the selection of wood. With the development of improved plywood resulting from the use of plastics, especially phenolic and urea resins, the growth in specialty applications, such as furniture, housing, radios, shipbuilding, and aircraft, has been large. Four general procedures are employed for fabricating aircraft parts by molding plywood with plastic binders—Aermold, Bellanca, Duramold, and Vidal processes.

A method has been devised for combining plasticizing and pressure whereby wood veneers can be converted into dense, tough material, interchangeable with metal for airplane propellers, radio masts, small fixed fittings, and beam reinforcements at fastening points. A building material with "compregnated" wood uses a partially polymerized phenolic resin solution driven into the cellular structure of the wood. Research by the John B. Pierce Foundation has led to building one-floored houses constructed largely of resin-bonded plywood. Plxweve is spruce bonded with phenolic and urea resins.

Wood Specialties. In Mobile a company is working on a low-cost plastic material from sawdust. Slat-Rack mat is formed of hardwood secured to rubber-supporting strips. Marlite Velvetex is composed of an oil-treated pressed-wood base with a baked surface finish; Horizontaline is this product with a plain surface having a horizontal scoring. Saferized Palco Wool insulation comprises fire-resistant shredded redwood bark fibers. Wood fiber blankets, bats, and insulation are being made to specifications. Cushionstone is a fibrous acoustic material. Fiber is being produced from Yucca.

Lignin. Cellulose, according to some authorities, probably consists entirely of chains of anhydroglucose units in varying degrees of association, ranging from a dense, crystalline, acid-resistant fraction to one that is amorphous and easily hydrolyzed. Wood and cotton celluloses appear to differ structurally. A continuous process for the hydrolysis of wood with dilute acid has been developed, resulting in the production of lignin and lignocellulose for plastics, as well as acetic and formic acids, furfural, and wood sugars. It seems likely that by irradiation lignin in wood meal is brought into a higher state of activity than isolated native lignin. The use of crude lignin powder for the removal of iron from water has shown promising results. Lignin paste appears satisfactory for bonding such floor coverings as linoleum, rubber, and felt base to subfloors in dry locations. The lignin and vanillin plants at Rothschild, Wis., have been increased over 50 per cent. Citrus wood may be a usable source of lignin.

Pulp Sources. Few American industires have been more affected by war than the manufacture of pulp and paper. In the past decade domestic producers of paper took from 32 to 38 per cent of all wood pulp moving in international trade. The United States has imported over 70 per cent of its newsprint paper consumption, chiefly from Canada. Upward of 230,000,000 cords of pulpwood annually can be taken from Georgia and the Carolinas without in any way exhausting this immense reservoir of pine. Experiments have shown that sweet gum is easily defiberized to produce a comparatively high yield of bleachable pulp. Although the soda process can be satisfactorily applied to this wood, the sulfate process or its modification (the soda-S process) gives superior results. The U. S. Department of Agriculture announced it would subsidize the use of 10,000 bales of low-grade cotton in the manufacture of high-quality writing paper. Crane C2 process treats cotton fibers for paper production.

Sapwood of both softwoods and hardwoods yields stronger pulps than obtained from heartwood. The four most plentiful hardwoods in the northeastern states are white birch, yellow birch, beech, and maple; all can be converted into pulps by the acid sulfite process. The U. S. Department of Agriculture has called attention to a high-yield semichemical pulping process that enables the use of the "weed" hardwood species in newsprint paper. Studies have been made on brown mechanical pulp from yellow birch. The Northwest Research Foundation has developed a process for making α-cellulose from aspen. High-α pulp from aspen was found to acetylate readily by the Forest Products Laboratory. Consisting largely of cellulose and pentosans, the flax shive is regarded as a potential source of α-cellulose, chlorophyll, pectin, and xylose. Cigaret paper is being made from Minnesota flax.

Wood Pulping. There is an increasing tendency to study from the point of view of chemical kinetics the reactions involved in wood pulping. The wood sugars in waste sulfite liquor may be utilized for the production of acetone and butyl alcohol by fermentation. The pulping action of calcium-base sulfite liquors, which do not ordinarily give complete reduction of Douglas fir, has been improved by high sulfur dioxide concentration and long time at low temperature. Forced circulation in sulfite-pulp digesters offers a nearer approach to uniformity than has been obtained with conventional quick-cook systems. A penetration and acid-recovery process for sulfite mills employs the principle of interconnected digesters which form a closed system. In pulping conifers a small but definite amount of sodium sulfide is necessary to obtain optimum pulp properties.

Chemicals for Pulping. A sintered mixture of sulfur and soda ash in a ratio of about 3 parts of sulfur to 10 of soda ash is being produced by Mathieson for use in the manufacture of pulp for kraft paper. Another substitute for salt cake has been offered in the form of a combination of gypsum and soda ash. Through the employment of gypsum, white liquors of higher sulfidity can be prepared than by the use of salt cake and the sulfidity can be raised more rapidly if desired. A study of the factors involved in the use of gypsum has been made by the Institute of Paper Chemistry. Sodium chlorite offers the possibility of securing high brightness in fully bleached pulp without damage.

Cellulose Felts and Boards. Papier-mâché is regarded as the first plastic. Asplund pulp for the roofing and flooring felt industry is produced by softening wood through heating in a defibrator before pulping. Forest Fleece Silkene padding consists of layers of spot-glued wood-pulp sheet. Cell-U-Blanket, Masonite's lightweight insulation, has a core of Cellufoam; Masonite parts are replacing metals in radios, fans, and pianos. Boards made from waste cellulose by the Loftin process are said to have high strength and to be unwarpable. Samsonite is built up of laminated material with butyl methacrylate polymer as a bond. Among paper products, paperboard constitutes 38, wrapping 14, and printing 13 per cent of the total consumption.

Wallboards. The Insulation Board Institute is carrying on investigational work on extending the usefulness of fiber insulating boards as interior wall finish. Colotyle is a plastic-coated wall sheet. De Luxe Monowall board is a tile-design wallboard of Armstrong Cork; Dubl-Thik Fibre-Tile is a compressed wood fiber wallboard with a tile-scored surface. Exlin is pressed from spruce cellulose. The plastic sheet Farlit is veneered to board cores. Homasote is an insulating fiberboard for wall construction. Ludlite Bord now has a surface of Protex paper. Temlok De Luxe Structural Unit is an insulating board in panel and plank forms. Linoleum manufacturers have been experimenting with substitutes for cork and burlap. Korktone is an insulation consisting of granulated cork secured on a fabric backing by a rubber binder.

Adhesives and Coatings. The Institute of Paper Chemistry published research on the effect of the adhesive used in the fabrication of corrugated fiberboard on the strength and serviceability of corrugated fiber boxes. Sveen glue solution is said to flocculate filler and fibers, to increase their retention, and to give added freeness to the stock on the wire on closed as well as open systems. Prosize consists of free rosin particles with a protein to stabilize the suspension. Tall oil is a potential source of various derivatives made from the separated rosin and fatty acids. Indusoil is West Virginia Pulp and Paper tall oil. Pectates are poor adhesives but may be used to prevent substances from sticking to paper. The war has induced many mills to change from tapioca to corn starch. A correlation has been found between the molecular weight of the starch, the height of the peak in the consistency-temperature curve, and the increase in strength imparted to a paper sheet where the starch is utilized in a condition of maximum dispersion. The outstanding use for zein appears to be in the paper-coating field. The paper industry is experimenting with hydrogenated vegetable oils in attacking coating problems.

Coated and Impregnated Products. The aqueous type of urea-formaldehyde resins is being applied in high wet-strength paper. Water-soluble alkyds may prove of interest as beater sizes for special purposes; they can also be incorporated into coatings to improve toughness and adhesion. Applied to sized sheets, American Cyanamid's Paper Resin 605 increases water resistance and triples the wet strength. Waxine Sizes 350, 357, and 358 are wax emulsions containing moderate amounts of unsaponified rosin. Resin-X-Crepe is a resin-impregnated paper for use in stampings. Blackout Sheet is a black kraft which sticks to industrial windows; Daylight Vent is a sliding light-tight shutter to be applied along with it. Centraline Road Coat consists of waterproofed kraft combined with burlap and paper backing. Corroflex is a waterproofed flexible corrugated packing material with an outer covering of kraft. Scutan is an asphalt-infused kraft.

Printing Papers and Processes. Coated paper is the most popular for house or-

gans, 65 per cent of them using the highly finished sheet; next comes offset stock, utilized by 18 per cent. Levelcoat is smooth coated book paper made by a new process. New developments occurred in direct-from-zinc printing of newspapers. Printing Plates Research launched a 3-year program at Battelle Memorial Institute. Zein is reported useful in solid color printing. Solfast outdoor bulletin colors are said to be sun-resistant. A development in the treatment of papers to minimize misregister of color prints in offset lithography is the controlled exposure of the paper to correct moisture conditions.

The Velo process is employed for publication printing; it is of promise for the converting industry. Perfumed ink is for use in newspaper advertisements. Aruba-base ink contains a bitumen which imparts smudgeproof qualities. A new "water-based carbon ink" is being tried for correcting "second impression off-set" in newspaper printing. Vaposet printing ink is dried by application of water vapor. Hydry printing inks consist of pigments and a vehicle of synthetic resin in a high-boiling odorless organic solvent. A curl-proof carbon paper was marketed. The removal of printing ink from waste paper is described as facilitated by including a small proportion of a divalent nickel salt in the alkaline solution employed for this purpose. In another process waste paper is defibered in an alkaline medium solely by the use of internal friction, so that ink can be removed and the original fiber reclaimed in an undamaged state.

Waterproofed Paper Novelties. About 425,000,000 rolls of wallpaper were sold in 1941. Research in this field has brought fadeproofness and washability. Copper Pak bag paper is a waterproof, antisulfur protection. Jaite waterproofed paper sleeping bags have been suggested for military use. Seat covers for cars are made of water-repellent paper. Masks for surgeons as well as industrial workers are being manufactured of paper. Papertone is a liquid paper preserver. Lamcoting preserves periodical files by cellulose acetate lamination. Protecto-Phane for paper protection is a thin cellulose acetate film. Bookbindings of durability and flexibility are being made with polyvinyl acetate adhesives.

Blueprinting and Photographic Supplies. Postex is a paper for the production of blue lines on a white background in ammonia-vapor dry-developing machines. Matte transfer film is a photosensitive material used in making hand-layouts from blueprints on metal sheets to be employed for templates. Special high-power mercury arc lamps have been devised to speed up the production of blueprints. Kotavachrome is a process for making color prints and enlargements from Kodachrome transparencies; Kodak Minicolor prints, with cellulose acetate base, are enlargements from 35 mm. or Bantam Kodachrome transparencies. Kodacolor is a new color film that makes a transparent negative from which prints can be easily produced on paper. In Varigram the sensitivity of the silver chloride emulsion has been extended to the blue-green by the use of dyes. Reduction of overexposed or overdeveloped photographic negatives can be done with sodium guanidine ferricyanide. A method has been proposed for obtaining an image on a wood base by transferring a collodion positive to the blackened surface of a block. REP is a sensitized metal for making photographic copies. A new photoflash bulb enables the taking of pictures with infrared rays. Ethofoil is employed for transparent envelopes in which photographs are filed. Photographs treated with Kodak print lacquer may be washed.

Research, the Wardrobe of the Textile Industry

Needed coordination of industrial and economic research in the textile industry was the goal of a joint meeting of the Textile Foundation and the United States Institute for Textile Research. Informative labeling has gained ground in many fields. Textiles are vitally related to national defense. Seventy yards of silk are required per parachute, 19 pounds of wool for a soldier's uniform and blankets, and 17 pounds of cotton for other uniform equipment. Electrically heated flying suits have been so perfected that the U. S. Army Air Corps has ordered 12,000 of them from General Electric. Research on airplane seats and cushions is in progress. Ionization of air may be responsible for periodic troubles in the spinning and weaving rooms of certain textile centers.

Flax. The U. S. Department of Agriculture is continuing its program to encourage fiber-flax production. Investigations are being carried on by TVA in cooperation with the Georgia Agricultural Experiment Station and the Georgia School of Technology on the growing and processing of flax to make available a fiber suitable for spinning and weaving on cotton-mill machinery. A large flax decorticating plant has been erected at Helm, Calif. Six Minnesota mills have been working full time to supply the demand for tow; it is estimated that 100,000 tons of flax straw have been processed this year. Biwing, a new flax variety, will be available commercially in 1943.



GENERAL ELECTRIC CO. PHOTO

An electrically heated flying suit

Hemp and Jute. The Hard Fibers Association is assisting in developing new uses for hemp and sisal. Hemp, raffia, and other coarse shade materials are seen on lamps. An attempt is being made to revive hemp-growing in Kentucky. Brattice cloth, a nonflammable fabric generally of processed jute, used in coal mines for ventilating purposes, is manufactured by about 20 companies, which have been seeking new markets. Jute stockings for soldiers are an item on the horizon. A plant at Atmore, Ala., is to process ramie grown experimentally at Alabama's prison farm; three other states are also trying to produce the fiber.

Cotton. Over 24,000,000 cotton-spinning spindles were in place during the year. Cotton has over 1,000 known applications. The Cotton Textile Institute reported that on the summer ready-to-wear market 62 per cent of all junior dresses, 60 per cent of the lower-priced sportswear, and 50 per cent of the play clothes were of cotton. The Cotton Board of Manchester, England, has been assisting in arrangements with the National Association of Hosiery Manufacturers and other groups to make available the experience of British cotton spinners in producing hosiery of fine-gage lisle yarns. The work done on the characterization of raw cottons by chemical methods was summarized. Experimental results indicate that a mixture of sodium hypochlorite and sodium chlorite is superior to sodium or calcium hypochlorite for bleaching cotton goods, as the straight fibers are not attacked to form oxycellulose.

Cotton Fabrics. Resist cotton yarns, called "immunized", are intended to produce decorative effects in fabrics. In new-use investigation excellent progress has been made by the Cotton Research Foundation toward the objective to effect, by inexpensive means, a marked increase in the drape qualities of cotton fabrics. Increased wear performance of fabrics has been attained through selected weaving conditions. Special fabrics have been developed for effecting better adhesion where employed in making laminated materials. Elastikon is an elastic adhesive bandage whose stretch and recovery

result from special weaving of the back cloth. Cloth, it is claimed, can be manufactured without weaving if a latex, cellulose acetate, cellulose nitrate, or casein binder is sprayed on cotton after it is run through a cording machine and dropped on a moving belt. Sabel is a new type of cotton curtain fabric. Applications of metal-coated fabrics in Technicolor film settings have been discussed. Fibredown is "electro-embroidered" cloth. Stiff shirt fronts are made of a plastic.

Other Cotton Products. Octupus is a transmission belt made of impregnated duck. Cotton tire fabric infused with Bakelite laminating varnish is used on Flor-Savr heavy duty wheels. The Ordnance Department of the Army has succeeded in developing satisfactory cotton loading bags for most purposes. The U. S. Department of Agriculture has undertaken a study on the substitution of cotton as a bagging and packing material for farm products. Cotton coats to keep older sheep warm in chill weather are being used experimentally. Tubcoat for the protection of bath tubs during installation is available in two types, in flexlined burlap and flexlined cotton. Pyronized gloves are made of flameproofed cotton flannel. Moropa is a brattice cloth of cotton, treated to render it flame-, water-, and mildew-resistant. Fire-resistant cotton is being supplied in blanket-form rolls with or without asphalt-impregnated paper backing. A roof covering consists of a thin layer of cement reinforced with a cotton fabric.

Rayon. In rayon production, spinnerets of platinum-rhodium are replacing those of platinum-gold, being more resistant to corrosion and abrasion. Extensive use of rayon in decorative fabrics has influenced contemporary style trends, creating unusual textured weaves, bright and dull contrasts, and highlights that enliven soft colors. In draperies, upholstery, curtains, bedspreads, and tablecloths, rayon is providing fabrics that have been outstanding among the new offerings. Varied weaves and styles in Cordura rayon have been featured in curtains. Keynote is an all-rayon rug. A new plastic-coated pliable rayon fabric is said to be proof against stain, mildew, cracking, and chipping. American Viscose is investigating the production and use of worsted-type yarns from rayon staple fiber and rayon blended with wool and other fibers.

Wool. Well over 700,000,000 pounds of wool were consumed in 1941. Wool in which the S-S linkages have been broken by reduction, or by reduction and alkylation with alkyl monohalides, is much higher in alkali solubility than untreated wool, while wool in which the S-S cross-linkages have been replaced by new covalent cross-linkages through reduction followed by alkylation with dihalides is much lower in alkali solubility. As the susceptibility of wool to degradation by alkalies is one of its greatest disadvantages, processes of the latter type offer considerable promise in a technological way. Bromination may have value in shrink-proofing wool. Fabrics treated with a chemical and latex process, known as Kolok, are said not only to give twice the wear but also to resist shrinking and to repel moths. The addition of 1.5 per cent pentachlorodihydroxytriphenylmethanesulfonic acid to the dye bath calculated on the weight of the material to be treated is reported sufficient to protect it against damage by the clothes moth. Larv-O-Nil is a mothproofer. The development of mildew is more rapid where wool fibers are closely packed together, as in yarns and fabrics. Salicylanilide is said to be a good moldproofing agent. Mohawk has been bringing out of the pilot-plant stage a process of putting pile on carpets without spinning or weaving, used previously for automobile rugs; the new carpet is known as Moh-Nat. Wool tape is a pressure-sensitive adhesive tape with a wool-felt backing. Denicron is du Pont's artificial fiber that can be woven into a material closely resembling wool cloth. Now we come to the synthons, fibers made from organic substances which in turn have been synthesized from simple raw materials.



E. I. DU PONT DE NEMOURS & CO., INC.

Nylon tennis racket strings are unaffected by water and have other advantages.

Nylon. Late in November du Pont announced a further 25 per cent expansion of its nylon yarn capacity. Preboarding has been emphasized as imperative in the care of nylon hosiery. Some finishes used for silk hose have proved useful for nylon; the resin finishes are especially adaptable. Nylon tricot knit lingerie came on the market. Velvets that do not crush or wrinkle have been woven of nylon, but are not yet commercially available. A fabric of nylon coated with a waterproof finish is for use in rainwear, food bags, shower curtains, and aprons.

Nylon thread for home sewing was offered in 40 colors. Nylon darning thread is obtainable in 10 hosiery colors. Women's shoes with nylon uppers were marketed. Nylon came into use in the Decoma fabric for silk screen stencils. Nylon-bristled household brushes were presented to the trade. Nylon bristles brushes for some 20 industries. Gun brushes bristled with nylon are available. Nylon badminton and tennis strings are now well known. Natural gut strings for the violin class of instruments are wound with nylon filament to protect them from excessive moisture and wear. Nylon bearings for machinery are asserted to require no lubricant. Nylon is being used for wire insulation of machinery and household appliances. An investigation at the National Bureau of Standards evaluated the surface electrical properties of nylon. Nylon and rayon supplemented silk in the special paper for money and government bonds. "Tempered" nylon has been studied for use in currency and other sheet forms. Replacing worn-out paper currency costs the United States Government several million dollars a year.

Proposed and Possible Silk Substitutes. Etorayon is a resinoid fiber, a substitute for silk in knitted goods. Tensylon is a round plastic yarn, an outgrowth of Tensolite. Women's hosiery made from yarn spun from synthetic rubber is a future possibility. It is thought soybean fiber sprayed with rubber will be employed as upholstery padding in automobiles. The production of fibers from zein is expected to provide an outstanding use, but research thereon is being deferred until more satisfactory methods of curing have been developed. The possibility is foreseen that better products can be derived from protein molecules which have themselves been permanently transformed into a fibrous configuration than are at present available as protein fibers in which the molecules are not so oriented.

Vinyon. Considerable developmental work is in progress on applications of Vinyon by Carbide and Carbon Chemicals and American Viscose. Vinyon net came into use for women's shoe uppers. Artcraft Vinyon gloves were also introduced to American women; preliminary tests indicate they will outwear ordinary fabric gloves three times and ease the job of keeping white gloves clean. Vinyon felts have been utilized by the shoe and luggage trade as liners and plumpers; they have also been employed as filtering media in air-conditioning and cleaning units and as antiabrasive elements on the bottoms of lamps and table and desk ornaments. Vinyon filter fabrics have excellent mechanical strength and wearability; they are used importantly in chemical indus-

try. Among acid-resisting applications outside of filter cloths, Vinyon has been utilized effectively in the form of anode bags in electrolytic operations. Vinyon fabrics have entered the field of chemical-resistant clothing for workmen.

Other Plastic Felts. American Felt is on a production basis with materials made entirely without the use of wool, the bonding of the structure being accomplished by the use of thermoplastic fibers which under heat and pressure partially fuse and join other fibers, particularly cotton. Flexnap is a rubbershod woven felt.

Fur. Hat-Making Materials. The use of toxic mercurial compounds in fur-carroting operations has been largely eliminated from the hat industry. The Bealmac process has become prominent in non-mercurial carroting. Hatters believe more and larger rabbits can be bred here and with the U. S. Department of Agriculture are laying plans for bigger rabbit farms as sources of fur; the problem is mainly how to encourage a better market for rabbit meat. Results from experiments with kid mohair have led some manufacturers to think they have found a replacement of value for rabbit fur. Other fibers are also being studied. Aralac is the prolon fiber used in hat making; Marvlo is a cloth containing Aralac. Hat Corp. of America announced a material composed of rabbit fur, wool, and Aralac. National Dairy Products' Aratex Division is in commercial production on casein fiber going into felt hats and automotive upholstery. A factory for producing milk fiber at Taftville, Conn., has an annual capacity of about 5,000,000 pounds. It was reported that 1,000,000 pounds of casein fiber would be in felt hats during the year. Both chloric acid and peroxide carroted furs are compatible with casein fiber and wool in all proportions. Associated Fur Coat and Trimming Manufacturers is promoting the greater use of South American furs. Typhur is artificial fur made from seed heads of Typha, such as cattail.



Vinyon net shoes

Dyes and Printing. The array of American dyes includes approximately 2,000 trade colors. The production in 1941 was valued at nearly $110,000,000 or about 45 per cent more than in 1940. Three new du Pont dyestuffs are Polyform Bordeaux RF, Pontachrome Fast Yellow R Conc., and Pontamine Black BCN. Calco also added to its line of dyes. Ethylsodium oxalacetate is being used for the manufacture of dyestuffs of the tartrazine type. *o*-Aminodiphenyl is utilized to produce dyes of the quinoline yellow series. The spring of 1941 was one of the most important seasons for prints. Light-colored American tung oil is utilized in a new process for cloth printing. A water-repellent back cloth treated with Zelan is applied in printing machines. Stamptex is a fugitive stamp-pad ink for identifying the production of workers in a textile mill.



UNION CARBIDE AND CARBON CORP.

Plasticized Vinylite sheeting, embossed and backed with fabric, being "pulled over" in the manufacture of a child's shoe

Textile Finishing Agents. Cationic finishing agents and their effects on direct dyestuffs have continued to receive research. Aripel F is a finish for acetate fabrics. Permel A is reported to improve feel and to minimize shrinkage of cotton and woolen goods. Wetting agents have enlarged their sphere of applications. A considerable number of wetting agents adjusted to pH 4 show germicidal properties. The manufacture of so-called self-antiseptic wearing apparel made from specially treated fabrics has had large growth. Triton NE is a high molecular weight organic alcohol wetting agent for scouring baths. The field of wetting agents and surface-active compounds in organic solutions has received little research. Dianol D is a textile detergent composed of sulfonated compounds and high molecular weight aldehyde condensates.

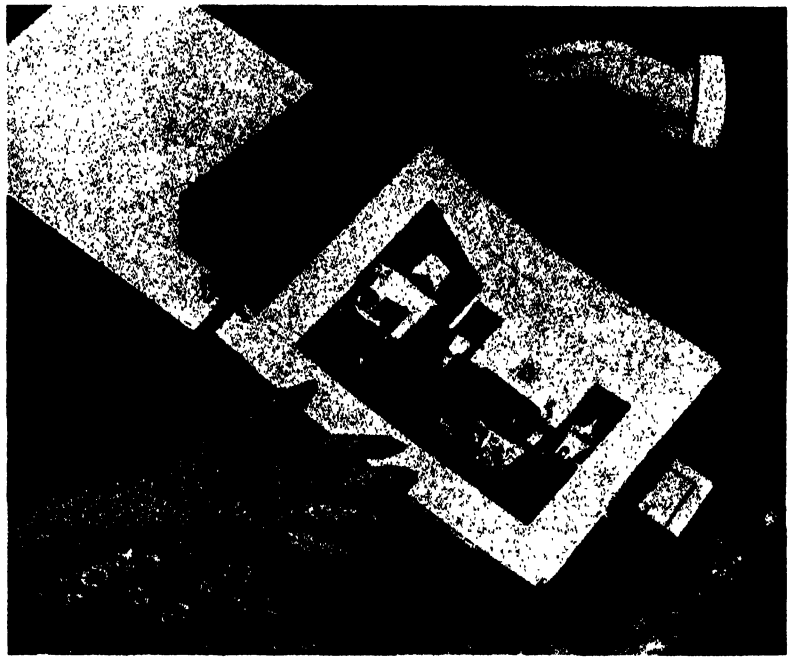
With the proper selection of formulas, finished starch coatings can be obtained that are substantially equal to casein coatings except in waterproofness. The chlor-gums approach casein in properties more closely than other types of starches. The propionic ester of starch can be used to give protective coatings to cloth and paper. The Mello-Sheen process is for waterproofing. Flexalyn is useful in back-sizing of rugs. Nypene emulsions have been investigated. Aerotex 140 is a synthetic resin emulsion for use in back-filling and weighting of the lower-count cotton constructions; Aerotex 301 is an emulsified resin blend for application mainly in the finishing of spun rayon. Formaset No. 8, a urea resin, and Resipon are for finishing; Paraplex RG-8 is a resin for coating. Vinylite copolymer, high molecular weight resins are applied extensively in cloth coatings. Light coatings on fabrics have been developed for shower curtains; heavier coatings have found their way into raincoats and other waterproof apparel. Combined with cloth, Vinylite sheeting, which is scuff-resistant, is utilized in children's shoes. Cements satisfactory for bonding the plasticized sheeting to leather as well as cloth have been evolved through research. It is estimated that more than 70,000,000 yards of pyroxylin-coated textiles are produced annually in this country.

A process for making cotton and other fabrics mildew-resistant depends upon forming an insoluble compound of morpholine and a salt of cadmium or copper. Research has proved that sandbag deterioration can be prevented. Fire Retardant CM is composed mainly of ammonium sulfamate with modifying agents which prevent afterglow, minimize

strength losses in treated fabrics, and permit greater penetration. Ammonium alkyl phosphates are useful in flameproofing cloth and paper. Lanthanum derivatives have been considered for use in loading silk.

The Panorama of Paints, Varnishes, and Lacquers

Exhaustive tests conducted by the National Bureau of Standards have revealed that dwelling houses are kept cooler in summer if the exteriors are treated with white or light-colored paints. During the development of paints to reflect ultra-violet light, it was noted that the reflection factors of certain paints decreased as the time of grinding in a pebble mill was increased. The decrease in reflection is accompanied by a decrease in the proportion of aggregates; the effect is greater, the smaller the difference in refractive index between the pigment and the vehicle. Recent developments in outside house paints have made possible new colors of buff and gray with the "self-cleaning" properties formerly available only in white paints. The Bureau of Standards is studying the behavior of the special paints used on exterior walls of porous masonry to keep out moisture.



Room styling with the color selector developed by du Pont. Color photographs with transparent wall areas permit study of a room in various color combinations.

Oils. Tung oil may be replaced by oiticica oil, dehydrated castor oil, glycerides of fractionally distilled fat acids (from fish oils), and segregated oils (natural oils from which the nondrying constituents have been partly removed). It has been pointed out that films from oiticica oil tend to check on aging, that those from dehydrated castor oil are soft and slow-drying, and that fish oil glycerides set up fast but remain tacky. Segregated oils in partly polymerized form (Polymerol A) have been reported to be faster drying and more waterproof than polymerized tung oil. The normal annual requirements for tung oil amount to at least 150,000,000 pounds, and the imports from China have been supplying only a twelfth of that; present domestic production takes care of hardly 2 per cent of the needs. A possible replacement for some tung oil is kukui oil, extracted from a nut growing in Hawaii. Alkyd resin vehicles are being substituted for oils and varnishes employing tung oil. Amberol 806-P, a rosin maleic type resin, is said to be useful in vehicles containing little or no tung oil.

Because of its low cost and similarity to tung oil, oiticica oil should be used increasingly by the paint industry in coming years. Zinc rather than lead driers should be employed with oiticica oil. Acetylated oiticica oil, it is claimed, will dry to a smooth, tough, glossy film in 15 minutes without the use of driers. The use of dehydrated castor oil has grown materially during the past two years. Exposure tests on varnishes indicate that dehydrated castor oil is more satisfactory blended with other oils than used alone. Castung is a modified castor drying oil. Domestic planting of flaxseed has expanded. The available supply, coupled with imports from Argentina, furnishes ample quantities of linseed oil. Special types of the oil are being processed to yield substitutes for tung oil. The Flax Institute is endeavoring to produce a seed that will afford linseed oil of higher iodine value. The U. S. Department of Agriculture has separated soybean oil into two fractions, one having much higher oil-drying power than the other. Armour announced the limited commercial production of the pentaerythritol ester of fractionated soybean fatty acids, said to be superior to linseed oil in color retention and drying speed. One company reports that it has made and sold more than 1,000,000 gallons of soybean oil paint. Several new plants for processing soybean oil to supplement the shortage of drying oils were reported under construction. Research during the past decade has improved the quality of menhaden and sardine oils. Combinations of fish oils with linseed and soybean oils are being utilized in lieu of tung oil. Suggestions have been given for the replacement of oils in varnishes by fish oils such as Falkovar and by alkyd resins modified by such oils (Falkyd resins).

Thorium naphthenate effects in linseed and soybean oils products which body in a class with dehydrated castor or oiticica oil. Cobalt, lead, and manganese dichlorostearates have the same efficiencies as the respective naphthenates as driers for oils and varnishes. It is claimed that, after treatment by sodium ethylate, vegetable oils dry to clear, tough films in but two days. The liquid esters made from succinic acid and the butene diols or from ethylene glycol and itaconic acid are types of polyesters which seem adaptable as drying oils. Petropol is being employed as a tung substitute in some products. Hercules is producing pine oil equivalent from gum turpentine.

Pigments. Witcarb is a precipitated calcium carbonate. A pigment produced by Pittsburgh Plate Glass, called Silene, is a precipitated calcium silicate. Ti-Pure R is a rutile form of titanium dioxide pigment; Ti-Cal R, a titanium pigment combined with calcium sulfate (70 per cent). A colloidal iron oxide pigment known as Mapico 297 has been described by Columbia Carbon. Zinc tetroxychromate (ZTO chromate) is a rust-inhibitive primer pigment. Hi-Way red of the lead-molybdate type is an ingredient of traffic paints. Research has been done on a new series of pigments from ammonium thiocyanate. Zinc naphthenate and zinc dichlorostearate are dispersing agents for lithopone, chrome yellow, iron blue, and (to some extent) carbon black. Carbowax compounds minimize the settling of pigments and act as binding agents in calcimines and water paints. Alumileaf is a promoter of leaf retention in ready-mixed paints. The use of *p*-coumaroneindene resin has been advised in the formulation of aluminum paints. Aquaplex S-6 alkyd resin emulsion is used in camouflage paints. There are possibilities along the line of precipitating chemical pigments upon a diatomaceous earth base.

Paints. A committee of the Federation of Paint and Varnish Production Clubs is cooperating with Army and Navy engineers on visual-deception problems. Special aircraft paints include a dull black hard to find with searchlights, a bright aluminum paint for sunny days, and a paint for hiding planes on hazy days. Experimental data indicate a superiority of well-chosen special primers over self-priming for painting such woods as Douglas fir and southern yellow pine. But they show also that primer and finish paint should be selected for use together because a primer may give good results with some finish paints and prove incompatible with others.

Anticalor and Blue-jacket are paints to stop the glare of sunlight. Checkmate is a synthetic resin liquid for use as a priming coat and for controlling grain raising. Coprene enamel is an air-dry finish with a chlorinated rubber base. Insulmat 595 consists of granulated cork in a vehicle for application on ducts and walls. Koroplate is a Koroseal paint for the protection of metals. Lay-Tite has a rubber base. Markal is paint in stick form for marking purposes. National Lead introduced a new white-lead paint in ready-to-use form. Paratex metal coating is a rubber-base preparation. Penetrol, a primer, is said to pierce rust on steel to stop further corrosion. Plitex is a canvas paint in 14 colors. Pro-Cote is applied on finished metal surfaces to protect them against corrosion in storage or transit. Reflect-O-Lite is a wall paint containing soybean protein. Tanco is a sound-deadener paint for sheet metals. Thurmalox paints are for use on hot metal surfaces. Wil-Bond is a liquid for deadening gloss.

A hot-dip phosphate solution treatment is utilized in improving the protective value of paints for steel. Various types of wax-fortified paints provide finishes said to be hard to mar and easy to clean. Alkyd emulsion paints have many uses. The application of germicidal paints has been proposed as a helpful factor in reducing atmospheric microbial contamination, but the addition of antiseptics in practicable amounts has met with little success. Mildew infection of white paints can be inhibited by incorporating large proportions of zinc oxide; 1 per cent sodium pentachlorophenate gives almost complete control of mold growth. Mert ZT is a mold, mildew, and algae preventive for employment in paints. In paintings, it has been found easier to prevent mold by grinding fungicides into artists' paints than to destroy it after well established. Ridsmel is a paint deodorant. Five million gallons of paint are used annually in traffic marking. The U. S. Department of Agriculture announced a traffic pavement paint using soybean oil instead of tung oil. Imbedding glass beads in paint, besides giving luminous quality, tends to prolong the life of markings from eight months to a year. No-Wash is a paint remover.

Varnishes. The American Gum Importers Association is sustaining research on natural resins. Congo and Manila resins possess possibilities through esterification. Advagum is a terpene plasticized polymer. A commercially available diterpene fraction, which dries in 15 hours in films in the presence of driers, may be used to replace part of either the rosin or oil of varnishes. Belro resin is obtained during refining of Hercules FF rosin. Pentalyn resins produce rapid drying. Esters formed from pentaerythritol and rosin acids yield varnishes of better color and baking and ultraviolet light stability than those from ester gum. Maleic-rosin-glycerol resins make good furniture finishing varnishes. Hercolyn is used in furniture lacquers to prevent cold-checking of the film. In sparkproof truck wheels, colloidal graphite mixed with varnish and fabric provides a conductor in the laminated rim. Ire-O-Volt is an electrical insulating tubing treated with an oil-base varnish. Harvel 612-C is an insulating varnish for use with windings that carry glass-fiber and asbestos insulation, consisting of a phenolic-resin base made from cashewnut-shell extract. Master Shellac Fortifier is said to prevent abrasion in varnished floors.



BELL TELEPHONE LABORATORIES

Determining the corrosion-resisting properties of paint by measuring the electrochemical potentials

Synthetic Resin Coatings. Cyclic ketones, derivatives of isophorone of high molecular weight, are being used as plasticizers for coatings. *N*-*n*-butyl sulfonamide is a plasticizer for cellulose acetate and nitrate. *N*-formyl-aminodiphenyl improves nitrocellulose compositions. New synthetic resin-base machinery finishes are said to possess greater durability than oil- or varnish-type enamels. As to coatings for use on electroplated ware, modified nitrocellulose lacquers have good adhesion, toughness, and abrasion resistance, but lose adherence on aging. Phenolic-type resins have the good characteristics of nitrocellulose lacquers and chemical resistance in addition but tend to turn yellow on aging. Alkyd resins have many good characteristics, including gloss retention. Urea and melamine resins, which are converted into hard, chemical- and oil-resisting films by heat, are quite useful. Uformites F-226-E and MM-58 are urea and melamine formaldehyde resins for coatings. A line of baking enamels that can be applied on plastics as well as metal parts has been announced by Duralac. Coatings of Vinylite on steel have replaced corrosion-resistant metals for many purposes, such as in refrigerator trays and washing-machine parts.

Spraying, Drying, and Baking. If Boothcote is sprayed on walls before painting operations are begun, the accumulation of paint spray may be stripped off in sheets. Bricate is used on the wet parts of spray booths; Linatol sticks on the dry walls of booths but can be washed off with a hose. The main saving with infrared heating is in time; the number of parts or bodies in process are reduced by short finishing cycles. Boston Wire Stitcher has speeded with infrared lamps the baking of finishes on wire-stapling products; Acme Chair now bakes finishes on metal folding chairs this way in 12 minutes instead of an hour by former practice. Nalco inside-silvered carbon



BELL TELEPHONE LABORATORIES

An x-ray study of crystallinity in cellulose esters

filament lamps are for employment in drying and baking.

The Status of Leather Manufacture

The War Department issued a manual on the classification, processing, and inspection of leather and leather equipment. The National Bureau of Standards devised a method for measuring the permeability of leather to water vapor. An improved dressing material, or "dubbin", developed by the Quartermaster Corps in cooperation with the Bureau of Standards, is expected to improve the serviceability and comfort of Army shoes. The C. W. S. has formulated a paste decontaminating agent for protecting shoes from the effects of mustard gas. The fungistatic action of leather insoles containing rubber impregnated with hydroxyquinoline, *p*-chloro-*m*-xylenol, and chlorothymol has been studied.

Calcium hydrosulfide, an unhairing agent, is available commercially in 30 per cent solution; Depilin-X is another dehairer. The cultivation of sumac and canaigre is being investigated, with emphasis upon the determination of growth conditions most favorable for tannin production. Research, however, has enabled several tanners to develop blends which effect satisfactory operations without the use of sumac and valonia. New-type tanning extracts are said to make kid shoes more resistant to scuffing. Pecan shells are thought to warrant consideration as a commercial source of tannin. Sulfite salts have been found effective in retarding discoloration and loss of tannin in aqueous solutions of tannic acid. Alkyd resins, modified with nondrying oils, are used on leather in conjunction with nitrocellulose; acrylic ester polymers have found application in the form of water dispersions. Tetraalkyl ammonium hydroxide dissolves keratins in the cold.

A hidebound belief is that it is not possible to produce a plastic with the same architectural pattern as leather. But it should be possible, according to experts, to make a form of plastic having means of ventilation, for satisfactory use in shoes.

Roll of Results in Rubber Research

The yearly American needs of rubber have increased from 1 to 10.5 pounds per person in the past 30 years. About 80 per cent of the rubber consumed normally is used in the automotive industry: the modern automobile contains about 200 different parts made wholly or in considerable part of rubber; including the tires and tubes, the weight of these materials is about 145 pounds per car. Reclaimed rubber production has continued at practical capacity. Dispersite is a water-dispersion of reclaimed rubber.

Rubber Production. The United States and Mexican Departments of Agriculture concluded an agreement for rubber-producing experiments in Mexico. The Governments of the United States and Haiti announced agreement on a program whose central feature is a plan of rubber development. The rubber-plantation industry in the Western Hemisphere is on the way to progress. Surveys of equatorial America's potential rubber-producing areas have done much more than show that rubber can be cultivated there; by means of wide plant collection and assembling at strategic points, production actually has been started. It takes seven years at the shortest to get a rubber plantation to the tapping stage. The U. S. Department of Agriculture approved a $25,000,000 project to plant guayule in the Southwest. Scientists at California Institute of Technology are experimenting with the guayule plant as a source of rubber. Preparation of rubber from guayule grown in Salinas Valley is directed by American Rubber Producers; the output is being used as a mixer and sealer because of its adhesive qualities.

Rubber Processing. Calcium nitrate has been suggested as a coagulant in latex dipping processes. 2-Nitro-2-methyl-1-propanol is a heat sensitizer for latex. Diazoaminobenzene (Unicel) is employed as a blowing agent in producing rubber sponge. Sheet rubber in continuous lengths is being made from latex. A machine which changes rubber from raw material to finished product is being used to speed up production of self-sealing fuel-tank linings. Rubber processing may profit by utilizing methods of injection molding developed by the plastics industry. Pellet rubber is said to facilitate mixing. Ethyl xanthic acid anhydride has been put forward as a plasticizing agent for rubber.

Vulcanization and Compounding. The crystallization of vulcanized rubber has been investigated at the National Bureau of Standards. In cold climates some rubber products have been observed to undergo slowly an increase in rigidity and permanent set; the crystallization of unstretched specimens of vulcanized rubber of low sulfur content offers a basis for the explanation of such phenomena. 6,6′-Bis-(2,2,4-trimethyl-1,2-dihydroquinoline) has been suggested as an antioxidant for low-sulfur-content rubber articles. Di-(2-methyl-4-isopropylphenol)-sulfide has been proposed as an antioxidant for white rubber goods. Du Pont 2-MT is an all-purpose vulcanization accelerator. Monsanto 2-mercapto-4-phenylbenzothiazole is another accelerator. 1-Nitro-2-methylpropane is an antigel or vulcanization inhibitor in cements containing ultra-accelerators, but is reported inferior to 1-chloro-1-nitropropane. Hydrated alumina is being used in place of zinc oxide as a reinforcing pigment in compounding. The properties of Naftolen from a compounding standpoint were described. Duramin is a combination of age resisters, stemming from nonaccelerating aldehyde-amine condensation products, utilized in the Goodyear Silvertown tire line and certain types of mechanical goods. A chlorinated dihydroxydiphenylmethane is employed as an antiseptic in rubber.

Tire Technology. Leading tire manufacturers have been eliminating truck tire wrapping and all nonessential tire lines so as to simplify production and distribution in aiding defense. Rubber for civilian use must indeed be stretched. Major tire companies are planning to establish retreading stations on a national scale. An investigation of the requirements for extra performance in high-speed, heavy-duty pneumatic tires has resulted in a method of increasing cotton cord strength about one third and also trebling its flex life. A cord of even better characteristics is anticipated by Cotton Research Foundation. More than a bale-and-a-half of cotton goes into each 36.00-40 Firestone 34-ply tire. A new rayon cord tire for passenger car service has been introduced



GOODYEAR FROM OEM

Lining for a bullet-seal aircraft tank being inspected

by U. S. Rubber. Light tires of synthetic rubber, strengthened by woven glass cord, are being studied. General Purpose Compound of U. S. Rubber, because of its low rolling resistance in tires, is claimed to cut the cost of truck operation. A product that practically prevents cracking of tread and side wall rubber has been developed by Firestone. Goodyear introduced a hydrotire and a filling process for increasing weight and traction by the use of water. Automotive static neutralizer is a fine powder that floats in the air inside an inner tube; industrial tires are made that conduct static electricity to the ground; rubber products which are conductive have also been developed for special service conditions, such as for airplane tire treads, airplane wing de-icers, gasoline hose nozzles, floorings, washing-machine belts, and hospital operating-room equipment.

Other Rubber Products. Rubber tank treads, self-sealing hose, bullet-sealing tires, flotation gear for disabled land planes alighting on water, and surgical pads were exhibited. U. S. Rubber developed rubber springs for mine cars. Falk Airflex is a rubber air-cushioned coupling to reduce the transmission of vibrations of pulsating machinery. Hevaloid is a transmission belt consisting of cotton impregnated with latex; Homocord is a new type of rubber conveyor belt. Teneplate is a molding medium, a thin aluminum foil covered with a wax-rubber plastic, used in electrotyping. Filtomesh is a rubber-mesh material and Torflex is a rubber-backed bearing. Rai-Seal is a quick-hardening rubber joint-sealing material and Sealz is a thermoplastic rubber compound for sealing purposes. Rubber-base liquids are available for application to pulley faces. Royal insulation board is a cellular rubber product carrying nitrogen in a matrix. Velvetex is a base of rubber applied to rugs by vulcanization to provide a cushioned foundation. A golf ball with an oil center is said to be livelier and tougher. Angleworms have been molded of rubber for fish lures; they are filled with a paste flavored with roe.

Cyclized and Chlorinated Derivatives. The so-called synthetic-balata mix D-30-T14 for high Pliolite-low rubber ratio is employed as a golf ball cover stock; another use is in protective helmets. Other applications of Pliolite-rubber mixtures are in coated fabrics and wire insulation. Plioform is being utilized in fuel tanks of airplanes and combat vehicles. Pliofilm gas-decontamination suits and baby parachutes for naval aircraft flares were shown; Pedettes are Pliofilm foot coverings. Early in 1942 Hercules will increase by nearly 50 per cent its production of Parlon chlorinated rubber. The first of a series of full-scale Raolin chlorinated rubber manufacturing units was placed in operation; the employment of Raolin-coated paper in closure linings was described.

Synthetic Rubbers. So far 29 varieties of synthetic rubber have been studied. Current synthetic production of general purpose rubber is equivalent to about 3 per cent of the crude rubber consumption; the output in 1942 should be at least 15 per cent of normal requirements. Factories arranged for and building are capable of producing at the rate of 40,000 tons of synthetic rubber by the end of 1942. Expansion of the plants being erected by four American manufacturers in cooperation with the Federal Loan Agency will provide another 40,000 tons of annual capacity. The following table shows American production of synthetic rubbers in recent years (in tons):

Year	Neoprene Types	Butadiene Types	Polysulfide Products
1939	1,750	None	500
1940	2,500	60	700
1941	9,000	4,000	1,400

In March Carbide and Carbon Chemicals shipped its first tank car of butadiene. Later it was announced that another larger butadiene plant would be constructed. Elastomers produced from Carbide and Carbon Chemicals dichloroethyl formal are employed extensively in self-sealing linings for fuel tanks and hose on military aircraft. Duraplex and dibutyl sebacate have found application as processing aids for synthetic rubbers; butyl phthalate is being used as a synthetic rubber softening agent; Resinous Products and Chemical Plasticizer 30 is interesterified phthalic anhydride and butyl and capryl alcohols.

Neoprene. Neoprene is valuable in defense in many ways and in April a million pounds were allocated to about 250 companies for use in such work. In 1941 the automobile and aircraft industries have used well over 100 different neoprene parts. Construction was begun on a new neoprene plant at Louisville, Ky., with a capacity of 10,000 tons a year. Ammonia has practically no effect on neoprene; dry sulfur dioxide stiffens the surface and, after continued exposure over long periods, stiffens neoprene throughout. Methyl chloride swells most neoprene compounds, but special products have given satisfactory service. Freon-type refrigerants swell and dissolve rubber but have practically no effect on neoprene products. Neoprene FR retains rubberlike properties at low temperatures.

A vibration- and shock-absorbing mounting offered for aircraft equipment applications is made of two stainless steel tubes separated by and mechanically bonded to a wall of neoprene. Neoprene is being employed in flexible bearings. A threadless pipe coupling has a neoprene gasket for sealing. P. A. W. sealing tape is a neoprene-faced cotton fabric for gasketing riveted seams in marine construction. Neoprene is said to give longer life than rubber in typewriter feed rolls. Par-Grip boots use neoprene. Dry-cleanable dress shields have been made with neoprene lining coats.

Ameripol. Goodrich is expanding Ameripol output from 6 to 18 tons a day. In its resistance to aging Ameripol is described as superior to natural rubber; its resistance to acids and alkalies is about the same. Special cements have been developed which enable vulcanization and adhesion to metals, provided the latter can be suitably roughened. Ameripol has uses involving resistance to petroleum products, such as in molded and lathe-cut

CONTINUED ON PAGE 41

PRELIMINARY PROGRAM

Memphis Meeting, American Chemical Society

April 20 to 24, 1942



General Chairman Bowld



Vice Chairman Rogers



Vice Chairman Nash



Honorary Chairman Coulter



BLANK AND STOLLER

Vice Chairman Barrow



Vice Chairman Bowers

General Program

Registration and most divisional meetings will be held in the Municipal Auditorium. A few sessions will be scheduled for the Sunday School Building of the First Methodist Church, one block from the Auditorium. The Division of Rubber Chemistry will meet in the Hotel Claridge.

Sunday, April 19

2:00 to 9:00 P. M.—Registration, Municipal Auditorium.
8:00 to 10:00 P. M.—Social hour.

Monday, April 20

8:00 A. M. to 6:00 P. M.—Registration.
9:30 A. M.—Council meeting.
12:15 P. M.—Group luncheons.
2:00 P. M.—General meeting.
6:30 P. M.—Group dinners.
8:15 P. M.—Entertainment.

Tuesday, April 21

7:30 A. M.—Group breakfasts.
8:00 A. M. to 6:00 P. M.—Registration.
9:00 A. M.—Divisional meetings.
9:00 A. M.—Plant trips.
12:15 P. M.—Group luncheons.
2:00 P. M.—Divisional meetings.
2:00 P. M.—Plant trips.
6:30 P. M.—Group dinners.
6:30 P. M.—Barbecue and entertainment.

Wednesday, April 22

7:30 A. M.—Group breakfasts.
8:00 A. M. to 6:00 P. M.—Registration.
9:00 A. M.—Divisional meetings.
9:00 A. M.—Plant trips.
12:15 P. M.—Group luncheons.
2:00 P. M.—Divisional meetings.
2:00 P. M.—Plant trips.
7:00 P. M.—Subscription dinner.
9:30 P. M.—Complimentary dance.

Thursday, April 23

7:30 A. M.—Group breakfasts.
8:00 A. M. to 6:00 P. M.—Registration.
9:00 A. M.—Divisional meetings.
9:00 A. M.—Plant trips.
12:15 P. M.—Group luncheons.
1:30 P. M.—Golf tournament.
2:00 P. M.—Divisional meetings.
2:00 P. M.—Plant trips.
6:30 P. M.—Group dinners.

Friday, April 24

7:30 A. M.—Group breakfasts.
8:00 A. M. to 12:00 M.—Registration.
9:00 A. M.—Divisional meetings.
9:00 A. M.—Plant trips.
12:15 P. M.—Group luncheons.
2:00 P. M.—Divisional meetings.

Local Committee Chairmen

HONORARY CHAIRMAN—Victor A. Coulter.
GENERAL CHAIRMAN—William F. Bowld, Buckeye Cotton Oil Co.
VICE CHAIRMAN—E. R. Barrow.
FINANCE—E. R. Barrow.
PRINTING AND SIGNS—T. L. Rettger.
PUBLICITY AND PRESS—R. F. Gould.
REGISTRATION—J. N. Pless.
VICE CHAIRMAN—P. D. Bowers.
INFORMATION—Jeff M. Hart, Jr.
LADIES' ENTERTAINMENT—G. N. Ferguson and Mrs. K. H. Hicks.
STUDENT CHEMISTS—G. H. Hayden.
WOMEN CHEMISTS—Mrs. K. H. Hicks.
VICE CHAIRMAN—T. P. Nash, Jr.
ENTERTAINMENT—E. E. Hembree.
GOLF—J. R. Meadow.
GROUP MEALS—E. F. Williams, University of Tennessee, Memphis.
VICE CHAIRMAN—L. N. Rogers.
ACCOMMODATIONS—E. R. Stevens.
MEETING ROOMS—J. D. Atkinson, Jr., Buckeye Cotton Oil Co.
TRANSPORTATION AND TRIPS—C. B. Weiss.

Ladies' Program

Ladies' headquarters will be maintained in the Hotel Peabody.

Sunday, April 19

2:00 to 9:00 P. M.—Registration, Municipal Auditorium.
8:00 to 10:00 P. M.—Social hour.

Monday, April 20

8:00 A. M. to 6:00 P. M.—Registration.
2:00 P. M.—General meeting.
3:00 to 5:00 P. M.—Complimentary tea and reception.
8:15 P. M.—Entertainment.

Tuesday, April 21

10:00 A. M. to 4:00 P. M.—Sightseeing tour of the Memphis park system, the Brooks Memorial Art Gallery, and the Pink Palace.
6:30 P. M.—Barbecue and entertainment.

Wednesday, April 22

10:00 A. M. to 4:00 P. M.—Garden tours encompassing the finer private iris and peony gardens. Supplementary plant visits will be arranged.
7:00 P. M.—Subscription dinner.
9:30 P. M.—Complimentary dance.

Thursday, April 23

9:00 A. M. to 4:00 P. M.—Annual Holly Springs Pilgrimage.

Registration

The Registration Headquarters of the meeting will open at 2:00 P. M. Sunday in the Main Street (east) corridor of the Municipal Auditorium, and will continue there throughout the meeting. The registration fee, required by vote of the Council to help carry local expenses, has been fixed at $3.00 for members and visitors other than American nonmember chemists and chemical engineers; $8.00 for American nonmember chemists and chemical engineers. All members and visitors must register. Admission to meetings will be restricted to those wearing official badges of this meeting.

Society Regulations Governing Registration

BYLAW 2. (*a*) Attendance at meetings of the SOCIETY is limited to registered persons.

(*b*) All persons in registering at meetings of the SOCIETY shall state whether or not they are members of the SOCIETY and, if not, whether they are chemists or chemical engineers.

(*c*) American chemists or chemical engineers, nonmembers of the SOCIETY, attending meetings of the SOCIETY, shall assist in the support of the facilities which they enjoy by paying a higher registration fee than members. This differential at general meetings shall be $5.00 higher than the fee charged members; while at regional and divisional meetings it shall be at least twice the regular fee adopted. They shall be furnished with a special nonmember badge to differentiate them from members of the SOCIETY and from foreign and nonchemist guests. The differential charged shall not apply to regularly matriculated students majoring in chemistry or chemical engineering at any college or university.

(*d*) Meetings are normally open to all registrants, but any session may be closed to nonmembers of the SOCIETY by order of the President.

NOTE. Corporation members have the right to designate *one representative only* with membership privileges at each meeting. If a *corporation member* sends a substitute for the delegate of record, the Secretary's office should be informed by mail. In registering, such a representative should sign the corporation name, per his own as representative.

Associate members of local sections and of divisions are not members of the Society, and have no Society privileges; if chemists or chemical engineers, their registration fee is $8.00. All visitors, including children, regardless of age, who participate in any trips, lunches, or other activities provided on either the men's or women's program, regardless of whether they are free or paid events, must pay the visitors' registration fee, $3.00, and wear the appropriate badge.

Hotels

Hotel Peabody, Union Avenue between Second and Third Streets, has been designated as headquarters for the meeting.

Hotel Claridge, 109 North Main St., will be headquarters for the Division of Rubber Chemistry.

Requests for reservations should be sent at once to the A. C. S. Hotel Committee, Memphis Chamber of Commerce, Hotel Peabody, Memphis, Tenn. Please fill out the hotel reservation application in this CHEMICAL AND ENGINEERING NEWS, page 36, giving all the data requested.

Because of the present large demand for hotel rooms in Memphis, it is imperative that reservations be made at the earliest possible date. For the same reason, double occupancy of rooms is desirable. Since defense activities are making a heavy call on Memphis hotels, the convenience of a single room should be sacrificed as a patriotic contribution. It is in this spirit that the Hotel Committee asks that (1) hotel reservations be made early, giving the dates of arrival and departure, and (2) members arrange to share double rooms.

Rooms for students will be available at 75 cents per day and up.

Railroad Rates

Owing to the general reduction of railroad rates, railroads have discontinued the granting of reduced fares to conventions. However, there are substantial reductions in special 15, 30, and 60-day round-trip fares from many cities. Consult your local ticket agent.

By April there may be a shortage of Pullman cars for movement of civilian traffic. Therefore, *early reservation of space is recommended.*

Addresses of Divisional Secretaries

AGRICULTURAL AND FOOD CHEMISTRY. Roger H. Lueck, Research Department, American Can Co., Maywood, Ill.

ANALYTICAL AND MICRO CHEMISTRY. Francis W. Power, S.J., Fordham University, New York, N. Y.

BIOLOGICAL CHEMISTRY. Erwin Brand, 630 West 168th St., New York, N. Y.

CELLULOSE CHEMISTRY. Charles R. Fordyce, 275 Maplewood Drive, Rochester, N. Y.

CHEMICAL EDUCATION. Paul H. Fall, Hiram College, Hiram, Ohio.

COLLOID CHEMISTRY. J. W. McBain, 571 Foothill, Stanford University, Calif.

GAS AND FUEL CHEMISTRY. G. R. Yohe, State Geological Survey, Urbana, Ill.

HISTORY OF CHEMISTRY. Ralph E. Oesper, Department of Chemistry, University of Cincinnati, Cincinnati, Ohio.

INDUSTRIAL AND ENGINEERING CHEMISTRY. Whitney Weinrich, Gulf Research & Development Co., Box 2038, Pittsburgh, Penna.

MEDICINAL CHEMISTRY. John H. Speer, 4737 Ravenswood Ave., Chicago, Ill.

ORGANIC CHEMISTRY. Arthur C. Cope, Department of Chemistry, Columbia University, New York, N. Y.

PAINT, VARNISH, AND PLASTICS CHEMISTRY. Adolf C. Elm, New Jersey Zinc Co., Box 263, Palmerton, Penna.

PETROLEUM CHEMISTRY. Cary R. Wagner, Pure Oil Co., 35 East Wacker Drive, Chicago, Ill.

PHYSICAL AND INORGANIC CHEMISTRY. Oscar K. Rice, Department of Chemistry, University of North Carolina, Chapel Hill, N. C.

RUBBER CHEMISTRY. Howard I. Cramer, Sharples Chemicals, Inc., 23rd and Westmoreland Streets, Philadelphia, Penna.

SUGAR CHEMISTRY AND TECHNOLOGY. E. Whitman Rice, National Sugar Refining Co., 129 Front St., New York, N. Y.

WATER, SEWAGE, AND SANITATION CHEMISTRY. H. Gladys Swope, North Shore Sanitary District, Dahringer Road, Waukegan, Ill.

Official Hotels

HOTEL	RATES		
	For One Person*	For Two Persons	Suites
Peabody	$3.00 to 6.00	$4.00 to 10.00	$14.00 to 25.00
Claridge	3.00 to 5.00	4.00 to 8.00	.....
Ambassador	2.25 to 3.00	2.25 to 3.00	.....
Blackstone	1.50 to 2.50	2.50 to 4.00	.....
Chisca	1.50 to 4.50	3.50 to 5.00	7.00
De Voy	2.00 to 5.00	3.50 to 5.00	.....
Gayoso	2.50 to 5.00	3.50 to 6.00	.....
Wm. Len	2.50 to 3.50	3.50 to 4.00	6.50

* Limited in number. Double occupancy is desirable.

Papers for the Meeting

Titles for papers should be sent to the secretary of the appropriate division and *not to the Secretary of the Society. Titles to appear on the final program and abstracts, or complete papers where required, must be in the hands of the division secretaries not later than February 16.*

Society Regulations Governing Papers

BYLAW 3. (*a*) Papers by American chemists or chemical engineers not members of the SOCIETY shall not appear on the programs of general, divisional, or regional meetings of the SOCIETY unless they be joint papers with SOCIETY members.

(*b*) All papers presented before general, divisional, regional, group, local section, or other meetings are the property of the SOCIETY, to be published in the journals of the SOCIETY or released by the appropriate editor if not retained for such publication.

(*c*) The SOCIETY is not responsible for statements and opinions advanced by individuals in papers or discussions before its meetings.

(*d*) Any paper, although announced in the final program, may be excluded at any time prior to delivery by order of the President.

The Board of Directors has voted the following regulations (R-55) governing papers to be presented before general, divisional, regional, or group meetings, supplementing Bylaw 3:

(*a*) Authorship of papers shall be accredited only to individuals and not to companies or laboratories.

(*b*) No paper may be presented which has been offered for publication elsewhere.

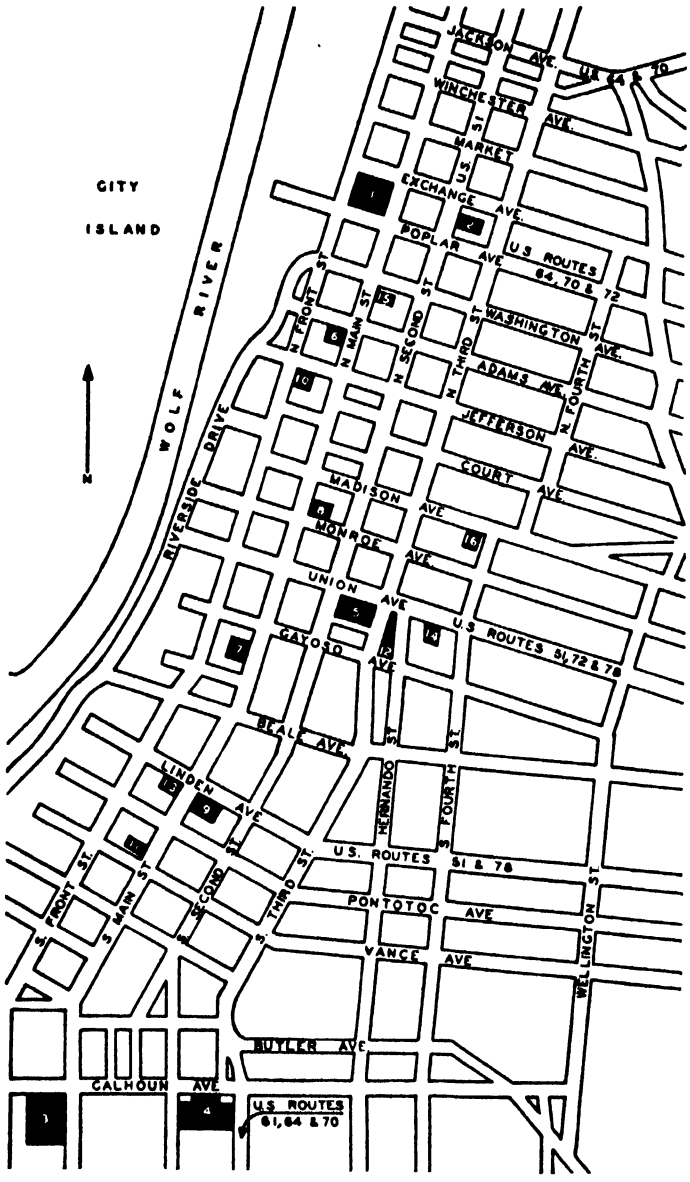
(*c*) No paper, no matter how important, may be presented, the title of which does not appear on the final program.

(*d*) If a paper is declined by any division of the SOCIETY, the secretary of that division is instructed to notify the secretary of any other division to which it is likely to be offered.

Priority is based solely upon the date of receipt of the *complete* paper deposited for publication with the secretary of the division or the appropriate editor.

The Council has empowered officers of divisions to request any paper in advance, so that it may be passed upon and an indication made to the author as to whether he is to read the entire paper or to abstract it in order to give time for discussion.

No paper may be presented at the meeting, title for which is not printed in the final program.



Map of Downtown Memphis

1. Municipal Auditorium
2. First Methodist Church Sunday School Building
3. Grand Central Station
4. Union Station
5. Hotel Peabody
6. Claridge Hotel
7. Gayoso Hotel
8. Wm. Len Hotel
9. Chisca Hotel
10. DeVoy Hotel
11. Ambassador Hotel
12. Tennessee Hotel
13. Adler Hotel
14. Rex Hotel
15. Jefferson Hotel
16. Reid Hotel

Outlying Hotels

Blackstone Hotel	855 Union Ave.
Parkview Hotel	1914 Poplar Ave.
Alamo Plaza Courts	2862 Summer Ave.

"By title" should be placed on the announcement of any paper when the author is to be absent, so that members may understand in advance that the paper will not be read. All such papers should be placed at the end of the program.

Authors should state whether or not they will require a lantern.

Divisional Requirements

The Division of Agricultural and Food Chemistry requires that those wishing to present papers at the meeting submit, in duplicate, a 200-word abstract together with information regarding the time required for presentation of the paper. Abstracts should be accompanied by the name and address of the author (or authors), the name of the laboratory in which the work was done, and information concerning the projection equipment required, if any. Abstracts must be in the hands of the secretary of the division not later than February 16. Authors will kindly notify him if they plan to present papers before other divisions. Planographed abstracts of the papers will be sent to all members of the division about two weeks prior to the meeting.

The Division of Analytical and Micro Chemistry requires that authors who plan to present papers before the division return to the secretary of the division not later than February 16 a form which lists the title of the paper, name and address of the author (or authors), name of the laboratory in which the work was done, time needed for informal presentation, projection equipment required, a 200- to 250-word abstract, and one copy of the complete paper.

The Division of Biological Chemistry requires by February 16 a 200-word abstract *in duplicate* and information regarding the time required for presentation of the paper. If deemed necessary, the division may request a 1,000-word abstract or the complete manuscript. Abstracts will be sent to members of the division prior to the meeting.

The Division of Cellulose Chemistry requires that an abstract not to exceed 200 words and two copies of the manuscript

be in the hands of the secretary of the division on or before February 16. Two copies of the manuscript are necessary in order that the paper may be considered by the review committee within the time remaining between February 16 and the date on which the final program is submitted for publication.

The Division of Chemical Education requires by February 16 a 200-word abstract, the complete paper, and information on the time needed for presentation. Abstracts of all papers on the divisional program will be sent to members of the division in advance of the meeting.

The Division of Colloid Chemistry requires not later than February 16 three copies of an abstract of about 200 words. The complete manuscript should be handed to the secretary of the division after the paper is presented.

The Division of Gas and Fuel Chemistry requires not later than February 16 a 200-word abstract, the complete paper, and an estimate of the time needed for presentation.

The Division of the History of Chemistry requires that its secretary receive not later than February 16 the name of the author (or authors) with address and official connection at the time of the work reported, an abstract not to exceed 250 words, and information regarding the time required to present the paper and need for a lantern. The complete manuscript should not be sent to the secretary of the division. After the paper has been read the manuscript, *prepared for publication*, should be submitted to the Editor of the *Journal of Chemical Education*.

The Division of Industrial and Engineering Chemistry requires the complete paper for submission to reviewers. It must be received by February 16 and accompanied by a 200-word abstract, the name of the laboratory in which the work was done, and information regarding the time requirement and need for a lantern. The paper will be placed upon the final program only after receiving a favorable report from the reviewers.

The Division of Medicinal Chemistry requires that authors submit by February 16 the complete manuscript, three copies of a 200-word abstract, an estimate of the time needed for presentation, and the name of the laboratory in which the work was done. The executive committee has full authority to accept or reject papers.

The Division of Organic Chemistry requires (1) a 200-word abstract, which must be typed in the space allotted on a form supplied by the secretary of the division, and (2) a more extensive abstract of at least 1,000 words, or a copy of the manuscript in form for publication. Both must reach the divisional secretary by February 16, after which no additions, changes, or withdrawals of papers can be made.

The Division of Paint, Varnish, and Plastics Chemistry requires that those wishing to present papers at the meeting send the title and two copies of an abstract to the secretary of the division before February 16. Two copies of the complete paper should be sent to the secretary before March 1.

The Division of Petroleum Chemistry requires that members wishing to present papers submit before February 16 three copies of a 100-word abstract and three copies of a 1,000-word abstract; before March 2, three copies of the complete paper must be in the hands of the secretary of the division. If the final paper is submitted in triplicate by February 16, the 1,000-word abstract is unnecessary.

The Division of Physical and Inorganic Chemistry requires that titles for papers be accompanied by an abstract of approximately 100 words for distribution to the members of the division, and the complete manuscript or another abstract of 1,000 words. The short abstracts should follow the form used in the sets of planographed abstracts for previous meetings; please refer to a recent copy. The manuscript or long abstract will be returned only upon request made at time of transmittal. All material must reach the secretary of the division before February 16, and no alterations or additions may be made thereafter. No title will be placed upon the program unless an author expects to be present to give the paper.

The Division of Rubber Chemistry requires by February 16 three copies of an abstract of 200 to 250 words, an estimate of the time needed for presentation, and the name of the laboratory in which the work was done. The complete manuscript (three copies) must be submitted to the secretary of the division on or prior to the date of presentation.

The Division of Sugar Chemistry and Technology requires a 100- to 200-word abstract, to be submitted not later than February 16.

The Division of Water, Sewage, and Sanitation Chemistry requires by February 16 five copies of a 250-word abstract, and information regarding time required and the laboratory from which the paper comes. The abstracts will be sent to members of the division prior to the meeting.

Publication of Papers

BYLAW 3 (*b*). All papers presented before general, divisional, regional, group, local section, or other meetings are the property of the SOCIETY, to be published in the journals of the SOCIETY or released by the appropriate editor if not retained for such publication.

If release is desired, address the editor

Divisional Programs

DIVISION	NUMBER OF SESSIONS	PROGRAMS
Agricultural and Food Chemistry	6	Vitamins (with Division of Biological Chemistry) Tuesday. Agricultural Products of the South (with Division of Industrial and Engineering Chemistry). Starch (with Division of Sugar Chemistry and Technology). Trace Elements in Nutrition (with Division of Biological Chemistry). General.
Analytical and Micro Chemistry	4	Analytical Methods in Organic Chemistry (with Division of Organic Chemistry). General.
Biological Chemistry	7	Vitamins (with Division of Agricultural and Food Chemistry) Tuesday. Trace Elements in Nutrition (with Division of Agricultural and Food Chemistry). General.
Cellulose Chemistry	4	General.
Chemical Education	4	The Problem of Teaching Chemistry. General.
Colloid Chemistry	2	General.
Gas and Fuel Chemistry	2	General.
History of Chemistry	2	History of the Development of Chemistry in the Southern States, Harrison Hale, Chairman. General: Biographical and Historical.
Industrial and Engineering Chemistry	3	Agricultural Products of the South (with Division of Agricultural and Food Chemistry). General.
Medicinal Chemistry	3	Recent Progress in Medicinal Chemistry. General.
Organic Chemistry	6	Analytical Methods in Organic Chemistry (with Division of Analytical and Micro Chemistry). General.
Paint, Varnish, and Plastics Chemistry	3	General.
Petroleum Chemistry	4	General.
Physical and Inorganic Chemistry	12	Rare Earths. The Hydrogen Bond. General.
Rubber Chemistry	3	General.
Sugar Chemistry and Technology	4	Starch (with Division of Agricultural and Food Chemistry). General.
Water, Sewage, and Sanitation Chemistry	2	General.

of the appropriate journal—i. e., H. E. Howe, A. B. Lamb, S. C. Lind, N. W. Rakestraw, or W. Albert Noyes, Jr. The editors will act promptly on any release requested when the paper is in their hands.

Abstracts of Papers

Abstracts should accompany all titles when sent to the secretaries of the various divisions. Many of the secretaries complain that they are caused embarrassment through the nonarrival or late arrival of both titles and abstracts. Members are urged to attend to this matter in order to facilitate proper cooperation with the News Service and enable the secretaries to have sets of abstracts ready in advance of the meeting.

Sets of Abstracts

Frequently there is a considerable period between the presentation of a paper and its publication, and in such cases the abstracts are of particular value.

The A. C. S. News Service, 1155 16th St., N. W., Washington, D. C., will supply abstracts of papers presented at the Memphis meeting. Sets are not guaranteed to be complete, but contain abstracts from all divisions as submitted by authors. The abstracts will be mailed as soon as possible after receipt of order, beginning about April 13, and will also be on sale at Memphis.

This enterprise is undertaken in a spirit of service and not for profit. Sets are offered on the following terms:

To members of divisions who forward receipt for divisional dues with remittance and order, 50 cents.

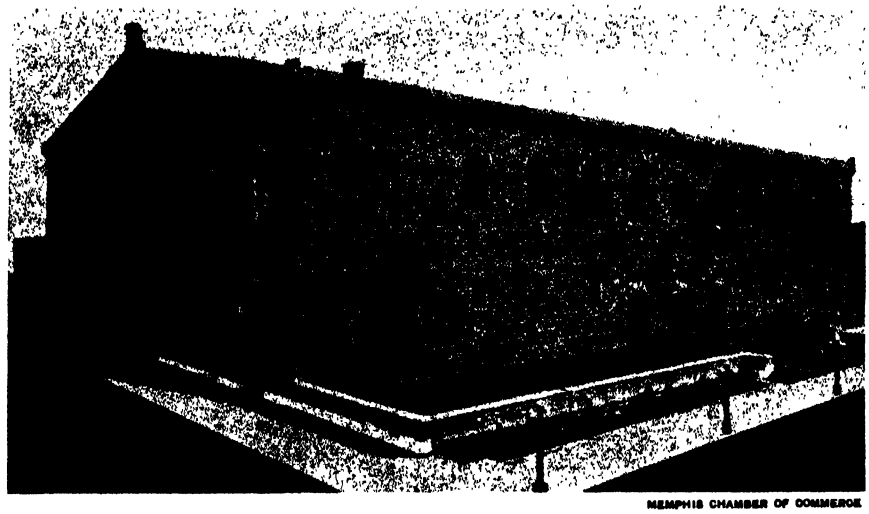
To those without receipt for divisional dues, who remit with order, $1.00.

To those who fail to enclose remittance with order, necessitating correspondence, $1.25.

To those who require bills to be rendered, $1.50.

News Service

The A. C. S. News Service will have a press room in the Hotel Peabody. Members who are to present papers will confer a great service and promote the efficiency of the publicity work by sending synopses to H. E. Howe, director of the News Service, 1155 16th St., N. W., Washington, D. C., as far in advance of the meeting as possible.



Memphis $2,000,000 Municipal Auditorium

Group Meals

Arrangements for group breakfasts, luncheons, and dinners should be made with the Group Meals Committee and not with the hotels. All correspondence should be addressed to E. F. Williams, University of Tennessee, Memphis, Tenn. Requests, indicating expected attendance and preference as to time, should be submitted by February 14 to facilitate the work of the committee and avoid conflicts.

Equipment for Divisional Meeting Rooms

Divisional meeting rooms will be equipped with a standard lantern slide projector, screen, blackboard, pointer, chalk, reading stand, reading light, table, and ice water. Motion picture and other *special projectors can be furnished* upon the request and *at the expense of divisions if notice is given* the Meeting Rooms Committee *before February 20, 1942*. Each divisional secretary should contact his local assistant and inspect the assigned meeting room before the first session of the division. Please direct all correspondence concerning meeting rooms to J. Dudley Atkinson, Jr., 849 Biggs St., Memphis, Tenn.

Plant Trips

The chemical industries of Memphis are diversified in nature and offer opportunity for a varied program of plant visits, provided the trips do not interfere with defense efforts. It is too early to state which plants can be inspected. The following are located in and around Memphis and plants to be visited will be selected from this group:

Buckeye Cotton Oil Co., cottonseed ginners and crushers and manufacturers of chemical cotton; Firestone Tire and Rubber Co., a large southern branch of the Akron plant; Millington Smokeless Powder Plant, a war plant operated by du Pont; Bruce Lumber Co., manufacturers of hardwood flooring; Southern Refinery or Humko Co., both processors of cottonseed oil and vegetable shortening; Forest Products Chemical Co., a destructive wood distillation plant; Memphis Packing Co., a pioneer of southern packing; Commercial Chemical Co., manufacturers of arsenate insecticides; Ford Motor Co., an assembly plant; Union or Federal Compress, where cotton bales are compressed to one third their regular size for storing or exporting; dairies such as Forest Hill, Reed Brothers, or Clover Farms. A trip to the Mule Auction, a unique institution where mules are bought and sold, may be included.

The University of Tennessee Medical School, with its many branches of research, provides a point worthy of repeated visits. The biochemists may also be interested in seeing the traveling hospital in operation.

The Watkins Experimental Farm may be visited at any time, and as many trips as desired may be scheduled.

Travel Information

Motorists will find travel in the South especially inviting in the springtime. On the roads to Memphis from all directions are many places of natural beauty and historic interest which are worthy of a visit. There are the mountain parkways through the Appalachian Range in the East, the battlefields of the Civil War throughout the South, and the famous gardens between Memphis and the Gulf which will be in full bloom in April. This suggests the possibility of an added vacation tour either before or after the Memphis meeting.

Definite information concerning best routes to Memphis can be obtained through local Automobile Clubs. The Committee on Transportation and Trips is prepared to send maps with recommended routes and points of interest to those who write for them. Address C. B. Weiss, Buckeye Cotton Oil Co., Memphis, Tenn.

Students

Students of chemistry and chemical engineering are urged to attend the Memphis meeting. By doing so, they will find many opportunities to improve themselves and make valuable contacts with other students and prominent chemists

from a wide territory. A broad field of subjects will be covered in the papers presented in the general and divisional meetings. The Student Chemists Committee in conjunction with the Division of Chemical Education is sponsoring a program of papers prepared by students. A low-cost breakfast for students is contemplated at the beginning of these sessions. An additional feature will be plant visits of educational value.

The registration fee for a regularly matriculated student of chemistry or chemical engineering is $3.00. Special low-priced hotel accommodations will be available. Some schools have signified that large groups will attend. For further details address G. H. Hayden, Memphis State College, Memphis, Tenn.

Student members and paid student affiliates of the AMERICAN CHEMICAL SOCIETY, registered at the meeting, are eligible to utilize the facilities of the A. C. S. Employment Clearing House (see next column).

Golf

The annual A. C. S. Golf Tournament will be held on Thursday afternoon, April 23, at the Chickasaw Golf Club in Memphis. Participants will tee off at 1:30 P. M., and the winner will receive the Wilson trophy for low gross score.

Women Chemists

Headquarters for women chemists will be maintained at the Municipal Auditorium. A complimentary tea will be served from 3:00 to 5:00 P. M. on Monday at the Hotel Peabody. A luncheon is planned for Tuesday. Arrangements for an Iota Sigma Pi breakfast also are being made for Tuesday.

All women chemists are cordially invited to attend the Memphis meeting.

Employment Clearing House

AT Memphis the SOCIETY will again provide facilities, beginning Sunday afternoon, to bring together employers looking for chemists and chemical engineers and *members and paid student affiliates registered at the meeting*, seeking employment and wishing to make such contacts.

Candidates for employment will file records in the Clearing House on forms which provide space for a photograph, personal data, and information regarding education and experience. The records are maintained in classified files and are indexed under all fields of training and experience. This enables an employer to find quickly the records of those with the qualifications desired.

Appointments for interviews will be made at the request of employers. Private booths will be available for such conferences. No chemist or chemical engineer looking for employment and no employer looking for trained men can afford to miss this opportunity. Many personnel representatives attend each meeting solely to take advantage of the service.

Candidates for Employment

By action of the Board of Directors (December 12, 1940), the Employment Clearing House is open only to members and paid student affiliates of the AMERICAN CHEMICAL SOCIETY registered at the meeting.

Advance registration is helpful to the registrant and to the staff of the Employment Clearing House. Please request the necessary forms from the AMERICAN CHEMICAL SOCIETY, 1155 16th St., N. W., Washington, D. C., in the near future. Forms will not be available to inquirers until February 1; requests received before that date will be filled as soon as possible. Forms can be completed under more favorable circumstances at home than in Memphis. If returned by mail well in advance of the meeting, trained Clearing House personnel will suggest, when desirable, changes that will make the record more serviceable to employers. Advance registration also enables completion of much of the clerical work in Washington, thus relieving congestion at the meeting. Records filed in advance cannot be inspected by employers until after the arrival of the registrants, since all users are assured that everyone whose vita is on file is available for interview. Those who do not file vitae by mail may fill out the forms in the Clearing House after arrival.

Since employers begin inspecting these vitae on Monday, most effective use is made of the records of those who arrive early in the week. At the most recent Clearing House, a larger proportion of interviews and offers of employment were received by those who registered during the first two days.

Amplification of the data on the forms and lists of publications cannot be accepted for filing in the Clearing House. Many employers decline to interview an individual whose photograph is not on his record; therefore, each person should bring with him two copies of a *good* picture (look pleasant; avoid flashlight photographs), not larger than 2.5 × 3 inches, and attach them to duplicate copies of his vita.

Employers

By action of the Board of Directors (December 6, 1941), the Employment Clearing House is not open to any employer or employer's representative "who, in offers made as a result of interviews in the Clearing House, is unwilling to meet the recommendations unanimously adopted

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Hotel Committee, Memphis Chamber of Commerce, Hotel Peabody, Memphis, Tenn.

Dear Sir: Please make hotel reservations noted below: _____ 1942

Hotel _____ First choice

Hotel _____ Second choice

Hotel _____ Third choice

If the hotel of first choice is unable to accept the reservation, the Hotel Committee will endeavor to comply with your second or third choice in the order named.

_____ Double rooms for _____ persons _____ Rate desired $_____ to $_____ per day

_____ Single rooms _____ Rate desired $_____ to $_____ per day

_____ Suite—parlor _____ bedroom(s) for _____ persons Rate desired $_____ to $_____ per day

Arriving April....., hour.....A. M.....P. M. Leaving.....

Print names and addresses of all occupants including person making reservation:

NAME	STREET ADDRESS	CITY	STATE

Please attach sheet listing additional names if necessary.

Signature_____

at the Atlantic City meeting of the AMERICAN CHEMICAL SOCIETY in its resolution on employer-employee relationships". (See NEWS EDITION, December 25, 1941, page 1442.)

Although employment of chemists and chemical engineers is at a high level owing to the demands of rapidly expanding industry, it is our expectation that employers will find in the Memphis Clearing House registrants whose availability might not otherwise be known. They will be drawn primarily from two sources: The small midwestern colleges not scouted by industry and those individuals seeking a change of employment, especially chemists and chemical engineers in nonessential industries wishing to make new connections in order to contribute directly to the defense program. Many employers expected a small Clearing House registration at the past two meetings. Actually 324 were available for interview in Atlantic City and 527 in St. Louis. At each of these meetings more than 1,000 interviews were arranged.

Those who have never visited an A. C. S. Employment Clearing House will find this unique employment aid of definite service if their experience follows that of those who regularly use it. Many employers send personnel department representatives to each meeting solely to take advantage of this service. The number of employers regularly using the A. C. S. Employment Clearing House at national meetings of the SOCIETY indicates that this activity is meeting a real need.

The forms filed by candidates for employment provide space for a photograph, personal data, and information regarding education and experience. A classified index will be maintained so that one can find quickly those with the special training or experience desired. A private room will be available in which employers' representatives may inspect the index and vitae at any time from Monday through Friday. At the request of the employer, interviews will be arranged promptly with any whose records are on file. The space available in Memphis will again permit erection of private interview booths.

We know of no other place at which one can find not only the records of such a diversified group of chemists and chemical engineers, but the individuals themselves. Any employer, having a vacancy to fill or anticipating one, can ill afford to pass up this opportunity to make personal contacts.

The advantages to employers are many. They may inspect these records without any of the registrants knowing they are looking for chemists. Personal interviews are always more satisfactory than correspondence; this plan makes available to each employer individuals from widely scattered localities who otherwise could be interviewed only through time-consuming and costly travel.

Plan on using the A. C. S. Employment Clearing House in the Municipal Auditorium, Memphis, April 20 to 24, 1942.

Final Program

The final program will be printed in the March 25 issue of CHEMICAL AND ENGINEERING NEWS.

CHARLES L. PARSONS,
Secretary

Survey of the Chemical Profession

THE Committee on Economic Status of the AMERICAN CHEMICAL SOCIETY is happy to report a very gratifying response to the mail questionnaire survey of the members of the AMERICAN CHEMICAL SOCIETY which is being conducted in cooperation with the United States Bureau of Labor Statistics.

On November 25, 1941, the bureau mailed 24,490 questionnaires to all individual members of the SOCIETY, except students, resident in the United States and its possessions.

The committee has been informed by the Bureau of Labor Statistics that, as of December 23, 1941, a total of 18,169 questionnaires, or 74.5 per cent of the original mailing list, had been returned. Of these, 16,848 or 68.7 per cent of the original mailing list have been transmitted to the bureau's Machine Tabulation Division for the preparation of the punch cards which will be used in the eventual analysis.

The remainder, totaling 1,321 questionnaires, cannot be included because of errors in answering certain questions. Thus, 835 were not coded for sex by respondents; 432 were improperly coded for educational level; and 54 members did not furnish information concerning the year in which they entered the profession.

Questionnaires are still coming in but at a very much reduced rate. The committee wishes to emphasize that *January 15, 1942, is the closing date for receipt;* questionnaires received later than this date cannot be included in the tabulations to be made at this time. It is also pointed out that all questions must be answered according to the instructions given in the form; otherwise the returns cannot be used.

It is estimated that the basic tabulations will be made available to the A. C. S. Committee on Economic Status by the Bureau of Labor Statistics early in February. In the interim, certain preliminary information is being compiled for the purpose of guiding the committee in formulating the program for the final publication of the data.

Register with the National Roster of Scientific and Specialized Personnel

THE National Roster of Scientific and Specialized Personnel in Cooperation with the AMERICAN CHEMICAL SOCIETY is now conducting a survey of the senior and graduate students of chemistry and chemical engineering in the universities of the country. It is urged that all persons with training in this field register with the National Roster as soon as possible.

The registers of this organization, containing the names of the scientific and professional individuals of the Nation, are of the utmost importance in our present crisis. They must be replenished and kept current in order that there always will be a supply of trained men and women to handle any situation or carry on any research which is essential to our war effort. Registering with the National Roster is one way in which the trained individual can do his part. An occasion may never arise when an individual would be asked by the Government to serve. On the other hand, the time may come when persons with certain skills will be vital to the welfare of the Nation either as full time workers, part-time workers, or as consultants.

Nothing has ever been lost through preparedness. Therefore, it is again urged that all specially trained persons who have not already done so register immediately with the National Roster of Scientific and Specialized Personnel. This can be accomplished by writing to Erle M. Billings, consultant, 343 State St., Rochester, N. Y., stating the field in which you are trained.











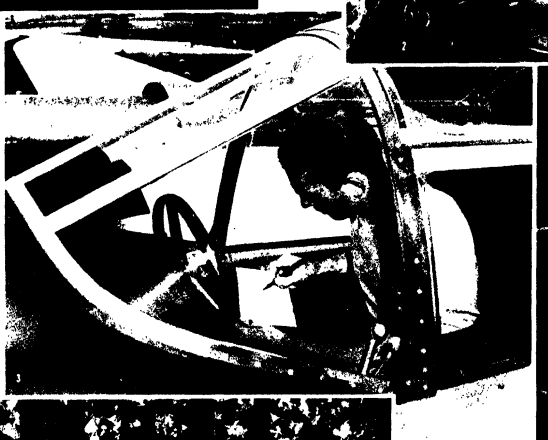
Industrial Research in the U. S. during 1941

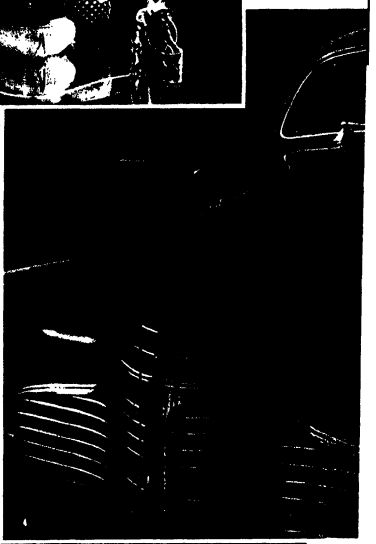
See page 42

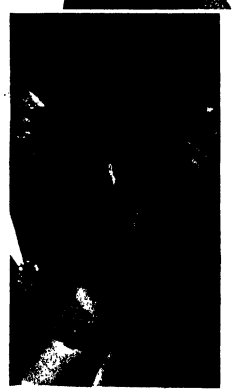
THE CHEMICAL NEWS PARADE

















(1) Du Pont Plastacele cellulose acetate is featured in this distinctive evening hair dress. (2) Everything shown here is science made—a rayon negligee, upholstery, drapery, curtains, rug, and lampshades; Lucite furniture; Lucite and nylon toiletware; and synthetic dyes. Courtesy, du Pont. (3) Sun glasses fabricated of Nitron, Monsanto cellulose nitrate sheet plastic. (4) A Plexiglas pin and earring set. Courtesy, Louis Werner. (5) Monsanto Lustron gems. (6) Another new use of Lustron. Courtesy, All-America Package Competition. *Right-hand page.* (1) Two identical sheets of Louverglas placed at different angles. Above, with girl looking through, it appears as a transparent sheeting with tiny hair lines in horizontal position. Below it appears translucent. This material, made of Plastacele cellulose acetate by du Pont, is intended primarily for fluorescent lighting fixtures. (2) Plexiglas bow-knots adorn vanity mirror, framed in the same plastic. Photo by Louis Werner. (3) A Lockheed Plexiglas enclosure. Courtesy, Röhm & Haas. (4) Transparent bug deflector is designed to create air currents to top and sides of car which will force insects away from windshield. It is molded from du Pont Pyralin cellulose nitrate. (5) Contribution of plastics technology to avian architecture, an acorn-shaped bird house of Resinox. Courtesy, Monsanto. (6) Air trap at Wakulla Springs, Fla., which provides a "filling station" for swimmers' lungs and observation booth for swimming coaches. The roof is made of du Pont Lucite methyl methacrylate.



American Chemical Society[1]

103RD MEETING. Memphis, Tenn., April 20 to 24, 1942.

104TH MEETING. Buffalo, N. Y., September 7 to 11, 1942.

105TH MEETING. Indianapolis, Ind., spring of 1943.

106TH MEETING. Minneapolis, Minn., fall of 1943.

Other Scientific Societies

AKRON RUBBER GROUP. Akron City Club, Akron, Ohio, January 30, 1942. The Standard Oil Co. will present three movie shorts.

AMERICAN ASSOCIATION OF CEREAL CHEMISTS. Edgewater Beach Hotel, Chicago, Ill., May 18 to 22, 1942. Annual meeting.

AMERICAN CERAMIC SOCIETY. Hotel Netherland Plaza, Cincinnati, Ohio, week of April 19, 1942.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Boston, Mass., May 11 to 13, 1942. Semiannual meeting.

AMERICAN PHYSICAL SOCIETY. Detroit, Mich., February 20 and 21, 1942.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS. Bellevue-Stratford Hotel, Philadelphia, Penna., January 25 to 29, 1942. Annual meeting.

INSTITUTE OF FOOD TECHNOLOGISTS. Minneapolis, Minn., June 15 to 17, 1942.

NATIONAL CHEMICAL EXPOSITION. Stevens Hotel, Chicago, Ill., November 17 to 22, 1942.

NATIONAL PETROLEUM ASSOCIATION. Hotel Cleveland, Cleveland, Ohio, April 16 and 17, 1942. 39th semiannual meeting.

SEVENTH INTERNATIONAL HEATING AND VENTILATING EXPOSITION. Commercial Museum, Philadelphia, Penna., January 26 to 30, 1942.

TECHNICAL ASSOCIATION OF PULP AND PAPER INDUSTRY. Commodore Hotel, New York, N. Y., February 16 to 19, 1942.

[1] The list of the SOCIETY's National Officers and Directors, Editors, members of Council, Divisional and Local Section Officers, Committees, and Chapters of Student Affiliates appears in CHEMICAL AND ENGINEERING NEWS three times a year—usually February 10, May 10, and October 10. The latest list is printed on page 1097 of the October 10, 1941 issue.

Local Sections

SECTION AND PLACE	JAN.	SPEAKER	SUBJECT
Akron, Women's City Club	22	Henry Eyring	Reaction Rates
Baton Rouge, Room 104, Nicholson Hall, Louisiana State University	21	W. C. Fernelius	Reduction Studies in Liquid Ammonia
Central Texas, Chemistry Building 12, University of Texas, Austin	19	W. C. Fernelius	Reduction Studies in Liquid Ammonia
Chicago, Stevens Hotel	23	Henry Gilman	Organometallic Compounds
Cleveland, Cleveland Engineering Society	21	Henry Eyring	
Columbus, Room 100, Chemistry Building, Ohio State University	19	J. K. Senior	Some Relations between Chemistry and Geometry
Dallas–Fort Worth, Fondren Library Auditorium, Southern Methodist University, Dallas	16	W. C. Fernelius	Reduction Studies in Liquid Ammonia
Delaware, Y. M. C. A., Wilmington	21	H. E. Howe	Chemistry in OPM
Detroit, Auditorium, Rackham Building	27	H. Mark	Elastic Properties of High Polymers
East Tennessee, Dabney Hall, University of Tennessee, Knoxville	22	Sherman E. Smith	Developments in Cellulose Structure
Eastern New York, Siena College, Loudonville	20	Henry Eyring	
Erie, Carnegie Hall, Allegheny College, Meadville, Penna.	23	Henry Eyring	Theory of Rate Processes
Indiana, Severin Hotel, Indianapolis	16	Ralph C. Corley	Immunity Reactions
Iowa, Chemistry Auditorium, State University of Iowa, Iowa City	20	W. M. Stanley	Viruses and the Transition from Molecules to Organisms
Lehigh Valley, Muhlenberg College, Allentown, Penna.	16	Louis A. Dahl	Systems of Refractory Oxides
Maryland, Room 101, Remsen Hall, Johns Hopkins University, Baltimore	16	Walter Clark	Color Photography
Memphis, Student Center, University of Tennessee	22	W. C. Fernelius	Reduction Studies in Liquid Ammonia
Michigan State College, Kedzie Chemical Laboratory, East Lansing	22	H. Mark	Mechanism of Polymerization Reactions
Midland, Mich., Auditorium, Dow Chemical Co.	26	H. Mark	Mechanism of Polymerization Reactions
Milwaukee, City Club	30	Arthur Knudson	Nutrition and Health
Minnesota, Room 100, Chemistry Building, University of Minnesota, Minneapolis	27	Arthur Knudson	Nutrition and Health
Montana, Bozeman	24	Arthur Knudson	Nutrition and Health
Nashville, Lecture Room, Chemistry Building, Vanderbilt University	21	Sherman E. Smith	Developments in Cellulose Structure
Northeast Tennessee, Hotel Bristol, Bristol, Va.	23	Sherman E. Smith	The Sorption of Water by High Polymers
Northeast Wisconsin, Appleton	29	Arthur Knudson	Nutrition and Health
Oregon, University of Oregon Medical School, Portland	17	Arthur Knudson	Nutrition and Health
Panhandle Plains, Capitol Hotel, Amarillo, Tex.	17	W. C. Fernelius	Reduction Studies in Liquid Ammonia
Pennsylvania-New York Western Border, Bradford, Penna.	24	S. L. Parsons	Spectroscopy
Puget Sound, Room 131, Bagley Hall, University of Washington, Seattle	19	Arthur Knudson	Nutrition and Health
Rochester, Lower Strong Auditorium, University of Rochester	19	R. L. Murray	Chlorine Industry and National Defense
Sioux Valley, Chapel, Morningside College, Sioux City, Iowa	26	Arthur Knudson	Nutrition and Health
South Jersey, Woodbury Country Club, Woodbury	20	R. L. Garman	Application of Electron Tubes
Southeast Tennessee, Chemistry Lecture Room, University of Chattanooga	28	Andrew J. Kelly	Developments in Textiles
Syracuse, Hotel Onondaga	26	Walter Clark	Color Photography
Toledo, Lecture Room, University of Toledo	28	H. Mark	Mechanism of Polymerization Reactions
University of Illinois, Room 112, Chemistry Annex, Urbana	23	W. C. Fernelius	Reduction Studies in Liquid Ammonia
University of Michigan, Ann Arbor	23	H. Mark	
Virginia Blue Ridge, Randolph-Macon Women's College, Lynchburg	24	Sherman E. Smith	Developments in Cellulose Structure
Washington–Idaho Border, Chemistry Building, Washington State College, Pullman	22	Arthur Knudson	Nutrition and Health
Western Connecticut, Hubbard Heights Golf Club, Stamford	26	Walter S. Landis	Chemical Situation Today (Open Forum)
Western Maryland, Fort Cumberland Hotel, Cumberland	16	M. L. Crossley	Dyes
Western New York, Niagara Falls	20	J. H. Foulger	Industrial Toxicology
Wisconsin, Chemistry Building, University of Wisconsin, Madison	21	M. S. Kharasch	Nonionic Mechanisms of Organic Reactions

Industrial Research in the United States

WILLIAM A. HAMOR

CONTINUED FROM PAGE 30

gaskets and rings to seal lubricants in bearings; Ameripol seals are being utilized on airplane hydraulic systems. Ameripol is also employed in sheet packings. Ameripol sponge is in production.

Compounds prepared by reacting fatty acids or fats with butadiene, indene, isoprene, and other unsaturated hydrocarbons, in the presence of catalytic agents, continue to show promise, specialists say, in the fields where flexible coatings are desired. A project at the Northern Regional Research Laboratory at Peoria relates to the making of synthetic rubber from corn.

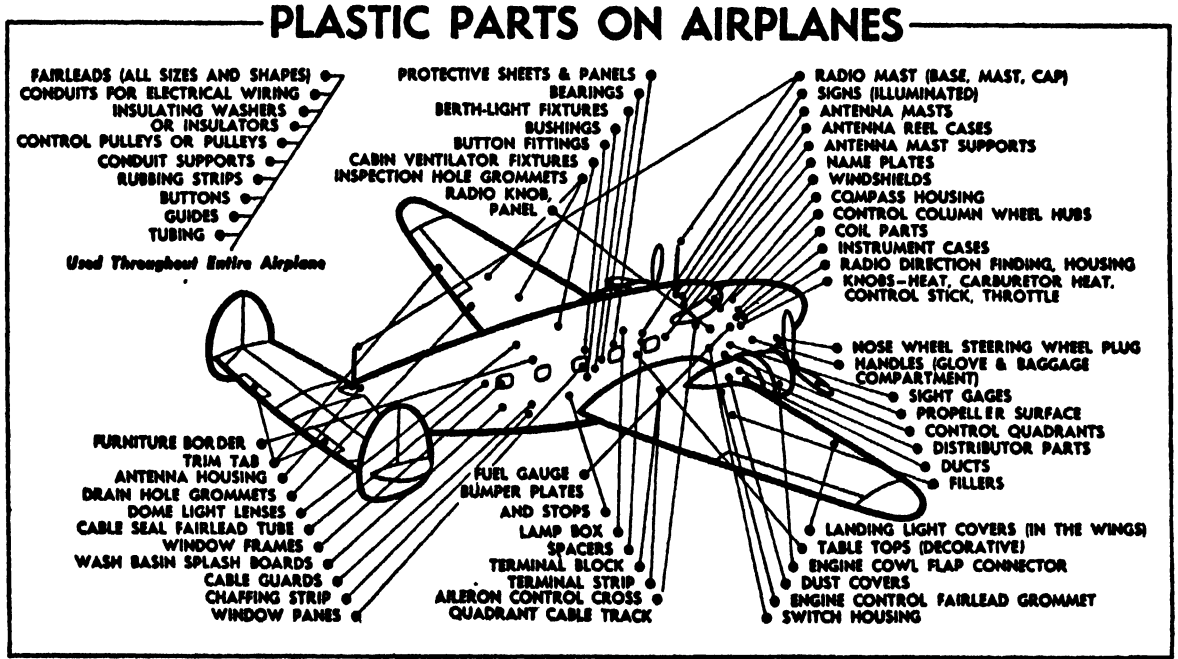
Beauty and Worth Glow in Plastics

The characteristic value of plastics is their nearness to everyone; their story is ever the voice of romance in industrial research. More than 125,000 tons of plastics were produced in the United States in 1941. Research is the engine on the train of thought in plastics technology, and plasticians, cherishing the useful and the esthetic, continue to transport new resins into commerce. Seventeen novel plastics were introduced between 1928 and 1939. The pace of plastics research is indicated by the fact that three quarters of all the plastics du Pont produced in 1941 are developments that emerged from the laboratories in the past 48 months. At least 13 types of plastics are on the market.

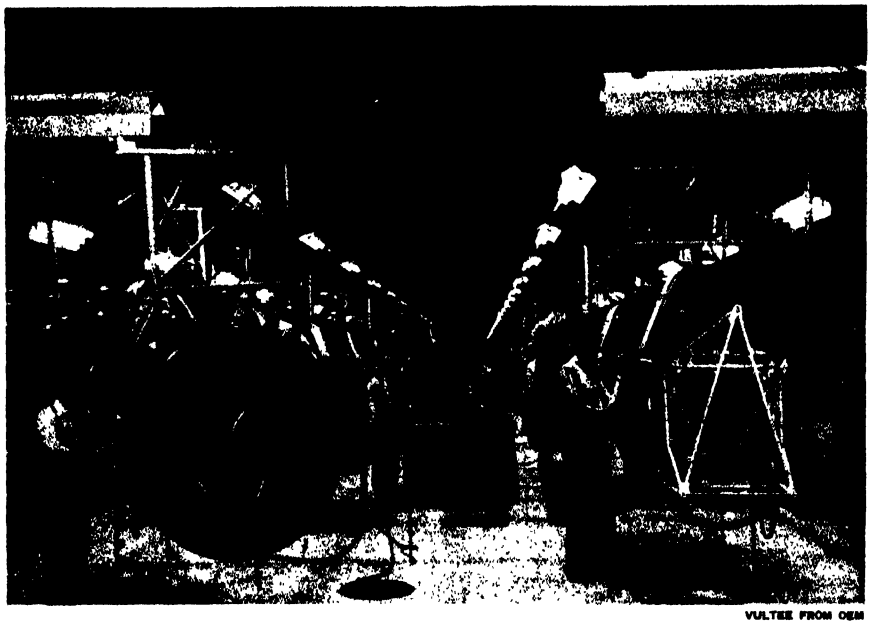
The Plastics Materials Manufacturers' Association is assisting the Government in defense and the industries in the substitution of plastics for metals. To cite some examples of plastics in defense work, shock-resistant compounds are finding outlets in instrument cases for aircraft, fuse timers, electrical fittings, and gun stocks; laminated and plywood products are of high importance to present-day construction methods both in airplanes and in the new motor torpedo boats. A branch has been set up in the War Department to work out substitution of plastics for metals and other scarce materials in articles purchased by the Quartermaster Corps. Increased use of plastics by the Government has led to the desirability of federal specifications for such products to simplify purchasing procedure, and a technical committee has been formed for the purpose. The National Bureau of Standards has under way a project, in cooperation with the National Advisory Committee for Aeronautics, to develop a plastic for use not only as a substitute for nonstructural parts, but also for those structural units subject to stress. Comparative burning tests of common plastics have been made by the Underwriters' Laboratories. New heat-resistant plastics under development include preparations of furfuryl alcohol and ethyl silicate. The trend in the use of plastics in recent years has been toward industrial applications rather than for ornamental purposes. For instance, comprehensive researches conducted in the laboratories of Resinous Products & Chemical have led to the development of new synthetic resin exchange adsorbents. Kyrite, a Dicalite product for use as a purifying agent in the sugar industry, consists of an active resin deposited upon a diatomaceous base.

Progress in Molding Practice. Extruded plastics are available in over 60 shapes. Commercial articles manufactured by injection-molding machines vary from a tiny doll's eye to windows for the housing of roadside gasoline pumps. The increase in the use of thermoplastic molding powders has been greatly assisted by the rapid development of injection molding, which is coming into use for the lower-cost, heat-setting plastics. Du Pont announced improvements in injection molding whereby electrical heating, working, and cooling of a granulated solid in a cylinder make it rigid enough for ejection into certain forms. A method for thermosetting resins, known as transfer molding, is extending the design of pieces made from phenolic and urea molding powders. The possibility of obtaining vulcanized molded articles from polyvinyl acetate, acrylic esters, cellulose derivatives, and shellac should extend the range of usefulness of these materials.

Plastics in Aircraft and Automobiles. In studying uses of plastics in bombers, 600 bomber parts were tested with plastic substitution and 34 parts were found practicable in this material. Extensive experiments are being made with plastic false windshields for 37-mm. armor-piercing shells, bodies of bomb fuses, and fins for mortar shells. Glenn L. Martin has devoted considerable attention to possibilities of incorporating synthetic materials into structures of military aircraft; aircraft plywoods, bonded with resinous materials moistureproof and inert in character, nullify to a great extent the disadvantages found in earlier types. Fluorescent Formica laminates are utilized in instrument panels of bombers and pursuit planes. The first seaplane equipped with plastic floats made its initial flight. Increased use of plastics by the automobile industry is observed in 1942 motor cars, in which more than 120 parts are made of



CHART— COURTESY OF E. I. DU PONT DE NEMOURS & CO. (INC.)



VULTEE FROM OEM

At the half-way point of Vultee's mechanized final assembly line

these materials. One automobile manufacturer foresees that plastic fenders will eventually absorb a blow 10 times greater than steel without denting. For soundproofing, a thermoplastic solution is sprayed on the underside of the steam-cleaned metal parts of automobile bodies. Muf-L-Cote is to seal cars underneath against snow, rain, and dirt. Experimental work and plans were described for producing plastic automobile bodies at Ford Motor.

Plastics in the Home. Plastyle furniture was introduced. A new process was announced for speeding the production of plastic phonograph records. A composite 1941 radio-receiving set has over 30 separate plastic parts; more than 60 plastic applications are possible on a six-tube set. Sonora Radio and Television expressed the belief that a radio receiver offered at $9.95 in a plastic case would have to sell for $14 or $15 if made of wood. Plastics have increased the sale of electric clocks. Dumor Plastics developed a material for electrical insulation. A composite 1941 electric refrigerator has some 39 plastic parts and more than 77 possible plastic applications; electric refrigerators are scheduled to have in 1942 more than 50 plastic parts. A project calls for the construction of refrigerator frames entirely of plastics.

Plastics in Industry and Commerce. In the field of gas-meter diaphragms, progress has been made on the preparation of drip-oil-insoluble resinous materials possessing high flexibility and low resilience. Artus is a line of milling cutter spacers molded of a plastic. Celluplastic capsule-type containers are intended to show or store tools. A silver chest of transparent plastic enables ready display. Koloplaks are colorful molded advertising signs. Translucent plastic buttons serve as bull's-eyes to transmit light from internal sources in equipment. A plastic wall material admits diffused light from lamps placed behind it. Tulca units are transparent plastic lenses. A plastic molded motion-picture screen is seen to be efficient and easy to clean. Autopen is an automatic electric rewrite machine to reproduce as many as 100,000 pen-and-ink signatures from one plastic master signature. United Autographic Register reported a sales gain of 30 per cent since it began using plastic material for registers. A survey revealed there are 18 applications of plastics in 10 different sports. Plastic heels for ladies' shoes came into use; Pipon is a plastic shoe-trimming braid. More than 25,000,000 pencils have plastic eraser holders. Densene is a plastic denture-base material; Vitain is a synthetic resin powder for denture use. Plastic eyes are under trial in monocular persons. AcromarK is a marking ink for plastics.

Cellulose Nitrate. Cellulose nitrate, the old timer of thermoplastics, still finds important usage in the automotive industry. Hammers with heads of Pyralin cellulose nitrate are employed extensively. Pearl Pyralin has become popular for bathroom accessories; drum coverings in sheets of colored or pearl effects, picks for banjos, guitars and mandolins, and piano keys are other Pyralin applications. Cellulose nitrates can be prepared from whole cotton without intermediate pulping; cellulose acetates can be produced from whole cotton but more readily from a high-cellulose pulp.

Cellulose Acetate. The chief factors determining the properties of cellulose organic ester thermoplastics are the amount of noncellulosic material, whether chemically bonded to the chains or colloidally held, and the kind of plasticiser retained by such colloidal bonds; both spatial structure and substitution of the plasticizer are important. A transparent tubing is made by spirally wrapping acetate tape over a steel form and using acetate cement for adhesive. Mar-Les shields for the protection of switch plates and adjoining wall areas are made of cellulose acetate; Protec-O-Shield is a similar product. In lampshades, cellulose acetate appears in plain, pleated, and cartridge shapes, also in stylized offerings, veering toward soft, restful colors. American Viscose introduced transparent cellulose acetate tags for its rayon. Liquafilm is a cellulose acetate solution for applying to paper with the aid of electric heat. Klipit is a cellulose acetate clothespin. Metex consists of three laminated cellulose acetate sheets, the center one metallic finished. Tenite is seen in window shades on busses, in tops of sirup pitchers, in fish net floats, in the casings of leash reels, in tool and revolver handles, in oil cups, and in graduates and funnels in laboratories. Extruded moldings of Tenite are being made in a variety of shapes, sizes, and colors. Tenite I and II in a wide range of colors are the basic materials of Plastikmould, Plastiktrim, and plastic rods and tubes for architectural purposes. Interlox plastic trim is extruded Tenite II. Plasticoils are springlike coils of Tenite for fitting over fluorescent light tubes. Automobile club emblems of Tenite have been subjected to severe tests of durability. Lightweight handbags are composed of colored Tenite strips woven in with white. Ocarinas, radio dials, lenses, and knobs, "juke box" coverings, and piano music racks are applications of Plastacele. Salt and pepper shakers are also being made of Plastacele. Cellulose acetate-butyrate has many possibilities for continuous extrusion. Plasticans of cellulose acetate-butyrate are the plastician's contribution to the packaging of liquids in quantity.

Phenolic Resins. Bakelite has more than 15,000 patented uses. Range finders are being manufactured of Bakelite, and Bakelite and Eclipse Molded Products have developed a plastic agitator for washing machines. The production of Durez has been increased 40 per cent. The heat resistance of Durez 775 black is said to be 400° F. FCD No. 140 is a high-melting, extra hard phenolic resin. Cast phenolic resins are made by Catalin and its licensees, Bakelite, Joanite, A. Knoedler, Marblette, and Monsanto. The production of cast phenolic resins approached 6,000,000 pounds in 1941; the principal applications include phonograph decorations, jewelry and dress ornaments, brush backs, and radio cabinets. Catalin is used in the gear for an oil pump. A building panel faced on both sides with phenolic impregnated cotton fabric has been marketed. Plastone is a molding compound made from phenolic resin with cottonseed hulls as filler. Cottonseed-hull plastic products

have proved satisfactory in the manufacture of sheaves for textile mills. Co-Ro-Lite is Dures-resin-impregnated sisal fiber. Amberlites PR-14 and PR-23 are phenolic plywood adhesives; Catacol is Catalin cold-setting phenolic cement; Catavar, liquid Catalin, is used for laminated products. Synbar developed a phenolic glue for plywood. Laminated phenolic plastics are used for large flat springs designed to support the shaking rail of paper-making machines and for racks, insulators, cylinders, tank linings, baffles, baskets, and hoods in the plating field. A study of the heat resistance and dimensional stability of plastics in boiling water has resulted in the development of a special laminated phenolic-type water-meter disk for application in meters operating continuously under these conditions. Other types of plastics are in the process of development for employment in water meters at medium and high temperatures. Lamicoid, laminated Bakelite sheet, is being used for floors and stair treads and in Venetian blinds. Blades of Westinghouse electric fans are almost entirely made of phenolic resin. Kys-Ite service trays are molded under Carterite license and similar preformed material is being considered for business machines and camera cases.

Polystyrene Resins. Polystyrene resins are produced by Bakelite, Dow, and Monsanto, and it is probable Catalin will enter the field. Polystyrene, heated near 180° F., changes into a soft, ductile plastic; at 212° F. it becomes rubbery. Plax is producing polystyrene and styramic resins in rod form. Continuous tubes and shapes are supplied in Lustron polystyrene. Polystyrene is resistant to hydrofluoric acid.

Elastomeric Compounds. The position of elastomeric compounds in the field of plastics has become increasingly important during 1941. These compounds, as their name implies, are flexible or rubbery at normal temperatures, a characteristic rendering them adaptable to many applications; furthermore, the degree of flexibility may be controlled by the amount of plasticizer used. Elastomeric compounds may be formed into various articles by compression or injection molding; rods and tubing may also be produced by the screw-extrusion process. The flexible material may be injection-molded in the same manner as the rigid type of Vinylite compound. Bite-resisting pipe bits and cigaret holders have been injection-molded; injection-molded insulators, which may be stretched over exposed electric wire terminals in airplanes, have been developed. Compression-molded collets for carbon rods in electroplating baths have proved more resistant to hot electrolytic solution than rubber collets. Lens rings for industrial flashlights, designed to withstand rough use, are being commercially compression-molded from the semi-rigid type of material. Aside from the use of elastomeric compounds for electrical insulation of wire, many other varieties of extruded forms have come into use. Metallic cooling coils, which require frequent cleaning, especially where employed in draught-beer dispensers, are being replaced by elastomeric tubing. Elastomeric compounds have been extruded over leaders for dry-fly fishing and into upholstery welting.

Vinyl Elastomers; Vinylite. Umbrellas, watch chains, and cosmetic, shoe, garment, and laundry bags are being made of vinyl elastomers, some formed by calendering, some by extrusion. In most of these articles advantage is taken of the protective qualities of the plastic, but all lend themselves to new and beautiful styling; the feature of transparence adds to their sales appeal. Vinylite compounds in tape form have been developed for providing electrical and protective insulation on many types of circuits, including automotive and aircraft lighting, power and ignition harnesses, naval and industrial power cables, and bus-bar distribution systems. These tapes may be of an all-resin type or, where greater mechanical protection is required, may be reinforced by calendering or hot-roller coating on asbestos, glass, or other fabrics; combinations of all-resin and reinforced tapes are often used. Vinyl acetate and diallyl succinate can be polymerized together to give a series of products, some of which may be useful for new types of cast plastics.

Koroseal, P. V. A., and Saran. Koroseal is available in monostrands and also in film and tubing. Polyvinyl alcohol is well known in the form of flexible refrigerant hose. Type H Polaroid, a glare-eliminating screen for automobiles, claimed to be 99.99 per cent efficient, uses polyvinyl alcohol, stretched, then treated with iodine. Polyvinyl alcohol plastics form a link between synthetic resins and rubber, including synthetic rubbers. The fractionation of polyvinyl chloride has been described. It is predicted that, before long, woven plastic such as vinylidene chloride will get into the summer hat trade. Saran fabric, woven like cloth, is under development as an upholstery material. Saran has been proposed for use in the place of metal in tubings.

Urea and Melamine Resins. A foamed urea plastic appears to be an insulator for heat and sound. Plaskon is applied in wheels of colored furniture casters. Both hot- and cold-setting Plaskon glues are in use in airplane construction. A new method of applying resin surfaces to dense materials such as laminates has been announced by Plaskon. Uformite CB-550 is a urea-formaldehyde resin to serve as a bond in wood construction. Cascamite is a urea-formaldehyde glue. Foamed urea-formaldehyde glue is thought to have a future in the manufacture of very thin plywood. Urea-formaldehyde film-forming compositions are now made to air-dry by special acidic accelerators soluble in organic solvents, including hydrocarbons; these accelerators consist principally of inorganic acid esters of alcohols. Additional research is necessary to standardize conditions of preparing ethylidene urea-formaldehyde coatings so as to improve flexibility and stability. Melamine-alkyd compositions are reported superior in color retention to the corresponding urea-alkyd enamels based on a time-hardness study at 350° F. Chemical resistance of heat-converted melamine resins is said to be equal to or better than that of the corresponding urea resins. With No. 3501 new Super-Beckamine it is claimed higher percentages of melamine can be incorporated at lower cost than is possible with any blend or admixture of urea-formaldehyde and melamine resins.



UNION CARBIDE AND CARBON CORP.

Plasticized vinyl resin compounds are used to insulate this marine cable

Acrylic Resins. Acrylic resins are made by du Pont and by Röhm and Haas, and it has been rumored that Celanese may become a producer. The acrylic gun turret is an improvement over the "blisters" formerly used on bombers; the acrylic navigator's hatch is also a recent development. A transparent, shatterproof acrylic plastic is utilized in planes for windows, noses, tail empennages, and landing light covers. A transparent Plexiglas pump for handling dilute acids, hypo-



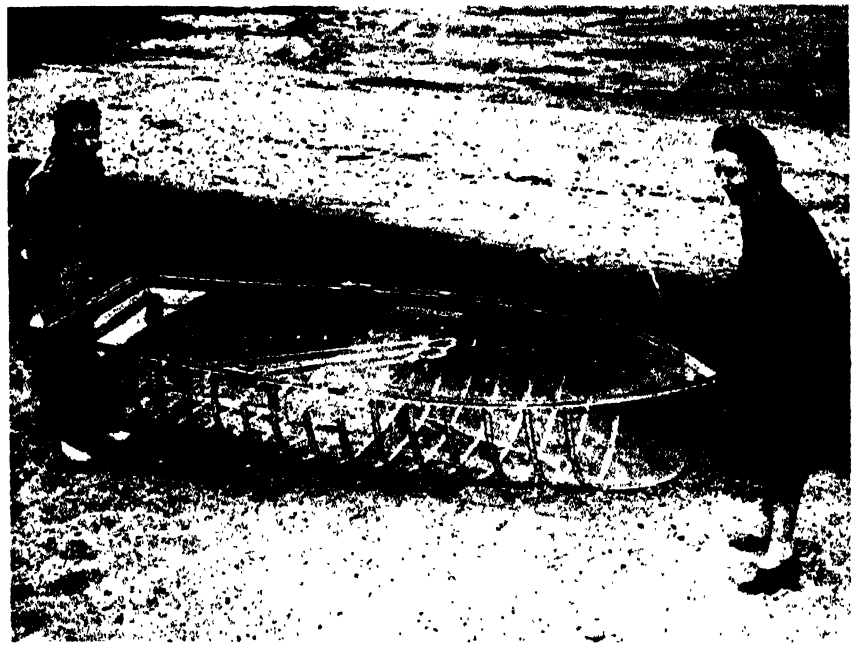
ROHM & HAAS CO.

In producing bomber nose sections, edges of a hot Plexiglas sheet are quickly clamped to a form before the material cools.

chlorites, and other chemicals is being marketed. Methyl methacrylate plastic is being employed for safety guards of coil-winding machines. A conveyor apron made of Lucite methyl methacrylate resin rods is an innovation on textile-conditioning machines. Du Pont has doubled its capacity for the manufacture of transparent Lucite sheeting.

Uses of Lucite. Seventy applications on fourteen 1942 automobiles attest to the use of Lucite in this field; two 1942 models each have 11 parts of Lucite. Protective reflectors of Lucite are mounted on approximately 500,000 automobiles in California. Transparent sections of chemical and oil feeders are the newest industrial equipment made from Lucite. A portable fluorescent light, incased in a tube of transparent Lucite, speeds night work on airplane assembly lines by providing illumination for confined areas. Beamlight is a flashlight with a lens of Lucite for examining inaccessible parts of machinery. Lumirod is a Lucite device for demonstrating the internal reflection of light. Lucite has been adapted for fabricating darkroom light filters. Prismatic pendants of crystal clarity produced of Lucite are appearing on many chandelier and lamp designs. Lucite is also applied as a spiral to the shaft of metal floor lamps. Lucite door pulls and push bars are being used on metal and wooden doors; there is likewise transparent hardware for tempered glass doors. Cigaret cases, compacts in jewel tones, bracelets, flower plaques, scarf slides, coat hangers, and picture frames are being manufactured of Lucite. A transparent typewriter roll has been introduced by Lumirol. Musical applications range from piano keys to allplastic clarinets: beauty and worth, joined together in Lucite, serve well a happy art.

The field of industrial research in the United States has been the scene of very many valuable and dramatic deeds that have aroused public enthusiasm and confidence. And now that military needs are investing scientific creativeness with transcendent importance, the capacity and energy of American laboratories will proceed with this new responsibility to bring greater grandeur to the technology of the Nation.



A rowboat made entirely of du Pont's Lucite methyl methacrylate

American Society for Metals Advisory Service

THE American Society for Metals, Cleveland, Ohio, has announced a free technical information and advisory service to companies engaged in war production work involving metals. The plan embodies the formation of A. S. M.-War Products Advisory Committees in more than 50 chapter cities of the Society. The board of directors has suggested that each local chapter form such a committee to provide answers to technical questions relating to both the manufacture and fabrication of metals. The service will be free and will be carried on by local chapter committees so that greater, speedier attention may be given the localized problem.

Return of Empty Carboys

A STICKER ringed in red, white, and blue, designed by Ray Mountain, Rumford Chemical Works, Rumford, R. I., has worked well in ensuring the return of empty carboys. It states:

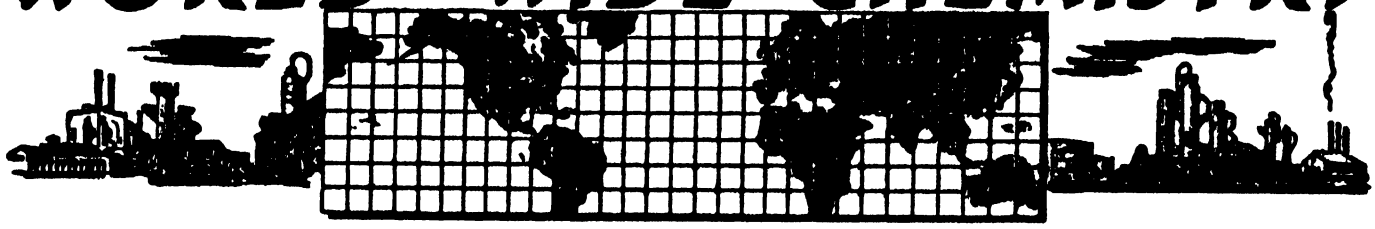
Unless this container is promptly returned
Several firms working on defense
Assuredly will run short of chemicals.

First Aid for the Manufacturer

IN THE interest of national defense, the Association of Consulting Chemists and Chemical Engineers, Inc., 50 East 41st St., Room 82, New York, N. Y., makes available its free services in providing the names of experienced consultants in chemistry and chemical engineering properly equipped to assist in solving problems in various fields.

The Process Equipment Division of the H. K. Porter Co., Inc., Pittsburgh, Penna., announces the appointment of J. H. Hille as Chicago district representative.

WORLD-WIDE CHEMISTRY





A plant for caffeine extraction from maté went into production October 21. The factory, which belongs to the Sociedade de Intercambio Mercantil Argentina-Brasil, will use 6,000 kg. of maté per day to produce about 60 kg. of caffeine. Caffeine is being sold at present at 600 milréis (about $30) per kg.

Exports to U. S. Compensate for Losses in European Trade

The value of Brazil's exports to Europe during the first seven months of 1941 were about 686,560 contos de réis ($34,328,000) less than in the same period of 1940. In compensation the United States increased its purchases by 800,226 contos de réis ($40,011,300).

During the first eight months of 1941, 250,123 metric tons of manganese ores valued at 44,854 contos de réis, were exported. The United States was the largest buyer, taking 94.6 per cent of the total. The balance went to Japan.

In 1939 Brazil exported 435,183 kg. of mica valued at 7,890 contos de réis. In 1940 volume and value of mica exports increased to 1,117,474 kg. valued at 15,755 contos de réis. Exports during the first six months of 1941 were 460,700 kg. The average price per kilogram, which in 1939 was 18$230 (about 91 cents), has now gone to 31$690 (about $1.58).

Decrees Issued on Production and Distribution of Fuels

President Vargas has prohibited exportation of Brazilian Santa Catarina coal on the grounds that present production is unable to fill local requirements. In 1940 Brazil produced 1,336,301 metric tons, against 1,046,443 in 1939. Even with this output Brazil imported 1,209,242 metric tons. In another decree President Vargas created the National Fuels and Lubricants Commission, which will have to do with distribution and uses of these products.

During the first six months of 1941, Brazil consumed 211,442 metric tons of gasoline.

To develop and spread the use of producer gas for motor trucks, President Vargas authorized the Ministry of Agriculture to spend 3,000 contos de réis ($150,000) for purchase or construction of 1,000 gazogenes (apparatus for generating gas) which will be sold to motor truck owners at cost to be paid in monthly installments.

American Firm Builds Cashew Nut Oil Plant

The American firm, Irvington Varnish Co., has started to build a factory in Fortaleza, capital of the State of Ceará, for production of cashew nut oil. The machinery was imported from the United States, and the new plant will be in operation early in 1942. The oil will be obtained from nuts collected and purchased in the northern states where the yellow pear-shaped fruits are found in large quantities.

Cashew nuts until recently were considered as waste material. In 1939, 460 metric tons of cashew nuts were exported, however, and in 1940 the amount increased to almost 700 metric tons.

Construction of Two New Cement Plants Planned

Two new cement plants probably will be under production in 1942. One will be installed in the State of Rio de Janeiro with an estimated production of 200,000 metric tons, and the other will be built in the State of Pernambuco to increase the output of the S. A. Fabrica Votorantin, of São Paulo, manufacturer of the trademarked "Votoran".

In 1926 Brazil imported 396,322 metric tons of cement and produced only 13,382 tons. By 1940 only 14,976 metric tons were received from abroad, while domestic output was 733,722 metric tons. With construction of the two projected factories and enlargement of the present plants, Brazil's production of cement should reach more than 1,000,000 metric tons in the next two years.

New Plants Established in Drive for Self-Sufficiency

The press has reported the opening of new plants for production of vegetable oils in Rio Grande do Sul; cellulose and paper in Santa Catarina, employing pine trees from Gramado, near Caçador; nitrates and other chemical products in São Paulo; textiles (three mills) in São Paulo and Minas Geraes; anhydrous alcohol in Minas Geraes and Baía; cottonseed oil in Baía; cellulose in Pernambuco, using cane sugar bagasse; perfume and cosmetics in Minas Geraes; abrasives in Paraná; tannins from the *Acacia negra* in Rio Grande do Sul; and soaps in Rio Grande do Sul and Paraíba.

A large factory for manufacture of equipment and heavy machinery for refineries for alcohol, ether, acetone, oils, and solvents was recently started in São Paulo. The plant is also equipped to construct stainless steel machinery and apparatus for chemical industries.

Plant Being Installed to Extract Tomato Seed Oil

Tomato seeds, obtained as a by-product in the preparation of tomato pulp, contain a large percentage of oil. One of the biggest producers of tomato pulp in Pernambuco is installing a plant for extraction of tomato seed oil. It was estimated that about 18 per cent of oil will be obtained, besides 48 per cent of cake. The oil will be used for soap manufacture; the cake as a fertilizer.

Potassium Carbonate to Be Produced in Brazil

A plant was recently installed in the State of São Paulo for production of potassium carbonate using as raw material ashes from cottonseed cake. Cottonseed cake, because of difficulties in exporting, was being used on a large scale in Brazil for fuel purposes.

Citrus Fruits Processed for Oil, Cake, and Juice

According to figures published by the Federal Council for Foreign Trade, sev-

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EDITOR'S NOTE. Those interested in further details should address the correspondent whose name and address appear for each country, and enclose sufficient international coupons to prepay the reply. United States stamps should not be sent.

eral factories are processing citrus fruits for various by-products. In a plant at Taubaté, 20 metric tons of oranges are handled daily during the crop months, giving a daily output of 8,500 liters of pure orange juice, 1,280 liters of concentrated juice, 50 kg. of essential oil, and 4,000 kg. of cake. A second plant, belonging to the Sociedade Anonima Industrias Reunidas de Amido, at Sorocaba, State of São Paulo, treats 20 metric tons of oranges per day to produce 500 liters of concentrated juice, 100 kg. of essential oil, 2,400 kg. of cake, and a quantity not revealed of brandy and pectin. At Limeira, State of São Paulo, another concern produces 15 tons of essential oil, 6 tons of calcium citrate, and a small quantity of brandy yearly.

C. E. Nabuco de Araujo, Jr.

Caixa Postal 970
Rio de Janeiro
December 3, 1941



The National Chemical Laboratory (Laboratorio Químico Nacional), established by the Colombian Government to study and promote use of domestic raw materials and to aid manufacturers and technicians in solving problems related to the utilization of native products, will undergo a reorganization in its new building in 1942.

Colombian Chemical Society Elects Corresponding Members

The following South American chemists have been elected corresponding members of the Sociedad Colombiana de Químicos: Raúl Wernicke and Venancio Deulofeu of Argentina and C. E. Nabuco de Araujo, Jr., of Brasil.

Deposits of Manganese, Asbestos, Ceramic Materials, Bauxite Studied

Natural deposits, particularly of strategic materials, are being studied.

Manganese ore has been located in the State of Huila. The ore in all deposits, in so far as samples taken at random determine, is from 36 to 44 per cent MnO_2.

Investigation of asbestos deposits has been made by the National Chemical Laboratory.

This laboratory is also studying mineral deposits where raw materials used in the ceramics industry may be found.

Small bauxite deposits have been located in the State of Antioquia.

Cement and Sugar Industries Enlarged by Plant Construction

A new sugar mill, Ingenio Central del Tolima is to be established at Pajonales, Ambalema, State of Tolima, within the present year.

One cement plant, with a daily production of 200 tons, has gone into operation near Cali, State of Valle. A second one is being erected at Nare, State of Antioquia.

Colombia Plans to Build Steel Industry

A contract was signed recently preliminary to installation of a steel industry near Bogotá. The Geological Survey and National Chemical Laboratory are cooperating in this program.

Project for Soda Ash Production Developed

Included in a bill authorizing the Colombian Government and the Banco de la República to participate in setting up and expanding industries using salt as raw material are plans for a soda ash plant at Zipaquirá, Cundinamarca. The project has been developed by the director of the National Chemical Laboratory. Alkali production will constitute the principal chemical output in Colombia. Soda ash, caustic soda, and sodium bicarbonate requirements will be met by local production.

Jorge Ancízar-Sordo

Apartado 18
Bogotá
December 4, 1941



Increasing demands for labor in the chemical industry are predicted by F. W. Bain, chairman of the Chemical Control, who said that 1,400 men are required immediately and 4,000 more would be wanted in the next three months. There are also vacancies for 8,400 women, of whom 4,800 would be needed for explosives in Scotland.

A pamphlet has been issued by the Ministry of Supply advising chemical firms about women workers. Women now account for 23 per cent of all labor in British chemical works, and are recommended for charging furnaces with automatic weighing machines, filling drying trays and attending to drying ovens, operating filter presses, digging out centrifuges, crystallizing and emptying crystallizers, taking samples for analysis, routine chemical testing, washing and cleaning carboys, etc., light shovel work (not involving throws above shoulder height), elementary drilling, screwing, milling, garage servicing, assisting fitters, welders, electricians, painters, carpenters, molders, and bricklayers, and attending to and recording machine operations. Women have not been able to replace men in heavy manual work, although generally speaking three women can do the work of two men if working conditions are suitable adjusted, in work which must be done in the presence of noxious gases, in handling certain dangerous or toxic materials, and in operations involving considerable discomfort.

Pharmaceutical Manufacturers Form Joint Research Company

The Therapeutic Research Corp. has been formed by five leading British pharmaceutical manufacturers—Boots, British Drug Houses, Glaxo, May & Baker, and the Wellcome Foundation—to coordinate and extend research. The company, which has a capital of £500,000, is an entirely new development in the British pharmaceutical industry, formerly characterized by numerous private research institutes working without direct contact. The five organisations mentioned above will, where desirable, negotiate agreements with other manufacturers of recognized standing. Research plans are to be drawn up by a Research Panel. The new company is also to ensure collaboration with medical, dental, and veterinary practitioners in the introduction of new medical substances and to enable the industry to cooperate more effectively in national planning by presenting to the government the pooled knowledge and facilities of the constituent companies.

Drug Research in America and in Germany Compared

A tribute to American research work on the chemistry of drugs was paid by Harold King, National Institute for Medical Research, in a speech delivered on presentation to him of the Hanbury Medal. The present output of papers dealing with the chemistry of drugs in the United States is amazing, he said, and surpasses that of Germany in her prime. Great Britain needs more organized research on synthetic drugs, Dr. King added.

Zinc Smelting Combine Forms Chemical Subsidiary

The National Smelting Co., Ltd., a company intimately connected with the British zinc smelting and refining industry, has formed a new company, Avonmouth Farms, Ltd., with a capital of £25,000, to manufacture fertilizers and chemical products.

Potassium Nitrate Slows Down Cheese Fermentation

Use of potassium nitrate to prevent fermentation of processed cheese has been

studied by H. J. Palmer and W. H. Sly who found that addition of up to 0.25 per cent of potassium nitrate has no appreciable effect on flavor, texture, or color of processed cheese. The flavor is affected by larger additions. The nitrate addition has a definite deterrent effect upon the organisms producing fermentation, which is however, subsidiary to that of temperature. If cheese is processed below 140° F., the nitrate is of little use, but at 145° to 160° F. additions of 0.1 to 0.5 per cent appear to be definitely helpful.

Rubber-Plastics Mixtures for Electric Cables Praised

A mixture of rubber and high-grade plastic material gives good results in the electric cable industry, according to S. W. Melsom before the Transmission Section of the Institution of Electrical Engineers. Polyvinyl chloride is being employed for extreme conditions, as insulation and as a protective sheath over the vulcanized insulated core. Another plastic material is used as a constituent in a gas type of cable, and styrene is being developed for supertension joints. As far as the prospects in the impregnated paper cable field are concerned, Mr. Melsom doubted if anything would take the place of paper for low-pressure cables because of cost. The same factor is preventing use of synthetic rubbers for cables.

Fluorescent Oil Used for Deciphering Charred Documents

A new method for deciphering charred documents, timely because of fire damage by air raids, was described by Julius Grant to the Society of Public Analysts and Other Analytical Chemists. The document is impregnated with a mixture of fluorescent oil and petroleum spirit. The oil is absorbed to different extents by remains of the ink, which is modified by chemical reagents if necessary, and the paper. Inspection in filtered ultraviolet light renders the ink visible because of its different degree of fluorescence as compared with the paper. The method has proved satisfactory with a wide variety of papers and inks and gives permanent specimens.

Acetone By-Product Studied as Protein Food for Animals

A by-product from commercial fermentation of cane sugar molasses for acetone production has been studied by the National Institute for Research in Dairying as a possible protein food for pigs or poultry. About 7,000 tons of this material, said to contain 60 to 65 per cent crude protein and resemble dried yeast in appearance, are running to waste each year.

Maximum Benzene, Toluene Recovery Made Compulsory

All gas and coke-oven undertakings with benzene recovery plants must work for the maximum recovery of benzene and toluene under a general direction issued by the Board of Trade. Maximum home market selling prices have been fixed by the Secretary of Mines for crude and refined naphthalene. Coal-tar distillers are working in accordance with official instructions, and an intensification of control may be expected.

Products Introduced on British Market

Alumina cement for insulating and securing electric heating elements of nickel chromium alloy wound on Vitreosil furnace lines is now supplied by a British producer.

A new red rubber color, claimed to be of exceptional fastness to light, stable to all conditions of vulcanization including sulfur chloride cures, and entirely nonbleeding in rubber, has been put on the English market.

British airplane engine manufacturers will soon be supplied with lubricating oils obtained in a plant for the reclamation of used lubricating oils. Capacity of this plant, first of its kind in England, will be 15,000 tons a year.

Sisal Plant Considered as Chemical Raw Material

Difficulties in procuring hemp and Manila have drawn attention to possibilities of increased use for sisal, produced in large quantities in Tanganyika and Kenya. The fiber is now used to a growing extent for "curing" in roadmaking operations, insulation of cables, filtration, and fiberboards for building. Sisal enters into laminated plastics and bitumen-lined paper. Fibers extracted from the plant, however, represent only 3 per cent of the total plant. While it may be possible to raise that figure to 5 per cent, experiments have been conducted on commercial utilization of the large amount of the plant which is at present waste or used only for fuel or fertilizer. The most promising fields are the manufacture of industrial alcohol and paper.

Improved methods of decortication have been developed, but these await the return of peace for practical application. Sisal has not hitherto suffered from the competition of synthetic fibers which generally lack the strength of the sisal fiber, but the new synthetic fibers of the nylon class may encroach on the sisal market.

Export Plans for Plastics Shelved

British producers of plastics are fully engaged on war work, and plans for an export drive had to be canceled. Some time ago the Plastics Export Group, at the request of the Board of Trade, prepared a catalog of moldings suitable for export. Over 400 articles were illustrated, and 15,000 copies were printed. Because of the change in policy these have been held back, and exporters have been instructed that they cannot proceed with the export plans while the war lasts. Shipments of molding powders are now restricted to such small quantities as will be used in overseas countries, chiefly the British Dominions, for purposes essential to the British war effort.

G. ABRAHAMSON

150 HALFWAY ST.
SIDCUP, KENT
December 1, 1941

Swedish Government Encourages Production of Sulfite Alcohol

UNDER government stimulation Swedish production of sulfite alcohol probably will total 30,000,000 liters in the last half of 1941, the first half having seen an output of 22,000,000, according to a report to export-import authorities in Washington.

In addition to a program of encouragement to the industry generally, the Swedish Government has recently subsidized construction and operation of three new sulfite alcohol plants, which are expected to be in operation during the coming summer, with an annual capacity between 1,000,000 and 1,500,000 liters each.

Besides the licenses granted these plants, the authorities have approved, up to last October, all applications for erection of new sulfite alcohol production facilities. With the three mentioned, there will be 32 such plants in operation in Sweden. With these and expansion of facilities at older plants, the industry is expected to attain an output of approximately 70,000,000 to 75,000,000 liters of sulfite alcohol, with an alcohol content by volume of 95 per cent, per year. This represents a 100 per cent increase of production capacity over 1939.

Spain Ships Argols and Tartaric Acid to U. S.

DESPITE war conditions, reports confirm that Spain has continued to make large shipments of argols and tartaric acid to the United States, declared exports from Barcelona in October showing 286,660 pounds of argols, valued at $68,446; tartaric acid, 17,837 pounds, of $11,038 value; and cream of tartar, 44,092 pounds of $20,750 value.

Tartaric acid exports are viewed by officials as particularly significant, inasmuch as only very small amounts have

been imported by the United States the past two years, the entire year's figure for 1940 being 2,205 pounds, of $508 value, and for the first three quarters this year, 7,164 pounds, valued at $3,866.

Spain is of secondary importance as a source of argols and wine lees, to this country at least; however, quantities shipped amounted to 19,935,274 pounds valued at $3,405,236; and cream of tartar, 44,423 pounds, of $14,427 value, for the first three quarters of the year.

Brazilian Perfume and Cosmetic Imports Limited to U. S. Products

BRAZILIAN imports of perfumes and cosmetics are limited to American products, a report to export-import authorities in Washington declares, pointing out that Brazil has developed its industry to a point where it is even exporting some products, many of which are of good quality.

The range of production in Brazil is indicated by the following summary of 1941 output: lotions, cologne water, etc., 6,000,000 bottles; talcum powder, 30,000,000 boxes; liquid and solid rouge containers, 10,000,000; glasses of brilliantine, 10,000,000; perfumed oils, 10,000,000 bottles; and toothpaste, 12,000,000 tubes.

Most goods carrying American, French, and British trade names are manufactured in branch factories in Brazil, it was pointed out.

Peru Imports Large Per Cent of Arsenate from U. S.

PERU imported 2,171,339 gross kg. of calcium arsenate, sulfates, and other compounds used in insecticides and fungicides from the United States, out of a total of 2,315,431 kg. of such products brought in during 1940, the U. S. Department of Commerce indicates. With the Peruvian sol at approximately 16 cents, the value of these imports was 1,468,061 sols of United States purchases of a total of 1,600,851 sols during 1940.

Calcium arsenate is used in Peru in large quantities as an insecticide on cotton plantations. It has to a large extent replaced lead arsenate since 1927 when an American company initiated airplane dusting for cotton fields in that country. Arsenic also is used in sheep dip preparations.

Netherlands Indies Imports of Carbon Disulfide from U. S. Gain

UNITED STATES exports of carbon disulfide to the Netherlands Indies amounted to 25,100 pounds, valued at $2,650 in 1940, compared with 5,500 pounds, valued at $320 in 1939 with demand contingent on prevalence of certain insect pests, according to a report received in this country.

Annual demand varies from 2.5 to 30 metric tons, it was stated. The United States and Europe, including Germany, were pre-war sources.

England Puts Fertilizer Use and Sale under New Control

USE and sale of fertilizers in England are under a new fertilizer control order administered by the Ministry of Supply. The order provides for acquisition by firms of compound fertilizers under authority of Phosphoric Acid Fertilizer Certificates issued by an agricultural executive committee. This will ensure ability to purchase for delivery further ahead than 60 days.

Agriculturalists can now purchase potash for growing sugar beets, root, and vegetable crops grown for seed under contract, in addition to potatoes, onions, carrots, flax, and tomatoes. The procedure for obtaining potash has not been changed, however, and the available quantity is still governed by the supply situation.

Netherlands Indies Munitions Project

FIRST steps to produce locally certain important munitions had just been taken by the Netherlands Indies when the Japanese attack on the Malay area occurred, reports indicate. The Netherlands Indies Chemical Works, Inc., first of the necessary plants, was formed in September, with government help of 1,650,000 guilders in a total paid-up capital of 5,000,000 guilders, with a prospective total of 10,000,000 guilders to be expended for such enterprises. Ammonium sulfate, gunpowder, and TNT are to be produced. What the present invasion by Japan has done to these projects has not been stated.

British India Imports Calcium Cyanide in Quite Large Amounts

CALCIUM cyanide has a variety of important uses in British India, a trade survey reports, and consequently that country imports rather large quantities, primarily from Great Britain and the United States. Health departments and municipalities use it extensively in plague control, especially in Bombay and southern India, while tea estates in Assam likewise use quantities.

Two British distributing concerns with offices throughout India virtually control the business, one firm handling the British product and the other a well-known American brand.

Chlorine under Control in Canada

CANADIAN authorities have recently inaugurated control of distribution, use, and consumption of chlorine in that country, it is reported through official channels. The step was taken to meet increased demands from Canada's war industries.

The control order exempts chlorine for bacteriological purposes, pulps with not less than 90 per cent alpha-cellulose content, dissolving pulps, nitrating pulps, and pulps in which chlorine is a processing rather than bleaching material.

Larger quantities are in demand for producing smoke bombs, flares, and other war supplies, and its industrial reduction will affect the brightness of some grades of paper, it is indicated, as has been the case in the United States.

Sodium and Potassium Dichromate Production Is Stimulated in India

WAR-TIME demand has stimulated production of sodium and potassium dichromates in India, the country having available a supply of chromite ore, it is reported in a recent trade document received in this country.

Four medium-sized plants, having a total output of about 150 tons per month, are reported, with expansion contemplated for several small plants now with a capacity of about 5 tons each. However, the development is viewed as primarily a war-born activity, with considerable technical improvement necessary, if the production is to compete with foreign products in the post-war period.

Local Phosphate Rock Used on Netherlands Indies Plantations

TROPICAL plantations growing rubber, oil palms, and tea have found in phosphate rock produced in the Netherlands Indies a satisfactory natural fertilizer, when properly selected and ground. It is more economical than superphosphate, according to Import-Export authorities. Practically the entire output is consumed locally.

Actual production figures are not available, but are reliably estimated at 33,113 metric tons in 1938 and 18,777 tons in 1939. Probable annual production is around 30,000, with consumption between 10,000 and 40,000 metric tons.

Turkey Sets Up Credit to Pay for Sulfur Imports

THE Turkish Government, reported to be taking special steps to ensure a sulfur supply, has allotted a credit of 500,000 Turkish pounds to a semigovernmental bank for importation of sulfur from abroad.

Imports through this source will be distributed to consumers at less than cost, in line with Turkish policy of aiding its agricultural population in every way. The price will be subject to determination by a joint agency of the Ministries of Commerce and Economy, with any resulting loss between cost and sales prices to be made up from government funds.

WITH the United States as the outstanding customer, new records in Argentine casein export volume, production, and prices are expected, according to Export-Import authorities.

POTOMAC POSTSCRIPTS

Priorities and Allocations

PRIORITIES REGULATION No. 1, the basic document which governs the operations of the priority system, has been amended in several important respects, effective December 23, 1941. Most important of the changes is a requirement that all orders bearing a priority rating, including B ratings for essential civilian orders as well as A ratings for defense orders, must be accepted by producers in preference to any unrated order. Previously the acceptance of B-rated orders was not mandatory.

The required acceptance of B-rated orders is a further transitional step in the move toward allocation of scarce materials, since B ratings are one method of designating the relative importance of civilian uses for materials after war requirements have been met. A priority rating of A-10 has been assigned to all defense orders not otherwise rated.

Section 944.14 has been revised to provide a stricter limitation of inventories. Producers were previously forbidden to increase inventories beyond the amount necessary to meet required deliveries; they are now forbidden to accept delivery of materials for inventory in excess of a practicable working minimum.

Other recent activities of the Division of Priorities include:

Methyl Alcohol. Limits on the amounts of methyl alcohol which may be delivered for use as a denaturant for ethyl alcohol, for the production of formaldehyde, and for general chemical manufacture were removed by an amendment to General Preference Order M-31 issued December 19. The purpose of this amendment is to promote these uses for methyl alcohol at the expense of less essential uses.

Restrictions on deliveries of methyl alcohol for antifreeze or general denaturant or solvent uses remain in effect. Orders for methyl alcohol for such purposes are assigned as before a preference rating of B-8.

Chlorine. All chlorine produced in the United States will be subject to direct allocation after February 1, 1942, in accordance with the terms of an amendment to General Preference Order M-19 issued December 20, 1941. Regardless of priority ratings, no producer of chlorine may accept orders after the 10th day of any month for delivery in the next calendar month without a specific direction from the Director of Priorities. No distributor may accept orders after the 5th day of any month without specific direction. All producers are required to file with the Chemicals Branch, Office of Production Management, on or before the 15th of each month on Form PD-191 a schedule of deliveries to be made the following month.

Vanadium. Vanadium was placed under a complete allocation system on December 20, 1941. General Preference Order M-23-a, replacing M-23, provides for monthly requests for allotments and authorizes the Director of Priorities to make monthly allocations without regard to previous preference ratings. Consumers receiving less than 50 pounds per month need not file reports.

Tin. On December 18, 1941, General Preference Order M-43 provided that all supplies of tin shall be subject to specific allocation by the Director of Priorities, no tin may be sold or delivered without specific permission, future imports may not be sold except to the Metals Reserve Company or other government agency, and tin now afloat may not be sold without special permission of the Director of Priorities.

Toluene. All toluene in the United States will be subject to allocation beginning February 1, 1942, in accordance with the terms of an amendment to General Preference Order M-34 issued December 30, 1941. The order will apply to stocks on hand as well as to toluene produced after that date.

On or before January 15, and each succeeding month, every producer of toluene is required to file with the Chemicals Branch of the Office of Production Management his estimated production and scheduled deliveries of commercial grade toluene for the following month. No deliveries may be made after February 1 without authorization from the Director of Priorities, except that deliveries may be made according to the schedule as filed if no word to the contrary is received from the Director of Priorities before the 25th of the month before which the scheduled deliveries are to be made.

Beginning February 1, 1942, at least 70 per cent of the total production of all producers of toluene must be of nitration grade, meeting the requirements of Grade A in United States Army specifications. Deliveries of nitration grade toluene are to be made only in accordance with specific authorization from the Director of Priorities.

The order as amended provides the following ratings for civilian uses of toluene:

Use	Preference Rating
Medicinals and Drugs	B-1
Petroleum Additives	B-2
Dyes and Intermediates	B-3
Rubber Accelerators	B-4
Miscellaneous Organic Chemicals	B-5
Solvents	B-6

The use of toluene as a diluent for protective coatings will be entirely prohibited after February 1, since substitutes are available. Effective immediately, no toluene is to be exported without authorization from the Director of Priorities.

Tungsten Metal Powder, Ferrotungsten, and Tungsten Compounds. General Preference Order M-29, which provides for the control and allocation of tungsten metal powder, ferrotungsten, and tungsten compounds, has been extended six months to June 30, 1942. Supplementary Order M-29-a, which exempts purchasers of 100 pounds or less of contained tungsten in any month from filing reports required of larger users, has been similarly extended. Both orders would have expired December 31, 1941.

Metal Production. With domestic metal production of more vital importance than ever before in American history, the Priorities Division on December 22, 1941, issued a Preference Rating Order designed to assure that the complete cycle, from mining through refining, be completed without interruption.

Of the four steps essential to metal production—mining, concentration, smelting, and refining—the first two are covered by Preference Rating Order P-56, which extends priority assistance to mine operators in the acquisition of necessary maintenance, repair, and operating supplies. Preference Rating Order P-73 provides similar aid to accredited smelters and refiners of copper, lead, zinc, antimony, mercury, and cobalt.

Repair Maintenance and Operating Supplies. Substantial modifications in the OPM provisions governing repair, maintenance, and operating supplies are contained in a new regulation issued December 18, Preference Rating Order P-100, which supersedes Repair and Maintenance Order P-22.

The aim of the new regulation is to extend priority assistance to manufacturers and producers in keeping plants and equipment in good operating condition, and its benefits are not available to retailers as such. It extends priority aid to firms or individuals engaged in manufacturing, processing, fabricating, warehousing, or wholesaling, to various classes of carriers, communications services, persons using tools and equipment to repair or maintain property of producers affected by the order, and various other categories.

Some important changes incorporated in P-100 remove certain restrictions governing inventories, liberalizing provisions in the previous order; and others redefine certain items: operating supplies have been extended to include many minor items of equipment and office supplies except paper products, but to exclude fuel.

The general procedure in using P-100 follows that governing P-22.

Food and Drug Administration to Control Insulin

THE Food and Drug Administration, Federal Security Agency, is now in full control of the purity and standard potency of insulin, following approval by the President of an amendment to the Federal Food, Drug, and Cosmetic Act. The control will be maintained through a system of assay and certification.

This amendment was passed by Congress with record-breaking speed, because the expiration on December 23, 1941, of patents on insulin held by the University of Toronto created a situation fraught with danger to users of insulin. Insulin of standard potency is essential to diabetic patients.

The University of Toronto, through a licensing system and the assaying of each batch of insulin manufactured, has maintained an effective initial control of its purity and potency. With the expiration of the patents, supervision by the university ceased.

Bills were introduced in the House on December 16, 1941, by Representative Clarence F. Lea and in the Senate on December 17, 1941, by Senator Josiah W. Bailey. The House bill was reported by the committee on December 17, 1941, passed by the House on December 18, 1941, and by the Senate on December 19, 1941.

Wholesale Price Indexes

INDEX numbers of wholesale prices for chemicals and allied products in September and August 1941 and September 1940 have been released by the United States Department of Labor. With the year 1926 at 100, the indexes were:

	Sept. 1941	Aug. 1941	Sept. 1940
Chemicals and allied products	87.4	86.0	76.8
Chemicals	88.2	87.5	84.8
Drugs and pharmaceuticals	104.4	100.1	96.0
Fertilizer materials	76.6	75.3	68.1
Mixed fertilizers	77.1	77.1	74.2
Oils and fats	91.3	87.3	39.9

Hormone Manufacturers Fined

THE Department of Justice announced December 17, 1941, the filing in the United States District Court of the District of New Jersey (at Newark) of two consent decrees, together with three informations to which the defendants pleaded *nolo contendere*. Fines totaling $54,000 were imposed.

The informations charged three corporations and five individuals engaged in the manufacture of hormones with violation of the antitrust laws by conspiring with certain European firms to prevent other persons from manufacturing or importing hormones into the United States, with allocating among themselves various countries of the world as markets for the sale of hormones, and with conspiring to establish and maintain arbitrary and noncompetitive prices for the sale of hormones.

Named as defendants were: Schering Corp., Bloomfield, N. J., its president, Julius Weltzien, and its vice president, Gregory Stragnell; Ciba Pharmaceutical Products, Inc., New Jersey, and Vincent A. Burgher, its principal officer; Roche-Organon, Inc., New Jersey, and Elmer H. Bobst, its president; Rare Chemicals, Inc., Flemington, N. J., and E. T. Fritzching, its president.

Price Regulations

A LIST of maximum prices for all grades of **zinc oxides** was published by the Office of Price Administration on December 16, 1941, and became effective January 1, 1942.

Fats and Oils. In connection with the price schedule recently issued for some 1,800 fats and oils, a special study is being made to determine the extent of hardship resulting from imposition of ceiling prices, beginning with cottonseed oil.

Guayule Rubber. The two principal American sellers of guayule rubber—the Intercontinental Rubber Co. and the American Cyanamid & Chemical Corp.—were asked on December 16 to refrain from raising prices above those prevailing on December 6.

Carbon Black. Because cost increases have gone beyond the point where they can be absorbed and because of reduced revenue from export sales, producers of carbon black are being permitted to raise prices by slightly less than 5 per cent above December levels on deliveries made beginning January 1, 1942.

Sulfuric Acid. The Grasselli Chemicals Department, E. I. du Pont de Nemours & Co., Inc., has agreed to continue present prices of sulfuric acid through the first quarter of 1942.

Bleaching Powder. Prices of bleaching powder were stabilized by a series of individual agreements with producers, according to an announcement made December 19, with temporary ceilings 25 cents a hundred pounds more than the 1941 level.

Glycerol. An amendment to the glycerol price schedule, which will aid refiners to get shipments of crude from primary manufacturers was issued December 19 by the Office of Price Administration. Ceiling prices are on a delivered basis for both crude and refined glycerol, with one exception.

Dry Colors. Individual agreements stabilizing prices of dry colors, due to expire January 1, have with minor modifications been extended to April 1, 1942. The agreements have been broadened to include pulp colors, certified food colors, dispersed colors, and similar products.

Export Controls

THE Economic Defense Board, Office of Export Control, has issued Export Control Bulletin No. 4, dated December 15, 1941, announcing strict export control over many miscellaneous materials imported to the United States from the Far East, effective December 23, 1941. The following materials thereafter will be exported under general license only to Canada, Great Britain, and Northern Ireland, Newfoundland, Greenland, Iceland, and the Philippine Islands:

- Camphor, natural
- Cashew nuts
- Cinnamon
- Eucalyptus oil
- Fennel seed
- Kyanite and sillimanite
- Lemongrass oil
- Mace
- Magnesite
- Menthol, natural
- Oilcake and oilcake meal
  - Cocoanut
  - Hempseed
  - Soybean
- Patchouli leaves
- Patchouli oil
- Pepper
- Fayllium seed
- Sago, crude and flour
- Sandalwood
- Sandalwood oil
- Senna
- Sesame seeds
- Tapioca

Existing general licenses also have been amended to limit exportation to the same destinations only of certain animal, fish, and marine mammal oils, fats, and greases; antimony, chrome pigments, some types of chromium, rice, refined sugar, tea, iron, and steel, vegetable oils and fats; wool, certain rubber goods, and numerous other articles and materials.

Price Quotations on Industrial Alcohol No Longer Permitted

INDICATIONS of a freezing move by OPA in connection with industrial alcohol, butanol, and acetone were seen in a request from that agency to producers of these commodities to refrain from quoting prices for delivery after January 1, until further word from Washington. These products already are under price ceiling, and the action was explained as necessary "pending completion of steps to ensure stability in the market for these products in the light of new conditions created by war".

American Cyanamid Co. Directed to Cease Employee Interference

THE National Labor Relations Board on December 15 announced an order to the American Cyanamid Co., Brewster, Fla., to cease discouraging membership in United Phosphate Workers Union No.

22036 (AFL), or any other labor organization of its employees, by transferring, discharging, laying off, or refusing to reinstate any employee because of his membership in the above or any other labor organization of its employees.

Ferrochromium Specifications

ALL American manufacturers of ferrochromium on December 16, 1941, voluntarily agreed to changes in specifications which will permit the use of lower grade chrome ores and conservation of higher grades.

Present specifications of 68 to 69 per cent chromium, 4 to 6 per cent carbon, and 1 to 2 per cent silicon will be changed to 60 to 63 per cent chromium, 6 to 8 per cent carbon, and 4 to 6 per cent silicon, by the agreement.

The agreement affects the type of ferrochromium used in making engineering steels running up to about 3 per cent chromium and does not affect stainless steel and heat-resistant alloy steels in which a larger amount of chromium is used.

U. S. Imports of Sodium Chlorate Dwindle

SODIUM chlorate imports by the United States have dwindled from 7,000,000 pounds in 1929 and 1937, and an annual average of 3,000,000 pounds in the past 16 years, to 2,600 pounds representing the sole imports for the first three quarters of this year, it is reported through export-import sources here. The year's imports were from Canada and occurred in July.

Formerly France, Germany, and Sweden were the principal suppliers of this country from abroad, but today manufacture of the product by United States plants supplies the bulk of the country's needs. Domestic production has increased since 1928. However, until recently, only one plant, located at Niagara Falls, N. Y., has accounted for United States output. Beginning this month, a new plant at Portland, Oreg., will further expand American resources of sodium chlorate.

War Halts Essential Oil Experiments in Philippines

OUTBREAK of the Japanese war and attacks on the Philippines, with hazardous communication between the islands and this country, probably will halt any benefits from recent moves in the islands to increase plantings of essential oil plants.

The islands grow a number of plants, but not in sufficient quantities in any one locality to assure a constant supply for production of essential oils. Many of them yield only small quantities of such oils, and then in very short seasonal periods, making production expensive and probably unprofitable.

However, at the outbreak of war, the Bureau of Plant Industry had been increasing its plantings of citronella grass, and had plans for installing a small distillery. In fact one such installation already had been made, but a further problem of interesting firms in commercial production had arisen. In progress at the time were attempts to increase ylang-ylang oil production by a commercial distiller and experiments in commercial production of oil from patchouli roots and cinnamon bark.

Philippines Carry On Successful Quinine Production

QUININE production in the Philippines, which has been in progress experimentally on some 850 acres, is apparently successful, the U. S. Department of Commerce reports.

This area produces approximately 6,000 pounds of cinchona bark annually which a government chemical plant manufactures into a drug, totaquina, used to combat malaria. Annually this disease causes 16,000 deaths in the islands.

After experiments in various parts of the Philippines, cinchona plantations are now restricted to a province on the island of Mindanao, where the combination of elevation, soil, and climate seems best suited to the trees. Under cultivation are 1,300,000 cinchona trees. Since 1933 more than 50,000 pounds of locally grown bark have been delivered for processing, in addition to 30,000 pounds in storage in a government warehouse. The quality of this bark is said to compare favorably with that produced in the Netherlands East Indies.

Tariff Commission at Service of EDB

FACILITIES of the U. S. Tariff Commission will be at the service of the Economic Defense Board during the war, according to Vice President Henry A. Wallace, chairman of the board, and Raymond B. Stevens, chairman of the U. S. Tariff commission. Before the outbreak of war with Japan, the commission was acting as a research organization for the Economic Defense Board in gathering and analyzing data on the maximum supply of certain strategic and critical materials which may be imported from foreign countries in the next two years. The work, begun in October at the request of the board, is well under way.

This move strengthens the facilities recently made available to the Economic Defense Board through similar arrangements with the Department of Commerce and the Coordinator of Inter-American Affairs.

THE first eight months of 1941 saw a 5 per cent decline, from $8,355,800, to $7,949,000, in Philippine imports of chemicals and like products. The drop is attributed chiefly to a sharp decline in fertilizer and fertilizer material imports.

U. S. Imports of Sodium Cyanide Set New High

UNITED States imports of sodium cyanide, all from Canada, received in the first nine months of 1941, exceeded all previous records for any year in the past 15, it was reported by official sources in Washington recently. Total 1941 imports from this source so far reported amount to 52,315,900 pounds, valued at $2,065,700, which compares with the previous year's imports of 50,410,500 pounds, hitherto the record, and the previous low, in 1932, of 17,584,600 pounds.

Used in extraction of gold and silver from their ores, as flotation agents for separating ores, fumigation, electroplating, and heat-treating metals, and manufacture of various chemical substances, it is an important industrial commodity in the United States, where only a few concerns produce it. Some exports from this country are reported, but are less than import figures.

Dyestuff Firms Indicted

A FEDERAL Grand Jury, sitting in the Southern District of New York (New York City), December 19, 1941, returned three indictments charging three corporations and seven individuals engaged in the dyestuff, film, and chemical industries with violation of the Sherman Antitrust Act and the Wilson Tariff Act.

Named as defendants were: General Aniline & Film Corp., Dietreich A. Schmitz, former president and director, William H. vom Rath, former secretary and director, Hans W. Aickelin, vice president and director, Ernest Schwarz, vice president in charge of the Agfa-Ansco Division, and F. William von Meister, general manager of the Ozalid Division; General Dyestuff Corp. and E. K. Halback, president and director; I. G. Farbenindustrie A.-G. and Hermann Schmitz, president.

The first indictment charges that General Aniline, General Dyestuff, and I. G. Farbenindustrie agreed to combine all their dyestuff properties in the United States into a single manufacturing company and not to compete otherwise in the manufacture or sale of dyestuffs in this country except through General Dyestuff Corp. Under this agreement, General Dyestuff was to act as exclusive sales agent for all dyestuffs manufactured by General Aniline, the latter also agreeing not to export dyestuffs from the United States unless authorized to do so by the I. G. F. The second indictment has to do with films and photographic materials, and the third with photoprinting materials and apparatus.



Howard B. Bishop, Summit, N. J., is head of the recently organized Kotal Co., which has acquired the business of the Asphalt Treatment Corp.

Three new assistants to J. F. McNamara, Monel sales manager, have been announced by The International Nickel Co.: **W. J. Calnan, H. D. Tietz, and E. A. Turner. H. E. Searle,** formerly an assistant to Mr. McNamara, has been transferred to the Nickel Sales Department.

C. G. Carter, president of the Liquid Carbonic Corp., has been elected chairman of the executive committee of the company. **P. F. Lavedan,** vice president, has been made president, and **J. H. Pratt** becomes executive vice president.

Howard E. Fritz, who for the past seven years has directed the development and sale of Koroseal, one of the Nation's newest synthetic materials, has been named director of research of the B. F. Goodrich Co., Akron, Ohio. Dr. Fritz went to B. F. Goodrich in 1925 from the engineering school faculty of Ohio State University, where he was graduated in 1914 and where he received his doctor's degree in 1921.

G. A. Jorquera, professor of agricultural chemistry in the School of Chemical Engineering, University of Concepcion, Chile, is spending the academic year 1941–42 at the Oregon State College as a Phi Kappa Phi fellow. He is engaged in work leading to an advanced degree in chemistry and chemical engineering.

John G. Kura has been named to the technical staff of Battelle Memorial Institute, Columbus, Ohio, and assigned to metallurgical research.

First lieutenant Floyd E. Kurtz, who has been Assistant Post Chemical Officer at Fort Meade, Md., since December 1, 1941, has been transferred to the Post Chemical Office at Fort Belvoir, Va.

Stanley M. Matelski, Jr., has been transferred from Edgewood Arsenal to the Office of the Chief of the Chemical Warfare Service, Washington, D. C., and has been assigned to the Industrial Service, Priorities and Labor Relations Section.

The retirement this month of **James W. Schade,** director of research for the B. F. Goodrich Co., since 1925, has been announced. One of the best known technical men in the rubber industry, Mr. Schade joined the company in 1909 as a chemist. He assumed direction of technical work in the footwear department and in 1919 became manager of the department. In 1922 Mr. Schade was selected to direct the operation of the company's testing laboratories and three years later was named to his present position.



E. A. Turner

E. A. Turner, for more than 15 years in charge of Monel and rolled nickel sales in the chemical and associated fields for The International Nickel Co., New York, N. Y., has been appointed assistant to the sales manager. **C. J. Bianowicz** succeeds Mr. Turner.

Roy C. Newton Honored

ROY C. NEWTON, vice president in charge of chemical research, Swift & Co., Chicago, Ill., was placed in the hall of fame of his alma mater, Oklahoma Agricultural and Mechanical College, in special ceremonies commemorating achievements of alumni, December 15. The occasion was part of a 3-day observance of the 50th year of the founding of the college.

Dr. Newton, member of the Swift & Co. chemical research staff since 1924, received his bachelor's degree from Oklahoma A. and M. College in 1921, having served in the A. E. F. as a second lieutenant in 1917–18. Wounded during the war, he holds the Croix de Guerre with one star. Following his graduation, Newton served as assistant chemistry instructor at the college, and later taught at Purdue University and Lewis Institute.

The citation giving Dr. Newton the honor said, in part:

Dr. Newton, through a rare combination of scientific and executive skill, has built for his company a research department that has contributed hundreds of improved forms of food and food by-products to the use of mankind. His personal research has contributed many valuable processes to the food industries.

Standing as he does at the meeting grounds of agriculture, science, and business, Dr. Newton exemplifies the combination in one person of those skills which it is the purpose of the land-grant college to impart; and hence it is fitting that we recognize him today as one of Oklahoma A. and M. College's outstanding graduates.

Haering Personnel Changes

RECENT personnel changes of D. W. Haering and Co., Inc., include the promotion of H. C. Daggett, formerly eastern division manager, to the position of general sales manager; appointment of Nat Bailey, formerly chief chemist of the Waukegan Coke and Chemical Co., as research chemist in Chicago; and addition of Tom Palen and Jarvis Johnson, chemists in the Chicago Service Laboratory. Dyer B. Lake has been placed in charge of the New York Service Laboratory, F. H. Wright has been made manager of the Chicago Winchester Avenue unit, and O. R. Borngosser placed in charge of the Wichita Service Laboratory. D. R. Walser has been promoted to Chicago district managership, C. E. Erb to Wichita district manager, and E. H. Snyder to Houston district manager.

George Perry has been appointed West Coast manager, P. A. Dobson is now in charge of Los Angeles, Calif., territory, and Joseph Paulson is in charge of Portland, Ore., and surrounding area. G. Knight-Smith has been placed in Dallas, Tex.; E. M. Lloyd, in Baltimore, Md., Walter Beschenbossel, in Minneapolis, Minn., and R. C. Rohrdanz, superintendent of the Shelley Refining Co., has returned to active service for Haering in the Houston, Tex., territory.

Frank W. Mrazek has been placed in charge of New Orleans, La., and W. S. Nathan has been added to the Milwaukee, Wis., staff. C. French and G. Conrow have been added to the Chicago service staff. W. F. Renner of Red Springs, N. C., has been placed in charge of North Carolina operations.

Spies Receives Manufacturing Pharmacists' Award

FOR pioneer work with vitamins that has cut the hidden hunger death rate from 50 per cent to 0, Tom Douglas Spies, of the University of Cincinnati School of Medicine and Hillman Hospital, Birmingham, Ala., received the Award of Distinction of the American Pharmaceutical Manufacturers' Association on December 8. Dr. Spies was among the first to use nicotinic acid to save patients dying from pellagra and has since studied the role of other B vitamins in the treatment and prevention of disease.

The award is made each year to a scientist who, in the opinion of an advisory committee, has made a fundamental contribution to public health in the field of drug therapy. Last year's award went to Perrin Long, of Johns Hopkins School of Medicine, for his study of the use of the sulfa drugs.

Perkin Medal to Martin H. Ittner

THE Perkin Medal for 1942 was presented January 9 to Martin H. Ittner, of the Colgate-Palmolive-Peet Co. at a joint meeting of the American Section of the Society of Chemical Industry, the New York Sections of the AMERICAN CHEMICAL SOCIETY, American Institute of Chemical Engineers, and Electrochemical Society, and the Société de Chimie Industrielle. Lincoln T. Work presided. Sidney D. Kirkpatrick, editor of *Chemical and Metallurgical Engineering*, spoke on the personal side of the medalist's life and Foster Dee Snell, president of Foster D. Snell, Inc., on his technical accomplishments. The medal, which is awarded annually by the American Section of the Society of Chemical Industry for outstanding work in applied chemistry, was presented by Marston T. Bogert, following which Dr. Ittner gave an address on "Forty-five Years of Chemistry in a Soap Plant".

For almost 45 years Dr. Ittner has been in charge of research at Colgate-Palmolive-Peet Co. or predecessor companies. Among his many contributions is the development of a successful commercial process for the hydrogenation of fatty oils, on which he has been granted a number of patents. He has also made valuable contributions in the field of distillation and he holds several recent patents pertaining to new processes for glycerol production and fatty acid distillation. He holds patents for the counter-current hydrolysis of fats with water to fatty acids and glycerol.

Who Makes It?

THE following acids, which need not be Schering-Kahlbaum preparations but should be of equal purity, are needed in 25- to 100-gram quantities by Marshall W. Mead, Department of Chemistry, Franklin College, Franklin, Ind.

Ethyl malonic	Benzyl bromomalonic
Benzyl malonic	Tribromoacetic
Heptyl malonic	Allyl acetic
Isopropyl malonic	Ethyl succinic
Methylethyl malonic	Phebyl propiolic
Dipropyl malonic	α-Chlorocrotonic

A NEW regulation on essential oils, just reported from Jamaica, states: "No person shall make, manufacture, produce, purchase, or sell, or cause to be made, manufactured, produced, purchased, or sold, any oil made, manufactured, or produced from bitter, bitter-sweet, or sour oranges."

Cincinnati Gives Chemical Engineering Lectures

A LECTURE series on Recent Trends in Chemical Engineering is being conducted by the Department of Chemical Engineering of the University of Cincinnati. Each program is preceded by a subscription dinner. Saul B. Arenson, professor of inorganic chemistry, has charge of arrangements.

Lectures which have been presented are Chemistry and Chemical Engineering in the Printing Industry by Robert F. Reed and Paul W. Dorst, Modern Chemical Engineering by R. S. Tour, and a Symposium on Microbiology of Chemical Interest with Mrs. E. K. Moore discussing Bacterial Friends and Foes of the Tanner and Furrier and Harry C. Fisher speaking on The Microbiology of Paper as a New Specification.

Future speakers, who are University of Cincinnati graduates and faculty members, and their subjects are:

SUBJECT	SPEAKER	DATE
Alloys from Powdered Metals	John F. Kahles	Jan. 22
Newer Tools in Chemical Engineering		Feb. 17
Ultraviolet Light	Francis M. Sell	
Some Fundamentals of Industrial Instrumentation	Selig H. Isaacs	
Progress in the Brewing of Beer	George Sipple	March 20

Defense Training Course

NEARLY 85 per cent of the men who have graduated from the course in the Chemistry of Powder and Explosives at Purdue university since last spring are now employed in the field of munitions. Applications are being accepted for the next course which opens on the campus, at Lafayette, Ind., January 26. This is a full-time, intensive course, six days a week, for six weeks.

The establishment of several new ordnance-manufacturing and powder-loading plants in the Midwest will require thousands of additional skilled workers. Satisfactory completion of this defense training course qualifies the student to act as explosive inspector for the Government or as operator and inspector in manufacturing plants. Passing the course is tantamount to passing the Civil Service examination for inspector of powder and explosives. The course is rated as one year of experience on this examination.

The applicant must have had at least two years of college chemistry, including one year of organic chemistry. The one year of organic is required regardless of the number of years of chemistry a student may have had. There is no tuition, the cost of supplies, supplementary teaching material, and instruction being met by federal funds supplied through the U. S. Office of Education. Students, however, are required to buy their own books and pay for transportation and subsistence.

The course is taught by George T. Austin, School of Chemical and Metallurgical Engineering, assisted by Lloyd Berg and Herschel Hunt. Persons interested should write to Harry Short, district representative, defense training program, Purdue University, Lafayette, Ind., giving a list of chemistry courses which the applicant has completed and the grades received.

Fellowships Established to Increase Knowledge of Nutrition

THE National Live Stock and Meat Board will place grants and establish fellowships through the National Research Council for the purpose of increasing the present knowledge of nutrition.

The grants may be made for either fundamental or clinical research on the nutritional properties of meat, meat products, and animal fats, and the importance of these nutrients to human health and welfare.

This fund, limited in amount, will become available on July 1, 1942. Applications will be received until March 1, 1942. Application blanks may be obtained from the Division of Biology and Agriculture, National Research Council, 2101 Constitution Ave., Washington, D. C. In addition to a statement of the problem and research plan or program, the committee in charge desires information regarding the method of attack proposed, the institutional support which will be given the investigation, and the uses to be made of the sum requested. No part of a grant may be used by the recipient institution for administrative expenses.

Licenses Required for Explosives

DECLARATION of a state of war makes effective the Federal Explosives Act of October 6, 1917, which prohibits the manufacture, distribution, storage, use, or possession of explosives, or the ingredients of explosives, unless a license has been obtained from the Director of the U. S. Bureau of Mines. Exempted are explosives used by the Army and Navy.



NECROLOGY

Howard Salisbury Evans

HOWARD SALISBURY EVANS, aged 65, died of a heart attack at his home in Pittsburgh, Penna., December 14, 1941. He had spent the greater part of his business career in the glass manufacturing industry.

Mr. Evans' first association with the glass industry was when he entered the employ of the Thomas Evans Co., of which his father was president. The firm, a pioneer Pittsburgh institution, was engaged in the manufacture of lamp chimneys. When the Evans and MacBeth interests were merged into the MacBeth-Evans Glass Co. in 1899 Mr. Evans became associated with that firm, and upon the death of his father in 1923 was advanced from vice president to president of the company. Mr. Evans continued as president until 1926 when he retired. He was also one of the founders of the Diamond Alkali Co., Pittsburgh, and a member of its board of directors.

William L. Lippincott

WILLIAM L. LIPPINCOTT was born in Hornell, N. Y., October 12, 1893, and died from a heart attack December 1, 1941. Graduated from Cornell University with the degree of bachelor of chemistry in 1918, after one year of graduate work at Cornell University he went to Clemson College in the fall of 1920. During the first World War and prior to his graduation, Professor Lippincott served as a sergeant in the Sanitary Corps and was stationed at Camp Wadsworth, Spartanburg, S. C.

During the first four years at Clemson College, Professor Lippincott was research chemist with the S. C. Experimental Station, as well as professor of analytical and physical chemistry. As the enrollment of the chemistry courses increased, the course in analytical chemistry required his full time.

Besides his instructional duties, for many years he served as faculty adviser and coach of the college glee club. Largely through his efforts in organizing a club among the students majoring in chemistry, which eventually resulted in establishing a chapter of Alpha Chi Sigma, the national professional fraternity was installed at Clemson College in 1938. He acted as faculty adviser from the time of its organization to his death.



Alexander Lowy

ALEXANDER LOWY, professor of organic chemistry in the University of Pittsburgh, died December 25, 1941, after an illness of about four months.

Dr. Lowy was born in New York City, March 31, 1889. He obtained his bachelor of science degree from Columbia University in 1911, the master of arts in 1912, and the doctor of philosophy in 1915.

Dr. Lowy was assistant in electrochemistry in Columbia University from 1912 to 1915. He taught in the high schools of New York City from 1915 to 1918, when he became professor of organic chemistry in the University of Pittsburgh, with which he was associated until the time of his death. During the past summer he was exchange professor in the University of Southern California. Dr. Lowy was the holder of numerous United States patents. He was a recognized authority in the field of protective chemicals, having invented methods for the safeguarding of banks and vaults. He also made important contributions in the field of dyestuffs and was a pioneer in electro-organic chemistry, to which he contributed numerous researches.

Dr. Lowy with Benjamin Harrow was the author of "A Textbook of Organic Chemistry", which is in use in over 125 colleges and universities in America and has gone through many revisions. A companion volume is "A Laboratory Manual of Organic Chemistry" with Wilmer Baldwin. Dr. Lowy was a coauthor of Rogers' "Industrial Chemistry" and contributed the chapter on organic chemistry. Alone and with his research students he was the author of over 70 research reports and scientific papers which have appeared in technical journals since 1919.

Dr. Lowy was a member of the AMERICAN CHEMICAL SOCIETY and a past chairman of the Pittsburgh Section. He was a member of the Electrochemical Society, its vice president from 1930 to 1933 and from 1939 to 1941, and chairman of its Committee on Publications from 1931 to 1941. He belonged to the honorary science societies Sigma Xi and Phi Lambda Upsilon and was an honorary member of Sigma Alpha Mu fraternity.

In the summer of 1929, Dr. and Mrs. Lowy visited England and continental Europe, where Dr. Lowy made a study of the universities and industrial establishments. He lectured extensively and addressed many of the sections of the AMERICAN CHEMICAL SOCIETY. It was as a teacher that Dr. Lowy reached his pinnacle. No effort was too great to provide what was best for the student. He was exacting in performance but tolerant of the individual's difficulties and ever willing to lend a hand and help, not only in studies but in private problems. In the University of Pittsburgh he was a member of important committees and was faculty chairman of registration.

J. S. Marlowe

J. S. MARLOWE, district representative for the Jessop Steel Co., Indianapolis, Ind., died November 2 from a cerebral hemorrhage. He was 60 years old. Mr. Marlowe had sold steel and steel products in the Indianapolis district for 35 years, during the last 20 of which he represented the Jessop Steel Co.

Charles Rudisel Park

CHARLES RUDISEL PARK, in charge of the Bulletproof Tank Division of The Firestone Tire and Rubber Co., Akron, Ohio, was fatally injured on December 11, 1941, in an explosion which occurred in the Parkway Restaurant, near the Firestone plants. He died in a local hospital several hours later.

Mr. Park was born in Tiffin, Ohio, August 21, 1894. He attended Heidelberg College and Cornell University, receiving the A.B. degree from the latter in 1916. After doing graduate work and serving as assistant in chemistry at the University of Minnesota (1916–17), he was instructor at Massachusetts Institute of Technology from 1917 until August 1922. He then joined the research staff of the Goodyear Tire and Rubber Co. in Akron. He was engaged in development work on carbon black for the Delano Land Co. from 1926 to 1928 and returned to research work at Goodyear in 1928. From 1930 to 1931 he was chief chemist of the United Carbon Co., and then became a member of the research staff of The Firestone Tire and Rubber Co., where he held the positions of research chemist, head of the division of physical chemical research, and assistant director of research. He became manager of the New Products Division of Firestone, March 1, 1938, and was placed in charge of the Bulletproof Tank Division June 1, 1941, in which capacity he was serving at the time of his death. He was the author of publications on the physical properties of rubber compounds, effects of powders in the reinforcement of rubber, and temperature effects during vulcanization.

Mr. Park was a member of the AMERICAN CHEMICAL SOCIETY (1917), having served the Akron Section as Secretary, Chairman, and Councilor, the American Institute of Chemical Engineers, the American Institute of Chemists, and Alpha Chi Sigma fraternity. His hobbies were gardening and music, and he was active in the civic affairs of his community, being a member of the City Council of Silver Lake, Ohio. He was a member of Akron Torch Club and the Akron Friends of Music.

He is survived by his wife, Kathryn, one son, John, age 15, of Silver Lake, Ohio, and his mother and sister of Tiffin, Ohio.





High Polymeric Reactions. Their Theory and Practice. *H. Mark* and *R. Raff.* 476 pages. Interscience Publishers, Inc., 215 Fourth Ave., New York, N. Y., 1941. Price, $6.50.

THIS book is Volume III of a series—Volume I related to the collected papers of W. H. Carothers on "High Polymeric Substances", and Volume II on "Physical Chemistry of High Polymeric Systems".

The scope of the volume, which is divided into two parts, may be indicated by the table of contents. Part 1, General, comprises (*A*) The Structure of High Polymers, (*B*) Some Data on Experimental Methods, (*C*) The Fundamentals of Reaction Kinetics, and (*D*) The General Theory of the Mechanism of Polyreactions; Part 2, Special, (*A*) Polymerizations, (*B*) Polycondensations.

Under *A* in Part 1 the authors classify polymers as having chain, net, and space configurations; for example, the chain polymers include substances such as rubber, cellulose, and silk, while the net and space polymers include substances which form rings in two or three dimensions such as the synthetic resins. In this same section the authors discuss some fundamental concepts such as homopolar covalence and properties of this type of linkage, both from the classical and the quantum mechanical viewpoints. Under Section *B* of Part 1 various experimental methods are presented, including the determination of specific properties both physical and chemical. Section *C* gives a rather complete discussion of fundamental reaction kinetics, including the various orders of chemical reactions, reaction rates, and activation energy. In Section *D* the general theory of the mechanism of polyreactions is discussed. The authors assume that such reactions take place either in steps or according to a chain mechanism. They also developed equations for the rate of formation of polymers. A considerable number of algebraic equations have been presented for the rates of chain reactions, and the authors have discussed the nature and function of the double bond in polymerization reactions. In Special Part 2, Section *A*, the authors review the experimental work on polymerization in the literature with reference to a large number of compounds, including olefins, diolefins, acetylene and its derivatives, and other types of compounds. Section *B* of Part 2 deals with polycondensations, which differ from polymerizations in that the combination of the primary constituents is made up by splitting off simple molecules such as H_2O, NH_3, and HCl. The formation of polyglycerols and glyptals (reaction between phthalic anhydride and glycerol) are examples of these types of reactions.

The book contains 436 pages of text and has a large number of references and a systematically arranged author and subject index. It is well written and has a sound theoretical and practical basis. The subject is timely.

J. C. MORRELL

Analytical Chemistry of Industrial Poisons, Hazards, and Solvents. *M. B. Jacobs.* 661 pages. Interscience Publishers, Inc., 215 Fourth Ave., New York, N. Y., 1941. Price, $7.00.

THE book is a useful text for students of industrial hygiene, industrial and preventive medicine, although perhaps somewhat large to be used in its entirety as a college textbook.

The author, through 134 pages, deals with the classification of the industrial poisons and the sampling of gases. In these 134 pages, many instruments for sampling are described, proper credit being given to the individual designers as well as to the manufacturers of the sampling devices. It is a thorough and all-inclusive introduction.

The chapters following describe the chemical and microscopical examination of dust with a critical analysis of the various methods. The author describes not only the various known chemical methods of analysis, but the relative toxicity of various compounds. The methods described for one particular toxic substance, for example, lead, are many. The lead sulfide method is outlined, then the diphenyl-carbazide estimation, the dithizone method, and the electrolytic separation of lead; determination of lead, also when the lead is present in the form of a true vapor or gas as is the case with tetraethyl lead, is given.

Some methods have their limitations, for instance, pyridine; the recommended determination consists of back titration of the consumed 0.1 *N* sulfuric acid by the pyridine. If other alkaline vapors, such as ammonia, are present in the air this determination fails and would have to be modified. No mention is made of this.

The chapter on chemical warfare agents and their determination is particularly recommended. The work is thorough and deserves a space in the library of physiological chemists, plant chemists, and physicians interested in industrial hygiene.

NICHOLAS M. MOLNAR

Chemical Engineers Handbook. *John H. Perry,* Editor-in-Chief. 2nd ed. 3029 pages + xviii. McGraw-Hill Book Co., 330 West 42nd St., New York, N. Y., 1941. Price, $10.

THE second edition of the Chemical Engineers Handbook is similar in appearance to its eight-year-old predecessor which it exceeds in size by some 400 pages. The general plan and content are exactly the same, each section or subject has been written by one or more contributors and more than 90 individuals are responsible for the 29 sections.

In the preface the editor-in-chief states that all sections except four have been rewritten or thoroughly revised. Those four are Mathematics, Factors in Chemical Plant Location, Accounting and Cost Finding, and Reports and Report Writing. Perry also states that the following new material has been added: a table of physical and chemical properties of inorganic chemical compounds, and a table of gages for wire and sheet metal; sections on solvent extraction; shotting, granulation, flaking, sprays and spraying; bulk packaging; and sublimation. There are new chapters on Thermodynamics; Mechanical Separations; and Pipes and Tubing.

Several physical features should be corrected. The handbook is extremely difficult to read: first, because type size is small (though this is to be expected), and second the paper readily transmits the illustrations and text on the underlying page. This condition existed in the first edition but it seems more pronounced in the present offering. Halftone cuts are the chief offenders in this respect and should either be discontinued in favor of line drawings or the handbook printed on heavier paper and divided into two sections as exemplified in Kent's Mechanical Engineers Handbook. When a book approaches 3.25 inches in thickness, as does this volume, it ceases to be a handbook as originally defined and ought to be made more convenient for the user.

It is impossible to comment on the accuracy of the technical data or even to have an opinion on every section, and it is unfair to single out individual offerings.

However, in all technical writings, accuracy depends on the competence of the author and Perry has done a masterful job in assembling a group of qualified men to write, advise, and criticize.

New Crops for the U. S. A.

A BULLETIN recently published by the National Farm Chemurgic Council, 50 West Broad St., Columbus, Ohio, discusses United States imports as possible new crops for experimentation and large-scale domestic cultivation. After an introduction by Wheeler McMillen, president of the council, and a preface by Robert T. Willkie and Paul J. Kolachov, the authors, the bulletin lists 131 imports, with 23 literature references to the subject. The bulletins are 25 cents each.

Journal of Chemical Education for January

THE *Journal of Chemical Education* for January 1942 contains the following articles among others:

LIU-SHENG TS'AI. A Transparent Phase Rule Model.
EVA V. ARMSTRONG AND CLAUDE K. DEISCHER. Johann Rudolf Glauber (1604–70), His Chemical and Human Philosophy.
HARVEY A. NEVILLE. Synthetic Resins and Plastics.
HAROLD F. SCHAEFFER. The Iodoform Reaction by Methods of Microscopy.
ALEXANDER SILVERMAN. Stoichiometric Calculations on the Basis of Crystal Lattices.
DOROTHY BARTON. Edwin Emery Slosson, a Chemist of the West.
H. A. SPOEHR. Origin and Transformation of Carbohydrates in Plants.
W. F. LUDER. Acids and Bases, Their Relationship to Oxidizing and Reducing Agents.
A. L. KUEHNER. Monomolecular Film Demonstrations.
W. H. DORE. Calculation of the Valence Angle.
J. W. GREENE, A. L. OLSEN, AND W. L. FAITH. A Laboratory Course in the Chemistry of Powder and Explosives.
M. G. MELLON AND D. R. MELLON. Problems of Teaching Quantitative Analysis. II. Students' Laboratory Records.
PHILIP F. WEATHERILL. The Valence Angle of the Carbon Atom.
R. H. BOGUE. Portland Cement and the "Plastic" Concrete.
J. A. V. BUTLER. John Maclean, Charles Macintosh, and an Early Chemical Society in Glasgow.
J. HERBERT WARD. An Experiment in Chemistry Teaching.

Chemical Reviews for December 1941

THE December issue of *Chemical Reviews* contained the following papers from the Symposium on Reactions and Equilibria in Chemical Systems under High Pressures, which was held under the auspices of the Division of Physical and Inorganic Chemistry at the 100th Meeting of the AMERICAN CHEMICAL SOCIETY, Detroit, Mich., September 9 to 13, 1940:

R. E. GIBSON. Introduction to the Symposium.
L. H. ADAMS. Equilibrium in Heterogeneous Systems at High Temperatures and Pressures.
BENTON BROOKS OWEN AND STUART R. BRINKLEY, JR. Calculation of the Effect of Pressure upon Ionic Equilibria in Pure Water and in Salt Solutions.
R. WIEBE. The Binary System Carbon Dioxide–Water under Pressure.
H. H. STORCH. Chemistry of Coal Hydrogenation.
W. B. KAY. Some Peculiarities in the *P–T* Border Curves of Mixtures of Hydrogen and a Petroleum Naphtha.
ALLEN E. STEARN AND HENRY ERYING. Pressure and Rate Processes.
L. J. GILLESPIE. Thermodynamic Calculations of Pressure Effects in Gaseous Reactions by the Equation of State Method. A Brief Review.

This issue also contained a paper by H. B. Hass and Elizabeth F. Riley, The Nitroparaffins.

Bibliography of Nomographs Dealing with Acids and Alkalies

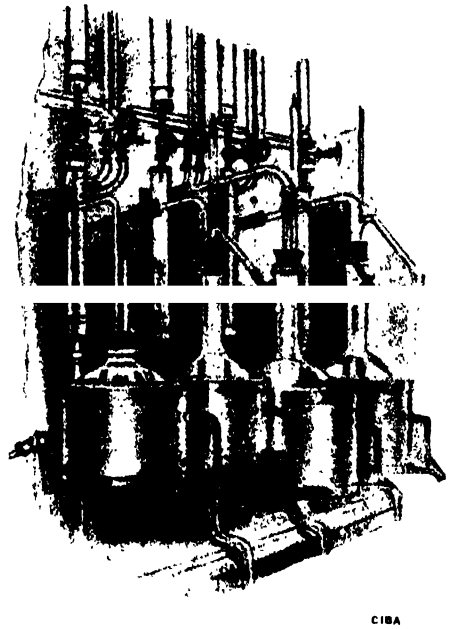
THE following references are drawn from "A Bibliography of Chemical Engineering Nomographs", 84-page Document 1599, compiled by Roy Myllynen and D. S. Davis of Wayne University and filed with the American Documentation Institute, Science Service Building, 1719 N St., N. W., Washington, D. C. It is obtainable on microfilm for $1.04 or in photocopies readable without optical aid for $8.60.

The references given here do not include titles listed under the headings of Vapor Pressure and Viscosity.

Acids

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Osborn, O. L., Wood, H. G., and Werkman, C. H., "Determination of Volatile Fatty Acids by the Partition Method", *Ind. Eng. Chem., Anal. Ed.*, 8, 270–75 (1936).

Perry, J. H., and Davis, D. S., "Charts for Specific Volumes of Mineral Acids", *Chem. & Met. Eng.*, 42, 87–88 (1935).

Alkalies

Ammonia

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Davis, D. S., "Specific Gravity Nomograph for Aqueous Ammonia", *Chemist-Analyst*, 24, No. 2, 8 (1935); "Hydrometric Line Coordinate Chart for Ammonia", *Ibid.*, 30, No. 1, 14 (1941).

Sodium Carbonate Solutions

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Davis, D. S., "Specific Gravity and Viscosity of Na_2CO_3 Solutions", *Ibid.*, 47, 690 (1940).

Miscellaneous

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Davis, D. S., "pH Nomograph for Industrial Alkalies", *Paper Ind.*, 22, 802 (1940).

5 WAYS to MAKE RESINS

1. Furfuryl Alcohol + mineral acid
2. Furfuryl Alcohol + acidic salts
3. Furfuryl Alcohol + heat (reflux)
4. Furfuryl Alcohol + water + heat (reflux)
5. Furfuryl Alcohol + Furfural + acids

Furfuryl ALCOHOL

The Furans

FURFURAL
FURFURYL ALCOHOL
TETRAHYDROFURFURYL ALCOHOL
HYDROFURAMIDE

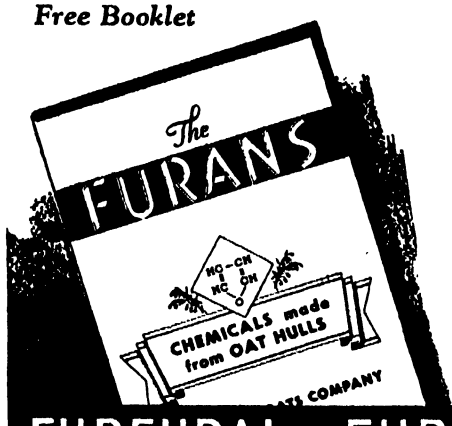
Coating compositions, heat-setting binders, and cements are being made successfully from Furfuryl Alcohol resins. The coatings based on the resinification with acids possess much resistance to corrosive substances including nearly all mineral acids and alkalis. By control of the kind and amount of catalyst and temperature one may form thermo-setting resins.

Other uses for Furfuryl Alcohol are based on its solvency for dyes and resins. It finds use as a penetrant and flotation agent intermediate. Here are typical properties:—

Specific gravity	1.130 (25/25°C)
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Write for a test sample of Furfuryl Alcohol and ask for your copy of the free booklet describing all the Furan compounds. A word concerning the nature of your company's interest will help us to supply pertinent data.

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TECHNICAL DIVISION 1-1

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FURFURAL - FURFURYL ALCOHOL - HYDROFURAMIDE
. . . TETRAHYDROFURFURYL ALCOHOL . . .



Left. Running a test on cellulose acetate material in laboratory at Derby, Conn.

Below. A general view in Farrel-Birmingham's testing laboratory at Derby, Conn.



Farrel-Birmingham Opens Testing Laboratory

To aid industry in the development of new processes and materials, Farrel-Birmingham Co., Inc., Ansonia, Conn., has expanded the testing facilities at its Derby plant by completely re-equipping the laboratory that has operated there for some years. It is not intended to compete with established commercial laboratories, but is operated solely to help the company's customers develop new products or improve old ones, with the view that expanded use of these products will create a greater need for the machinery built by the company.

The new laboratory was started about August 1, 1941. Since that date an average of three independent companies a week have made use of the testing facilities. Many experiments have been performed with such materials as rubber, synthetic rubber, various kinds of plastics, such as cellulose acetates, resinous compounds, and phenolic condensation products, asphaltic materials, linoleum, cellulose products, paints, and enamels. Many of the more recent formulas for plastic articles have been developed. Production-size machines as well as experimental machines have been installed so that, when formulas are developed and tested on a laboratory scale, tests can be completed at once in the same size machines used for production. Users of the laboratory have complete privacy, and secret processes or formulas need not be disclosed. Schedules are so arranged that no two clients are there at the same time.

The main room is 36 feet wide by 90 feet long. With the exception of the lower part of the walls and floor, the entire interior and the machinery are painted white, providing good lighting under most daytime conditions. Fluorescent lamps give bright illumination when artificial light is necessary.

The machinery includes a size 3-A Banbury with two-speed drive so that it can be operated at speeds of 34 and 68 r. p. m. The Banbury is mounted over a 22 by 48-inch heavy-duty, two-roll mill, which can be used for sheeting out the stock from the mixer or for other milling operations. An elevator and conveyors carry materials from the main floor to the operating platform of the Banbury mixer. Next to the Banbury mixer and sheeting mill installation is a tilted refiner with 21- and 24-inch by 36-inch rolls. This machine is driven by an individual motor and arranged to operate at either 20 or 61.44 r. p. m.

The experimental size equipment consists of two laboratory Banburys—a size B and a midget; a 6- by 13-inch two-roll mill; a 6- by 13-inch three-roll calender; a 3-inch plasticator, and an 8- by 8-inch hand-operated hydraulic press with electrically heated plates.

A 15-horsepower, automatic, gas-fired boiler provides steam pressure to a maximum of 150 pounds per square inch. Laboratory scales with metric graduations, portable scales of 1,000-pound capacity, tables, stock bins, shelves, and cupboards make the laboratory equipment complete for handling the materials being processed.

Outside the main laboratory another room has been provided for storage of both raw and processed materials.

American Drug Firm Launches Latin American Campaign

Inauguration of an economic war against Nazi control of the drug trade in Latin America has been announced by Sterling Products (Inc.), American manufacturer and distributor of drugs, pharmaceutical supplies, and allied products.

The drive was launched in Mexico with the largest sales and advertising campaign ever undertaken in that country. The campaign is to be extended to other Central and South American countries, under direction of 60 men trained for foreign commercial service, through Sterling's subsidiaries, the Sydney Ross Co. and Sterling Products International, Inc. Personnel of these companies is largely Latin American.

Surveys show that until recently Germany controlled 75 per cent of the Latin American drug business; the United States only 20 per cent. The remaining 5 was divided among Great Britain, Italy, Japan, and others. The German organization is strongly intrenched with large stocks of drug supplies on hand.

SYNTHETIC RESIN PLYWOOD ADHESIVES

TEGO-UFORMITE AMBERLITE

The development of resin-bonded plywood over the past ten years is one of the less-heralded, but none the less spectacular, accomplishments of synthetic resins, and one which is still in the early stages of growth. It would be a gross understatement to say that this development has resulted merely in a greatly improved product, for it has actually brought about a revolution in plywood. This is true not only from the standpoint of *production*, where the advantages of the resin bonding process are immediately apparent, but also from a standpoint of *design*, since engineers have been provided with a new structural material.

The cornerstone of this development was TEGO Resin Film, a thin sheet of a special phenol formaldehyde type resin which, under heat and pressure, yields plywood proof against boiling water, mold, heat, and freezing. TEGO Resin Film still remains the outstanding quality adhesive, with millions of square feet being used today in aircraft and marine plywood alone. For example, the United States Navy patrol torpedo boats make wide use of TEGO-bonded plywood in their construction.



TEGO was followed by the urea formaldehyde adhesive, UFORMITE, widely used in the manufacture of furniture and radio cabinets where it has proved far superior to older type adhesives under extreme service conditions. UFORMITES of various types have been evolved for use in both hot and cold pressing of plywood, replacing casein and animal and vegetable glues in many applications.

Recently, AMBERLITE PR-14, AMBERLITE PR-23, and AMBERLITE PR-28, water-soluble phenol formaldehyde powders, have been developed to meet the adhesive needs of the Douglas Fir plywood industry on the one hand, and molded plywood, as typified by the so-called plastic plane, on the other. Interest in these products is not limited to their use in plywood manufacture. For example, AMBERLITE PR-28, created to meet the need for a phenol formaldehyde adhesive curing at the relatively low temperatures required for rubber-bag techniques, represents an entirely new type of resin, possessing wide possibilities as a binder in a variety of applications.

Literature which describes in detail the properties of synthetic resin adhesives and their application in the plywood field is available upon request and our technical staff will gladly discuss special problems without obligation.

OTHER DEVELOPMENTS OF THE RESINOUS PRODUCTS LABORATORY

Ion Exchange Resins

The use of synthetic resins as ion exchangers—developed in the laboratories of the Department of Scientific & Industrial Research, in Great Britain—represents the newest field of application of synthetic resins. The Resinous Products & Chemical Company, sole licensee for the United States under basic Holmes and Adams patents, is now producing these resins. Their use on a commercial scale, both for the softening of water and the removal of cations and anions as salts from solutions is now being widely investigated.

Synthetic Resins in the Coatings Industry

More than fifteen years ago, AMBEROLS (modified oil-soluble phenol formaldehyde resins) paved the way for the modern, quick-drying varnishes. Since then, DURAPLEX alkyd resins, UFORMITE urea formaldehyde resins, and ACRYLOID polymers of acrylate and methacrylate esters have extended the use of synthetic resins in paints, varnishes, lacquers, printing inks, coated fabrics, and floor coverings.

Resin Emulsion Paints

Six years ago, work was begun on the development of alkyd resin emulsions as clear coatings, primers, and in pigmented form—as paints. This emulsion, AQUAPLEX, is now in wide use as the base of an entirely new type of paint.

The Paraplex Family of Resins

The PARAPLEX resins are a unique class of the alkyd-type resins. They are tough, rubbery products of varying degrees of softness and are outstanding resin plasticizers for nitro-cellulose and ethyl-cellulose. Special forms are adapted for use in caulking and sealing compounds and in the modification of synthetic rubber.

Versatile Urea Formaldehyde Resins

UREA formaldehyde resins are proving to be the most versatile of the synthetic resin types. Produced as dry water-soluble powders, as aqueous solutions, as modifications soluble in ethyl alcohol and butyl alcohol, octyl alcohol and hydrocarbons, these resins are finding a widening use as plywood adhesives, in the treatment of textiles and paper and in baking finishes for wood and metal.

Complete Technical Advisory Service

Upon request, interested chemists will promptly receive technical literature on any of our products. In addition, a member of the Resinous Products' trained technical staff will consult with chemists on proposed applications of any of our products. This service, which includes the facilities of the Resinous Products Laboratory, is offered without obligation. Write today, stating what cooperation you would like us to render.

THE RESINOUS PRODUCTS & CHEMICAL COMPANY
WASHINGTON SQUARE, PHILADELPHIA, PA.

Wanted—Defense Production Inspectors

THE latest examination announcement to come from the U. S. Civil Service Commission is for inspector positions in the Defense Production Protective Service of the War Department. Salaries range from $2,600 to $5,600 a year. Applications will be rated as soon as possible after receipt at the U. S. Civil Service Commission, Washington, D. C.

The title "Inspector, Defense Production Protective Service" implies the urgency of this examination. These inspectors will be responsible for making recommendations to prevent interruptions or delays in the production and delivery of all types of defense material when these interruptions may be caused by major accidents, explosion, or other hazards inherent in manufacturing plants. No written test will be given. Applicants will be rated on their education, experience, and personal qualifications. The requirements are:

(*a*) General experience in performing inspectional and professional engineering advisory services for manufacturers, as inspector in a property insurance rating bureau, as plant protection supervisor or master mechanic in a large industrial establishment, or as professional engineer specializing in plant protection work.

(*b*) Chief and principal inspectors ($5,600 and $4,600 a year) are also required to have had responsible administrative experience not necessarily in connection with plant protection inspections.

Provision is made for substituting appropriate college study for part of the prescribed experience.

Although applications will be accepted until further notice, qualified persons are urged to apply at once. Copies of the announcement and application forms may be obtained at any first- or second-class post office or from the Civil Service Commission, Washington, D. C.

Types and Sizes of Drums for Liquids Reduced

THE chemical industry has accepted specific recommendations of the Manufacturing Chemists' Association covering extensive reductions in sizes and types of metal barrels and drums for liquid products during the national emergency. These recommendations are that:

Single-trip drums for liquid chemicals be restricted to the 5- and 55-gallon sizes.

Returnable drums (12- to 16-gage) for liquid chemicals be restricted to the 10-, 20-, 30-, and 55-gallon sizes. Four specific sizes are stipulated because of Interstate Commerce Commission requirements for specific hazardous liquids such as bromine and hydrofluoric acid.

Shippers specify a wall thickness not heavier than 13-gage for 110-gallon aqua ammonia drums and not heavier than 14-gage for 55-gallon drums on future orders.

No further orders be placed for 110-gallon drums, except in the case of aqua ammonia.

Freezing of Gas Pipe Lines Investigated

FREEZING" of natural-gas pipe lines in cold weather by the formation of snowlike compounds called "gas hydrates" is being investigated by the U. S. Bureau of Mines through temperature surveys of certain western pipe lines, according to a report submitted by R. R. Sayers, director of the bureau.

The bureau in cooperation with the American Gas Association is seeking to eliminate gas-hydrate obstructions in the pipe lines, thus contributing to national defense by permitting an uninterrupted supply of this vital fuel to cities and industries far removed from gas fields.

Bureau chemists established temperature-reading stations on a 340-mile natural-gas pipe line extending from the Texas Panhandle gas fields to Denver, Colo., and control stations where temperatures were recorded at the surface and at various depths to a maximum of 10 feet below the ground level. Measurements for nearly 4 years showed that the temperature of the gas in the pipes generally approximated the temperature of the ground at the depth of the center of the pipe.



Hand operation of hoist and carrier on straight line process system.



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Illinois Testing Laboratories Inc.
429 N. LaSalle St. Chicago, Ill.

IMPORTANT!

Publication and closing dates of the News Edition

Issue of the 10th closes—
25th of preceding month

Issue of the 25th closes—
10th of the month

Announcing——

a departure

to meet the needs of today and tomorrow, National Oil Products Company departs from its long-standing policy of producing only natural-source vitamin products, and announces the first of its synthetic vitamins:

Calcium Pantothenate Dextrorotatory-Nopco

Pharmaceutical and food manufacturers who desire to increase the pantothenic acid activity of their products will find Calcium Pantothenate Dextrorotatory-Nopco a dependable source of this B Complex factor.

Dependable Vitamin Products from Natural Sources——

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"Nopco"*

VITAMIN A CONCENTRATES VITAMIN D CONCENTRATES
VITAMIN A & D CONCENTRATES
WATER-DISPERSIBLE VITAMIN A & D CONCENTRATES
HIGH POTENCY FISH LIVER OILS HALIBUT LIVER OIL
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R.S.V.P.

for complete information about Calcium Pantothenate Dextrorotatory-Nopco—or any of the famous line of natural-source vitamin products made by National Oil Products Company and its subsidiaries.

NOPCO CHEMICAL COMPANY, HARRISON, N. J.

A SUBSIDIARY OF NATIONAL OIL PRODUCTS COMPANY

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Natural Gas Consumption

THE marketed production, or consumption plus exports, of natural gas in 1940 reached the highest peak ever recorded, according to the U. S. Bureau of Mines. This was partly due to an increased demand by defense industries, although the largest gain was recorded in the oil and gas fields for drilling, pumping, gas lift, and operating natural gasoline and recycle plants. The total production was 2,660,222,000,000 cubic feet, an increase of 7 per cent over the peak recorded in 1939. The consumption of natural gas reached a new peak of 2,654,659,000,000 cubic feet, also 7 per cent over 1939.

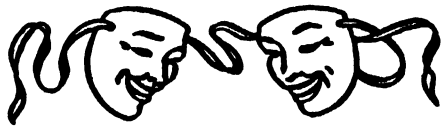
The average value of natural gas at the wells decreased from 4.9 cents in 1939 to a new low of 4.5 cents per 1,000 cubic feet in 1940. The average value at points of consumption increased 0.1 cent and was 21.7 cents.

Glass Carboys Standardized

THROUGH efforts of the Container Standardization Committee of the Manufacturing Chemists' Association, all members of the chemical industry have agreed to specify only 13-gallon boxed glass carboy bottles for transportation of acids and other corrosive chemicals. Previously approximately 70 per cent of new carboy production has been of the 13-gallon standard M. C. A. type, the balance of the 12-gallon type.

Owing to unprecedented demand for acids and other liquid chemicals needed by defense industries, requirements for additional carboys greatly exceeded productive capacity.

Universal adoption of the 13-gallon carboy will increase by 8 1/3 per cent the volume of liquid shipped per container and add to the productive capacity of the carboy bottle plant by at least 10 per cent through elimination of lost time and breakages necessitated by size changeovers.



EMANATIONS

Pyrometry—by Wood and Cork

THE book on Pyrometry, written by Messrs. Wood and Cork and reviewed on page 1370 of the NEWS EDITION for 1941, has appealed to one of our readers as an example of appropriate names that has tickled his funny bone.

The Chemist and His Ken

How open-mouthed with wonder
The people hearken when
The Chemist turns his thunder
On things within his ken.

"Oh, marvel of the ages,
Oh, cynosure of men",
The people say, "How sage is
The Chemist in his ken".

Alas, it often follows
The Chemist swells up then,
And passionately bellows
Of things beyond his ken.

The people blink and wonder
At this rare catechumen,
"The Chemist, too, can blunder
When strayed beyond his ken?"

Let's draw the saving curtain;
Repent, and say "Amen",
His punishment is certain
Who strays beyond his ken.

BERZELIUS BEAKERTONGS

J. **Eugene Lindsay,** First Lieutenant, Chemical Warfare Service, United States Army, has been ordered to active duty and assigned to Munitions Development Division, Edgewood Arsenal, Md. Lieutenant Lindsay was chief chemist for the National Radiator Co. which granted him a leave of absence for the duration of active service.

Investigate . .

BARNSDALL SPECIAL WAXES

MELTING POINTS—160/165°F, 180/185°F
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CHEMICALLY INERT MICROCRYSTALLINE
Examine these waxes—They May Offer Distinct Advantages in Your Products and Processes
Samples and Information Gladly Furnished

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Any Questions About
THERMOCOUPLES?

Do you know —

- how to make a thermocouple? See Page 21.*
- where bare thermocouples can, or cannot, be used? See Page 4.*
- what type of protecting tube to use for your application? See Page 14.*
- how to check thermocouples and pyrometers? See Page 22.*

* The above page numbers are from the New Wheelco Thermocouple Data Book and Catalog. Temperature conversion tables, pipe and wire sizes, wire resistances, millivolt tables, decimal equivalents, etc., are also included in this valuable book. Write for your copy TODAY!

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GAST ROTARY AIR PUMPS

ANHYDROUS ALUMINUM CHLORIDE

in

ORGANIC CHEMISTRY

By

CHARLES ALLEN THOMAS
Central Research Director, Monsanto Chemical Company

In collaboration with
Mary Baluk Moshier, Herbert E. Morris and R. W. Moshier
Thomas and Hochwalt Laboratories,
Monsanto Chemical Company

American Chemical Society Monograph No. 87

This volume has been eagerly awaited for some time by all those concerned with the catalysis and isomerization of organic compounds. The reactions of aluminum chloride with hundreds of compounds are discussed in detail; and a feature of the book is the presentation of the exact changes which occur in structure. A résumé of the work of Friedel and Crafts, who did the pioneer work in this field, is included. This is indeed a monumental compilation which will be invaluable to research workers in the fields of petroleum, plastics, rubber, synthetic coatings, flotation agents, dyes, fats and waxes, cleansing and dry-cleaning agents, perfumes and textiles.

990 Pages **Illustrated** **$15.00**

Notice!

Owing to manufacturing difficulties the publication date of the new third edition Condensed Chemical Dictionary, completely revised, has had to be advanced from January 15, 1942 to January 31, 1942

Because of this postponement we will continue to accept orders at the prepublication price of $10.00 up to January 31, 1942. Thereafter the list price of $12.00 will be strictly maintained, subject to usual trade discounts.

PHENOMENA AT THE TEMPERATURE OF LIQUID HELIUM

***by* E. F. Burton, H. Grayson Smith *and* J. O. Wilhelm,**
Dept. of Physics, University of Toronto

THE FIRST BOOK ON THIS INTRIGUING SUBJECT!

It is of the greatest importance for both physicists and chemists to be familiar with the peculiar action of matter at excessively low temperatures. An understanding of the modern phases of low-temperature research requires discussion of the means of the producing low temperatures and of measuring both the temperature and the properties of the substance involved, as well as a general presentation of experimental results already obtained. This fundamental material is given in the early chapters.

The essence of the book is found in the latter half where are presented the results of the impact of curious low-temperature phenomena on modern theories of matter, the nature of superconductivity, the behavior of specific heats and magnetic properties of matter and the freakish antics of liquid helium below 2° K. Particular attention has been given to the definition and measurement of temperature, and to the intriguing problems of the approach to the absolute zero.

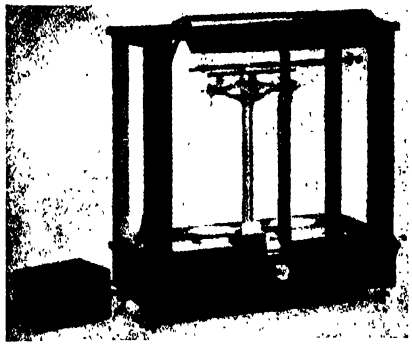
The experimental work discussed in this timely book was performed at the McLennan Laboratory in Toronto, one of the best equipped physical laboratories in the world! The authors are pioneers in low-temperature research, and their work will be of the greatest interest to chemists, physicists, engineers and metallurgists.

CONTENTS—Historical Introduction. The Liquefaction of Gases. The Measurement of Temperature. The Physical Properties of Liquid and Solid Helium. Superconductivity. Specific Heats at Low Temperatures. Magnetic Properties. Temperatures Below 1° K. Electrical and Thermal Conductivities. The Nature of the Superconducting State. The Transformation in Liquid Helium and the Nature of Helium II. Appendixes. Author Index. Subject Index

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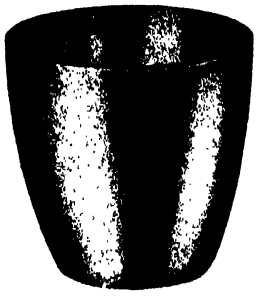
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Visirecord Card Index System

Tenite strips replacing aluminum in card index are cut in lengths to fit vertical edges of divider cards and once snapped and riveted into position serve to support and protect the cards. Indexes and subdivisions can be identified quickly by using different colored Tenite strips.

THE Canadian munitions industry has delivered over 150,000,000 pounds of finished explosives, and in 1942, it is said, will reach an output of 70,000,000 pounds per month of chemicals and explosives, with complementary materials.



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STANDARD 20 ML PLATINUM CRUCIBLE—ACTUAL SIZE—IN OUR CATALOG N-17

Valdura Black-Out

A BLACK-OUT paint for darkening windows and skylights of industrial and commercial properties, where it would be impractical to extinguish lights at the sound of an air-raid warning, is announced by American-Marietta Co., 43 East Ohio St., Chicago, Ill.

The paint had been undergoing development in the company's laboratories for several months with the thought that it might find application in some outlying United States possessions. Final tests were speeded with the Japanese attack on United States possessions in the Pacific, and commercial production started 10 days later. First shipments were made to distributors on the Pacific, Atlantic, and Gulf Coasts.

The paint is being marketed in paste form, and, when cut 50 per cent with water, can be sprayed or brushed on windows to prevent all passage of light. Coverage is 800 square feet to the gallon. It dries within 40 minutes, providing a flat surface that will not flash back or glare when hit by artificial light used within the room. In interior applications, a single coat may be covered with a white paint where large glass surfaces make the higher reflection properties of a white surface necessary.

Removal of the product, termed Valdura Black-Out, is made without damage to the glass. It is being packed in 1- and 5-gallon containers.

Processing Machine for Aluminum Alloys

A TWO-STRAND, cross-rod conveyorized Detrex processing machine has been designed by the Detroit Rex Products Co., 13005 Hillview Ave., Detroit, Mich., for the cleaning and treatment of metal parts. It follows an approved U. S. Army and British procedure for the treatment of aluminum alloy sheets used in aircraft to make them less pervious to the effects of air and to provide a better paint bond. This machine incorporates hot alkali wash, hot water rinse, hot chromic acid dip, hot water rinse, and oven dry off. It has the advantages of a compact self-contained unit that eliminates special handling systems and tanks spread out over a large floor space.

Rubber Swimming Pool Paint

UNTIL recently the amount of rubber that could be introduced into paint was very small. With a better knowledge of the proper treatment of rubber to fit it for painting requirements, it has been possible to develop paint which is really based on rubber.

The research chemists of the Truscon Laboratories, Detroit, Mich., have produced a paint known as Paratex, suitable for concrete. Because of its toughness of film, waterproofness, resistance to weathering, Paratex provides the type of protective and decorative coating for outside pools that concrete swimming pool owners or operators have been seeking.

Service Pins for Employees

A TOTAL of 8,810 years of service will be recognized by Standard Oil Co. of Indiana by presentation of gold pins to 501 employees during the first six months of 1942.

Eight will be awarded pins for 40 years' service each; 41, 30 years; 274, 20 years; and 178, for 10 years.

Stainless Steel
SPATULAS
In Stock for Immediate Shipment



18755



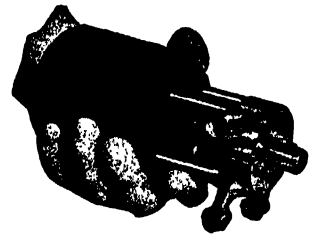
18765

Flexible Blades—Rosewood Handles

18755 Wide Blade			18765 Narrow Blade		
No.	Length Inches	Each	No.	Length Inches	Each
A	6¾	$0.40	A	7	$0.50
B	7½	.50	B	8½	.60
D	10¼	.75	C	9½	.70
E	13	1.00			

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Every day new applications are discovered for this amazing line of pumps.

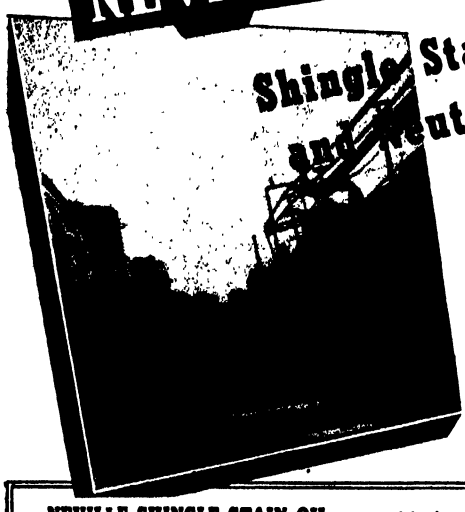
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*Sizes as small as 4½" long × 2¾" high × 2½" wide.
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CLEAR, clean dark red oils. Non-corrosive and of low volatility

NEVILLE SHINGLE STAIN OIL is suitable for thinning low cost high-baking japans. It is an excellent vehicle for pigmented shingle stains.

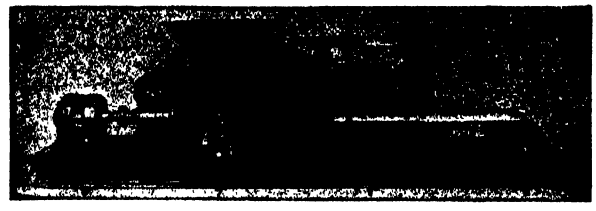
NEVILLE NEUTRAL OIL serves as cut-back solvent for tars, asphalts, and other bitumens. Important as inexpensive vehicle for tar acids, or cut-back solvent for tar acid oils, in manufacture of emulsifying-type coal-tar disinfectants, cattle and sheep dips.

• *Inquiries solicited for drums and tank cars. Send for complete brief leaflet "Neville Coal-Tar Products."*

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A BLENDER A MIXER
AND UNEQUALLED IN ITS EXACTNESS



THE AUTOMATIC FEEDER-WEIGHER-CONVEYOR

Schaffer Poidometers will proportion or feed your bulk material automatically with a high degree of accuracy. They are now being used for proportioning of feeding materials in the following industries—Cement, Process, Ceramic, Oil Refining, Feed, Soap, Ore, Gypsum, Lime and many others.

If you are handling a variety of materials, arrange your Poidometers in batteries—set one for each material and for the proportion wanted—then forget it! The Poidometers will do your bidding better than your most loyal employee. If any machine is not getting its full quota of material, the entire battery will automatically stop. Space does not permit of a thorough explanation of the many cost-saving qualities of Schaffer Poidometers.

We are in Chemical Engineering Catalog

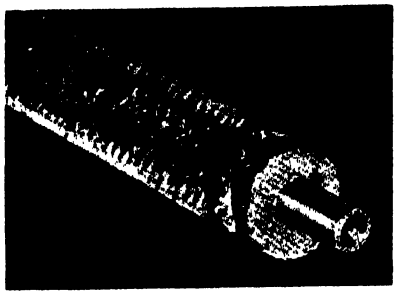
Will handle any free-flowing, pulverised, granular or crushed material containing up to 4" cubes.

Install Schaffer Poidometers and Watch Results.

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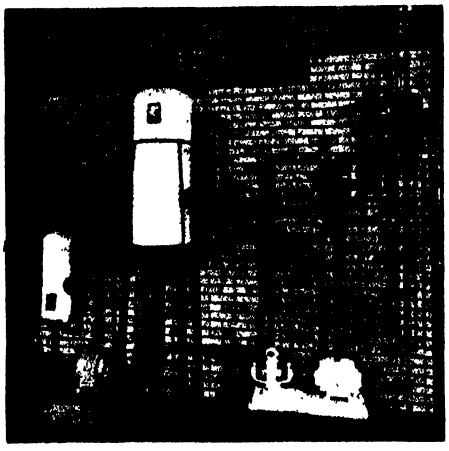
New Insulation Product



PROBLEMS encountered in insulating small diameter heating lines on large airplanes have resulted in development of a new product known as Insutube by Union Asbestos & Rubber Co., 1814 South 54th Ave., Cicero, Ill. Light weight, small size, and ability to stay put under severe shock and vibration are listed as features.

The material is made in the form of a seamless braided tube of long fiber asbestos with a wall thickness of 0.5 inch, and is supplied either plain or with a water- and grease-repellant coating.

Electric Condensate Return



ADDITIONS to the line of condensate return and boiler feeding systems are announced by the W. M. Acker Organization, Inc., Cleveland, Ohio, in the form of single and dual electric systems. Adaptable to any conditions in plants operating up to 250 pounds, the single system automatically returns condensate and supplies make-up water to boilers when actuated by mercoid switch at the water column. Make-up water is admitted to the certified A. S. M. E. receiver tank by float-operated valve when condensate reaches a predetermined low level or is insufficient to satisfy the needs of the boiler. The dual system handles high- and low-pressure condensate and make-up water automatically.

Chinaware Decalcomanias by New Process

A NEW process for making chinaware decalcomanias, which substitutes photolithography for hand-lithography in preparing plates from which decalcomanias are printed, has been developed by E. I. du Pont de Nemours & Co., Inc. In the new process, artists' designs are photographed through color filters and reproduced on sensitized metal plates, instead of being tediously stippled by skilled craftsmen on soft stone. The designs are then transferred by use of a special offset lithograph press.

A. C. S. Members Elected November 1, 1941 to January 1, 1942

1941 New Member

NEW YORK SECTION. Joachim J. Berber.

1942 New Members

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ALABAMA SECTION. W. K. McPherson, Harry Nash, Jr.[1].

AMES SECTION. H. B. H. Cooper, Stanley Flikkema[1], James D. Head[1], Kenneth N. Warner[1].

BATON ROUGE SECTION. John G. Ditman, Brandon U. Durham[1], J. Clifton Hill, Kenneth M. Purdy, Thomas M. Smylie, Jr.[1], Louis J. Snyder[1].

BINGHAMTON SECTION. Charles O. Barbre, Carlton Beebe, Earl R. Dooley, M. Elizabeth Fessenden, Maurice D. Fischer, Henry Fowler, Harold C. Harsh, Stanley L. Judkins[1], Ernst Schwarz, J. Benjamin Towner, Robert H. Zappert.

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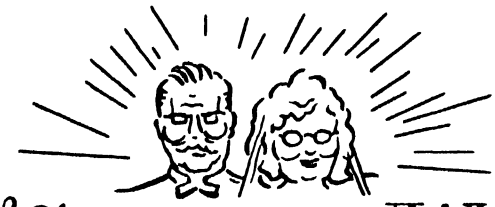
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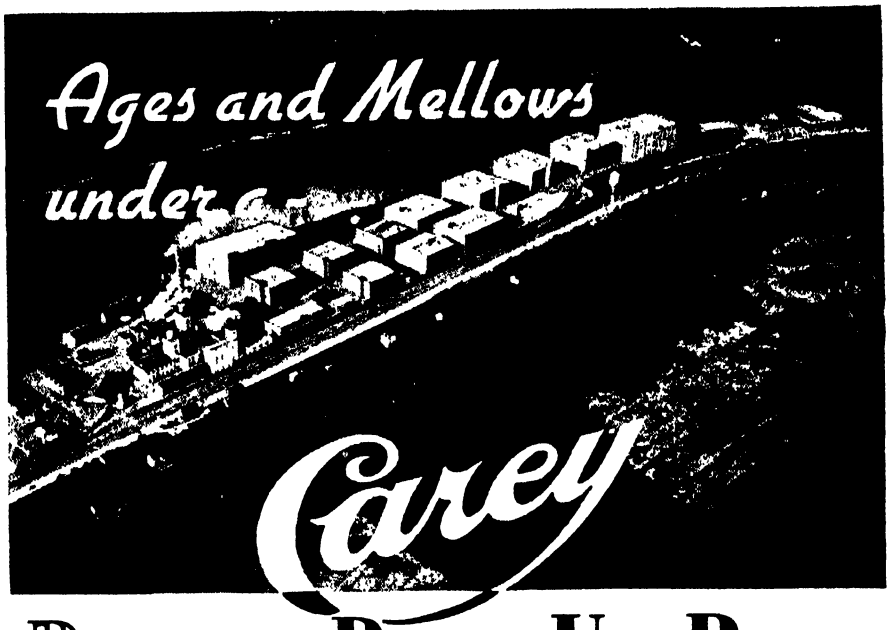
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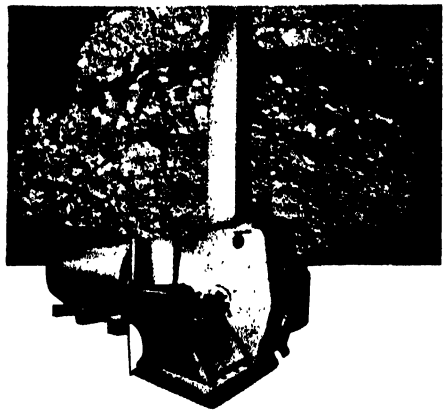
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Business Statistics

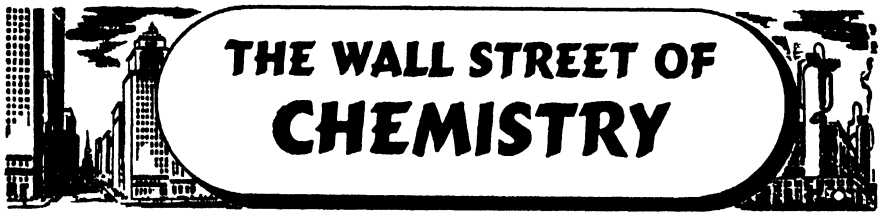
We are indebted to the Manufacturing Chemists' Association, 608 Woodward Bldg., Washington, D. C., for the following figures showing business conditions.

Monthly Statistical Report on Business Conditions

	Seasonally Adjusted			Without Adjustment		
	November	October	November	November	October	November
	1941	*1941*	*1940*	*1941*	*1941*	*1940*
(Base 1935–39 = 100)						
Industrial production[a]	167[b]	163	134	167[b]	167	136
Chemical production	156[b]	147	117	158[b]	151	120
Steel production	207	206	177	207	206	178
Pig iron production	184	184	173	184	184	173
Freight car loadings	135	127	116	141	144	122
(Base 1923–25 = 100)						
Construction contracts, residential	71[b]	87	87	68[b]	84	83
All other	193[b]	192	130	166[b]	181	112
Department store sales, value	115[b]	105	100	132[b]	112	114

	November	October	November
	1941	*1941*	*1940*
Index of factory employment[c]:			
All manufacturing	134.5[b]	135.3	114.7
Chemicals	183.3[b]	182.5	148.0
Drugs	148.4[b]	145.6	116.2
Fertilizers	102.3[b]	103.6	92.1
Compressed gases	140.7[b]	140.5	118.4
Index of factory pay rolls[c]:			
All manufacturing	165.5[b]	166.6	116.4
Chemicals	265.2[b]	249.4	181.7
Drugs	189.9[b]	183.4	131.1
Fertilizers	99.5[b]	102.7	76.5
Compressed gases	164.8[b]	162.3	122.8
(Base 1926 = 100)			
Wholesale price indexes:			
All products (except farm products and foods)	93.5	93.4	84.1
Chemicals	88.3	88.4	85.1
Drugs and pharmaceuticals	123.2	124.1	95.9
Fertilizer materials	77.3	77.3	69.9
Purchasing power of the dollar:			
All products (except farm products and foods)	$1.070	$1.071	$1.189
Chemicals	1.132	1.131	1.175
Drugs and pharmaceuticals	0.811	0.806	1.042
Fertilizer materials	1.292	1.292	1.430
Automobile retail sales:			
Passenger	198,271	184,561	334,536
Truck	64,934	59,376	56,995
Total	263,205	243,937	391,531

[a] Source of statistics in first seven items: Federal Reserve Board.
[b] Preliminary figures.
[c] U. S. Department of Labor.



The December issue of the bulletin of the Federal Reserve Board reported that for the first 9 months of 1941 the earnings, after taxes, of 416 companies were 31 per cent higher than in the first 9 months of 1940. The largest increase was reported in the durable goods field, 40 per cent increase compared to 19 per cent in the nondurable field. In the field of industrial chemicals 25 firms reported profits of $144,700,000 in 1941, compared to $135,200,000 in 1940, or an increase of 7 per cent. In drugs, the increase amounted to 21 per cent and in oil producing and refining, to 46 per cent. The report stated that 122 industrial companies, on which data are available since 1939, set up federal tax reserves during the first 9 months of 1941 equal to 53 per cent of their net before taxes, compared with 17 per cent in the preceding comparable period. The major part of the increase in earnings that has accompanied the defense program has been set aside as reserves to meet federal taxes.

For the period January 1, to November 5, 1941, the American Hard Rubber Co. reports net profit of $525,087 after charges and provision of $500,000 for federal income and excess profit taxes. For the year ended December 31, 1940, net profit was $456,475.



North American's Dallas Plant
DEPENDS ON LAYNE WELLS AND PUMPS

Startling the Nation by going into production just one hundred and twenty days after construction began, the Dallas plant of North American Aviation, Inc., is now rolling out their famous Army AT-6A and Navy SNJ-3 Scout Trainer Planes. Factory and assembly space is completely air conditioned as an aid to accuracy, speed and efficiency in manufacturing.

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When the final chapter of America's greatest war is written, the part played by Layne Wells and Pumps will be a very absorbing story. Certainly in all the world, as hundreds of installations testify, there are no finer Well Water Systems. To meet the country's urgent demand for more and more production you may need more water. Act now! Communicate with Layne. Wire or address,

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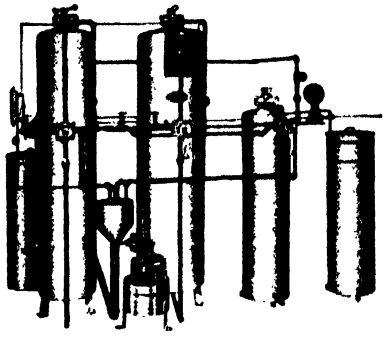
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Layne-Louisiana Company.....Lake Charles, La.
Layne-New York Co.....New York City.
Layne-Northwest Company.....Milwaukee, Wis.
Layne-Ohio Company.....Columbus, Ohio
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by chemical treatment

WITHOUT HEAT!



OPERATION — Water passes through two reactor tanks. A chemical reaction in first tank removes positive ions, such as calcium, magnesium, and iron, substituting hydrogen. Water then passes to second tank where the hydroxyl (OH) ion is substituted for negative chloride and sulphate ions, etc. This OH ion then combines with hydrogen to form H_2O. The minerals removed from water are retained in reactor tanks until flushed to drain. Treated water contains small amounts of dissolved carbon dioxide gas which can be dispelled easily by aeration.

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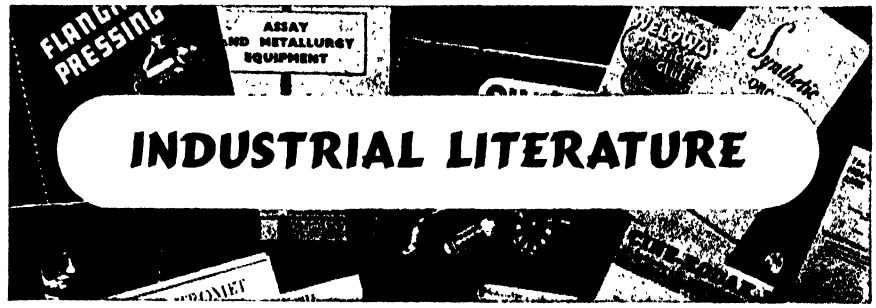
845 Cedar St., Rockford, Illinois

Anglo-Chilean Nitrate Corp. for the fiscal year ended June 30, 1941, shows distributable profits of £373,224, compared with £664,006 for the preceding year. Earnings have been affected by war conditions, which have restricted or completely closed many markets. International money settlements have also been continued with difficulty. Net proceeds are sufficient to pay the 4.5 per cent interest on sterling first mortgage bonds and United States dollar income debentures.

For 16 weeks ended October 4, 1941, the **Mead Corp.** shows net profit of $651,646 compared with $301,665 for the comparable period of 1940. For 40 weeks ended October 4, 1941, net profit was $1,418,004 after taxes, etc., equal after preferred dividends to $1.72 a share on common, compared with $1.02 a share in 1940.

Sherwin-Williams Co. sales for November 1941 are reported as 40 per cent above those for November 1940, while sales in September and October were 31 per cent above the preceding year.

During its fiscal year, ended September 30, 1941, the **York Ice Machinery Corp.** reported an increase of 64 per cent in orders booked over the previous year. Sales completed amounted to 22 per cent more than in 1940. Of the current year's carry-over 63 per cent consisted of orders for national defense.



Listed publications should be requested directly from the company concerned. Use business stationery, mention bulletin numbers, and refer to this journal. Publications will be sent free unless otherwise noted.

Acid Pumps. A 6-page bulletin sums up important operating characteristics and construction features of a pump designed to handle hot and cold acids and other corrosive solutions. The manufacturers point out that the pump has the simplicity and efficiency of a high-grade centrifugal water pump. A rubber base composition is bonded to the cast-iron casing and covering. A soft form of this material can be applied where abrasive particles are carried in the liquid being handled. The pumps are available in 3 sizes, 1.25, 2, and 4 inches. Each type can be furnished with either direct or V-belt drive. *Bulletin 308 IE.* OLIVER UNITED FILTERS, INC., 33 West 42nd St., New York, N. Y.

Boiler Feedwater. This bulletin discusses supplementary treatment of boiler feedwater, feedwater line, that may be necessary after an ordinary external water treatment. Purposes and advantages of the various materials are discussed. Flow-sheet drawings show various hook-ups by which the chemical feeding equipment can be attached to the system. The booklet describes both the proportionating feed and the non-proportionating feed. *Bulletin 2420 IE.* PERMUTIT CO., 330 West 42nd St., New York, N. Y.

Cast Steel Valves. A new 56-page catalog gives complete information on design, dimensions, and metallurgical descriptions of cast-steel stop, check, and stop-check valves. Stop valves are available in sizes for pressures up to 2,500 pounds. Check valves are horizontal, vertical, angle, and "Y" in sizes from 2.5 to 14 inches for all pressures. Engineers will find an interesting section of the catalog supplying current pressure-temperature adjusted service ratings, flange facing information, drawings, and helpful tips on valve usage. *Bulletin 12 IE.* EDWARD VALVE & MFG. CO., INC., East Chicago, Ind.

Chlorination. A series of data sheets is available describing equipment and giving question and answer treatment on protecting water supply with chlorine. This bulletin will be particularly useful where new conditions indicate immediate treatment of water supplies to prevent pollution. *"Stop Gambling With Health" IE.* %Proportioneers, Inc.%, 9 Codding St., Providence, R. I.

Colloid Mills. An interesting 8-page catalog describes the various models in a well-known line of colloid mills. Specification tables and detailed engineering descriptions will help the prospective purchaser make an intelligent decision as to the particular model needed. An interesting feature is a page on a recently developed line of mixers. Three models in this line are designed to handle quantities ranging from 5 to 50 gallon lots of materials. *Bulletin C-41-5 IE.* PREMIER MILL CORP., 110 East 42nd St., New York, N. Y.

Distilled Water. A 4-page leaflet gives an interesting series of photographs of water distillation equipment. The types illustrated range from a small 2-gallon-an-hour still for a research laboratory to a 500-gallon-an-hour unit in a distilling plant. *Bulletin 103 IE.* BARNSTEAD STILL & STERILIZER CO., INC., Lanesville Terrace, Forest Hills, Boston, Mass.

Fabrication of Clad Steel Plate. This excellent technical bulletin gives valuable information on the strength and permanence of bond, mechanical properties, standards of cladding, sizes, and finishes.

CONTINUED ON PAGE 74

CHEMICAL MARKET PRICES

January 2, 1942

Compiled from weekly current price listings in the *Oil, Paint and Drug Reporter*, with permission of the publisher under its copyright. These prices, unless otherwise specified, are those prevailing in the New York market for technical grades in usual large commercial quantities.

Acetaldehyde, drums, c/l., wks.	lb.	.11
Acetamide, tech., kegs, 500-lb. lots, works	lb.	.30
Acetanilide, tech., powd., bbls.	lb.	.27
Acetic anhydride, drums, c/l., frt. allowed	lb.	.11½
Acetone, c. P., drums, c/l., dlvd.	lb.	.08½
Acetophenetidin, bbls., 1000 lbs.	lb.	1.00
Acetophenone, drums, 100 lbs.	lb.	1.55
Acid, abietic, drums, c/l.	lb.	.08¾
Acetic, 28%, bbls., c/l.	100 lbs.	3.18
56%, bbls., c/l.	100 lbs.	5.18
Glacial, synth., drums, c/l.	100 lbs	8.43
Glacial, U. S. P., drums, c/l.	100 lbs.	10.25
Acetylsalicylic, U. S. P., bbls.	lb.	.40
Anthranilic, tech., bbls.	lb.	.75
Battery, cbys., c/l., E. wks.	100 lbs.	1.60
Benzoic, tech., bbls.	lb.	.43
Boric, tech., gran., bags	ton	99.00
Butyric (99%), drums, c/l, wks.	lb.	.22
Chloroacetic, mono-, tech., bbls. wks	lb.	.15
Chlorosulfonic, drums, c/l., wks.	lb.	.03
Chromic, 99%, drums	lb.	.16¼
Cinnamic, bottles	lb.	3.50*
Citric, cryst., bbls., c/l.	lb.	.20
Cresylic, H. B., 210–215°, drums, c/l, wks., frt. equal	gal.	.81
Formic, 90%, cbys., f. o. b. works, c/l.	lb.	.10½
Gallic, tech., bbls.	lb.	1.10
Hydriodic, 57%, 5-lb. bot.	lb.	2.90
Hydrobromic, 34%, cbys.	lb.	.35
Hydrochloric, 20°, tanks, wks.	100 lbs.	1.15
Hydrofluoric, 30%, bbls., wks.	lb.	.06
60%, lead cbys.	lb.	.14
Hydrofluosilicic, 30%, bbls., wks.	lb.	.09
Hypophosphorus, U. S. P., 30%, 5-gal. demis.	lb.	.75
Lactic, dark, 22%, bbls.	100 lbs.	2.90
Light, 22%, bbls., wks.	100 lbs.	3.50
Maleic, powd., drums	lb	.30
Mixed, tanks, wks. N unit.	lb.	.05
S unit.	lb.	.0085
Naphthenic, 220–230, drums	lb.	.11
Nitric, c. P., cbys.	lb.	.13
36° cbys., c/l, wks.	100 lbs.	5.00
Oxalic, bbls., wks.	lb.	.11¼
Phosphoric, U. S. P., 50%	lb.	.10½
Picramic, kegs	lb.	.65
Picric, bbls.	lb.	.35
Pyrogallic, tech., bbls.	lb.	1.45
Salicylic, tech., bbls.	lb.	.33
Stearic, distilled, d. p., bags, dlvd.	lb.	.14¼
Sulfanilic, tech., 250-lb. bbls.	lb.	.17
Sulfuric, 66°, cbys., c/l., E. wks.	100 lbs.	1.50
66°, tanks, E. wks.	ton	16.50
60°, tanks, E wks.	ton	13.00
Oleum, 20%, tanks, E. wks.	ton	18.50
Tannic, tech., bbls.	lb.	.71
Tartaric, U S. P., cryst., bbls.	lb.	.70½
Tungstic, pure, 100 lb. pkg.	lb.	2.86
Alcohol, ethyl, 190 proof, from molasses, drums, c/l.	gal.	8.19
Amyl, from pentane, tanks	lb.	.131
Butyl, normal, tanks, frt. allowed.	lb.	.12½
Cinnamic, bottles	lb.	3.00
Denatured, C. D. 14, drums, c/l., wks., E.	gal.	.45½
Diacetone, tech., drums, c/l.	lb.	.11
Furfuryl, tech., drums, c/l., wks.	lb.	.20
Isobutyl, ref., drums, works	lb.	.0860
Alcohol, isopropyl, ref., 91%, drums, c/l., f. o. b. dest	gal.	.40½
Wood, *see* Methanol		
Aldol, 95%, drums, c/l., wks.	lb.	.12
Alpha-naphthol, bbls.	lb.	.52
Alpha-naphthylamine, bbls.	lb.	.32
Alum, ammonia, lump, bbls., wks.	100 lbs.	4.25
Chrome, bbls.	lb.	.12½
Potash, lump, bbls., wks.	100 lbs.	4.50
Soda, bbls., wks.	100 lbs.	3.25
Aluminum, metal, 98–99%, drums, c/l.	lb.	.15
Chloride, anhyd., commercial, drums extra, c/l., wks.	lb.	.08
Stearate, bbls., c/l.	lb.	.23
Sulfate, comm'l, bags, c/l., wks. frt. equal	100 lbs.	1.15
Iron-free, bags, wks.	100 lbs.	1.75
Ammonia, anhydrous, fertilizer, f. o. b. wks., frt. equalized	ton	90.00
Pure, cyls.	lb.	.16
Ammonia, aqua, 26°, tanks (on NH_3 content), f. o b. wks.	lb.	.04
Ammonium bicarbonate, drums	lb.	.0564
Bifluoride, bbls.	lb.	.15½
Bromide, bbls.	lb.	.31
Carbonate, tech., bbls.	lb.	.08¼
Chloride, gray, bbls.	100 lbs.	5.50
U S. P., gran., bbls.	lb	.12
Iodide, 25-lb. jars	lb.	3.65
Linoleate, 80%, anhyd., bbls.	lb.	.12
Nitrate, tech., bags, c/l., wks.	100 lbs.	4.35
Oleate, bbls.	lb.	.14
Oxalate, kegs	lb.	.23
Persulfate, cases	lb.	.21
Phosphate, dibasic, tech., bbls.	lb.	.07¼
Sulfate, bulk, c/l., f. o. b. cars, ports contract	ton	29.00
Sulfide, liq. 40–45%, basis 100%, tanks, dlvd.	lb.	.07½
Amyl acetate, from pentane, tanks, frt. allowed	lb.	.14½
Chloride, mixed, tanks, wks.	lb.	.06
Chloride, normal, drums, wks.	lb.	.56
Mercaptan, drums, l. c. l., wks.	lb.	1.10
Oleate, drums, l. c. l., wks.	lb.	.31
Stearate, drums, l. c. l., wks.	lb.	.32½
Amylene, tanks, wks.	lb.	.09
Anilin oil, drums	lb.	.15
Anthraquinone, subl., bbls.	lb.	.70
Antimony, chloride, soln., cbys.	lb	.17
Needle, Bolivian, 67%	lb.	.16½
Oxide, bags, c/l.	lb.	.15
Salts, 65%, drums	lb.	.34
Argols, test 75–80%, basis 100%, f. o. b. Spanish ports	100 kilos	105.00
Arsenic, metal, kegs	lb.	No prices
Red, kegs, cases	lb.	No prices
White, c/l., kegs	lb.	.04
Barium carbonate, natural, 99%–200 mesh, bags, c/l., wks.	ton	43.00
Chloride, tech., cryst., bgs., c/l.	ton	77.00
Dioxide, drums, wks.	lb.	.10
Hydroxide, bbls., wks.	lb.	.06
Nitrate, casks	lb.	.10½
Barytes, floated, 350-lb. bbls., wks.	ton	27.65
Benzaldehyde, tech., drums	lb.	.45
Benzidine base, bbls.	lb.	.70
Benzol, tanks, frt. allowed E. of Omaha	gal.	.15
Benzoyl chloride, carboys	lb.	.23
Benzyl acetate, F. F. C., drums	lb.	.55*
Beta-naphthol, tech., bbls.	lb.	.23
Beta-naphthylamine, tech., kegs	lb.	.51
Bismuth, metal, ton lots	lb.	1.25
Bismuth nitrate, cans	lb.	1.30
Oxychloride, kegs	lb.	3.10
Subnitrate, powd., barrels	lb.	1.20
Blanc fixe, dry, bags, c/l.	ton	60.00
Bleaching powder, drums, wks.	100 lbs.	2.25
Bone black, 4, bbls., c/l., frt. allowed E	lb.	.11
Borax, tech., gran., bulk, c/l., frt. allowed	ton	41.50
Bordeaux mixture, drums	lb.	.11
Bromine, cases	lb.	.25
Bromoform, cbys.	lb.	1.42
Butyl acetate, drums, c/l., frt. allowed	lb.	.14½
Aldehyde, drums, l. c. l.	lb.	.16½
Lactate, drums	lb.	.23½
Stearate, drums	lb.	.32½
Cadmium, metal, ingots, cases	lb.	.90
Bromide, 25-lb. jars	lb.	1.65
Sulfide, boxes	lb.	1.35
Caffeine, 100-lb. drums, 10,000 lbs. or more	lb.	2.60
Calcium acetate, bags	100 lbs.	3.00
Arsenate, bgs., c/l.	lb.	.06½
Carbonate, precip., bags, 50 lbs., c/l., wks.	lb.	.02¾
Chloride, bags, flake, c/l., dlvd.	ton	18.50
Gluconate, U. S. P., bbls., 150 lbs.	lb.	.52
Phosphate, dibasic, 38–40% P_2O_5, bags, Atlan. pts.	unit-ton	No prices
Tribas., bbls.	lb.	.0635
Calomel, bbls., kegs, 50 lbs. or more.	lb.	2.95
Camphor, synthetic, gran., powd., drums, ton lots	lb.	.42
Carbasole, 95%, drums, ton lots, wks.	lb.	.70
Carbon bisulfide, drums, c/l.	lb.	.05
Black, reg., uncomp., bgs., c/l., works	lb.	.03625
Dioxide, liq., cyl.	lb.	.06
Tetrachloride, drums, c/l., frt. allowed	gal.	.73
Casein, dom., 20–30 mesh, bags, c/l.	lb.	.31
Cerium oxalate, bbls., wks.	lb.	.35
Charcoal, willow, powd., bbls.	lb.	.06
China clay, bulk, c/l., wks.	ton	7.60
Chloral hydrate, drums	lb.	.90
Chlorine, liq., c/l., cyl., dlvd.	lb.	.05½
Tanks, wks., frt. equal	100 lbs.	1.75
Chlorobensene, mono-, drums	lb.	.07
Chloroform, tech., drums	lb.	.20
Chromium acetate, 24%, powd., bbls.	lb.	.22
Coal tar, crude, bbls., c/l., wks.	bbl.	7.50
Cobalt oxide, black, kegs	lb.	1.84
Copper carbonate, 52–54%, bbls.	lb.	.18
Chloride, bbls.	lb.	.19½
Cyanide tech., bbls.	lb.	.34
Metal, elec.	lb.	.12
Oxide, black, bbls., tons, wks.	lb.	.19½
Sulfate, bbls., c/l., wks.	100 lbs.	5.15
Copperas, cryst., bulk, c/l., wks.	ton	14.00
Cream of tartar, bbls.	lb.	.57½
Cresol, U. S. P., drums, c/l., wks.	lb.	.10¼
Crotonaldehyde, 97%, c/l., wks.	lb.	.15
Cyanamide, 22% N, pulvd., dlvd., contracts	Nitrogen unit	No prices
Diamylamine, drums, c/l., wks.	lb.	.50
Diamylene, tanks, wks.	lb.	.09½
Diamyl ether, tanks, wks.	lb.	.07½
Diamyl phthalate, tanks.	lb.	.20
Diatomaceous earth, dom., bags, c/l., Pacific Cst.	ton	22.00

Dibutylamine, drums, l. c. l., wks.	lb.	.53
Dibutyl phthalate, drums, c/l., dlvd.	lb.	.21
Tartrate, drums	lb.	.87
Dichloroethyl ether, drums, c/l., wks.	lb.	.15
Diethanolamine, drums, c/l., wks.	lb.	.23½
Diethylaniline, drums	lb.	.40
Diethylene glycol, drums, c/l., wks.	lb.	.14
Monobutyl ether, drums, wks.	lb.	.22½
Monoethylether, drums, c/l., wks.	lb.	.14½
Diethyl phthalate, drums, c/l.	lb.	.21½
Sulfate, tech., drums, wks.	lb.	.13
Diglycol oleate, light, bbls.	lb.	.17
Dimethylaniline, drums	lb.	.23
Dimethyl phthalate, drums, c/l., dlvd	lb.	.20
Dinitrobensene, tech., drums	lb.	.18
Dinitrochlorobensene, bbls.	lb.	.14
Dinitronaphthalene, bbls.	lb.	.35
Dinitrophenol, bbls.	lb.	.22
Diphenyl, bbls., c/l., wks.	lb.	.15
Diphenylamine, bbls.	lb.	.25
Diphenylguanidine, bbls.	lb.	.35
Epsom salt, tech., bags	100 lbs.	1.80
Ether, conc., drums	lb.	.11
Nitrous, bots., 100 lbs.	lb.	.73
Ethyl acetate, 85-90%, tanks, frt. allowed	lb.	.11
Acetoacetate, drums, c/l., wks.	lb.	.37½
Bromide, drums	lb.	.50
Chloride, drums	lb.	.18
Formate, drums	lb.	.25
Methyl ketone, drums	lb.	.09
Ethylene dichloride, drums, c/l., wks., frt. allowed	lb.	.0742
Glycol, drums, c/l.	lb.	.14½
Monobutyl ether, drums, wks.	lb.	.16½
Monoethyl ether, drums, wks.	lb.	.14½
Monoethyl ether acetate, drums, wks.	lb.	.11½
Monomethyl ether, drums, wks,	lb.	.15½
Feldspar, 20 mesh, bulk, wks.	ton	9.75
Film scrap colors, dk., cs., 1000 lbs., E. wks.	lb.	.12
Fluorspar, 95%, bags, f. o. b. mines	ton	32.00
Formaldehyde, bbls., c/l.	lb.	.05½
Fuller's earth, bags, c/l., mines	ton	8.50
Furfural, tech., drums, contract, works	lb.	.10
Glauber's salt, bbls., c/l.	100 lbs.	1.05
Glycol phthalate, drums	lb.	.38
Stearate, drums	lb.	.26
Hexamethylenetetramine tech., drums	lb.	.32
Hydrogen peroxide, 100 vol., cbys., c/l.	lb.	.16
Hydroquinone, kegs	lb.	.90
Indigo, synth., liq., bbls.	lb.	.16½
Iodine, resubl., jars	lb.	2.00
Iodoform, drums, 100 lbs.	lb.	3.95
Iron acetate, N. F. IV, cbys.	lb.	.15
Iron chloride, tech., cryst., bbls., wks., frt. allowed	lb.	.05
Isopropyl acetate, tanks, frt. allowed	lb.	.07½
Lead acetate, white, broken	lb.	.12
Arsenate, bags	lb.	.09½
Metal, N. Y.	1 lb.	.0585
Oxide, litharge, bbls., 20-ton lots	lb.	.0735
Peroxide, powd., tech	lb.	.23
Red, bbls., 20-ton lots	lb.	.0835
Sulfate, bbls.	lb.	.0675
White, basic carb., bbls.	lb.	.0750
Lecithin, edible, grade 1, drums, c/l.	lb.	.45
Lime, live, chemical, bulk, wks.	ton	7.00
Lime-sulfur, dry, bags, c/l.	lb.	.07½
Lithopone, ordinary, bbls.	lb.	.04½
Magnesite, caloined, dom., bags.	ton	72.00
Magnesium carbonate, tech., bags, c/l.	lb.	.06¼
Chloride, drums	ton	32.00
Fluosilicate, cryst., bbls.	lb.	.20
Oxide, light, bbls.	lb.	.26
Manganese chloride, bbls.	lb.	.14*
Dioxide, 85-90%, bbls., c/l., wks.	ton	74.00
Sulfate, anhyd., bbls., wks.	lb.	.10½
Mannitol, commercial, bbls., wks.	lb.	.35
Menthol, nat., Chinese, cans	lb.	14.00
Mercury bichloride, cryst., drums, 50 lbs. or more	lb.	2.39
Mercury, flasks, 76 lbs.	flask	212.00
Meta-phenylenediamine, kegs	lb.	.65
Meta-toluylenediamine, kegs	lb.	.70
Methanol, pure, synthetic, drums, frt. allowed, c/l.	gal.	.34½
Tanks, frt. allowed	gal.	.28
Methyl acetate, 97-99%, tanks	gal.	.09½
Chloride, cylinders	lb.	.32
Formate, l. c. l., drums	lb.	.89
Hexylketone, drums, tech., wks.	lb.	.60
Salicylate, drums	lb.	.35
Monoamylamine, drums, c/l., wks.	lb.	.50
Monobutylamine, drums, l. c. l., wks.	lb.	.40
Monoethanolamine, drums, wks.	lb.	.24
Naphthalene, crude, dom., 74 deg., bags, c/l., wks.	100 lbs.	2.50
Nickel salt, single, bbls.	lb.	.13
Niter cake, bulk	ton	16.00
Nitrobensene, drums	lb.	.08
Nitrocellulose, alcohol-sol., bbls., wks.	lb.	.28
Nitrogen solution	unit	1.2158
Octanol, normal, drums	lb.	.85
Oil, castor, No. 3, tanks	lb.	.11½
China wood, dms.	lb.	.36
Coconut, crude, tanks	lb.	.09½
Cod, Newf., bbls.	gal.	.78
Corn, crude, tanks, mills	lb.	.12
Cottonseed, cooking, bbls.	lb.	.15¾
Linseed, raw, tanks	lb.	.1020
Menhaden, crude, tanks, f. o. b. Baltimore	gal.	.60
Neat's-foot, pure, bbls.	lb.	.17¾
Oiticica, bbls.	lb.	.22½
Oleo, No. 1, bbls.	lb.	.13¼
Olive oil, denat., bbls.	gal.	4.00
Edible, Calif., drums	gal.	5.00
Palm, Niger, bbls.	lb.	.09
Sumatra, bulk	lb.	.08
Peanut, crude, tanks	lb.	.13
Perilla, drums	lb.	.22½
Rapeseed, tax incl., bbls.	gal.	.15¼
Red, bbls.	lb.	.12
Soy bean, crude, tanks	lb.	.11¾
Sperm, 38°, bbls.	lb.	.1270
Whale, bbls., natural, refined	lb.	.1070*
Ortho-dichlorobenzene, drums	lb.	.06
Ortho-nitrochlorobensene, kegs	lb.	.15
Ortho-nitrotoluene, drums	lb.	.09
Ortho-toluidine, bbls.	lb.	.19
Para dichlorobensene, drums, c/l.	lb.	.11
Para-formaldehyde, drums	lb.	.23
Paraldehyde, tech., drums	lb.	.12
Para-nitraniline, drums	lb.	.45
Para-nitrochlorobensene, drums	lb.	.15
Para-nitrotoluene, bbls.	lb.	.30
Para-phenylenediamine, bbls.	lb.	1.25
Para-toluidine, bbls.	lb.	.48
Paris Green, 250-lb. kegs	lb.	.24
Perchlorethylene, drums, c/l., wks.	lb.	.08
Phenol, drums, c/l., wks.	lb.	.12½
Phenolphthalein, yellow, drums, ton lots	lb.	.80
Phenylethyl alcohol, bottles	lb.	2.10
Phloroglucinol, tech., tins, wks.	lb.	15.00
c. p., tins, wks.	lb.	20.00
Phosphorus, red, cases	lb.	.40
Oxychloride, 175-lb. cylinders	lb.	.15
Trichloride, cyl.	lb.	.15
Phthalic anhydride, bbls., c/l.	lb.	.14½
Platinum, metal, solid	os.	36.00
Potash, caustic, solid, drums	lb.	.06¼
Potassium acetate, tech., bbls.	lb.	.28
Bicarbonate, gran., bbls.	lb.	.14
Bichromate, casks, c/l., wks.	lb.	.09½
Bromide, U. S. P., gran., bbls.	lb.	.27
Carbonate, 80-85%, calc., casks	lb.	.06½
Chlorate, cryst., kegs	lb.	.11*
Chloride, tech., cryst., bgs.	lb.	.08*
Cyanide, drums	lb.	.55
Meta-bisulfite, bbls.	lb.	.18
Muriate, fert., bulk K_2O unit		.53½
Permanganate, tech., drums	lb.	.19¾
Prussiate, red, casks	lb.	No prices
Yellow, casks	lb.	.17
Pyridine, denat., drums	gal.	1.71
Pyrocatechin, c. p., drums	lb.	2.15
Quinine, 100-os. cans	os.	.97½
Resorcinol, tech., kegs	lb.	.68
Rochelle salt, powd., bbls.	lb.	.43½
Saccharin, drums	lb.	1.45
Salt cake, bulk, wks.	ton	15.00
Saltpeter, gran., bbls.	100 lbs.	8.20
Silica, amorph., 90%, 325 mesh, bags, c/l., wks.	ton	20.00
Silver nitrate, vials	os.	.26¼
Soda, ash, 58%, light, paper bags, contract, wks.	100 lbs.	1.05
Caustic, 76%, solid, drums, contract, wks.	100 lbs.	2.30
Sodium acetate, flake, 60%, bbls.	lb.	.04½
Alginate, drums	lb.	.69
Antimoniate, bbls.	lb.	.15
Bensoate, U. S. P., bbls.	lb.	.46
Bicarbonate, U. S. P., powd., bbls., c/l., wks.	100 lbs.	1.85
Bichromate, c/l., wks.	lb.	.07½
Bisulfite, bbls.	100 lbs.	3.00
Bromide, U. S. P., bbls.	lb.	.27
Chlorate, cryst., bags	lb.	.06¼
Chloride, bags	ton	15.70
Cyanide, 96-98%, dom., drums	lb.	.14
Fluoride, white, 90%, bbls., c/l., frt. alld.	lb.	.08
Metallic, untrimmed bricks, drums, f. o. b. Niagara Falls	lb.	.15½
Metasilicate, gran., bbls.	100 lbs.	2.50
Naphthionate, bbls.	lb.	.50
Nitrate, crude, bulk	ton	27.00
Nitrite, bbls.	lb.	.06¾
Perborate, bbls.	lb.	.14¾
Phosphate, disodium, cryst., bags, c/l., wks.	100 lbs.	2.55
Phosphate, trisodium, bags, c/l., wks.	100 lbs.	2.70
Picramate, kegs	lb.	.65
Prussiate, yellow, bbls.	lb.	.11
Silicate, drums, c/l., 40°	100 lbs.	.80
Silicofluoride, dom., bbls.	lb.	.12
Stannate, drums	lb.	.33½
Suffate, anhyd., bags	100 lbs.	1.70
Sulfide, cryst., bbls.	100 lbs.	2.40
Solid, 60%	100 lbs.	3.15
Sulfocyanide, c. p., bbls.	lb.	.55
Thiosulfate, reg., cryst, bgs.	100 lbs.	2.25
Tungstate, tech., kegs	lb.	No prices
Strontium carbonate, tech., bbls.	lb.	.15*
Nitrate, bbls.	lb.	.07¾
Sulfur, bulk, mines	ton	16.00
Chloride, drums	lb.	.03
Dioxide, commercial., cyl., wks.	lb.	.07
Tetrachloroethane, 50-gal. drums.	lb.	.08
Thiocarbanilid, bbls.	lb.	.24
Tin, Straits	lb.	.52
Crystals, bbls.	lb.	.39
Oxide, bbls.	lb	.55
Tetrachloride, anhydrous, drums, bbls.	lb.	No prices
Titanium dioxide, bags	lb.	.14¾
Toluene, tanks	gal.	.28
Triamylamine, l. c. l., wks.	lb.	.90
Triamylborate, drums, l. c. l., wks.	lb.	.33
Tributylamine, drums, l. c. l., wks.	lb.	.70
Trichloroethylene, drums, wks., frt. allowed	lb.	.08
Tricresyl phosphate, tech., drums.	lb.	.25
Triethanolamine, drums, c/l., wks.	lb.	.19
Triphenyl phosphate, drums.	lb.	.88
Tungsten, tech., powder	lb.	2.60
Urea, dom., 46 + % N., bags, f. o. b. wks. or seaboard	ton	80.00
Vanillin, 25-lb. tins	lb.	2.35
Whiting, comm., dry-grd., bags, c/l., wks.	ton	18.00
Xylene, 10°, tanks	gal.	.30
Xylidine, drums	lb.	.35
Zinc ammonium chloride, bbls.	lb.	.0565
Chloride, tech., fused, drums.	lb.	.05
Dust, bbls., c/l.	lb.	.1035
Metal slabs, at N. Y.	lb.	.0865
Oxide, Amer., bags	lb.	.0725
Stearate, tech., bbls.	lb.	.30
Sulfate, cryst., bgs., c/l., wks.	100 lbs.	3.40

* Nominal.

RATES to be paid in advance. Standard setting 5c a word, minimum charge $2.00 each; include 8 words for box address. Exceptions see ⟶ Display, $7.50 per column inch. No discounts or allowances.

SEND advertisements with remittance to INDUSTRIAL AND ENGINEERING CHEMISTRY, 332 West 42nd St., New York, N. Y., to reach there not later than 10:00 A.M. on the 10th and 25th, closing dates for NEWS EDITIONS of the 25th and 10th, respectively. Insertions made in order of receipt provided necessary remittances are complete.

Employers are requested to mention in their announcements the section of the country in which the open position is located to ensure replies only from those who are geographically available.

In printing these advertisements the SOCIETY assumes no obligations as to qualifications of prospective employees or responsibility of employers.

Unemployed members of the AMERICAN CHEMICAL SOCIETY seeking employment for themselves are allowed in one calendar year 3 free announcements, one per issue, set in standard style and limited to 50 words each, including 8-word box address. Excess words 5c each. Additional standard announcements 50% of regular rate.

Employed members of the AMERICAN CHEMICAL SOCIETY seeking new positions are permitted 3 standard announcements during the calendar year at 50% of the regular rate—include 8 words for box address.

Employers seeking chemists and chemical engineers are permitted 3 standard announcements, not to exceed 50 words each including box address and not more than one per issue, during the calendar year without charge, provided they agree in writing to acknowledge all replies (excess words 5c each), otherwise full rate applies.

The AMERICAN CHEMICAL SOCIETY is vitally interested in the welfare of its members and in seeing that the chemical industry is manned with competent chemists and chemical engineers. These pages are part of our service in that connection. In addition most of the larger sections of the AMERICAN CHEMICAL SOCIETY and several of the smaller ones have active employment committees. Local section secretaries in your area will inform you as to any employment aids that may be available locally.

An Employment Clearinghouse is operated at each national meeting of the SOCIETY for the purpose of bringing together representatives of industry looking for chemists and members and student affiliates in attendance wishing to make such contacts. For further details, consult the preliminary and final programs as printed in the NEWS EDITION prior to each meeting.

In the New York area, special employment facilities are offered by the Employment Bureau of the Chemists' Club, 52 East 41st St., New York, N. Y., and by the Chemist Advisory Council, Inc., 60 East 42nd St., New York, N. Y. In the Chicago area, the Chicago Section maintains an employment service at 413 Stevens Hotel, Chicago, Ill.

Those replying to announcements should be careful to send copies and not original documents. Advertising circulars will not be forwarded and to that end all letters will be opened at the forwarding office.

SITUATIONS OPEN

Those announcements in which the letter "I" is part of the address key have paid in full and are not committed to acknowledge replies. The Society regards acknowledgment by employers of all applications as an act of common courtesy but can assume no responsibility for their failure to do so.

EXECUTIVES, CHEMICAL ENGINEERS AND CHEMISTS with exceptional backgrounds of experience should use our confidential and individual method of contacting responsible employers. No limit to territory. We negotiate all overtures. Established 1915. The National Business Bourse, 20 W. Jackson Blvd., Chicago, Ill.

RUBBER CHEMIST wanted by large Eastern concern engaged in manufacture of synthetic rubber. Must be graduate chemist or chemical engineer with three to five years of experience in rubber industry both in non-routine laboratory work, and factory compounding and processing. Opening offers opportunity in research, manufacture and sales. Recent snapshot, personal information and salary requirements requested. Our own personnel has been advised of the appearance of this advertisement. Applications will be treated in strictest confidence.
Box 64-NP-12, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL LABORATORY supply house wants man having sales and purchasing experience in this line.
Box 54-TP-12, Ind. & Eng. Chem., Easton, Pa.

GRADUATE ASSISTANT wanted beginning with the second semester to do part time laboratory teaching and to work toward the Master's Degree. Salary $60 per month. Exemption from fees and tuition except $25 per semester. For application blanks, write to H. D. Newton, Head, Department of Chemistry, University of Connecticut, Storrs, Connecticut.

ORGANIC RESEARCH chemist, Ph.D., under 30, with wide experience in synthetic organic chemistry for development of research department in large mid-west industry. Submit full details of education, experience and complete personal data. Include salary expected and recent photo.
Box 14-N-1, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST for research laboratory of mid-western detergents manufacturer. Training, intelligence and initiative to carry on independent work required yet cooperation with others necessary. Sound technical training essential and industrial experience desirable. Include photograph and give fully reply first letter.
Box 15-N-1, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER for research and development on unit processes in grain alcohol manufacture and in by-product recovery. Require man with doctor or master degree and about one year additional experience. State qualifications and salary expected in letter and enclose small photograph. Midwest location.
Box 18-NP-1, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST for small industrial research laboratory. Prefer man with doctor's degree and about one year additional experience. Mostly organic materials requiring some microanalyses. Location Midwest. Send outline of record, salary expected and photograph.
Box 19-NP-1, Ind. & Eng. Chem., Easton, Pa.

WANTED BY large Eastern concern for immediate employment: Chemists or chemical engineers for research and development work in petroleum and polymer chemistry. Our own employees have been advised of this advertisement. Replies will be treated in strictest confidence.
Box 22-N-1, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST wanted. Location, New Jersey. Relatively recent graduate. In first letter of application, state age, experience, if any, education, religion, citizenship, marital status.
Box 23-N-1, Ind. & Eng. Chem., Easton, Pa.

POSITION TEACHING "General Chemistry," "Teaching of Chemistry," "History of Chemistry," in large, fully accredited, mid-western university. Success will be measured by teaching results, activity in Division of Chemical Education, effectiveness in contacting and leading secondary school science groups. Send full particulars in first letter.
Box 24-N-1, Ind. & Eng. Chem., Easton, Pa.

EXPERIENCED RUBBER Chemist and technologist for an Eastern Company. Must have full and varied background in synthetic rubbers as Neoprene, Hycar, Thiokol, etc., both with dry rubber compounding and cement manufacture. State age, experience, etc.
Box 38-NP-1, Ind. & Eng Chem., Easton, Pa.

INORGANIC ANALYTICAL Chemist with recent B.S. or M.S., north Philadelphia suburb. Opportunity to become chief chemist. Must be familiar with modern technique and capable of devising new time-saving methods. Knowledge of microscopy and optical analysis desirable but not essential. Some research work. Reply giving full details on education experience, personal data, availability, references, salary expected. Enclose full length recent photo. Gentile only.
Box 44-NP-1, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST Bachelor or Master, must have outstanding scholastic record and good foundation in physical and organic chemistry. Applicants should give educational history, experience, age and other personal data, and recent photo. Excellent opportunity for qualified person in research laboratory of prominent food organization.
Box 47-NP-1, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(A.C.S. MEMBERS)

CHEMIST, BIOCHEMIST, bacteriologist. A.B., 16 years' experience in foods, biological and bacteriological products, plant management including production, maintenance, personnel, and accounting. Successful research and sales records. Patent experience. Age 39, married, Protestant. Continental U. S. preferred.
Box 66-T-10, Ind. & Eng. Chem., Easton, Pa.

FOOD CHEMIST with over twenty years wide experience in the food industry, in direction, research, process development, quality control, and factory problems. Desires a responsible position.
Box 48-T-11, Ind. & Eng. Chem., Easton, Pa.

CHEMIST B.S. 1940. One year towards M.A., A.C.S. approved universities. Single, 23, draft deferred. Analytical, physical, crystal structure, and some organic research. Read French, German. Desire research, development, or position leading thereto. Far west preferred, but will consider anywhere. Available immediately.
Box 76-T-11, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, PHARMACIST, age 43, single, Marquette University, 20 years' Drug and Chemical experience combined with selling. Sales manager for a liquor wholesaler. Desires analytical or plant operation position in an ordnance, pharmaceutical or distillery plant. Middle west desired but not essential. Will consider plant representative sales.
Box 30-N-12, Ind. & Eng. Chem., Easton, Pa.

SALES DEVELOPMENT Engineer available for South America. Chemical engineer, graduate work business administration. Experience in sugar and oil refining. At present employed as sales development engineer for large chemical company. Married, no children, age 27. Will require several months notice.
Box 41-N-12, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST Ph.D. 1924 with 17 years' experience in development and production of glandular and vitamin products. Special interest in development of new products and clinical uses. Desires position in either laboratory and plant development or promotion and sales. Available immediately.
Box 13-T-12, Ind. & Eng. Chem., Easton, Pa.

PRODUCTION CHEMIST. Graduate chemical engineer with 20 years' diversified experience in heavy chemicals, acids, purified cellulose fibre, nitrocellulose, viscose-cellulose film, paper coatings, lacquer formulation. Positions held: chief chemist, pilot plant design and development engineer, production department chief and plant superintendent. Primary interest in production supervision.
Box 30-T-12, Ind. & Eng. Chem., Easton, Pa.

ELECTROCHEMIST-CHEMICAL Engineer. Ph.D. thesis accepted and course work completed at large Eastern university. Three years experience as assistant to prominent consultant; now employed. Successful prosecution of patents; development of metal recovery processes. Several publications; honor societies. Age 28, married. College teaching, industrial research, or specific problems on a consulting basis.
Box 10-N-1, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, B.S. Fifteen years experience in plant research, pilot plant development, and plant control. Experience includes design, construction, installation, development, operation and maintenance of a number of processes and a diversified list of equipment for organic and inorganic chemistry. Primary interest is in development.
Box 11-N-1, Ind. & Eng. Chem , Easton, Pa.

ANALYTICAL, INORGANIC chemist available for teaching or industrial position. Ph.D Experience covers college teaching, supervision of analytical methods, wide variety of analyses, inorganic projects. American, adaptable, publications, honor societies. Location immaterial.
Box 16-N-1, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. Woman. Six years research and analytical experience. Training in biochemistry, bacteriology and medical fields. Five languages fluently. Desires research analytical or literature position. Preferably in East.
Box 20-N-1, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST finishing M.S. in synthetic and theoretical organic chemistry. B.S. 1939. Phi Beta Kappa. Age 24, single. Desires position in research or production. Available immediately. Location immaterial, although vicinities of Philadelphia or Cleveland are preferable.
Box 26-N-1, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., 1933, post graduate work organic synthesis in University in Switzerland, industrial experience in research and development of synthetic waxes, resins, coating compositions, emulsions, surface active agents. Literature research in 4 languages, age 33, married, 2½ years' in U.S.A. and employed (first papers) desires change for greater opportunity.
Box 27-N-1, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 74)

Address communications to the box number indicated and Mail to Easton, Penna.

The American Chemical Society has no information concerning the position advertised—or in regard to those seeking employment.

(Situations Wanted Continued)

FOOD CHEMIST, Ph.D. 1941, large eastern university, desires industrial position. Special experience in chemical vitamin analysis, with thorough training in physical chemistry. Age 24, single, 3A in draft, available Feb. 1.
Box 30 N-1, Ind. & Eng. Chem., Easton, Pa.

PROFESSORSHIP Ph.D., Phi Beta Kappa, listed in Who's Who, Protestant. Experienced in teaching General, Organic, and Industrial Chemistry, also as industrial research laboratory director. Now employed, but interested in return to teaching because of opportunity for essential constructive work.
Box 31-N-1, Ind. & Eng. Chem., Easton, Pa.

EXPERIENCED PHYSICAL Chemist, excellent scholastic standing, available for research position. Eleven years' successful research in gas reactions, hydrocarbon chemistry, catalysis. Many publications, patents. Author of books recognized as standard works in their respective fields. Married, 35. First papers obtained (British subject).
Box 32-N-1, Ind. & Eng Chem., Easton, Pa.

PHYSICAL and INORGANIC Chemist, Ph.D. Cornell, with teaching experience in general chemistry, research work in insecticides and fertilizers, publications and patents, and experience translating and abstracting, desires teaching or research position.
Box 35-N-1, Ind. & Eng Chem., Easton, Pa.

CHEMIST, ORGANIC, Ph.D. in 1942 from Eastern University. Available immediately. Research in enzyme chemistry and analytical organic. Publications. Broad background in major field including synthetic organic. Minor in physical and biochemistry. 4 years' experience in teaching organic and inorganic. Eastern location preferred but not essential.
Box 36-N-1, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST Chemical Engineer: A.B., M.A., 3½ years' towards Ph.D. (evenings). 5 years' experience industrial research, principally in organic chemical lines, cosmetics, and pharmaceuticals. Wants position in production or research with good chance for advancement. Draft deferred. Available immediately.
Box 37-N-1, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL MICROSCOPIST. Organic chemist. Minor in physical Chem., M.Sc. from an eastern university plus year of recent graduate study. Decade of college teaching. Publications. Biochemical background. Available February.
Box 41-N-1, Ind. & Eng. Chem., Easton, Pa.

INORGANIC and ANALYTICAL chemist, B.A., M.S., 1941 USC, age 25, single American, draft exempt. Languages. References. Graduate research on beryllium. Expert in mineralogy, assaying rare, precious and common elements. Rocks, ores and metallurgical analysis. Desires position with consultant or to do research and development testing. Immediately available. Los Angeles vicinity. Ed Calderon, 206½ E. 24 St., Los Angeles, Calif.

SITUATIONS WANTED
(NONMEMBERS)

GRADUATE WOMAN Chemist, age 32, excellent knowledge German, French, some Spanish; also medical and engineering phraseology. Experienced research and executive office routine. Writing ability. Wants position combining research and office, or research and laboratory, or reporting for trade paper. No straight abstracting or stenography wanted.
Box 40-N-12, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL PATENT Attorney, New York City is interested in part time connection.
Box 12-T-12, Ind. & Eng. Chem., Easton, Pa.

PATENT ATTORNEY'S assistant. Lawyer, 13 years broad general experience; intensive appellate experience; working toward M.P.L. and B.S. in chemical engineering; excellent potentialities for patent work. Desires connection specialising chemical patents, Chicago area.
Box 21-N-1, Ind. & Eng Chem., Easton, Pa.

CHEMIST, B.S., 1940, now employed in pharmacy and doing own research on quinine synthesis, desires opportunity in chemical laboratory. Knows Spanish and German. Age 23. Draft deferred.
Box 33-N-1, Ind. & Eng. Chem., Easton, Pa.

ELECTROCHEMIST: Chemical engineer, Columbia; fourteen years' industrial experience; general consulting laboratory, electrodeposition, metal finishing, and allied fields; installation, process development, research. Several outstanding developments. Available part time, temporary and consulting. Full time position considered.
Box 39-N-1, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, Ph.D. 1933 desires responsible research or development position with progressive organization. 4 years' academic research and 8 years' industrial experience in new process development (wetting agents, detergents, higher alcohols) and oil refining technology. Many patents and publications. Age 35, married.
Box 42-N-1, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S in Chem. Eng., ten years' experience in compressed gas industry. Experienced gas analyst, likewise organic research. Married, 39.
Box 43-N-1, Ind. & Eng. Chem., Easton, Pa.

Industrial Literature

CONTINUED FROM PAGE 70

Also included are instructions for cold working, hot working, annealing, design, fabrication, arc welding, and surface cleaning. *Bulletin T-4 IE.* INTERNATIONAL NICKEL CO., INC., 67 Wall St., New York, N. Y.

Hand Pumps. The hand pumps described in this 4-page bulletin are designed primarily for operating hydraulic jacks and other small hydraulic tools as well as for testing purposes. Pressure capacities shown range from 1,500 to 30,000 pounds per square inch. Ten different types of pumps are illustrated, including single and double plunger types, the latter for use where high speed of initial movement is required. Construction features of each are described. *Bulletin 240-A IE.* WATSON-STILLMAN CO., Roselle, N. J.

Heat Transfer Equipment. In this 4-page bulletin the manufacturers have given brief but informative data on a new line of heaters, coolers, and condensers. Flow diagrams are widely used to illustrate operating characteristics. Six different types of equipment are described. *Heaters, Coolers, Condensers IE.* DOWNINGTOWN IRON WORKS, HEAT TRANSFER DIVISION, Downingtown, Penna.

Industrial Pumps. This bulletin is planned as an aid to the proper adaptation of these vertical pumps to widely varying operating conditions. The manufacturers point out that these pumps have earned a reputation in such operations as booster, transfer, condenser, circulating, agitator, vat, sump, vacuum lift, vaco-process sinking, caisson dewatering, dredge transfer, air conditioning, filter wash water, sewage treatment, and fire protection. The bulletin emphasizes simplicity of construction, ease of installation, non-overloading characteristics, and variable capacity. *Bulletin 29-A107 IE.* POMONA PUMP CO., 120 Broadway, New York, N. Y.

Liners—for Ball Mills. This 8-page engineering bulletin is devoted entirely to a discussion of the various types of liners required for different industrial work. The bulletin discusses design, gives interesting comparisons on tonnage handling, and deals with a variety of installations. *Bulletin 1141L IE.* AMERICAN MANGANESE STEEL DIVISION, Chicago Heights, Ill.

Manometers. An 8-page catalog includes not only manometers but also draft gages, flow-meters, mercury pressure and tank gages. Equipment is discussed in relation to its service in measuring pressures, vacuums, and flows of liquids and gases. *Bulletin C-10 IE.* MERIAM CO., 1955 West 112th St., Cleveland, Ohio.

Mills, Mixers, and Sifters. A 4-page bulletin describes this equipment in relation to its service for the drug and cosmetic industries. The line includes large pebble mills for production work as well as smaller jar mills useful for operations on small quantities of material. Size and capacity tables are supplied for both sifters and mixers. *Bulletin 39 IE.* ABBE ENGINEERING CO., 50 Church St., New York, N. Y.

Motors. This new bulletin gives a complete technical discussion, devoted entirely to a working description of construction and operation characteristics, of a well-known line of single-phase, direct-current, and small polyphase motors. The illustrations include both drawings and cut-section photographs showing the details of design in relation to operating characteristics. *Bulletin M U-183 IE.* WAGNER ELECTRIC CORP., 6464 Plymouth Ave., St. Louis, Mo.

Orthosil. This little booklet is devoted to the practical use of this cleaning agent. Use recommendations bear directly on the cleaning of metal surfaces before finishing operations are undertaken. *Orthosil IE.* PENNSYLVANIA SALT MFG. CO., 1000 Widener Bldg., Philadelphia, Penna

Pebble and Ball Mills. A 6-page booklet will make interesting reading for any engineer who is working with grinding or processing problems. After an initial discussion of the considerations determining the choice of equipment, the authors proceed with a well-illustrated discussion of operating characteristics and construction features. Capacity tables and a specification table will be of material assistance in selecting the right equipment. *Bulletin 55 IE.* ABBE ENGINEERING CO., 50 Church St., New York, N. Y.

Platinum Catalysts. A pocket-size booklet discusses the field of usefulness of platinum and palladium catalyst work. The booklet describes 32 types of catalyst combinations with recommendations as to the use of several. *Platinum Metal Catalysts IE.* BAKER & CO., INC., 113 Astor St., Newark, N. J.

Plywood. An interesting 8-page folder contains a brief history of the plywood industry, describes present-day methods of manufacture, and illustrates the widespread uses of this new structural material, including a discussion of its application in aircraft. *Folder IE.* DUREZ PLASTICS & CHEMICALS, INC., North Tonawanda, N.Y.

Pressure Filters. This type of filter is designed for production problems requiring filtering, clarifying, or polishing of chemicals, dyes, fruit juices, wine, beer, sirups, inks, and other fluids. Details of construction are covered by both photographs and line drawings. These filters are available in three sizes with areas of 25, 50, and 100 square feet. *Bulletin 123.* OLIVER UNITED FILTERS INC., 33 West 42nd St., New York, N. Y.

Protection Coatings. This little bulletin describes a line of coatings designed to

CONTINUED ON PAGE 76

MISCELLANEOUS

BUSINESS OPPORTUNITIES • FOR SALE • WANTED • ETC.

Five cents a word, minimum charge $2.00; display available at $7.50 per inch; in advance. No discounts or allowances

MICRO-ELEMENTARY ANALYSES: C, H, N, S, P, Halogens, Methoxyl, Mol. wt., etc., U.S.P. and other official tests, Purity tests, Microinorganic assays, Spot tests, Micro-distillations, Toxicological investigations, and typical micro-chemical research work. Dr. Carl Tiedcke, 360 Fifth Avenue, New York, N. Y.

WANTED SCRAP

Nickel, Monel and Alloys, Residues, Oxides, Precipitates, Sludges, Containing Zinc, Tin, Nickel, Copper, Cadmium, Tungsten, Molybdenum, Vanadium.

Metallurgical Products Co.
Reclaimers — Processors — Established 1909
35th & Moore Sts. Philadelphia, Pa.

WANTED: "Acta Physicochimica," Volume 5, 1936. Please state price expected. Margaret Carlson, Librarian, American Cyanamid Company, Stamford, Connecticut

WE ARE interested in buying the following journals: "Chemisches Centralblatt," April 1914 to present with collective indexes; "Berichte der Deutschen Chemischen Gesellschaft," 1912 to present with collective indexes; Leibigs' "Annalen der Chemie," volume 407 to present, including indexes from volumes 308 to present; "Journal of the Chemical Society of London," 1900 to present with collective indexes; "Transactions of the Faraday Society," 1920 to present. Please give prices and state whether periodicals are bound or unbound, and indicate their condition.
Box 49-T-12, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Traylor lead blast furnace, 36 × 72". Condition good.
Box 25-N-1, Ind. & Eng. Chem , Easton, Pa.

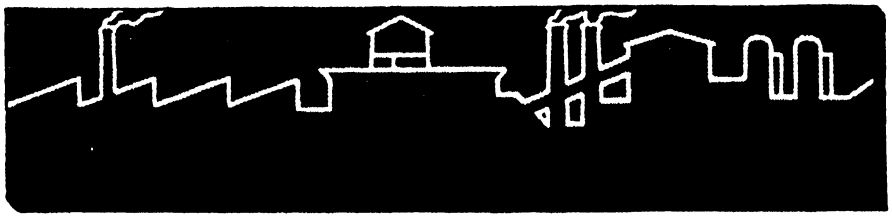
FOR SALE: Chemical Abstracts, Volumes 1-27 (1907-33), with First and Second Decennial Indexes. Unbound and in excellent condition.
Box 28-N-1, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: London Edinburgh and Dublin Philosophical Magazine and Journal of Science years 1798 to 1925 bound. Chemical Abstracts vols. 3 to 1939 with first and second decennial indexes. Wish to purchase: Intern. Critical tables, also complete Chemical Library.
Box 29-N-1, Ind. & Eng. Chem., Easton, Pa.

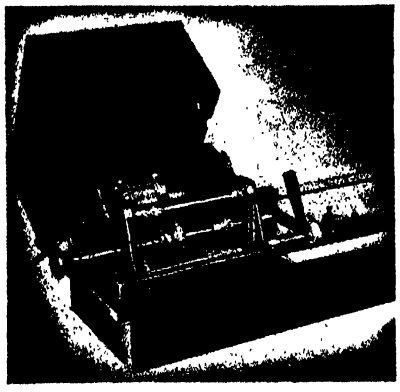
FOR SALE: "American Chemical Journal" (by Ira Remsen), complete set; "Journal, American Chemical Society": Vols. 16-60, complete, bound; "Chemical Abstracts"; complete bound set, with 3 Decennial Indexes, bound. A. Calvert, 221 Seaman Ave., New York, N. Y.

FOR SALE: Need Equipment? In a hurry we have available for immediate delivery at very low prices standard laboratory equipment. A few are listed, many others are available Write us your needs at all times. Hydraulic laboratory presses, International Centrifuges, microscopes, Zeiss and B & L Abbe Refractometers, Freas Ovens, Incubators, small and large single wall ovens, Analytical balances, Spectrophotometers, Hilger Spectrometer, Gaertner Photometer, B & L Dubosq, Colorimeters, Autoclaves, Stills Furnaces, Vacuum ovens, De Laval Separators, Colloid Mills, Saccharimeter, Hoskins Pyrometer, Testing Machines, etc. More than ever we are at your service for Laboratory Apparatus. Whether you wish to buy or sell, write or wire us for complete information. The Laboratory Exchange, 24 E. 21st Street, N. Y. C.

FOR SALE: 1000 lbs. Copper Fluosilicate, 5 tons Nickel Sulfate single 18%, 100 lbs. Calcium Levulinate, 100 lbs. Levulinic Acid, 20 grams d-Ribose, 25 grams Galacturonic Acid, 10 kilos Cystine, 1000 grams Germanium Dioxide, also Caesium, Rubidium, Indium, Gallium.
Box 45-N-1, Ind. & Eng. Chem., Easton, Pa.



Ductility Machine



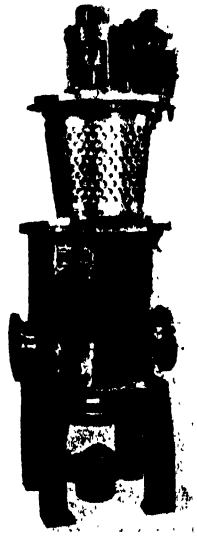
PRESENTING several new features, the new ductility machine announced by the Precision Scientific Co., 1750 North Springfield Ave., Chicago, Ill., complies with Designation D-113 of the American Society for Testing Materials, for testing the ductility of bituminous materials at speeds of 0.25, 1, or 5 cm. per minute. Having a depth of 5 inches, ample room is allowed for insertion of cooling coils or ice when conducting tests at reduced temperatures.

The selective gear-drive mechanism, fully enclosed in a metal housing, is of the automotive type, with all gears of bronze, on steel shafts. Bearings are of the oilless type, requiring no lubrication. Speed selection is virtually instantaneous, by means of a gear shift lever protruding from the gear-drive housing.

Ruggedness, coupled with accuracy, is achieved by utilizing a bronze lead screw, with Acme square threads free from sharp peaks, to avoid screw thread delicacy. A single lead screw occupies little space in the trough, and is above the water level so that agitation of the water does not occur. After the carriage reaches the 150 cm. limit, it automatically disengages the lead screw, and comes to rest.

Readings can be taken up to 150 cm. The scale is divided in centimeters and millimeters, and the indicating pointer is adjustable, so that it can be set to the exact zero position at the starting point.

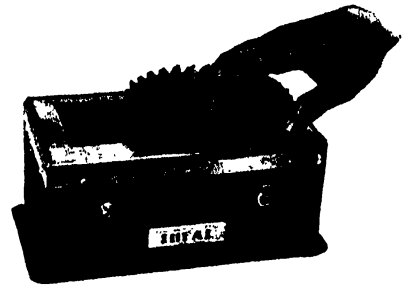
New Multipore Rubber Screening Medium



H. A. BRASSERT & Co., 60 East 42nd St., N. Y., announce that a new screening medium of Multipore rubber has been added to the media available for Brassert automatic strainers and complements those already available in glazed perforated porcelain and reinforced stainless steel screening.

The Brassert strainer consists essentially of a rotating drum fixed to a vertical shaft and centered within a cast-iron housing. The entire vertical surface of the drum is perforated, and into each hole a circular filtering disk is fitted. Liquid enters through the inlet, rises around the outside of the revolving drum, and passes through the screening media into the central section. It is then discharged from the bottom. As the drum revolves, the straining disks pass in front of a washout orifice, in the form of a vertical slot, which backwashes one row of disks at a time using strained water as the wash liquid and discharging into a separate basin. Units are available in capacities ranging from 110 to 24,100 gallons per minute using 80-mesh screen and a pressure drop of 1.5 pounds. In the small size there are 22 screening disks while the large requires 3,600.

New Demagnetizer

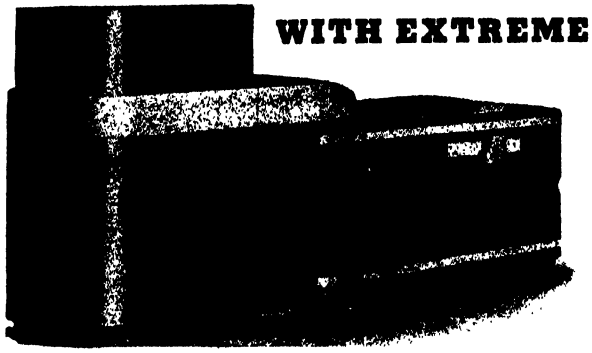


A NEW, powerful, portable demagnetizer is announced by the Ideal Commutator Dresser Co., 1347 Park Ave., Sycamore, Ill.

It quickly demagnetizes tools, drills, punches, dies, and work held in magnetic chucks. Abrasive particles such as metallic dust, flakes, fine chips, etc., are easily removed after a single pass across the magnetic poles.

Large parts may be demagnetized in a similar manner, except that the demagnetizer is moved over the heavy, bulky work.

CONTINUOUS FEEDING WITH EXTREME GRAVIMETRIC ACCURACY

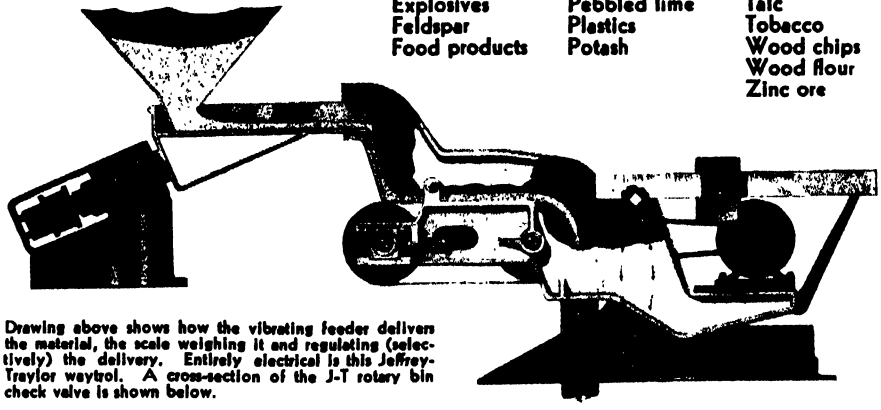


Jeffrey-Traylor electric vibrating weytrols (Patented) give a much different conception to continuous feeding when extreme gravimetric accuracy is required. They will deliver a continuous uniform flow of a given weight per hour — eliminate the effect of bin load, material size and density variations, and other outside factors contributing to inaccurate feeding. May be remotely controlled, interlocked with processing equipment. Investigate.

Type 100 Jeffrey-Traylor weytrol complete with dust-tight housing.

PARTIAL LIST of materials being fed with J-T weytrols:

Activated carbon
Alum
Ammonium sulphate
Bauxite
Cement clinker
Chemicals
Clay
Coal
Explosives
Feldspar
Food products
Fullers earth
Gypsum
Cullet
Iron ore
Limestone
Pebbled lime
Plastics
Potash
Salt cake
Sand
Shale
Soda ash
Starch
Talc
Tobacco
Wood chips
Wood flour
Zinc ore



Drawing above shows how the vibrating feeder delivers the material, the scale weighing it and regulating (selectively) the delivery. Entirely electrical is this Jeffrey-Traylor weytrol. A cross-section of the J-T rotary bin check valve is shown below.



Jeffrey-Traylor electric vibrating equipment includes economical units for feeding, weighing, conveying, cooling, drying, packing and screening . . the basis for all is balanced high frequency vibration under absolute control. They provide a new conception to feed control—rate can be changed when unit is running—no mechanical adjustments required. Let us send you literature.

The Jeffrey Manufacturing Company

885-99 North Fourth Street, Columbus, Ohio

Baltimore	Chicago	Detroit	Milwaukee	St. Louis
Birmingham	Cincinnati	Harlan	New York	Scranton
Boston	Cleveland	Houston	Philadelphia	Salt Lake City
Buffalo	Denver	Huntington	Pittsburgh	Terre Haute

Industrial Literature

CONTINUED FROM PAGE 74

protect equipment against water, acids, alkalies, and corrosive gases. After discussing the composition of these materials, brief recommendations are made as to the choice of particular numbers for the problem in hand. *Prufcoat Protective Coatings IE.* PRUFCOAT SALES CO., 202 104th Ave., Hollis, Long Island, N. Y.

Solvamin, a natural source of riboflavin is the subject of a 13-page bulletin which describes the characteristics of Solvamin and deals briefly with importance of riboflavin in the human diet. The question and answer section will be of particular interest to food and pharmaceutical manufacturers. *Solvamin, Rich in Riboflavin, Booklet IE.* COMMERCIAL SOLVENTS CORP., 17 East 42nd St., New York N. Y.

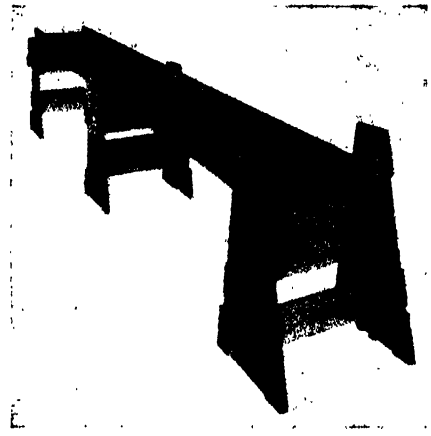
Squeegee Type Pumps. These pumps, operating on a unique principle, are available in single- and double-stage. Single-stage pumps deliver 0.5 gallon to 50 gallons per minute and discharge pressures of 50 pounds. The essential operating element consists of flexible rubber tube units squeezed and released by the action of a circular rotator or rocker mechanism. Installations in service show that the pump can handle solutions containing a lot of solid as well as viscous or stringy solutions. *Bulletin 1041 IE.* DOWNINGTOWN MFG. CO., HUBER PUMP DIV., Downingtown, Penna.

Stainless Steel Electrodes. This 11-page, compact technical bulletin contains tables showing current values and deposition data as well as information on heat treatment and applications of stainless electrodes. A feature is the table of stainless weld metal data which gives a variety of applications and provides chemical analysis, physical properties, and heat treatment for each type of job. *Arcos Technical Bulletin 5 IE.* ARCOS CORP., 401 North Broad St., Philadelphia, Penna.

Stainless Steel Processing Equipment. Rather than attempt to sell equipment the authors of this bulletin have sought to guide the prospective purchaser in making an intelligent selection. Line drawings are used in interesting fashion to illustrate significant variations in favorable technic. *"What to Look For" IE.* S. BLICKMAN, INC., Weehawken, N. J.

Thickeners. A 4-page engineering booklet describes these thickeners designed for thickening, washing, and leaching materials that do not readily settle from a suspending fluid. Because of their compact design, they can be used on rapidly settling materials where the cost of special materials of construction would be too high if ordinary thickeners were used. Their greatest field of usefulness is on materials that settle slowly, owing either to a low differential in density between these materials and the suspending liquid or to their finely divided state. Applications include thickening, continuous decantation and washing, and counter-current leaching. *Bulletin 114 IE.* T. SHRIVER & Co., 810 Hamilton St., Harrison, N. J.

Wood Roller Conveyor



A WOOD roller conveyor especially designed for handling explosives in ammunition and armament plants is announced by the Standard Conveyor Co., North St. Paul, Minn. Rollers and frames are made of maple and brass. Bearings are either ball bearing or oilless bronze. Shafts and shaft holders are made of brass. Supports are made of wood and are adjustable for various heights. In fact, the construction throughout is wood and brass to prevent any sparks from friction.

CHEMICAL AND ENGINEERING NEWS

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HARRISON E. HOWE, Editor

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Industrial Research in Foreign Countries during 1941

WILLIAM A. HAMOR

Mellon Institute, Pittsburgh, Penna.

War wears mechanical garb, and every opportunity is being sought to apply mechanisms to multiply the strength and speed of man and to conserve his energies for direction and control. Physical efficiency and intense research and technologic development characterize the present conflict. There has also been much investigational activity the world over because, whatever the outcome of the war, there will be heavy debt and it is generally realized that the only certain road to recovery is to increase industrial power.

That less is heard about chemistry in Great Britain and Germany than during the first world strife—less regarding chemical industry, shortage of this or that chemical, need for chemists and chemical engineers—is principally attributable to the prevision of the chemical profession and the chemical manufacturing field and to their prewar organization in those countries. These nations are equipped for offensive and defensive chemical combat.

Canada

Of 19 projects in the $105,000,000 program administered by Allied War Supplies Corporation, 14 are in production; not less than 12 types of chemicals and 8 explosives will be included in the final output. The staff of the National Research Council's laboratories at Ottawa has been almost doubled since the war began. The funds at the disposal of the council for 1941 have been some fivefold greater than for the last prewar year. In addition, other projects will involve about twice or three times as much again and a trust fund set up by the industries of well over $1,000,000 is available if needed. Research Enterprises, Ltd., is a wholly owned government corporation established by the Ministry of Supply to produce for the armed forces and for the industries devices developed by the council. Optical glass and instruments and radio gear are being manufactured; a new de-icing fluid for aircraft propellers has also been evolved by the council. Aeronautical laboratories have been constructed outside Ottawa. About 1,000 laboratories are being maintained by industrial establishments; close to 225 laboratories are in operation in universities. A Wartime Bureau of Technical Personnel has been set up in the Department of Labor to recruit competent persons for scientific work in the war industries.

Minerals and Metals

War minerals are being sought widely, and numerous discoveries have been made. Efforts toward the commercial production of graphite in Labrador are progressing. In Newfoundland exploration for fluorspar has been going on for over three years; the production of this mineral is about 15,000 tons annually. A large deposit of barite has been found near Windsor, Nova Scotia. Deposits of magnesite, tungsten, cobalt, antimony, and chromium were reported in British Columbia, where prospecting for manganese and bauxite was also conducted. Chromite deposits on the Fox Island River in Newfoundland were examined. The production of radium ore has been suspended because there is a two years' stock. The National Research Council has investigated extraction of radioactive substances other than radium from Great Bear Lake pitchblende, which contains 53 different elements. Ionium should be applicable in the preparation of luminous paints, but, like polonium, it is lost in the present Port Hope refinery process. The gypsum industry was further developed. A new type of gypsum wallboard is being manufactured in New Brunswick. The annual consumption of refractories is about $3,000,000. Refractory products are being made from the dolomite of Kilmar and from the brucite of Wakefield, P. Q.; silica is losing ground to magnesite brick in metal-smelter roof service; special types of basic and neutral refractories are under investigation by the National Research Council. Despite the reported development of a type of ceramic aviation plug to replace satisfactorily mica plugs, the latter still continue in use. A group of cast-iron enamel ground coats containing 80 per cent nepheline syenite and 20 per cent flint was shown to approximate an all-feldspar coat. Steel production is expected to reach an annual rate of 2,500,000 tons early in 1942. Research on the production of pure uranium metal and the ferroalloy has been continued. Steel parts of airplanes are cadmium-plated before painting. The Arvida plant of the Aluminum Co. of Canada has been producing about 1,000,000 pounds of aluminum daily; the annual output was expected to increase to about 500,000,000 pounds by the end of 1941 and this production is to be doubled by 1943, when one sixth of all the electrical energy generated in the Dominion will be used in producing aluminum. By the close of 1942 sufficient aluminum will be made for 80,000 aircraft annually. Silver hardens aluminum; lead reduces the hardness of aluminum-silver alloys. The war demand for nickel, copper, and zinc is keeping the pertinent mining, smelting, and refining industries working at peak levels. Consolidated Mining & Smelting announced the production of tin on a semicommercial basis at its Kimberley plant.



NATIONAL RESEARCH COUNCIL OF CANADA

An aircraft engine crankcase of cast aluminum alloy undergoes x-ray inspection for internal defects.

Chemicals

Basic investigations on photosensitized reactions have been continued by the National Research Council. Experiments have indicated that the system $3CaO.Al_2O_3.1.5H_2O$–$3CaO.Al_2O_3.6H_2O$ would serve as an efficient drying agent at temperatures below 100°. A combination of selective absorption and anion exchange offers the best possibilities of removing fluorine from domestic water supplies; promising results have been obtained with oxides of magnesium and aluminum and orthophosphates of calcium and aluminum. The production of military explosives in 1941 exceeded the total output from 1914 to 1918. Twenty-five plants are making heavy chemicals and the production of synthetic ammonia was started in the first of three new factories. Large quantities of magnesia are to be manufactured from brucite in a plant near Wakefield. Work has continued at the Ontario Research Foundation on methods for securing organic acids by fermentation and also on the preparation of pure lactic acid. The production of ethylene glycol by direct oxidation has been under study by the National Research Council. Polyvinyl chloride is to be manufactured. Polyvinyl acetates, of which four are in large-scale production, are known as Gelvas; they are hydrolyzed to give bodies containing free hydroxyl groups, termed Solvars; about 10 acetal resins are in commercial production, including Formvar, Alvar, and Butvar. Synthetic drying oils are being made from oleic acid and also from unsaturated triglycerides; a fast-drying heat-reactive oil is prepared from blends of linseed, pilchard, and soybean oils. Brown and white factices have been supplemented by Amberex (vegetable oil lightly sulfurized in presence of an accelerator) and Factex (an aqueous dispersion of partially vulcanized oil). Tysonite, a special brown factice, is useful for protecting insulated wire from the ozone generated in corona discharges.

Fuels, Wood Products, and Textiles

Natural gas is used to provide atmospheres for bright annealing and gas carburizing. The daily production of petroleum in the Turner Valley field is 22,000 barrels; a new oil field was tapped about 120 miles east of Calgary. The first aviation gasoline of octane value 80 to 87 came from the crude oil of Turner Valley. A plan is under consideration to produce motor fuels from a combination of ordinary gasoline and wheat-derived alcohol. The Alberta tar sands are to be worked for oil, of which they can yield at least 100 billion barrels. The high average of 150 gallons of gasoline has been produced by hydrogenation from a ton of Alberta coal. A plant to produce toluene and xylene was opened in Nova Scotia. TNT poisoning has been studied. Only 10 per cent of the timber resources have been tapped. Gas from wood has been foreseen for small plants and rural homes. Birch is being used in the manufacture of airplane veneers; plywood production in British Columbia has greatly expanded during the past two years. Newsprint, with a value of over $160,000,000 a year, is a leading export; about 75 per cent of the output is sold to the United States. Pyrite will be used instead of sulfur in the manufacture of pulp at Hull. Studies on lignin and related compounds were pursued actively at McGill. Extraction of lignin by the alcoholysis of wood appears to hold promise of future technical application, and the recent development of processes using only aqueous solutions of organic acids, such as sodium xylene sulfonate, indicate that lignin removal can be accomplished by much milder means than hitherto was regarded possible. At the Ontario Research Foundation 18 manufacturers of fabrics and 80 producers of garments are cooperating in a quality control program. The output of rayon fabrics showed an increase of about 30 per cent; more than $25,000,000 are invested in plant and equipment for the manufacture of rayon. Limited amounts of Canadian-made nylon hosiery (from imported yarn) were placed on the market early in 1941. The production of nylon is not expected before spring; the capacity of the plant to be erected at Kingston is placed at 575,000 pounds an-



NATIONAL RESEARCH COUNCIL OF CANADA

Proofing of gas-mask containers

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nually. Canadian Industries will also install equipment in a plant at Brownsburg for the manufacture of nylon monofilament. Natural dyestuffs have been investigated from the standpoint of competition with synthetic dyes. By reacting acid-formaldehyde liquors with cotton and rayon materials under baking conditions these fabrics have been given modified dyeing properties while they have acquired considerably increased resistance to creasing and to shrinkage during washing and laundering.

Foods and Marine Products

Recommendations for research by the Canadian Chamber of Commerce embrace production of starch and gluten from wheat, sunflowerseed oil, utilization of wheatgerm oil and of refuse grain screenings, production of alfalfa meal, dehydration of fruits and vegetables, utilization of whey, and cultivation of certain drug plants. A mill was built in British Columbia to manufacture starch and glucose from surplus potatoes. The British Columbia Fruit Growers' Association is considering the establishment of a research laboratory to work on the utilization of apples. Waxing apples reduces shrinkage in storage but induces scald on McIntosh and Delicious varieties. In Vernon, B. C., experiments are in progress on the preparation of apple powder from surplus apple crops. At the Central Experimental Farm in Ottawa the production of distilled cider vinegar was studied. Mapelit is a new flavoring. Many cheese factories are using fine salt rather than cheese salt. Solutions of calcium propionate prevent the mold of cheese. Improvement in the flavor quality of Wiltshire bacon can be had by the adoption of better handling and curing practices. As regards this bacon, it may be noted that 23 papers on the subject have been published in the *Canadian Journal of Research*. Spoilage in pork or bacon fat is primarily caused by oxidation. Articles have appeared on canned smoked oysters, spiced surf smelts, canned smoked salmon, chum salmon products, halibut "cheeks" canned in jelly, canned smoked abalones, and canned smoked black cod. Canning of whale and seal meat is under development in Newfoundland. The strands of gill nets, treated with a benzene solution of Parlon, plasticized with dibutyl phthalate, and containing copper naphthenate, were found effectively preserved. Sodium benzoate combined with sodium chloride is best for fish fillet wrappers. Sodium or potassium nitrite in 0.1 per cent concentration is most effectual in fish preservation. The Fisheries Research Board issued a comprehensive bulletin on the chemistry and technology of marine animal oils. The Canadian annual production of cod liver oil of all grades is usually more than 150,000 gallons, although this quantity is only 25 to 35 per cent of the output in Newfoundland. A chemical preservative for fish livers, during the period between the catch and return to the home port, came into use in eastern waters. Five cod liver oil refineries are in operation; many of the extraction plants have improved equipment. The processing of swordfish and tuna livers from the Atlantic coast is being investigated.



A machine in the leather laboratory of the National Research Council of Canada for making fatigue tests on shoe upper leather. The movement simulates that of walking, and artificial perspiration is automatically injected at intervals.

Brazil

The government, considering the great mineral resources and the need for the development of heavy industries, set up the National Council of Mines and Metallurgy. Mineral exports for 1941 are roughly estimated to amount to $12,000,000. Production of sulfur from pyrite and of potassium salts and about 20 other chemicals is being studied. Plants are manufacturing ceramic materials, paper, textiles, leather, quebracho extract, essential oils, vegetable oils, cellulose from sugar bagasse, and polishes. Six factories produce practically all the cement consumed in the country. Backed by a $20,000,000 loan of the Export-Import Bank of Washington and the promise of technical aid from the United States, Brazil has started the construction of a steel industry. The production of aluminum from Brazilian ores is being investigated by the government.

Mineral Products

Most of the rock crystal comes from Goyaz, Minas Geraes, and Bahia; some of this mineral is especially valuable for the manufacture of optical instruments. Many rivers of the Amazon Valley yield a variety of shells suitable for buttons and novelty articles. Brazilian diamond sales have been increasing. The asphalt deposit in Anhembi has a reserve estimated at about 775,000 tons. The production of apatite at Ipanema is still small. An effort is being made to interest American importers in Brazilian rutile. Production of mica has increased notably in recent years. Most of the mica that Brazil exports is in block, but processing is being attempted. The output of beryl can be encouraged by extending purchases from the small producers and by developing concentration methods for ores. The production of manganese ore from the centers in Minas Geraes may be increased from 30,000 to 50,000 tons a month, if transportation facilities can be improved adequately. The Urucum manganese deposits are reported to be extensive. The chromite deposits in Bahia have not been developed. Two deposits of tungsten are known—the more important in Encruzilhada and the other in Mariana. The government of São Paulo has made an arrangement with the Instituto de Pesquizas Tecnologicas for the construction and technical supervision of a plant for the treatment of lead and silver ores. Cinnabar is being mined at Don Bosco. Columbite and tantalite are produced.

Chemicals

A plant produces caustic soda from sea water by the electrolytic process. A project to erect a caustic soda plant, to use the Solvay process, has been studied seriously. Textile soaps and oils are being made

locally from domestic supplies. Sodium silicate is being manufactured but is not used extensively in soap. Small plants producing oxalic and formic acids are at work in Rio de Janeiro. The growth of the coal-tar dye industry is evident by the increase in imports of intermediates used in making aniline derivatives. The production of medicinal preparations is being increased. Four hundred fifty-two registered laboratories are said to meet 90 per cent of the demand for pharmaceuticals and biologicals. Botropase, extracted from the venom of species of *Bothrops*, is an antihemorrhagic agent that has been under investigation.

Woods and Fibers

With the exception of Spanish cedar, useful woods of the Amazon Valley forests are often inaccessible and widely scattered. The principal commercial plantings of black acacia are in Rio Grande do Sul. There are at least 200,000,000 eucalyptus trees in the entire country. Gasogenio is a fuel for trucks obtained by the use of wood or coal; eucalyptus has been found to make the best wood for the generation of gas. A firm in São Paulo produces from Pau bark a material resembling corkboard. A National Pine Institute has been established. A cellulose plant is being erected in the southern Parana pine region; another company has been formed to make newsprint. A study of technical methods used in processing agricultural materials has been undertaken for Brazil by the U. S. Department of Agriculture. The cultivation of plants suitable for large-scale production of fibers to substitute for imported jute is under way; the Agricultural Development Service in the State of São Paulo has started a campaign to increase the production of various fiber plants, particularly sisal and ramie. Efforts to cultivate Indian jute are said to be successful in the Amazon Valley. Guacimo mixed with jute fiber is used to some extent in the manufacture of bags. Experimental plantings of sisal in São Paulo are yielding satisfactory results; the production of ramie fiber is still in the preliminary stage. The first fiber to be classified and standardized is caroa; five grades have been defined. Attempts are being made to increase the output of caroa, which has proved satisfactory for admixture with jute for the manufacture of twine and cordage; caroa has also been combined with jute and other fibers in yarn for suitings. Notices were sent out regarding the commercial production of fibers from pineapple plant in Parahiba.



JAMES SAWDERS

Sorting room in the Brazilian Government's experimental station for the growing of tobacco



JAMES SAWDERS

This Amazon Valley worker is bleeding a rubber tree.

Vegetable Oils and Rubber

Brazil has approximately 20 varieties of vegetable oils. Stimulated by the shortage of tung oil and by assistance of the Bank of Brazil, the oiticica oil industry has advanced. Bahia was expected to maintain the 1941 castor-bean production at about the same level as 1940 (40,000 to 45,000 tons). Leaf wax of the palm *Cocos coronata* resembles carnauba; the nut oil of the same plant (licuri oil) is similar to coconut oil. An effort is being exerted to utilize cashew nuts; the oil is being produced. A division on rubber was formed in the Instituto Naçional de Tecnologia. Rubber plantations in São Paulo are receiving favorable reports from the experimental stations. Farmers are said to be recognizing the possibilities of rubber plantings for providing shade for other plants, for the production of a drying oil from the seeds, and for utilizing the residue in animal feeds and fertilizers. Amazonas is the largest producer of rubber, having an output close to 7,000 tons; the second largest is Acre, yielding 5,000 tons, and Pará produces about the same quantity. It has been repeatedly affirmed that the hard-fine Pará rubber from the islands and the Territory of Acre has special qualities of resistance and elasticity attributed to the smoking process which makes use of the oily nuts of the urucuri palm, said to contain iodine. Ford's 2,500,000-acre rubber plantation near Belém began tapping trees on the original 22,000 acres developed over the past 12 years at a cost of $12,000,000. Firestone has large experimental rubber plantations in Colombia and Guatemala; Goodyear has done similar work in Colombia and Peru. Chicle Development of New York is reported to be purchasing Massaranduba latex.

Other Plant Products

The cultivation of wheat is becoming urgent in the agricultural development scheme. Since compulsory use of alcohol with gasoline was begun, alcohol production has been growing from year to year and the control organization for alcohol has recommended that the increased output of anhydrous ethyl alcohol be used as motor fuel. Reports show that 1,178,963 tons of sugar and 101,865,190 liters of alcohol have been produced during the current crop year. A new cassava mill has been built in São Pedro. Oil is to be produced from tomato seeds and the residual cake utilized in fertilizers and animal feeds. Equipment has been installed for making by-products of citrus fruits, such as oil and juice concentrates. A process has been evolved for vitamin A extraction from urucú. Caffein is being produced from maté. Brazil will be a most important source of natural caffein if Caffelite is manufactured on a large scale: from the planned annual consumption of 5,000,000 bags of coffee, there will be an output of 2,500,000 kg. of caffein. Other by-products of the Caffelite industry are to include coffee oil and furfural. Government authorities are trying to find local outlets for Caffelite, especially for use in wall and floor coverings, furniture parts, small electrical accessories, buttons, and novelties. Fifty thousand bags of coffee can be treated annually in the pilot plant in operation. Estimates are that Caffelite can be sold in the United States for 7 to 10 cents a pound. Pyrethrum cultivation is a comparatively recent development, mainly by small farmers. Five plants in Pará are engaged in milling the Amazonian woody vine timbo.

Other American Countries

Argentina. Production of beryllium oxide by a new process, utilizing native beryl, was initiated. In Argentine and Venezuelan petroleums, vanadium was found if the oil contained asphalt; the highest amount of vanadium occurred in the less soluble parts of the oil and residues. These facts are taken as confirmatory of the theory that vanadium is the principal factor in the formation of the asphalt. Government Oil Fields opened a research laboratory in the Province of Buenos Aires.

Investigation has shown that unrefined sugar caramelizes more rapidly than pure sucrose because of the presence of mineral compounds. Government officials are urging the chemical utilization of corn; only one concern is producing alcohol from this cereal. Two companies are starting to manufacture acetic acid by the oxidation of acetaldehyde from the catalytic dehydrogenation of fermentation ethyl alcohol. Steps have been taken to encourage olive cultivation and to make soybean products. A committee has been appointed to study possibilities of developing the paper industry; a company has completed experiments in mixing wheat straw with bamboo pulp for making newsprint and also has succeeded in using domestic wood and wheat pulp. Tung trees are being grown. Medicinal herbs are getting much commercial attention.

Chile. A company has been formed to turn out 30,000 tons of potassium salts annually. There is governmental interest in establishing an industry for producing iodine derivatives. The question of additional cement plants is being studied. A Chilean steel factory will use a process employing finely ground iron ore mixed with charcoal, calcium carbonate, and alunite. The government is investigating a project for the manufacture of aluminum from aluminum sulfate, which is plentiful. A rayon factory has been erected at Quillota, using eucalyptus. The Instituto Médico-Técnico Sanitas is manufacturing some aniline dyes. An olive oil plant has been built. Fennel and boldu oils can be produced if markets are found.

Colombia. Undeveloped beryl deposits exist in Cundinamarca. A soda plant is to be constructed at one of the government-owned salt mines. Abarco, a hardwood, is said to be a practical substitute for teak. Tanners are seeking a substitute for formaldehyde as a pigment-fixing agent in the production of shoe leather.

Cuba. The Minister of Agriculture announced the establishment of a Laboratory of Mines, equipped to make analyses and experiments and to serve as a source of data on domestic mineral deposits. A company was organized for deriving motor fuel and other products from asphalt. To aid farmers and to test new varieties of seeds, a horticultural demonstration station was founded at El Cano. Sugarcane research has brought out that difficult clarification results if the nutrition of the plants is unbalanced. The government is encouraging the production of textile fibers, particularly ramie.

Guatemala. The government is investigating cultivation of cinchona, derris, guaiac, paprika, and valerian. Plantations of cinchona trees have been set out, provided by American capital. The tea plantations are capable of much expansion.

Mexico. The problem of building an adequate iron and steel industry has been studied. At present one company is producing pig iron; two other concerns are making steel from scrap. The Governments of Mexico and the United States have been cooperating in a survey to determine prospects for expanding the output of Mexican crops. Coyol nuts are cracked mechanically to provide a substitute for coconut oil; a similar replacer for the latter is Costa Rican royal palm oil. The Mexican production of candelilla wax ranges from 1,500 to 2,000 tons annually. A shark-liver industry has been started in Lower California.

Peru. The employment of river shells in the manufacture of buttons and other articles has been considered. A pilot electrolytic zinc refinery was started at Oroya. Peru has joined the ranks of fiber flax raisers, with a crop of about 500 tons. Energy is being devoted to methods that



ARGENTINE INFORMATION BUREAU

State oil wells on the eastern Argentine coast



ARGENTINE INFORMATION BUREAU

A corner in an electric light bulb factory in Argentina

will result in higher yield and lower cost in rubber production. The National Institute of Animal Biology was created by the government. Ten tanners have made steady progress in recent years.

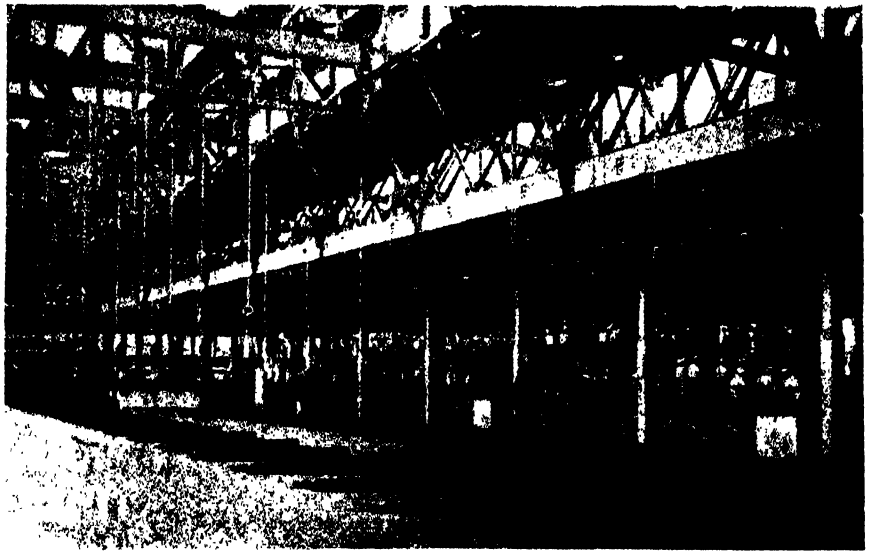
Great Britain

Scientific research in Britain's war effort has three main pillars—the Department of Scientific and Industrial Research, the Medical Research Council, and the Agricultural Research Council. Some twenty fields are being given associative investigation under the auspices of the department. Two research associations have annual expenditures of £100,000. The government is cooperating with the United States in scientific matters pertaining to national welfare. An Engineering Advisory Committee was appointed to assist in solving engineering problems connected with the war. The British Standards Institution issued emergency specifications to meet conditions from restrictions in the supply of materials and also advice on fire-detection devices for combating incendiary bombs. The Gas Research Board was formed. Approximately 14,000 persons are listed on the Ministry of Labour's register of chemists. The chemical industry continues to meet essential requirements, but a number of important materials must be imported, including pyrite, phosphates, and potash. A Chemical Control Board is engaged in coordinating the work of the various raw material controls. Women account for 23 per cent of all labor in British chemical plants. In 137,294 factories, in each of which less than 250 persons are employed, representing 52 per cent of the workpeople of the country, there is no industrial medical service. The maintenance of ventilation in plants has been defined because the application of blackout measures brought about an increase of accidents from gas and fumes. Ozone is used in some air-raid shelters.



ARGENTINE INFORMATION BUREAU

Interior of an important Argentine cheese plant



ARGENTINE INFORMATION BUREAU

A meat packing house in Buenos Aires

Coal, Coke, and Petroleum

The proposal has been made that coal seams of low range be exploited by underground gasification, as in the U. S. S. R. The mild degradation of lump coal was investigated with the help of the general knowledge of coal breakage. Starch flocculants are used in the removal of pyrite from coal-washery refuse. The disadvantages of hydrogenating low-rank coals are said to be less than anticipated. In the purification of water gas and coke-oven gas, peat containing sulfur bacteria is employed with iron oxide. Gas undertakings are seeking to combine more hydrogen sulfide as ammonium sulfide in their ammoniacal liquor. Much remains to be done in developing a satisfactory method of coking pitch. The possibilities of the

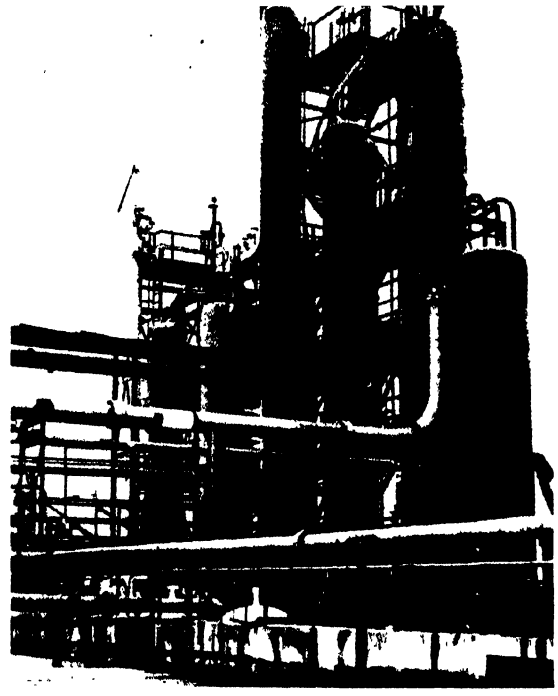


ODHAM FROM BLACK STAR

A fair munition worker sewing up bags of cordite in Woolwich Arsenal

process of activating coke with sodium carbonate are in need of research.

Apparatus for the recovery of light oil from the gas produced in small works is an important recent development. Picric acid was suggested as a retarding agent in the building up of resinous deposits within benzene still columns. Coumarone-indene resin is now being produced. A report was published on possibilities of utilizing home-produced fuels for Diesel engines; Scottish light creosote is being employed satisfactorily in road-transport Diesels. A method was evolved for preparing β-methyl-naphthalene from tar oil. The 3,4-benzophenanthrene compounds are more active carcinogenically than the benzanthracenes. For the use of methane as an airplane fuel a satisfactory container for the liquefied gas is needed. In motor vehicles a supply of compressed methane is preferable to storage in a balloon on the roof. Methane is obtainable in Scotland. It was rumored that the discovery of a method of obtaining large quantities of petroleum by synthesis was imminent. Asbestos shields on lifeboats of tankers protect crews from torpedoed ships surrounded by burning oil and can also be used as sails. Studies became available on the separation of paraffin waxes, on improvement of mixed cresols for inhibitor purposes, and on the effect of alkyl substitutions on the efficiency of phenols as inhibitors of gum formation. Mesitol as an inhibitor of gum formation in Iranian cracked gasoline was six times as efficient as *o*-cresol. In low-octane blends the addition of small proportions of furan caused a big rise in octane number. Attention was given to the reclamation of used lubricating oils. Swift Oil and the Adcols are metal-cutting lubricants. Clock Oil R.304 has been evolved by Stafford Allen and Sons in conjunction with the Admiralty Research Laboratory. Lubrivac is a vacuum-joint grease. A mode of applying asphalt by spraying a powdered compound through a flame-gun was described. Ledphalt damp courses consist of bituminous sheeting interleaved with lead.



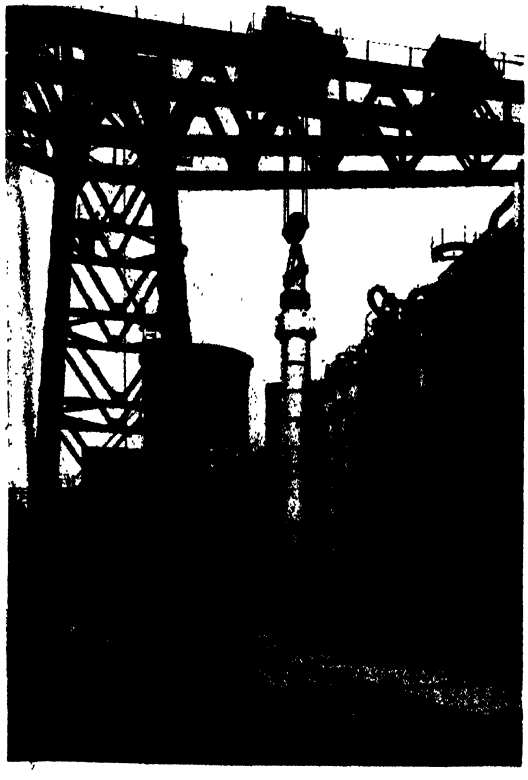
TRAVEL AND INDUSTRIAL DEVELOPMENT ASSOC. OF GREAT BRITAIN

Distillation section of I. C. I. petrol-from-coal plant at Billingham



BLACK STAR

Diamond-cutting machines in London



TRAVEL AND INDUSTRIAL DEVELOPMENT ASSOC. OF GREAT BRITAIN

Crane lifting converter into position, I. C. I. petrol-from-coal plant at Billingham

Ceramic Products

A magnesite from Kenya was found to be an excellent substitute for the Swedish material. Diatomite from Kenya and the Shetlands and vermiculite from Kenya and Western Australia have good possibilities. Necophyl is a china clay; Stockalite and Devolite are colloidal kaolins. In Supreme kaolin 70 per cent of the particles are not above 1 micron in size; Speswhite kaolin has 50 per cent of its particles not larger than 1 micron. Talcolin is a mixture of Speswhite and talc; Talcolite is a low oil-absorption material of similar type. Kalytes is finely ground



ODHAM FROM BLACK STAR

A 60-ton acid open-hearth furnace at the Vickers Works in Sheffield

Cornish chinastone; Molochite is a calcined china clay used as a refractory. Fullogel is a treated fuller's earth, a substitute for bentonite. The Building Research Board issued reports on general principles of wartime building and on precautions for concreting and bricklaying in cold weather. Included in the shipbuilding program are a number of concrete vessels. Elcol is an oil dressing for dustproofing concrete. Porsulex is a plaster-composition roofing slab. The war has given a decided impetus to the use of chemical stoneware in the manufacture of foods, paper, textiles, dyestuffs, soaps, and cosmetics. The resistance to thermal shock of semidry pressed bricks is greater than that of wet-plastic products. Molten and vaporized magnesium disintegrates silicon carbide refractories by forming magnesium silicide. The search for satisfactory one-coat enamels has continued; consequently much study has been given to opacifiers. Glazes containing natural rutile or artificial titania are liable to become blue upon firing in oxidizing conditions. Lewcoglass is glass-insulated wire. Thousands of pre-stressed- or toughened-glass insulators are performing better than the old-type annealed glass products. Toughened glass is being considered for hot plates and tops of hot kitchen cabinets. Hysil is a heat- and chemical-resistant glass used in lubricated glass valves. The application of glass in reinforcing concrete was found suitable for static but not impact loads. At least 50 per cent of window surface must be covered with a suitable protective agent to prevent splintering of glass subjected to blast. There are about 80 replacers for glass in panes; cotton-net fabric impregnated with cellulose acetate is widely used. Surface mirrors of rhodium, chromium, and silicon were studied.

Metals

The Rakos electric fusion welding process is being tried for industrial purposes. Chemag is an immersion process for preserving and coloring ferrous surfaces. Nicosilal is a special cast iron for use in tar stills, said to give three times the service of stainless steel; Nicosilal and Ni-Resist have good resistance to deflection at 850° C. Tantiron Special contains not less than 16 per cent silicon, equal to Krupp Thermisilid E in practical properties. Ferrocite automobile valve guides are made from iron powder. Phosphates, either alone or in conjunction with silicates, are being favored by platers for cleaning steel. Creep-resisting steels of carbon-molybdenum and chromium-molybdenum compositions were described. The chromium - molybdenum steels are particularly useful for autoclave bodies: Hecla 153 is of this type. The formation of martensite is an important cause of failure in haulage cables. Koolex is an incendiary-bomb extinguisher. Quenching stresses in aluminum alloys and also unsoundness in gravity die-cast silicon-aluminum alloy pistons were investigated. Research was published on the constitution of alloys of aluminum with magnesium and silicon. In melting magnesium, fluxes comprising magnesium chloride, magnesium fluoride, and calcium fluoride are employed. A promising method of magnesium recovery is based on the use of a high-frequency induction furnace and a solid reducing agent, such as ferrosilicon or calcium carbide. Magnesium sheets made by rolling direct from castings have mechanical properties at least equal if not superior to those manufactured from extruded slabs. Antimony-magnesium alloys are readily melted and easily cast, but antimony does not cause any improvement in the mechanical properties or corrosion-resistance of magnesium.

The British Non-Ferrous Metals Research Association is investigating the character of the oxide film on aluminum-base magnesium-aluminum alloys and the influence of selenium and tellurium on the properties of copper. I. C. I. scientists studied the influence of crystal structure on the cold rolling and annealing of copper strip. An investigation was made of the effect of prolonged heating on copper wire. Silbralloy (Ag-Cu-P) is suitable for joints on copper and copper-base alloys excluding cupronickel. L. M. S. Railway released a report on the corrosion of copper and some copper alloys in atmospheres highly polluted with coal smoke.



Shipbuilding on the Clyde

Precipitation in copper-beryllium alloys was studied. Substantial interest has been shown in electrical contacts of tungsten copper made by powder metallurgy. Alloys of zinc 60, manganese 25, and copper 15 per cent in the extruded form have exceptional machining properties. A study was conducted on the effects of progressively increasing amounts of cold work on the properties of phosphor-bronzes. The causes of porosity in tin-bronze castings were investigated. Speculum plating is obtained by the electrodeposition of a tin-copper alloy containing about 45 per cent of tin. Bronzes with good properties have been made by adding aluminum to tin-rich bronzes. A process was developed for coating hardened lead foil with tin. An alloy of 91.35 per cent tin, 8.5 per cent zinc, and 0.15 per cent nickel was found to yield a strong and ductile foil. A new bearing alloy of tin is for employment in sea water. In nitriding, tin is being used to provide temporary protection to surfaces which have to be kept in an unhardened state, so that they are still machinable after the rest of the surface has been hardened. Ersin is a resin-cored solder. Progress is being accomplished in finding alternatives to palm oil and tallow as covers for tinning baths by adding fluxing agents to mineral oils. A protective film is produced on tin plate by immersion in a hot chromic acid solution after preliminary degreasing, or by immersion in hot alkaline phosphate–chromate solution, which simultaneously degreases and films the tin plate. Designs are being worked out for automatic plant for the oxide-filming of cans. For export purposes, a flattenable tin can has been developed.



BRITISH PRESS SERVICE

Working on 40-mm. guns for countering low-flying attacks

Chemicals

The Chemical Society introduced a scheme to facilitate the supply of fine chemicals. Studies of sensitized explosions were published by the Royal Society. Liquid nitrogen tetroxide and liquid nitrosyl chloride were put on the market. Kessler-type concentrators have been improved so that they produce 97 to 98 per cent acid from spent mixed acid with about 13 per cent fuel consumption. Base-exchange materials were prepared from domestic fuller's earth and glauconitic sand. The Ministry of Aircraft Production specified triethanolamine phosphate as the inhibitor for ethylene glycol. Galanthol is an ice-formation preventive for aircraft. Halothenes are halogenated derivatives of polythenes. Magnesium, calcium, and barium salts increase just as readily as sodium salts the detergent power of products of the sulfonated alcohol type but are effective in lower concentrations. The S. A. F. E. process for bleaching palm oil employs sulfuric acid and fuller's earth. Research on fats was continued at Liverpool University with aid from the industries. Mixed fatty acids and naphthenic acid are serving occasionally for stearic acid. Use of accelerators with antiaging properties reduces the consumption of antioxidants. Nipantiox is a group of esters employed as antioxidants in oils and fats. Synthetic menthol was introduced. Monochlorothymol is effective in preserving starches, casein, and glues. Penicillin has been stressed as a bactericide. Pressure distillate is a good antimalarial oil. An antiseptic with the physical properties of spindle oil is needed for hospital floors. Ylangone is synthetic ylang-ylang oil. The Imperial Institute published a survey of wartime drug supplies and empire production; the Medical Research Council issued a report on economy in the use of drugs in wartime; the Ministry of Health has been studying the cultivation and collection of vegetable drugs; a special section within the Ministry of Supply is concerned exclusively with drugs and medicinal chemicals. The cultivation of drug-producing plants is being encouraged by the Pharmaceutical Society and the Ministry of Agriculture, and nine commercial drug-plant farms are in operation. It appears that cascara sagrada and also ergot, gentian, dill, and lobelia can be produced. In Scotland school children are collecting medicinal plants. Therapeutic Research Corp. has been formed by five pharmaceutical manufacturers.

Foods

To hasten the application of promising research results to farming practice is the task set to the Agricultural Improvement Council. The dietary has required on British yields about 1.6 acres of land per head of population, while in Germany 1 acre of land feeds an individual. The I. C. I. agricultural research station is collaborating with the government in attempting to increase domestic food production. Mobile canning units are in operation. Instructions for the protection of food from contamination by poison gas have been disseminated. Ammonium bicarbonate has been proposed as a wartime alternative to ammonium sulfate as a fertilizer. Research has been undertaken on the effect of low temperatures in preventing damage to wheat stored with high moisture content. Unground wheat starches contain a small quantity of water-soluble material of high reducing power. Wheat starch ground dry in a ball mill for 2,000 hours is almost completely soluble in cold water. Results obtained on commercial batches of vitaminized bread indicated a loss of B_1 during manufacture of not more than 10 per cent. A large vitamin B_1 plant was started at Welwyn Garden City. B_1 increases the anaerobic fermentation of baker's yeast. Exposure of living yeast cells to ultraviolet light results in the liberation of nitrogenous materials that stimulate growth. It has been urged that more rye be grown and that more potato flour be produced. British people are being encouraged to use more potato flour as a food. It is believed potato starch might be utilized extensively as a source of glucose. A high nitrogen and low potassium ratio in the soil or fertilizer will cause blackening of cooked potatoes. Dried carrot meal might be of value in biscuits; inclusion of carrot in marmalade has been suggested as a war

measure. The Ministry of Food has proposed the use of sodium bicarbonate for cooking fruit to reduce sugar consumption. Depectinized purees are dried to make satisfactory fruit powders; plum powder can be made into jam at any time of the year. Black currant sirup is said to contain five times as much vitamin C as orange juice; the employment of hedgerow products as sources of vitamin C is being encouraged. It has been suggested that for food purposes the opium-poppy would be an appropriate crop; the seeds contain about 50 per cent of edible oil and 20 per cent of protein. Bracken roots may be converted into protein with the aid of *Torula utilis*. Straw-pulp plants installed on farms by I. C. I. number about 250. Waste food is dried for use as animal fodder. Factories for converting seaweed into cattle and poultry feeds may soon be set up in West Scotland. Macova is an egg substitute; Alimil is a powdered dried milk; Yolac is a preparation of soybean flour and dried milk. Addition of 0.3 per cent of lactic acid prevents softening of pickles. The cheese-making industry is to be cultivated by the application of rheological methods. A product for the baking industry has been originated in Scotland from cheese whey. In nature the heat required by a colony of bees is produced by the consumption of honey, an expensive fuel; hence it is thought the electric heating of beehives might be of advantage.

Paper and Leather

Bothered with "showing through", resulting from the use of thinner pages necessitated by rationing, periodicals have solved the problem by adopting titanium-treated paper. Pectate pigments may be employed in printing inks. Bracken was studied for papermaking purposes. At Leeds University it was found possible to produce satisfactory paper from strawy rhubarb. Young teak does not yield an easily bleachable pulp, it was learned in experiments for Trinidad plantations. The effect of a large number of naturally occurring gums and mucilages in dispersing long-fibered pulps has been examined: among the most successful deflocculants are such gums as deacetylated karaya and bassora, and mucilages from rosemallow, marshmallow, cactus, and hyacinth. Acetylation makes kraft pulp more difficult to disintegrate. Waste paper recovery has gained more and more response. Blends of paraffin wax with liquid oxidized rubber and isomerized rubber are suggested as coating agents for paper cartons. Castwood is a woodcrete or artificial wood, especially for use in unsinkable packing cases. Mellopad is a constructional material consisting of laminated strips of lead and wood pulp. Secolith is a bituminized building board. Ilford Multigrade photographic paper is coated with an emulsion, part of which is not color-sensitized, while the remainder is sensitized to the blue-green region of the spectrum. Chloral hydrate is useful in restoring documents "knocked out" by fire. Some 3,000,000 acres in Great Britain is woodland; accordingly there is opportunity to build better markets for firewood and charcoal as well as turnery timber. A synthetic tannin is obtained by fusing phenol with alkali and sulfur. A modified two-bath chrome tanning process was described. In manufacturing chrome-tanned leather under a strict wartime economy, reduction of dichromate with sulfur dioxide is the best method of preparing one-bath liquors. Use of wool grease is suggested as a substitute for cod oil and tallow in currying and stuffing leather. In oil-tanning, water in the pelts may be dispersed in the oil during processing and removed during heating-off.

Textiles

The Textile Institute published a report on the identification of fibers. Ramie can be processed on flax-preparing and -spinning machinery, if suitably degummed, without impairing the properties of the fiber. Palfpap is a sheet of jute cloth, paper, and bitumen for use in building to replace glass. Meritex is impregnated felt for roofing. The rate of transmission of heat through fabrics was measured. The dissolution of chemically modified cotton cellulose in alkaline solutions continued to get research. Mercerizing of cotton was claimed to be improved by replacing caustic alkali with silicate of soda. I. C. I. developed a method of rotproofing sandbags by saturating the fibers in a basic copper carbonate suspension. Micronil is a series of aqueous zinc and copper naphthenate emulsions for the protection of textiles against deterioration by exposure and rot. The sodium salt of oleyl-*N*-methyltaurine has been found effective as an auxiliary agent in the processing of cotton. A method for dyeing cotton with mineral khaki consists of development of the pigment with potassium chromate and washing the dyed material for at least 24 hours. To combat attack by microorganisms, the pigment on mineral khaki-dyed yarn should be neutral and contain an appreciable amount of chromium soluble in warm 10 per cent sodium hydroxide. A preparation enables wool printers to produce as bright colors as are obtained on other fabrics. The bisulfite-papain treatment is particularly advantageous for the treatment of silk-wool fabrics; the silk is degummed and the wool is made nonfelting. Wheat and barley straw was advocated as a raw material for rayon. Synthetic resin and resin-starch finishes are useful, apart from crease-resistance properties, in avoiding shrinkage and in increasing durability of spun rayons. Certain tin compounds reduce the loss of strength of undyed cotton and rayon yarn on exposure to ultraviolet light. Cisalpha, Fibramine, and Lacisana are fibers of regenerated cellulose containing protein. Vistra XT, Lanusa, Floxalan, and spun-dyed Fibro are physically modified viscose staple fibers. Rayolanda X is obtained by introducing a synthetic resin into the viscose spinning mass; its special feature is its affinity for wool dyes; this fiber is suitable for admixture with wool. The range of shades offered in spun colored Fibro is being gradually increased. Lynophane is I. C. I. nylon. Nylon cordage is under specification by the Ministry of Aircraft Production. Beryllium alginate has been found to be the most satisfactory alginic salt for textile manufacture. Further stability may be found in an organic replacement of the carboxyl group, decomposition of which constitutes the principal weakness of the alginic acid molecule. Dyes containing sulfonic groups form insoluble precipitates with sapamines; this property is utilized for improving the fastness to water of dyed materials. The dyeing and processing of blackout curtains have continued to get attention. Azomel A is a dispersing and wetting agent for pasting and dissolving Brenthols. Lamoa T. S. is used in the kier boiling or scouring of fabrics before dyeing. Perpentol is a kier boiling and bleaching assistant. Suedelaine and Luana are textile finishes. Tennace is an oil textile-softener. Raynamine is a textile softener; Raynaquol is a textile processing agent; Raynowex is a wetting-out agent. Flexo is a preparation for combating laddering and stranding in artificial silk materials. "Triple-three" is the crease-resisting finish of the Bradford Dyers' Association. Polythene is used as a glaze for chintz and similar materials. British Bead Printers apply urea resin as drops, in a prearranged pattern on a fabric, which on hardening give a beaded effect. Dellite is an emulsion giving films which resist mustard gas, gasoline, and water. Fabrone is a fireproofing preparation. Newtrell and Rayncoso are soaps for use in dry-cleaning. Daster is a white odorless wax extracted from Hartolan wool wax.

Rubber

The plantation rubber industry, of vital importance to Malaya and Ceylon, took steps to apply research methods with the object of raising the output per acre and reducing costs. The shortage of formic acid was overcome in Malaya by the adoption of acetic acid from Canada; the State Council of Ceylon authorized a pilot plant to produce acetic acid for use in coagulating rubber. The addition of fibrous pectate to latex accelerates creaming. Other innovations include special organic dyestuffs for marking uncured stocks of rubber and a method for deammoniating latex with formaldehyde. The rubber industry is searching for home-produced materials which can be used as substitutes for imported com-

pounding ingredients especially carbon black. Rubber armor has been found to protect persons exposed to air raids by taking up and dispersing the pressure wave. Molded rubber fenders are coming into increasing use on trucks and busses. Rayon tire cords are inferior to cotton in adhesion to rubber. Impregnation of rayon with a resin is useful; simultaneous impregnation with latex is desirable. A process for reclaiming rubber has been announced whereby the cotton is destroyed, the rubber plasticized, not by alkali, but by a secret agent, and the product is heated under pressure in the presence of oxygen. Semtex is a chemically resistant cementing material with a basis of specially treated latex. Alloprene is I. C. I. chlorinated rubber, similar to I. G. Pergut. Detel is a chlorinated rubber dissolved in a mixture of high-flash aromatic hydrocarbons for use as a corrosion-resistant paint. Isobutylene where highly polymerized resembles natural crepe rubber but deteriorates less on aging. It is expected that the supplemental development of synthetic rubber will have a stimulating effect on the processing of natural rubber.

Other Plastics

British Plywood Manufacturers set up a division for the production of major components and stressed parts of airplanes. Wood impregnated with plastic material is being used for the construction of airplane stamping dies. In aircraft, plastics are employed for undercarriage, hydraulic ram and pump, and power-operated gun-turret bearings. In the automobile industry 30 components of a car, including water pump, stub axle, pivot pin, and clutch thrust bearings, are made from plastics. In marine engineering, rudder post, stern tube, and pump bearings are manufactured from these materials. A company found that resinoid laminated fabric bearings lasted 10 times as long as bronze bearings; it was concluded that the savings in power consumption were approximately 25 to 30 per cent. Permali, a resin-impregnated laminated material, is employed as a supporting grid for holding mixing vessels. Pytram is a laminated cellulose material bonded with special adhesives. Work continued on the production of plastic pistons for internal-combustion engines. Use of metal powders may prove advantageous in outer layers of laminated plastics in moving parts to reduce wear and slip. Machines that could be run at 150 r. p. m. with metal cams have been speeded up to 450 to 500 r. p. m. by using plastic cams. Luminous plastics have attracted much interest. Cellulose acetate sheets containing a variety of fluorescent dyestuffs are available. Plassitil is glycerol monolactate-triacetate, used as a plasticizer for nitrocellulose and cellulose acetate. An architectural creation, Isol-umen, consists of a corrugated sheet of cellulose acetate cemented on another sheet. Isoflex is a multilayer insulating material made from cellulose acetate. Transparent cellulose and cellulose acetate films afford good antiscatter treatments for windows if film of adequate substance is suitably stuck to the glass. Lactophane is a cellulose sheet. Lassolite is a cellulose acetate sheet reinforced with cotton fabric for use as a glass substitute. Luxoid consists of woven glass fibers impregnated with a synthetic resin. Shieldex, a glass substitute, is reinforced synthetic resin sheet. Splindow and Visi-Lite are textile-fabric-reinforced cellulose acetate sheets. Wamilite is a glass substitute made of synthetic resin reinforced with cotton fabric or wire netting. Some 9,000 distinct molds are being produced to make available surface-hardened polystyrene eyeglass lenses for men in military service who must wear spectacles.

The use of phenolic plastic sheet in fish-plate insulators on the track of electrified lines is under close study by the B. S. I. and Electrical Research Association. In terms of phons the reduction of noise in factories by the use of phenolic plastic gears is about 65 per cent. Bakelite fabric pulleys appeared almost unchanged after 40 months of service with copper alloy wires in railway signals. Vinyl resins, either acetate, chloride, or co-polymer of both, will become increasingly employed in the future. Tenafoil is Tenaplas vinyl chloride in sheets or strips. Polyvinyl chloride extrusion compounds are in considerable demand by aircraft manufacturers; Welvic is a polyvinyl chloride resin. An excellent resin is formed by polymerizing the 3-component system vinyl ester–butadiene body–maleic ester. Perspex, the I. C. I. methyl methacrylate resin, has become a synonym for organic glass in the R. A. F. A process has been developed for melamine resins which, it is claimed, yields 90 per cent of the theoretical output and does away with the need for expensive high-pressure plant. Casein plastics are being used in the aircraft industry chiefly for the production of spacers, small handwheels, instrument knobs, and name plates; conduits made of such resins are employed on fighter planes. B. I. P. Beetle cement is widely utilized in plywood manufacture; a powder form was introduced during the year. Posamax is a casein of Argentine origin. Portex is a plastic for dentures. Duralain is a plastic electrical insulation. Filatex is a prepared textile filling material for use in plastics. Hair clippings are being collected for possible application in plastics technology. Work was published that threw light on the problem of chitin formation. Methods were reported for silvering plastics. Ardux is a cement for joining synthetic resins.

Paints and Varnishes

In the present conflict, camouflagists are aware of the importance of the principles of countershading and dazzle. An investigation of fluorescent and phosphorescent materials has been undertaken by the Civil Defence Research Committee. Luminous paints are of two basic types: the permanently luminous variety, which contains minute amounts of a radioactive substance, usually radiothorium or mesothorium; and the temporarily luminous type, which must first be activated by sunlight or ultraviolet. It is claimed that practically any pigment can be pro-



BRITISH PRESS SERVICE

Production of de Haviland Tiger Moth training planes



METCALF FROM BLACK STAR

A camouflaged model of a factory. The angle would be equivalent to an aerial view from about 500 feet. From a plane at a height of 10,000 feet the whole factory would likely dissolve almost entirely into the surrounding country. The object is to prevent telltale surfaces and shapes from catching the eye of an aviator flying at that height at a speed of 200 or more miles an hour.

duced in flake form by a new process. Webko is a whiting. Blancophone, another pigment, consists of 70 per cent barium sulfate and 30 per cent calcium carbonate. Tocarba is a titanium white for exterior use. A study was published on the gelation of polymerized linseed oil films in the presence of cobalt. Hyptis seed oil from Sudan and Nigeria was said to have possibilities as a linseed oil substitute. Tung oil from Nyasaland is evidently worthy of commercial development; the experimental plantations of tung trees started in Cyprus in 1931 have been making good progress. Doboline, octadecadienoic triglyceride, is a succedaneum for tung oil; Chi-Woo is another tung oil substitute. A thermosetting impregnating varnish consists of xylenol-formaldehyde resin and tung oil. A thermoplastic white-line material for roads is of promise. Sposs is a varnish to fill up pores in wood. Damasol is a purified dammar resin; Hal resin resembles dammar but is of inferior solubility. The Synolac resins are oil-modified glyptal products. The addition of 5 to 10 per cent toluene or higher alcohols to lac solutions prevents crazing for long periods. Plasticizers which prevent crazing do not also prevent blushing; plasticizers containing hydrophylic groups are unsatisfactory; hydroaromatic phthalates and tartrates are superior to the aliphatic esters. Pale colored resins have been produced from aconitic acid by simultaneous condensation with a terpene and a drying oil.

Eire

The government set up the Emergency Scientific Research Bureau, to deal with technical problems involved in the provision of substitute processes and materials. Activated charcoals were prepared from peat and two processes were developed for the manufacture of wallboard from seaweed.

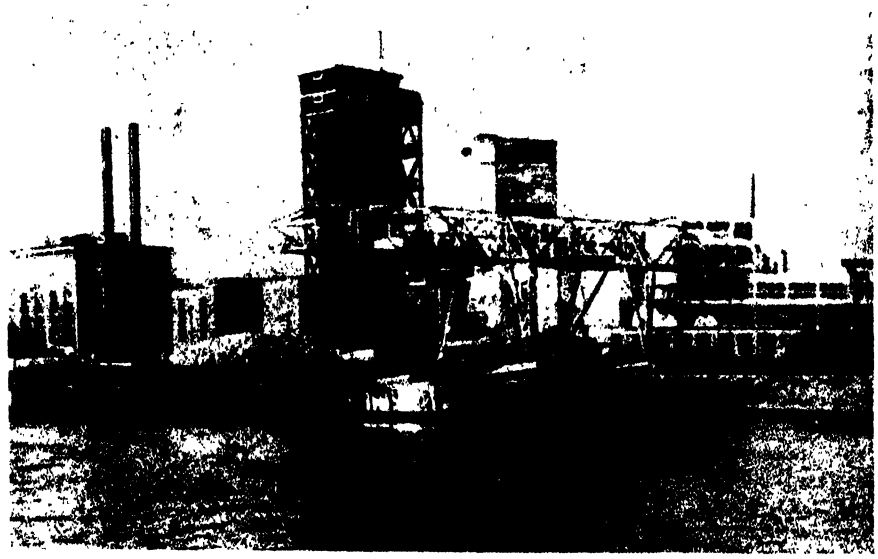
Netherlands

The Cuma water-treating system consists of weak solutions of silver produced by electricity. Sulfur dioxide is used to control rinder scab of cattle. Liquid sulfur dioxide acts on certain oils as a hardening agent without benefit of hydrogen. Linseed oil, activated with sulfur dioxide, is much more sensitive to heat than the original oil, yielding stand oil in a comparatively short time without any extra catalyst. The heat stability of asphalt-rubber mixtures has been investigated. The kinetic characteristics of the oxidation of normal butane have been studied at 220° to 270°. The thermal decomposition of acetic acid esters is employed as a method for preparing unsaturated hydrocarbons; researches on pyrrole derivatives have also been pursued at Amsterdam.

Sorption of hydrogen by wool has all the characteristics of adsorption, but sorption of air is distinctly different, a process of chemosorption being set up. The dyeing of silk with an acid dye has been explained by density measurements. Intensely colored condensation products of isatin chloride with phenol, secondary amines, and aromatic tertiary amines have been prepared at Leiden. Parinarium oil has been described. Davitamon K is an extract from alfalfa. All yeasts investigated at Amsterdam contained free aneurin, originally present and not formed during processing.

Belgium

An Antwerp company has been studying the more extensive use of gas for ve-



A sulfite cellulose plant in Strassburg

hicle propulsion. The linen industry is working at 70 per cent of normal output; it is the only branch of textiles for which raw material is available. An Ostend factory is making flour from grass, clover, and alfalfa; beet leaves and roots will be tried.

France

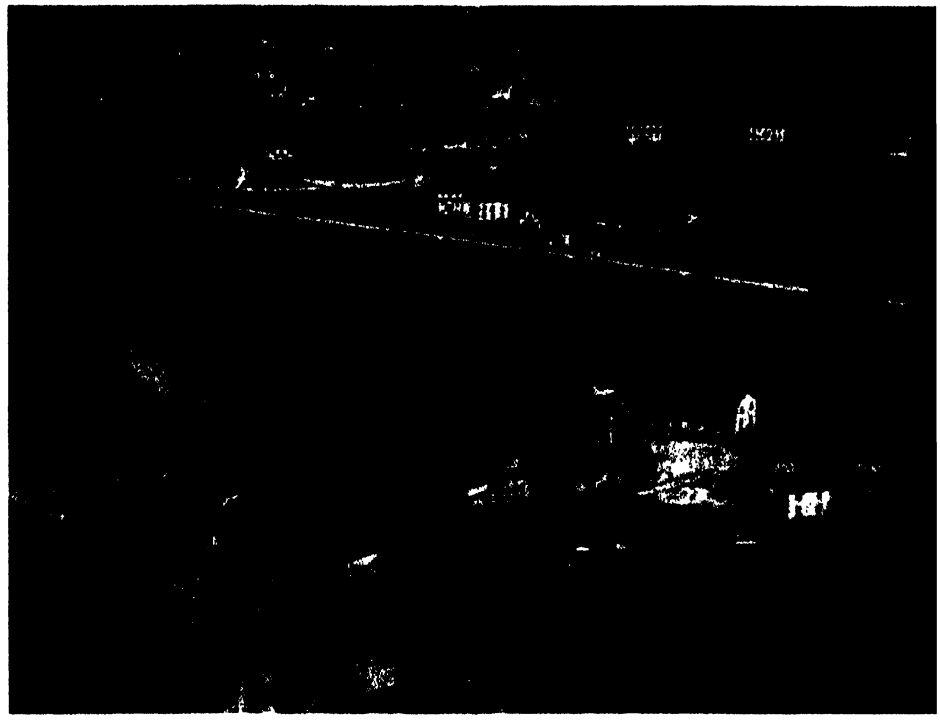
Peat is dried from 90 per cent moisture content to 15 to 18 per cent, briquetted, and then used as fuel for gas generators for automobiles. It has been urged that automotive producer gas be made from coal concentrated by flotation so as to ensure the highest quality motor fuel of this type A strong concrete is produced by incorporating sand and gravel in a special asphalt emulsion. Early in the year papers appeared on the basic Martin process and on the properties and uses of rare-earth metals and their compounds. Electrolytically prepared permanganate was reported to be cheaper than that made by straight chemical processes.

Researches were published on the synthesis of diacetone alcohol, on the ethers and esters of glycol and glycolic aldehyde, on the condensation of phenylacetic and phenylformylacetic esters, and on the nitration of cellulose. France is making plans for cellulose manufacture from straw and has a mill for producing fiber from Spanish broom. A process to modify viscose by reaction with formaldehyde in an acid medium compares with the tanning of proteins; it results in greater tensile strength of viscose where wet, reduced swelling, and resistance to wrinkling. The incorporation of dyes or pigments into the spinning solution has been studied: thus the color is dispersed throughout the formed thread and is fast to washing. Little progress has been made in the production of synthetic alcohol or of alcohol from hydrolyzed wood. Before being dried, a paper related, yeast must be washed with sodium carbonate to remove the bitter taste; drying can be done in vacuum or at normal pressure; finely dispersing the yeast by spraying or blowing in hot air gives good results; the water content should not exceed 8 per cent.

In Algeria olive oil is doing duty as a lubricant for machinery. North African milkweed is being studied as a source of a rubber substitute. Natural phosphates mined in French West Africa are being ground and applied to the soil, without acidulation, in an experimental way.

Spain

The production of manganese ore is in need of revivification. Efforts are being made to start aluminum and magnesium manufactures; provisions have been defined for the organization of an aeronautical industry. A national institute for housing has been authorized.



U S DEPARTMENT OF COMMEI

Yarzo plant of Società Fratelli Galtarossa of Milan where ferroalloys are produced by electric furnac

The Spanish National Rice Syndicate reported that cyanamide could be used for rice cultivation instead of ammonium sulfate. Methods have been developed to manufacture a fabric consisting of 20 per cent hemp and 80 per cent esparto for use in packing and shoes, to replace jute cloth. Work was started on a plant for producing cellulosic fibers from eucalyptus trees. Cork strippings are not expected to equal the 1940 total of 31,000 tons; the trees have been in better condition but labor problems have handicapped production. It is believed Spanish sources of essential oils and crude drugs will increase in importance. Some soaps are made from oil from cull filberts. Glycerol is to be obtained from green sulfur oil.

Italy

Molybdenum cast iron is used where the higher wear resistance after heat-treatment at 450° justifies the greater expense. In the stainless and heat-resistant steels, chromium-nickel steel is replaced by chromium and chromium-manganese steel, if necessary with the addition of a slight amount of nickel, or by chromium-molybdenum, chromium-silicon, or chromium-silicon-aluminum steel. A saving of tungsten in tool steels is effected by alloying with vanadium, molybdenum, or both these metals. By the melting-down of nickel coins withdrawn from circulation 4,500 tons of nickel have been recovered. A plant for obtaining vanadium oxide from bauxite is in operation; Italy produces about half its normal vanadium requirements.

Metals

A method of coating small objects by copper carbonyl was described. Research has been active in the production of pure zinc and zinc alloys. By alloying zinc with copper, aluminum, and magnesium in a total amount not exceeding 3 per cent, the metal Zama is produced. Small amounts of impurities increase the rate of corrosion of zinc alloys notably; copper improves tensile strength, elongation, and weldability; magnesium in zinc-aluminum and zinc-aluminum-copper alloys tends to counteract the injurious effect of any lead addition by retarding intercrystalline corrosion. Although Italy possesses considerable bauxite the country has conducted extensive experiments on the employment of leucite as an aluminum raw material: by such use it is hoped not only to supply a part of the aluminum requirement but also to obtain considerable quantities of potash salts. The utilization of alunite also has been considered. Magnesium production has been estimated to be around 1,800 tons a year, although it was announced the output would be 3,000 tons by the end of 1941. A government-sponsored concern in the Italian Alps is building a plant for the manufacture of metallic magnesium from local dolomite.

Fuels

The annual production of electric energy is some 17,000,000,000 kilowatts. The yield of gas in the fermentation of town refuse is about 90 liters per kilogram; the gas contains about 60 per cent of methane. A factory compressing 1,500 cubic meters

of methane a day began operation at Rovigo. Vetrocoke, Milan, installed a plant for recovering phenol from ammonia waters of its cokery and for compressing methane, and Vetrocoke, Venice, enlarged its works for distilling coal tar and producing methyl alcohol. Crushed coke with tar binder is formed into brick and used for the construction of pickling vats. Experiments have been carried out with coal gas as a fuel for airplanes. A pilot plant is extracting fuel oil from the asphalt-bearing rocks in Abruzzi; several new works have been erected for producing shale oil. A method of making isooctane in successful use consists in alkylation of butylene with isobutane in the presence of 98 per cent sulfuric acid.

Chemicals and Plastics

Porcelain containing sodium feldspar is less transparent than that containing potassium feldspar; thermal expansion is higher in sodium feldspar enamels. In 1933 Italy made only 70,000 tons of sulfuric acid, but with plants under construction or enlargement production in 1942 will be more than six times that quantity. A new factory for the annual output of 600,000 quintals of calcium carbide and cyanamide was opened. In the electrolytic production of sodium chlorate increased yields are obtained by acidification and by operating the cells under slight pressure. Italy produces 6,000 tons of borax and boric acid a year, consuming 3,000 tons at home. The oxalic acid plant of the A. C. N. A. was started. The Linate manufactory has maintained production of tartaric acid and hydrosulfite. The output of acetaldehyde, acetone, and acetic anhydride has been favorable. The manufacture of phthalic anhydride was increased further and the production of other coal-tar derivatives was considerable. Anthraquinone is being made satisfactorily by the catalytic oxidation of anthracene. A plant at Novara began the manufacture of polyamid resins. Fluosite, Reflite, Tessilite, and Fenoplast are phenolics; Gabrite is an aminoplastic; Xilocolla is an adhesive resin; Sibitle is an amino resin with a cellulose filler; Scarabeo, an amino resin with wood flour filler; Canevasit is used in gears, Isotex in bearings, Flexil in cable sheathing. The production of chlorovinyl resin (Vipla) has proceeded.

Plant Products

The cultivation of the castor plant is being encouraged; reports indicate that castor oil is to be used in the production of airplane lubricants. A new method for the chemical utilization of wood differs from that of Scholler in that the material to be decomposed is subjected only to preliminary treatment with acid, the actual decomposition being accomplished by means of superheated steam. By treating cellulose with solutions of sodium and potassium sulfides, the Na and K ions are adsorbed from the solution and an alkalicellulose is formed. The extraction of cellulose from the stems of sunflower has not given good results. Jutital is a jute substitute made from the Typha plant; Ginster is another jute replacer, to which authorities seem to attach more importance. Typha was tried without success in Germany during World War I, but a better method of decorticating the fiber has been evolved in Italy. The fiber of the lupines, either alone or mixed with jute, offers, it is thought, a suitable material for coarse fabrics, cord, and rope. Research progress has been effected in light-resisting dyestuffs and basic colors. The production of a new series of leather dyes was begun and advances were reported in the employment of soluble dyestuffs for acetate rayon. Nuova-Era is a tanning extract, a substitute for quebracho.

Italy is producing glycerol from treacle in the sugar factories of the Padua district. There will soon be a production of 10,000 tons of oil annually from grapeseeds. An experimental station is conducting research toward utilizing native essential oil plants. A process of treating wheat by electricity consists of the use of high-tension current generating an intermittent field to stimulate the reproductive qualities of the seeds. Organic compounds of mercury in many cases are more effective than copper salts in disinfecting and stimulating seeds. Cultures of several species of *Penicillium* and *Mucor* give yields of 15.45 to 25.4 per cent of fats (calculated on the dry weight of the mycelia). For the destruction of flies a mixture of molasses and sodium arsenate, called "miafonine", is used. Aluminum arsenate has been found practically as good as lead arsenate in control of codling moth on apples.

Switzerland

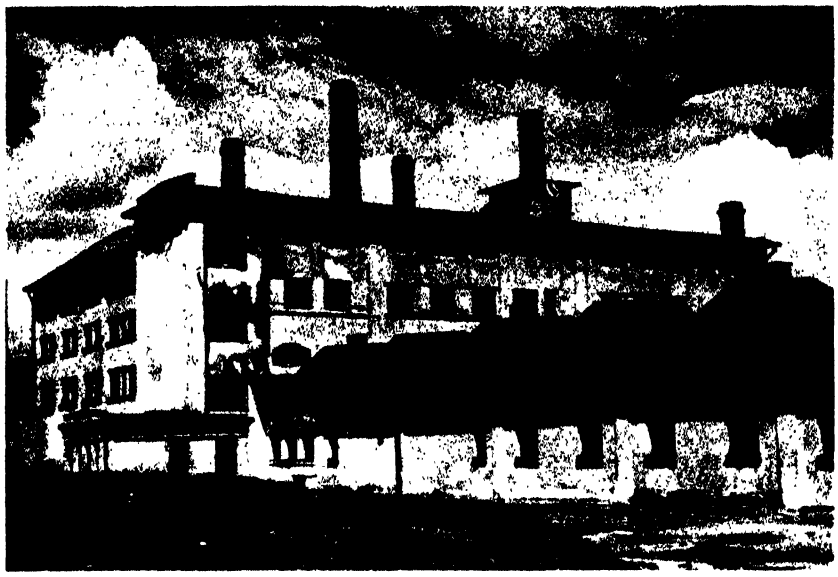
The leading task of the War Industries and Labor Office is to safeguard the raw materials supply and industrial production. The number of persons employed in the chemical industry has nearly trebled during the past 50 years. The Society of Chemical Industry in Basel has attributed its success under present conditions to a policy of decentralization.

Ninety-nine per cent of the buildings and homes are wired for electricity. It has been proposed to utilize the excess water power available in summer to generate and store heat for winter. The use of lignite has received inventive development. Plants have been authorized for liquid-fuel production from wood. The limited supplies of calcium carbide and methanol have rendered it necessary to restrict the number of motor vehicles operating with substitute fuels. Inability to obtain parts from the United States has tended to encourage local production of automotive equipment. The Secheron Works at Geneva has been active in improving electric welding apparatus. Steam-cleaning and lacquering make it possible to re-use undamaged old tin cans. A new machine for grinding high-grade precision lenses on a mass production basis has been developed at Aarau. Radiamant is a hard-metal substitute for bort. Studies have been reported on the recovery of nitrogen oxides with silica gel and on the chemical action of electric discharges.

Various restrictive measures pointed to a decline in output in the textile industry, notwithstanding a sustained demand for fabrics, but the first of three new staple-fiber plants commenced operation. The wetting agent Arosin has been investigated. Twenty factories produce about 30,000 tons of paperboard annually, mainly from old paper. An apparatus is available for cleaning and regenerating old and damaged motion-picture films. Plans have been approved for the construction of the first wood saccharification plant. Work on corn starch led to the study of amylose and amylopectin. Postonal, a polymer of ethylene oxide, is in use as a substitute for cacao butter. The production was begun of leathers which hitherto had not been available in sufficient quantity or suitable quality. Researches were continued on sesqui-, di-, and triterpenes. At Geneva the molecular weight and constitution of caoutchouc were studied. Investigations were published on amidon, steroids, vitamin F, and the enzymatic oxidation of carotin. Switzerland depends on imports for about one fourth of its food, particularly wheat, sugar, and feed grains. Swiss waters yield an average of 4,000,000 pounds of fish annually.

Hungary

Fuller's earth is improved by drying, boiling with water under pressure, and treating with mineral acids. Bentonite-like clays are used for laundering and in the place of cutting oils in the metal-working industry. Cacao butter has been replaced by a mixture of waxes and hydrogenated vegetable oils, mainly sunflower oil, which also serves as a substitute for sesame oil in many applications. Carthamus oil is available for producing soaps, varnishes, and margarine. Sheep tallow is preserved by treating with small amounts of sodium carbonate, hydrazine sulfate, and thymol. Condensation products of aromatic amines and aliphatic aldehydes are used in making resin preparations. A method tries to supersede wood tanniferous material in the leather industry by combining chromium compounds and extracts of sulfite waste liquors. Scrap leather is being utilized in the manufacture of leatherboard. Keratin can be transformed into various colored azo dyes. Nikotex is nicotine-extracted



Bohemian porcelain works, near Carlsbad

tobacco, out of which 7,000,000 cigars and 100,000,000 cigarets are made annually. The area planted in poppies has been enlarged considerably; it is claimed Hungarian poppies contain a third more morphine than those raised in Yugoslavia Turkey, or Macedonia. An ointment consisting of 3 parts glycerol, 2 gelatin, and 3 water is suitable for protecting the feet of animals in traversing land contaminated with mustard gas. A meat substitute concocted of 12 vegetables enables a dinner for four to be served at a cost of less than 20 cents.

Germany

The Association of German Engineers has been active in saving strategic materials, particularly fuels. Prizes are being offered for new machinery to speed up coal output in the direction of an ultimate goal of 10 tons a man per shift. By combining screening and electrostatic methods larger coal sizes can be cleaned without the use of wet processes. Research was carried out on coal-dust engines. To prevent glare from coke ovens during discharging at night the red-hot coke is covered by a screening hood. Large area smoke-screen installations have come into use over industrial cities. Coke dust is successfully added to gas and coking coals before carbonization. Benzene-scrubbing plants are using tar oil. The importance of low-temperature carbonization is attested by the fact that its annual production of tar exceeds 1,000,000 tons, of which 98 per cent is from treatment of lignite. A plant combines low-temperature carbonization with power generation: coke and excess gas are burned in the power plant; tar products are cracked to produce motor fuel. Peat treated with lime is used in place of slag in trickling filters (Ca-To process); Collactivit is usually made from sawdust, but a better product can be obtained from peat. Petroleum prospecting is going on in Hungary, Greece, and Bulgaria. Tixoton is bentonite prepared for employment in petroleum production. Germany has available about 50,000,000 barrels of crude petroleum a year from her own and controlled territory, with 80 per cent of this quantity coming from Rumania; in addition, there are 70 plants manufacturing oil from coal, making 36,500,000 barrels annually. Since 1938 the Reich has succeeded in trebling synthetic oil output; this product costs two to three times as much as natural petroleum. German planes have to fly mostly on 87 to 92 octane gas. An improved motor fuel has been obtained by heating benzene in an autoclave to 225° under a pressure of 20 to 25 atmospheres for several hours. More than 1,000,000 cubic meters of wood were distributed for motor fuel during the year. Acetyl benzoyl peroxide displayed a higher activity in Diesels than diacetone diperoxide where added to commercial gas oil. Mineral oil sulfonic acids and sulfonates are used in the production of emulsions, mainly for the textile industry; the free acids are applied in the splitting of fats. The catalytic reduction of naphthenic acids was studied.

Ceramic Products

Ceramography has the same relationship to ceramics as metallography has to metallurgy. Work in black-marble quarries was found to entail no danger from silicosis and the examination of 251 slate workers revealed no signs of this disease. Slurries of kaolin, cement clinker, and lignite can be filtered much faster with the aid of konjak flour. Reinforced concrete tanks with plastic linings are replacing lead and coated wooden tanks. Asbestos-cement pipes are used in large and small sizes. A central bureau for controlling size and quality of brick products has been established in Berlin; its field especially covers light brick made of pumice and blast-furnace slag. A new carbon brick and mortar will withstand hydrofluoric acid and alkaline solutions. Silicon carbide brick is used in boiler plants. An exhaustive survey was made of possible compositions for chromite brick on the basis of constitution diagrams. Protective atmospheres in tunnel kilns may be attained by a suitable oil. Mixtures of iron powders with water and organic binders have been employed in laying magnesite or chrome-magnesite brick. Barium carbonate is a good enamel flux, does not greatly affect thermal expansion. The difficulties in making satisfactory white enamel without borax can be overcome to a great extent if prefused materials which act as fluxes are used, such as powdered glass and glass frits, as "milk glass meal". As an acid oxide titania is especially suitable as a substitute for borax. Zirconium



A metal works at Hamborn

silicate instead of tin oxide as an opacifier gives an enamel more resistant to impact. The homogeneity of a glass melt before refining is increased by briquetting the mix. Experiments on the effect of replacing soda by lithium carbonate in the smelting of soda-lime silicate glasses and the addition of lepidolite showed that the use of lithia as a constituent of the batch has advantages. A good decolorizer for glass contains magnesium chloride, barium peroxide, and fluorspar. Only Ultrasine and gray-green glasses gave effective ultraviolet protection. In sulfur and selenium glasses zinc oxide is able to combine sulfur and selenium to a pronounced extent. The cementing of glass plates to a transparent plastic interlayer is improved by application of a high-frequency electric current. A research institute was formed to work out improvements in safety glass and glass fiber manufacturing processes.

Iron and Steel

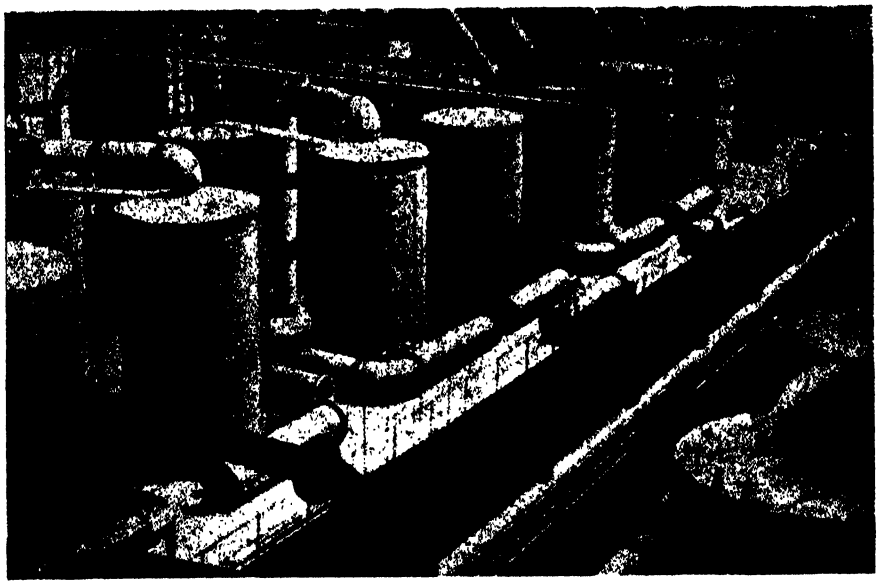
To produce arsenic-free iron, arsenic is best removed from the ore before reduction. Nitriding improves wear, especially in alloy cast irons. The addition of 5 per cent aluminum to cast iron increases its resistance to oxidizing gases at 800° to 875°, but to obtain the most satisfactory mechanical properties at temperatures up to 900° an aluminum content of 8 to 18 per cent is desirable. The properties of cerium-treated cast iron were studied. Mischmetal is used in tracer shells and bullets; the alloy is also utilized in photoelectric cells and detonators. Because of the superior heats of formation of the rare-earth oxides, Mischmetal has been proposed as a substitute for aluminum in thermite incendiary bombs. Future possibilities were considered in intensifying and hastening steel-making reactions through the use of the low-frequency stirring principle in conjunction with the arc furnace. Desulfurization of steel in basic-hearth furnaces must rest upon desulfurization of the fuel and an accurate proportioning of the fluxes. Many steel alloys have been developed especially for castings; castings of electric-furnace steel have been particularly successful. Hardening by brief immersion in a salt melt is applicable to any steel now treated by the torch method. A new hydrochloric acid–resistant steel contains 11 to 18 per cent antimony, 0.1 to 0.3 per cent beryllium, up to 5 per cent molybdenum, and 5 per cent tungsten. Manganese steels can be substituted for chromium-molybdenum airplane structural steels; whether they can replace chromium-nickel-molybdenum steels is not certain. In electric machines higher manganese steels have replaced manganese-nickel steels. Nickel carbonyl has been used in acid, open-hearth, basic electric, and induction melting operations for the production of steels, cast irons, and nonferrous alloys. Inkromizing is effected by the chrom-diffusion of steel with chromic chloride. Research has been done on the conditions to be met by carburizing agents for chromium steels. The use of nitrogen in chromium-manganese steel stabilizes the austenite and gives better processing properties; it also can be employed in place of nickel in chrome-nickel steels. Chromium-nickel austenite steel which contains tantalum and columbium carbides is superior to copper, iron, or aluminum for vessels for cracking fats and oils, for oxidation of paraffins, and for distillation processes. A search for inhibitors to lower acid consumption and avoid metal losses in pickling baths has brought out dibenzyl sulfoxide.

Other Metals

If plans are carried out, aluminum eventually will largely replace tin in the production of containers. About 93 per cent of the 250,000,000 tubes produced were of aluminum. Zinc foil has displaced tin foil for packaging cigarets. In an ingot-casting method for aluminum a special type of chill (cooled by circulating water) is lowered into the molten metal, which solidifies against it, and is then lifted out. Hydrokollag is a graphite dressing for facing chill molds for aluminum alloys. The Seo photographic process is applied on anodized aluminum. Aluminum can be protected by 0.05 to 0.1 per cent sodium fluosilicate against attack by dilute soda solutions. The eutectic aluminum-silicon alloy Silumin is unattacked by boiling linseed oil or fat acids. The corrosion resistance of aluminum-magnesium-silicon alloys is contingent upon purity; they must be free of copper and nickel. Anticorodal is aluminum-magnesium-silicon; Avional is aluminum-copper-magnesium. Alva 36 is a manganese-(copper, iron, silicon) aluminum alloy with additions of lead and antimony or calcium. In many cases brass wood screws can be replaced with such alloys as $ZnAl_4$, $ZnAl_4Cu_3Li$, $ZnCu_4$, $ZnAl_{15}$, $ZnAl_{10}Cu$. $ZnAl_4Cu_3$ is suitable for parts demanding high tensile strength and great hardness but where precise dimensions are not necessary; $ZnAl_4Cu$ is appropriate in apparatus requiring moderate strength and dimensional accuracy; and $ZnAl_4$ is adaptable where dimensional exactness is essential. Uses of magnesium include telephone switch parts, optical instruments, microscopes, and bus bars. Automobiles, streetcars, and tanks offer some of the most important outlets for magnesium alloys. Increasing employment of magnesium alloys in machine parts, railway and automotive vehicles, and aircraft has made strength a vital problem. The Elomag process (anodic oxidation in alkaline solutions) combined with subsequent lacquer impregnation provides good protection to magnesium. Neomagnal A is mainly magnesium, zinc, and aluminum; additions of manganese and silicon and sometimes lead are made. The three-component system aluminum-magnesium-manganese used as forging and casting alloys contains up to 2 per cent manganese and 15 per cent magnesium. Cuprema is copper tubing armored with resin-impregnated paper. Fused copper alloys can be freed from oxygen by treatment with briquets of 10 to 20 per cent red phosphorus and 90 to 80 per cent zinc. Aluminum has been largely supplanted by zinc in slide fasteners which are being used on military uniforms. To recover indium, zinc blende is roasted so that the indium is not volatilized in the oxidizing atmosphere. Aluminum wool, Sinterit, and Mundit are satisfactory for packing bell-and-spigot joints as substitutes for lead wool. A soft solder containing 6 to 8 per cent cadmium and small quantities of zinc, copper, tin, and phosphorus or arsenic compares favorably with the usual tin solder. Palid bearing alloys (11 per cent Sb maximum, 7 As, rest Pb) and Quarzal (15 per cent Cu maximum, 10 Si maximum, + Mn, Fe, Ni, Cr, Mo, rest Al) show promising bearing properties. Alloys containing approximately silver 80, manganese 10, and tin 10 per cent make electric resistors. Copper-tungsten contacts and aluminum-nickel magnets are offspring of powder metallurgy. New types of sifters are available for obtaining various grain sizes of powders.

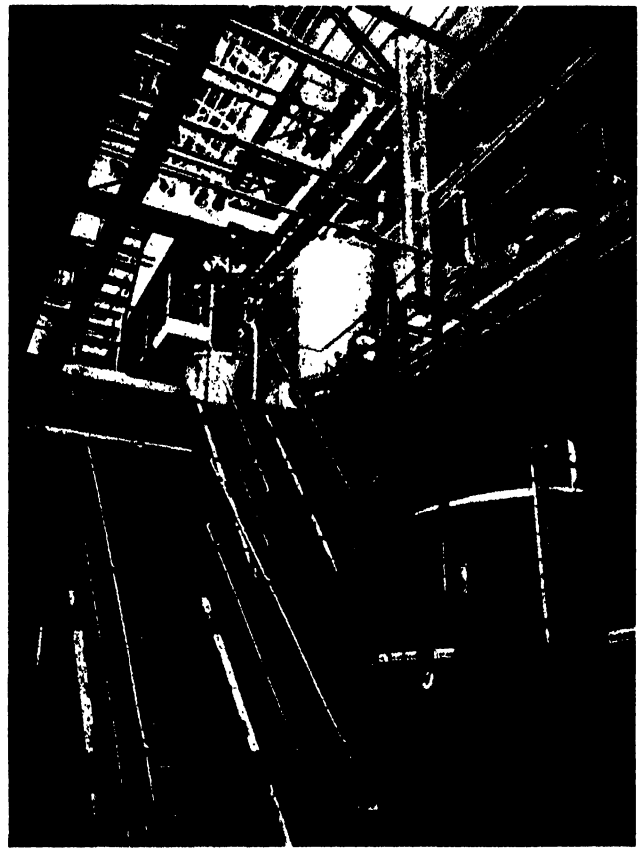
Chemicals

It is known that large quantities of war gases are ready. New techniques would enable gas attacks on a wider scale than any seen in World War I; for instance, fleets of airplanes equipped with chemical tanks could spray large areas with vesicant liquids. That gas attack is regarded as possible at any time is evidenced by the fact that all the belligerent nations have equipped their armies with masks. Supersorbon is a carbon activated by the zinc chloride process. Several brands of dry cells contain activated carbon. The underground storage facilities in salt mines are being utilized in defense. Sodium is an excellent conductor of electricity and wires consisting of sodium cores provided with copper mantles have been finding increasing applications. Strontium carbonate is used to produce special alloy steels and in the manufacture of glass, ceramic glazes, and enamel. Strontium chloride powder is employed in refrigerators working on the solid absorption principle. Magno iron sol, iron hydroxide containing calcium and magnesium chlorides, in 10 per cent suspension, is being utilized for facilitating water softening in boiler operation and to remove oil emulsions from boiler water. A process for clarifying sewage by treatment with iron filings and carbon dioxide was tested. Reclaiming silver from used photographic fixing baths is said to be easier with a new I. G. product, Agfargan. Triolith U and Basilit U are Wolman salts treated with chromium compounds to decrease their solubility;



Evaporators for fertilizer salt at Ludwigshafen

Tanalith U and Basilit UA contain arsenic in addition. Tritox, trichloroacetic nitrile, is a fumigant. Glyzerogen is an I. G. glycerol substitute. Compounds based on triethanolamine are used to combat rancidity as induced by bacterial action. Zephyrol 345, for sterilization of surgical instruments, is an alkyldimethylbenzylammonium chloride. Sagrotan, an antiseptic, is a combination of saponified vegetable oils and *p*-chloro-*m*-cresol with *sym*-chloroxylenol. Neo-moscan, for dairy apparatus, is a mixture of soda, sodium silicate, and sodium hypochlorite. Microformin, used particularly in the fermentation industry, is a neutral, stabilized formaldehyde. The antiseptic properties of essential oils are increased by exposure to radiations of the wave lengths 3050 to 3075 Å. from a dihydroxyanthracene lamp. Soaps from crude tall oil may be used only for industrial purposes; more than 25 per cent tall oil usually leads to soft soaps. A sidelight to soap rationing is the trend toward electric razors. Dibromol, a bromo-isocyclic sulfonic acid derivative, is a dermal disinfectant. A substitute for tincture of iodine, Iodana, consists of complex bromine-iron rhodanides and methylated halogen phenols in a 10 per cent alcohol solution. New sulfonamides, such as Orsulan, were synthesized.



Indanthrene plant at Ludwigshafen

Foods

An Institute for Agricultural Labor Science investigates mechanization in farming. Another new establishment is concerned with vitamin testing and research. Manufacturers of margarine must incorporate vitamin A concentrate in their product. The consumption of vitamin C has increased since the outbreak of war; school children have been systematically supplied with tablets and the diet of the armed forces includes ascorbic acid in prepared foodstuffs. The use of fresh potato juice is recommended for feeding infants and children. Cabbage, spinach, carrot, or onion juice is added to dough to make noodles. Besides dried fruits and vegetables, such as dried sliced potatoes, army diet items embrace sauerkraut, dried and compressed to brick form, and powdered tomato soup, apple sauce, and marmalade, to which water is added prior to use. Vollsoja, a soybean flour, is employed to supplement other foods. Progress has been made in the quick-freezing process for preserving foodstuffs: 14 large refrigeration establishments are engaged in such work; in addition, there are 74 quick-freezing units in 27 canning factories and 67 in the course of construction. Hydrogen peroxide increases the germinative energy of barley. The processing of grape seeds has been extensively developed as a source of oil, and an annual production of over 1,500 tons is expected by simple pressing and by extraction by naphtha or trichloroethylene; the extracted oil is suitable for certain edible purposes. Table rapeseed oil was marketed on a large scale. Research is reported to have been successful in improving tobacco types. Approximately 3,000 tons of natural nicotine-free tobaccos were harvested for mixing with other tobaccos. Essences similar to hyacinth oil are obtained from tobacco blossoms; 100 kg. of seed yield 33 liters of oil, employed for food purposes. Peppery taste in foods can be obtained with derivatives of *o*-phenylvaleric acid. Artificial cinnamon consists of 96 per cent cinnamic aldehyde and 4 per cent eugenic acid, incorporated in a carrier made from pulverized shells of hazelnuts or almonds, colored yellow; about 0.2 per cent of natural cinnamon oil is added. Hog-raising establishments have been encouraged all over Germany. Some 1,500,000 kg. of kitchen wastes are being collected every day and about 300,000 hogs are being raised yearly at 1,308 establishments. Filtered lard is not so stable during storage as lard which has not been so treated. Barley and malt meals act as antioxidants to olive oil and lard. Pemmikan is a concentrated food for emergency rations, containing smoked meat, soybean flour, dried fruits, tomato pulp, whey, yeast, and lecithin. The nutritive value of seaweed meal is low. If bran is fermented with yeast it can be used in rations in place of fish meal. Bergin Holzhydrolyse, with government subsidy, has been experimenting to develop a suitable cattle fodder by wood sugarization. An announcement that eight cellulose fodder factories are to be erected indicates that this substitute will be used on a large scale. Mineral acids serve to preserve green fodder if a neutral protective agent is interlayered.

Paper and Leather

An institute was founded to furnish information on various woods. Wooden "hardware" for doors, windows, and furniture appeared on the market. Engineers are at work to achieve satisfactory substitutes for cork. Among the substances tested for this purpose are pressed peat boards, plates of slag and glass wool, pine bark, hemp scraps, and porous concrete. About 30,000 tons of paper are required annually for food-rationing cards. The consumption of wood for cellulose manufacture has more than doubled during the past four years, but the cellulose output has not been sufficient to fill the demand of the rayon and paper industries; therefore recourse has been had to increased utilization of straw and waste paper as raw materials. Collections of waste paper from households are carried on by school boys. Mill runs show that de-inked, regenerated paper can replace 50 per cent of the usual fresh stock. As little as 1.5 grams of sand in 10,000 kg. of paper can have a deleterious effect. The change from spruce to beech and pine for pulpwood has made further progress; beech is more readily ground than spruce, and power and steam consumption are low; foaming during the grinding process has been overcome by the addition of oleic acid. Peat serves satisfactorily as an auxiliary material (up to 20 per cent) in board manufacture. The preparation of cellulose from cornstalks is much easier than from wood sources. Potato tops are being pressed into briquets for use by paper factories; admixed with straw, potato tops are suitable for the manufacture of coated paper; periodicals are being printed on this Solanum paper.

Sulfate pulps from woods cooked with potassium hydroxide and potassium sulfide were superior in physical properties to the usual kraft pulps. The sulfite industry, with few exceptions, utilizes about 50 per cent of its raw material and discharges the remainder in dissolved form into sewers. The difficulty encountered in the digestion of pinewood by the sulfite process is not the result of colloid-chemical conditions but is attributable to the presence of phenols. In the main sulfite pulps are far more sensitive to heat than soda pulps. Sulfite pulp bleached with hypochlorite has superior sizing behavior. The purification of pulp at low temperatures was described. The fat acid portion of tall oil contained only oleic, linoleic, and linolenic acids. A combined sheet iron and cardboard pail is being used for jams. Cardboard is being employed wherever possible to replace wood in boxes. Neutralit is an insulating substance for containers. Transparit is a beech cellulose sausage casing. Ultrasan is used for increasing the whiteness of wrapping papers. Cigaret paper can be made with as much as 50 per cent wood pulp, but only with cheap and strictly neutral fillers. Recent improvements in the Duxochrome process for making color prints on paper with films dyed in manufacture are said to include a purer color in the yellow film and the addition of a gray print. The Colorprint process involves the preparation of wash-off relief matrices with special dyes and a tanning developer. Germany is using tanned rabbit skins for belts and handbags. Tschamba-fii new, with the composition $C_{18}H_{30}O_{11}N_2S_3Cl_3$, is a tanning agent. Palatine fast dyes with chromium bound complexly to the organic dye molecule tan hide substance in proportion to their chromium content. Three general types of substitutes for leather are: Fagelan, a woven fabric impregnated with a lacquer; Fabinette, consisting of at least 50 per cent fibrous filler embedded in suitable waterproof bonding material, such as Buna; and Nifarin, the filler of which is nonfibrous in nature. Elefant is another leather substitute and Neocor is a fiber-latex product for employment in place of leather. Panplast, essentially a felt, impregnated with a nitrocellulose composition so as to be permeable by air and moisture, is a succedent to leather and cork in orthopedic appliances.

Textiles

Research was conducted on the use of flax and hemp wastes for making staple rayon, manufacture of cellulose from lignite, use of chestnut wood, willow bark, hops and beanstalks as cellulose raw material, preparation of keratin from wool dust, human hair and natural silk waste, making of textile fibers from tendons and horse meat, and production of fish-skin leather. In the manufacture of Cellulon yarns, the moist cellulose is divided into ribbons on the paper machine and then spun. Xylolin is the name for yarns from cut spinning paper; Textilose and Textilit are mixtures made from paper and fibers. "Cell jute" is used to manufacture sacks for flour and sugar and for coverings for cell wool; it has also found applications in the linoleum, carpet, and cable industries. It is estimated that 200,000 to 300,000 tons of waste paper are used yearly to be spun into these containers. The dry strength of paper yarns can be increased 20 per cent with spinning softeners and 30 to 50 per cent with impregnating agents. Hop vines have been found to be a good source of fiber for textile and other uses. The strength, uniformity, and yields of green flax products are somewhat higher than those of materials from retted flax; the working costs are approximately the same. The Kaiser Wilhelm Institute for Bast-Fiber Research was set up. By a newly developed process rags are machined to a long-fibered product which can be spun to fine yarns. Successful experiments were recorded for dry-spinning viscose from aqueous solutions; a special aftertreatment is required to render the fiber water-insoluble and to impart orientation to the cellulose chains. Proteins lower the sorption and raise the crease-proofness of rayon; substantive dyes added to viscose spinning solution act similarly; like results are obtained if finely divided metallic hydroxides are introduced during spinning. Artilana is a rayon containing urea resin. Trocolen is a vinyl polymerizate for the textile industry. Casein fibers, e. g., Thiolan, cannot be fulled like wool, swelling rapidly and becoming sticky. Work has been done on improving protein fibers by the use of gelatin, wool and silk wastes, and algin. Fibers resembling hair or catgut and leatherlike films of fibrin have been prepared by addition of calcium chloride to diluted plasma, drying, treatment with formaldehyde and glycerol.

As substitutes for olein, mineral oil and compounds containing it are useful for general purposes but are deficient in the manufacture of army cloth and felt. Leonil WS can be used for washing wool in a neutral medium. Tylose HBR is a clear cellulose product whose addition prevents discoloration of fabrics by frequent washing. Servital OL is an oiling and fulling agent. Data were given on fulling agents made from soaps, fulling methods involving the use of Calgon, water-soluble spinning oils, as Servital OL, Thianol, and Lamepon SB, and textile assistants having fulling properties, as Me-dialan and Ceropon. Hydrophobing has no material effect in reducing ultimate shrinkage; it lessens resistance to abrasion and tear; it is used in conjunction with impregnation to obtain waterproof fabrics. Water-repelling impregnations embrace the Inflos process, involving the employment of high-molecular isocyanates in organic solvents, use of Persistol LA and LB in organic solvents, and incorporation of urea resins. Tylose 4S, a water-insoluble, alkali-soluble ether of cellulose, is a finishing agent for rayon. Appretan H is a synthetic hat-sizing material. Zinc oxide can be used in textile-finishing agents, acting not merely as a filler but also as a preservative. Amicrol has high germicidal power. Dullit RK combats fabric shine. Natural fibers take up pigment more uniformly along their surfaces than do synthetic fibers. New methods for dyeing vat colors were developed by I. G. to improve results on rayon and staple fiber.

Sulfonated seal-blubber, shark-liver, and herring oils, alone or mixed with sulfonated vegetable oils, can be utilized in dyeing and finishing rayon. The Pentazikon products are useful for the dyeing of staple rayon. Favorable results were obtained in dyeing cross spools by the employment of the leveling and dispersing agent Pentasikon TS, followed with Ribanat for the soaping treatment. Iridescent color effects can be produced by dyeing smooth fabrics in such a manner that the viscose-rayon warp and the acetate-rayon weft are given different colors. The preparation

of some fluorene azo dyestuffs was reported.

Elastomers

Guttasyn and similar products were endorsed for fabricating containers for explosives. Aside from use in automobile tire manufacture—the latest creation is a soft solid tire—Perbunan is being employed for ink rollers on printing presses, in replacing leather rollers in the textile industry, for hoses in oil refineries and gasoline stations, and as a covering for wiring and a lining for containers in the chemical industry. Perbunan is particularly useful for preventing accumulation of static electricity in belts, gasoline hose, and other products. The cost of producing synthetic rubber is about 40 cents per pound. Hard Buna is equal to hard rubber products in chemical and mechanical durability and superior in heat resistance. Filter plates and certain parts for rayon machinery are made of vulcanized Buna. For jacketing electric cables Buna shows better aging behavior than natural rubber and greater heat resistance. Brake linings composed of Buna loaded with aluminum wool were officially recommended. Suitable antioxidants of rubber are phenyl-β-naphthylamine, aldol-α-naphthylamine, p-aminophenol, and various diphenyldiamine compounds.

Other Plastics

Celluloid made from high-viscosity nitrocellulose has better strength properties than that made from nitrocellulose of low viscosity. Unlike metals, plastics such as are used in bearings do not provoke chemical changes in oils. Delignit is a resin-wood product employed in constructing wood-gas busses. Calypsol, a laminated plastic, is employed in bearings for reciprocating machine parts. Duastria, Faktosit, Haulanit, Jolosteen, and Pluvex are plastic packings. Duskon is a vinyl polymerizate for similar utilization; Luvican is a polymerized vinyl carbazole. Polyvinyl chloride is used for corrosion prevention in coils and jacket-linings of condensers, in stirrer arms, and in pipe linings. Vinidur is being welded by an air or gas current of 230° to 270°. Gears are made of laminated fabric impregnated with phenolic resin; gears being developed are fabricated from wood impregnated with phenolic resin and cured under pressure. Promising experiments have been carried out with Mipolam and Kuprema for cold-water conduit. Tee joints and special plumbing parts are available in a number of resins, as is resin-clad steel tubing. A domestic gas meter is made almost entirely of a phenol resin. For lacquers for the protection of metals plasticised phenol resins are considered satisfactory. Polystyrene (Trolitul), Luvican, Igelit MP and PCU (Astralon and Vinidur), Oppanol B, and Lupamid can be used for surface coatings for metals, storage-battery cases, surgical goods, and combs. Tromipaste is an Oppanol heavy textile impregnant. The characteristics of concentric Styroflex cables were investigated to determine their suitability for transmission of high-frequency energy. Trolitul and Amenit are utilized in high-frequency insulators; Trolitul is also employed in hydrofluoric acid containers. Type faces are being produced from resin obtained by interpolymerizing styrene with acrylic or methacrylic nitrile. There are five or six kinds of plastic tubes for holding pastes and liquids. Molded mudguards are utilized on motorcycles; molded phenolics are being used in the manufacture of carburetors. Iporka is a urea resin in the form of foamed sheets; glass fibers are added to increase its strength. Ethylbenzylanilin is a clarifier in producing transparent casein plastic. With emulsifying oils iridescent effects may be obtained in synthetic horn. Neohekolith, a thermoplastic mixed-ester polymeride, has been approved as a denture material. Artificial teeth made of methacrylate resin are under study. Research on the condensation of malonamide with formaldehyde yielded a hard resin. The tabletting of synthetic resins was investigated with special reference to fiber-filled molded products. Relief globes, slide rules, sewing machines, and shingles offer opportunities for plastics. The much discussed question of making invisible airplanes goes back to World War I when Cellon machines were flown by the Germans on the front. Uses of plastics in aviation are in laminated bullet-resisting windshields, transparent cockpit covers, and instrument panels.

Paints, Varnishes, and Lacquers

The outer surfaces of new buildings must be painted or plastered with dark colors. An industrial air-raid precaution making blacking-out of windows unnecessary is a luminescent paint for vital apparatus, activated by special lamps emitting hardly any visible rays, independent of the regular light current. The proportion of drying oil used in making paints can be reduced from 30 to around 10 per cent without impairing durability by utilizing pigments having less oil demand and by formulating with synthetic resins. Work has been active in seeking substitutes for linseed oil. Through careful selection, the oil content of an improved white lupine has been doubled in the past few years, but an entirely satisfactory process for refining the oil or for getting a good fiber along with increased oilseed yield has not yet been developed. The following seed oils were suggested for possible employment in varnishes and lacquers: blueberry, cranberry, burdock, wild lettuce, raspberry, blackberry, currant, haw, asparagus, tomato, pumpkin, henbane, buckthorn, and ash. Evidence indicates that the action of microorganisms on oil paints may bring about the liberation of free acids having a deleterious action on wood. Alkyd resins are being more and more used in the painting of iron. Copal ester in general increases the gloss and hardness of varnish films in which alkyd resins are present. Mechanical tests indicate that oil-lacquer films containing



A. ANDERSEN FROM BLACK STAR

The Hollesen firm in Copenhagen formerly produced radiators. Now the company is making wood-burning appliances.



A. ANDERSEN FROM BLACK STAR

Danish flax mixed with hemp and reclaimed rope and paper is used in the rope factory at Randers. Efforts are being made to raise hemp.

so-called oil-reactive phenolic resins are comparable with those containing stand oil and have high water resistance. Soybean oil, though less suitable than castor oil as a nitrocellulose plasticizer, can be regarded as a partial replacer. Lacquer films containing soybean oil tend to yellow more quickly and to be less resistant to alkaline solutions. Chlorinated-rubber lacquers are resistant to benzene, mineral oils, alkalies, acids, and aggressive gases; linseed oil is used as a binder. Chlorinated rubber and polyvinyl chloride derivatives are being employed as components of bituminous paints. Demurag is a copal substitute; Mureg is a similar product. Mawag is a resin solvent. An aluminum-silicon alloy occasionally substitutes for lead pigments. Zinc ferrite is the rust-proofing ingredient of a new paint. Iron is rust-inhibited by paint containing carbon and ammonia.

Denmark

Iron ore discovered on the Island of Fyn is said to be as good as the Swedish product. A firm in Copenhagen is to manufacture a small electrically-driven commercial vehicle of local design. A new cargo vessel is driven by means of producer gas. A committee set up in Thisted has been investigating possibilities for constructing the first nitrogen fixation plant in Denmark. The formation of metal ammines was investigated fundamentally. A factory for the manufacture of insulating boards from peat was built in Jutland. Danish Sulfuric Acid & Superphosphate developed a new tar emulsion for road work. Substitutes for imported oilseeds are being sought; linseed output has been increased. The principal paint manufacturer is offering four clear oil-in-water emulsions and six pigmented emulsions for cement and wood work. Aluminum hydroxide is made for use in stable emulsions as a carrier for vaccines. The pharmaceutical industry is specializing in biological preparations. Raw materials have been available in abundance, owing to increased animal slaughterings. Experiments have been made on the extraction of pepsin and ventriculin. New medicinals of the year include sulfathiazole, three hormones, and dioxydiphenylhexadiene. The cultivation of peppermint, wormwood, thornapple, mullen, and henbane is being carried on.

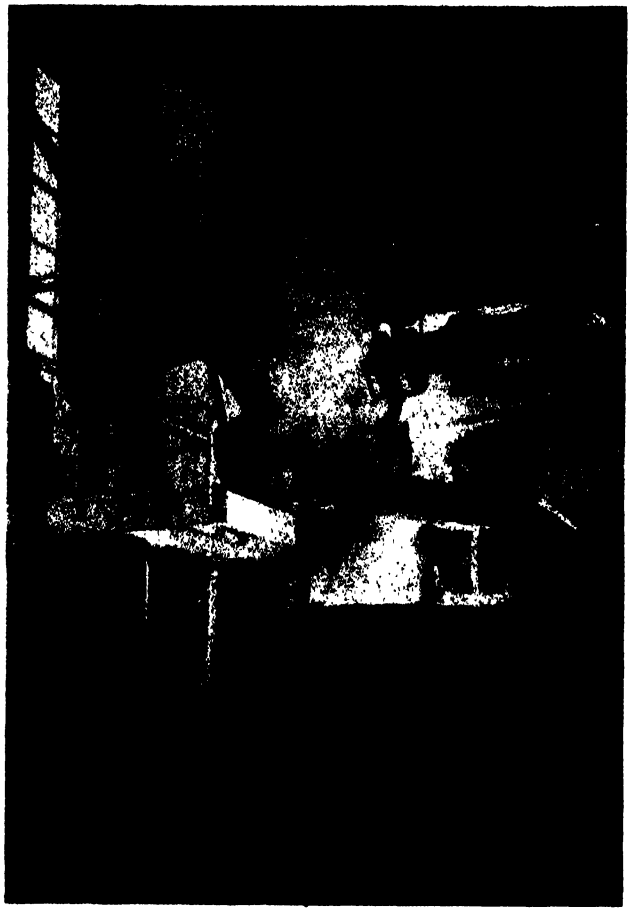
Norway

Labradorite has been found utilizable for producing aluminum. Several thousand motor vehicles are equipped with gas generators. Pulp production has grown through increasing efficiency and capacity of plants rather than by building new ones. Good sizing of paper cannot be obtained if rosin is completely omitted and so far a satisfactory substitute for alum has not been secured. A staple fiber plant with a daily capacity of 20 to 25 tons has been authorized. Norway is said to be in a position to produce annually around 100,000 tons of cellulose fodder. Ordinary sulfite and sulfate wood pulp is subjected to a special cooking process designed to increase its digestibility; the product is then mixed with herring meal and other waste from the fish industry and with root vegetables. Pulps for foodstuff require different cooking conditions than for rayon or paper pulp, but it may be possible by a classifier to segregate sulfite pulp into fractions of which one is satisfactory for paper pulp and another suitable for feedstuff. Freed from lignin, wood cellulose is utilized by



A. ANDERSEN FROM BLACK STAR

A new Danish industry—the cultivation of lavender



SWEDISH-INTERNATIONAL PRESS BUREAU

Tapping a 14-ton arc furnace at the Sandvik, Sweden, steel works

horses and cattle, but not by pigs and poultry. Efforts are being largely centered on reducing raw material and processing costs to get products which satisfy feedstuff rather than pulp specifications.

A factory for the manufacture of pressed fish has a process that is claimed to preserve the product for 10 years regardless of climatic conditions. Herring oil, from which the fishy taste has been removed, is used to replace olive oil. Three hundred thousand tons of seaweed are available yearly along the Norwegian coast, and utilization of this supply for feedstuff and also as a raw material for chemical processing has been discussed.

Sweden

A cement and concrete research institute has been established. Production of sponge iron has been increasing. New types of alloyed constructional steel having either very little or no nickel content have been developed. Experiments have been made to extract vanadium and also alumina and potash from spent oil shale. A plant has been planned for the production of alumina from andalusite: about 2 tons of andalusite are required for a ton of alumina; the silica content is troublesome. New deposits of copper have been uncovered. The airplane industry has been carrying on considerable extensions. Sweden's large armament works, Bofors, has been conducting research especially on developing new methods of by-product utilization, and acetanilide, saccharine, and nitrocellulose are being manufactured in consequence. Lithium has been added to the Boliden products.

Fuels and Lubricants

Since 1938 the Swedish State has been combating occupational diseases and promoting industrial hygiene. In a pottery factory it has been found that the working capacity rose by 11 per cent following the introduction of music hours. Dermatitis from handling explosives and also producer-gas poisoning have been under study. The number of producer-

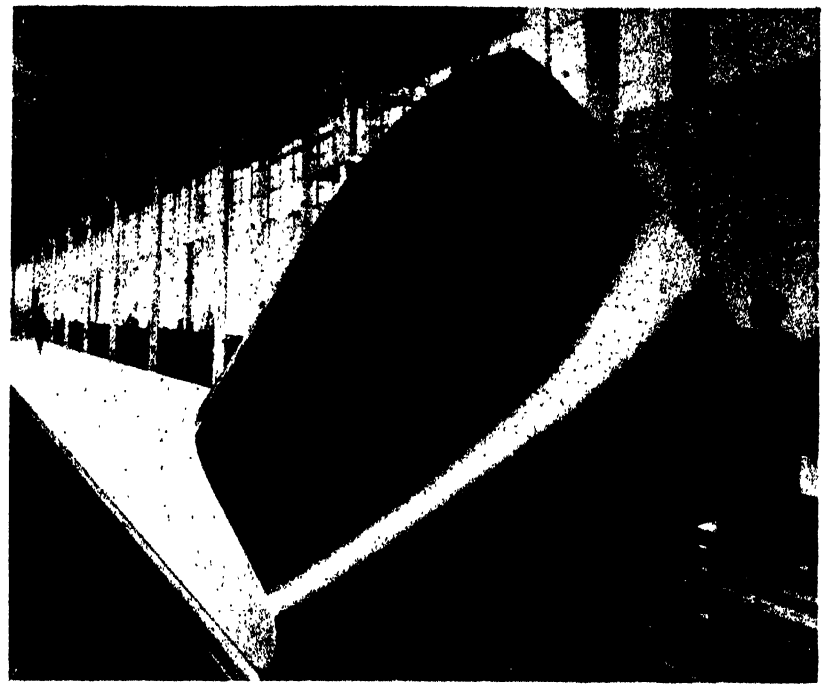


SWEDISH-INTERNATIONAL PRESS BUREAU

Cold-rolled strip is bright-annealed in these electrically heated furnaces at the Sandvik, Sweden, steel works.

gas vehicles amounts to 65,000; about 60 per cent are operated on charcoal gas, while the remainder is wood-gas driven. Close to 3,000 tractors are run on charcoal or wood, which are also being employed in motorboats, fishing vessels, ferries, and stationary engines. A producer-gas fuel made by drying wood pulp is expected to increase the use of gas adapters in automobiles; experiments in which at least 30 per cent of the fuel consisted of wood pulp have proved satisfactory. Several big water-power plants are under construction. The manufacture of wind generators has been begun for use in homes for the generation of electric energy. Electrically driven automobiles and cycles have appeared in increasing numbers. In Stockholm a bakery is producing fuel for 50 cars and trucks from the alcohol vapors arising from bread ovens; the cost is about 33 cents a gallon. Peat production, which can be carried on only in summer, is calculated to amount to about 500,000 tons in 1941, but in 1942 it is hoped to attain about double that figure. The Parca semigas furnace has a peat or wood consumption about 25 per cent lower than older furnaces.

Feed pulp and alcohol are a combination, arising out of the present situation in the paper industry, to develop new openings for labor and new opportunities for profit because of the annulment of contracts for products with foreign countries. Three new plants have been built for producing fodder cellulose. Work has been started on the production of liquid fuel from wood; the output of sulfite alcohol and potato alcohol will be increased. Shale oil technology is also receiving attention. At present only about 3 tons of crude shale oil are produced daily, but the output will be enlarged in 1942 to at least 30 tons a day. It is expected that about 2,000 tons of lubricants will be made from wood tar during 1942. Experiments are being conducted with the object of making peat tar by reducing peat to coke, and from this tar it is hoped to produce gasoline and lubricating oils. Amex is a new oil reclaimer. A device has been marketed for saving lubricating oils from ships' bilge water. In combating shipworms all test blocks that had been treated with Boliden salt or with chromium or zinc arsenate were fully intact, while those treated with barium arsenate were badly damaged.



SWEDISH-INTERNATIONAL PRESS BUREAU

A Sandvik conveyor band, 3.9 meters wide and 50 meters long

Paper and Textiles

Lignasan and Pulpasan are in use as wood pulp preservatives. Paper vests have been shipped to Belgium and France. The production of cigaret paper has been studied broadly. A new field where paper bags have found employment is as containers for fuel for producer-gas automobiles.

The wallboard industry comprises 14 mills with an annual capacity of about 150,000 tons. Wallboard is looked upon as the best substitute for windows smashed in air raids. The heating problem has prompted greater interest in insulation in various forms and the latest novelty, Wellit, consists of several layers of corrugated board, impregnated in a special way to render it impermeable by moisture. From tall oil a satisfactory washing soap is being produced. Rosin emulsions have been investigated as replacers of rosin soaps for paper sizing. Experiments recently completed have revealed improved methods of producing pine tar.

By using some hydroquinone or pyrocatechol with wood-tar phenols, hardenable resins are obtained. There has been a considerable increase in the output of rayon and a third factory was announced for the production of cell wool. Interest in flax cultivation has grown and a modern flax-preparation plant with laboratory facilities has been erected.



SWEDISH-INTERNATIONAL PRESS BUREAU

Interior of a works of the Swedish Asea Co. for manufacturing machinery



JAMES SAWDERS

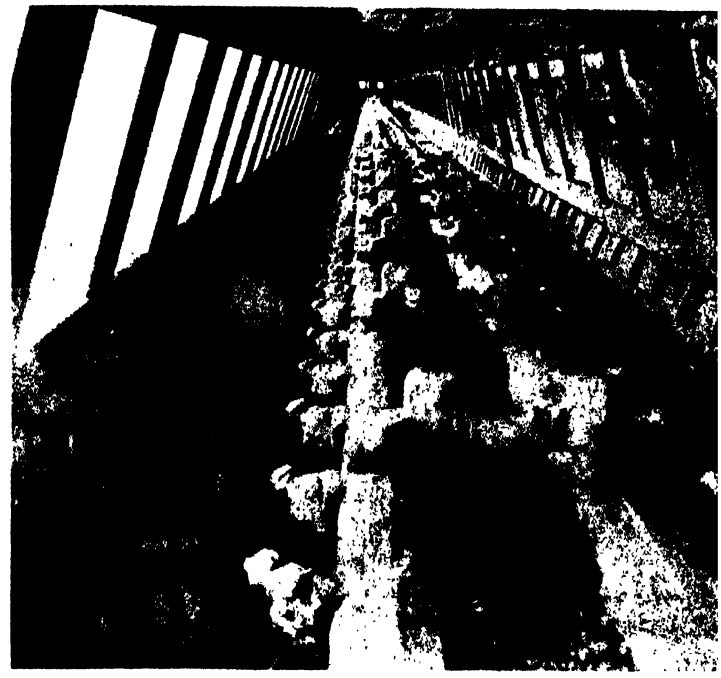
A pulp and paper plant in Central Sweden

Agricultural Products

Domestic apatite is serving as a substitute for phosphate rock and research is in progress on the production of phosphates from apatite. A new sulfuric acid sprayer for exterminating weeds in oat fields entered the manufacturing stage. Practical silos have been designed for intermittent drying with electrically heated air or by cold air. An allied undertaking has been the drying of grasses; this work has been supplemented by studies of the effects of drying on straw fodder. Special attention has been given to the question of winter storing of potatoes and garden produce. A radio firm has been carrying on experiments with music in cow houses to ascertain the influence on milk production; beneficial effects were claimed in a preliminary study. A new type of dry-milk powder, produced by a method said to preserve all the natural properties and the entire nutritive value of milk, called S. M. P. milk, has become of value. Whey is being converted into a substitute for molasses in cattle feed and confectionery. The Swedish State Research Institute for Freshwater Fisheries is investigating catch methods and the prevention of stream pollution and piscatorial diseases. Yeast, it is claimed, can be preserved without drying by the addition of 2 per cent of Nipakombin (a mixture of the sodium salts of the ethyl and propyl esters of *p*-hydroxybenzoic acid). A committee is supervising the systematic provision of vitamins.

Finland

Water-gas production, with wood, lignite coke, peat, and cellulose by-products as fuel, has been discussed as a source of power which would also enable the domestic manufacture of methyl compounds. The impurities have been studied in the gases from charcoal and wood in portable generators used for operating automotive vehicles. A number of cases of poisoning



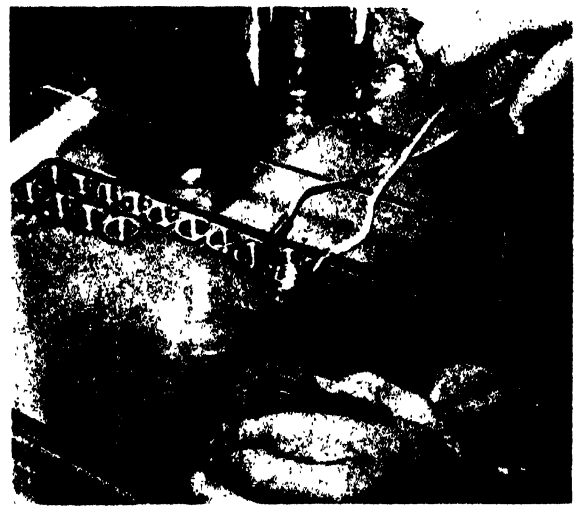
VICTOR MALMSTR

A 200-foot spinning aggregate for staple fiber by the viscose process i the plant of Nordisk Silkecellulosa in Norrköping, Sweden



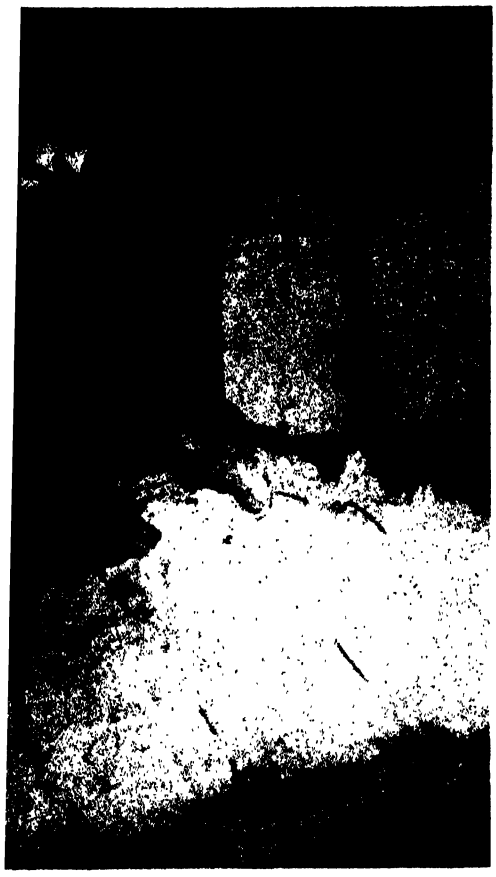
SWEDISH-INTERNATIONAL PRESS BUREAU

Cell-wool being washed in the staple-fiber factory of Nordisk Silkecellulosa



VICTOR MALMSTROM

Fitting of gold-platinum alloy spinning-mouthpieces at Nordisk Silkecellulosa



GULLERS

Cell-wool being packed in bales in the staple-fiber factory of Nordisk Silkecellulose

have occurred among workers in garages where gas generators have replaced gasoline motors. A new wood chemistry department building was erected at the Technical University of Helsingfors. Ky 5 is a phenol preservative against bluing of wood. Auto-kollag, a colloidal graphite, is employed for keeping polished the surface of dryers in making wrapping papers. At a pressure of 50 kg./sq. cm., exerted for 30 seconds, felt pads dehydrate a moist groundwood pulp to a greater extent than does filter paper. The use of sea water for the preparation of sulfate pulp results in high maintenance costs because of greater wear and corrosion on the machines. The "vacuum" method of impregnating chips in sulfite digestion is slightly more expensive than steaming, involves more chemicals, greater heat loss, and lower digester yield; but pulp obtained from an evacuated digest is uniform and firm and has excellent color.

Twelve factories producing fodder ("pine oats") from cellulose have been in operation; the output of these establishments rose from 350 to 700 tons daily. At a sulfite mill the yeast is separated (for fodder) from the wort prior to distilling off the alcohol. The large-scale manufacture of sugar from wood has been undertaken. In wood saccharification experiments sulfur dioxide under high pressure has been used for producing dextrose economically. A procedure has been evolved for making, by a special method of fermentation, a cellulose fodder with a high protein content. The oxidation of *p*-cymene, obtained as a by-product in the sulfite cellulose industry, yields terephthalic acid, and if the latter is heated for several hours at 200° to 250° with glycerol and tall oil an alkyd resin is obtained.

U. S. S. R.

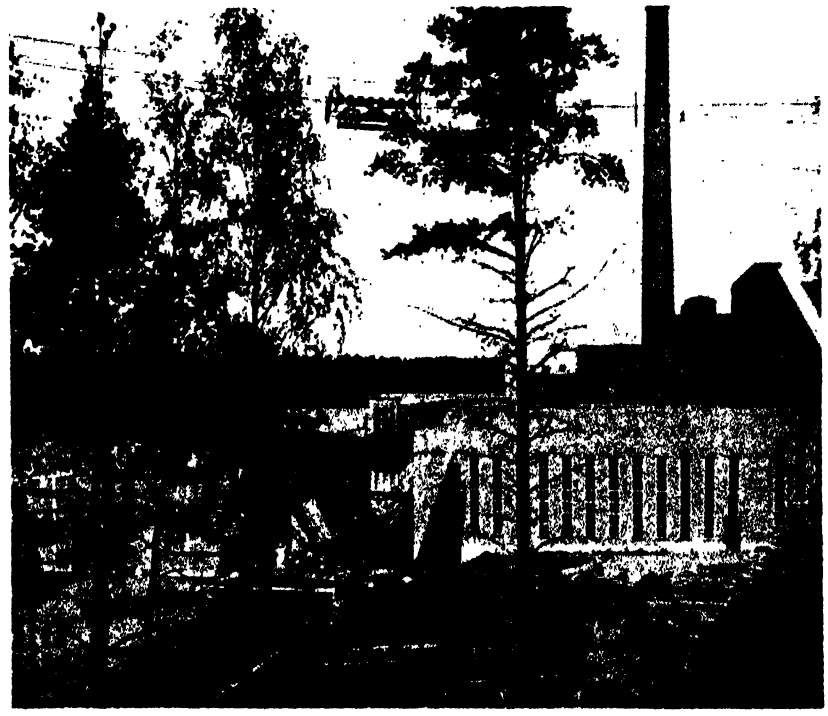
The application of low temperatures in industrial research has been important. A new process of making liquid air was developed; the technique of producing oxygen was improved by the discovery of a method for cooling air without employing high pressures. Quantities of liquid helium were placed at the disposal of scientists. A compound of xenon with phenol was announced and it was said that krypton acts similarly. Research was done on semiconductors, rectifiers, and photoelectric cells. The Academy of Sciences decided to construct a powerful cyclotron at a cost of 1,500,000 rubles. Radioactive substances showed no effect on the oxidation of sulfur dioxide. The explosive properties of nitrogen chloride were studied.

Ceramic Products

Agalmatolites were found to be excellent raw material for the production of ultramarine. Lead cyanamide was investigated as a pigment. Pemzolite is obtained by mixing pumice with cement. Addition of titanium dioxide improved the physicochemical properties of cement; cements containing zinc oxide were resistant to air and water and of considerable mechanical strength. Dehydrated olivine, dunite, peridot, serpentine, bronzite, talc, and synthetic forsterite were used for preparing refractory materials by mixing with calcined magnesite. Pegmatites were utilized for high-voltage porcelain. Glazes based on microcline, plagioclase, and their mixtures possessed high thermal stability and luster. Glasses containing beryllium, lithium, and boron were resistant to crystallization and transparent to x-rays. The efficiency of boron carbide as an abrasive was 40 to 70 per cent that of diamond dust. Attempts to use high-frequency installations for drying various ceramic products were successful.

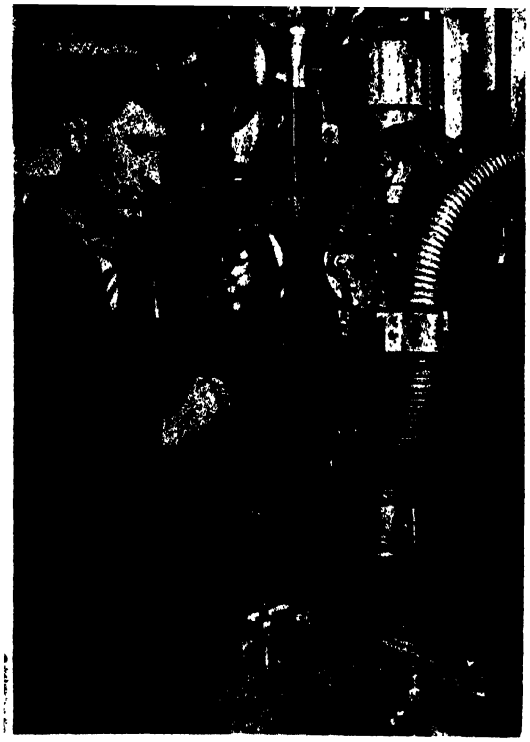
Coal and Petroleum

Gas is produced in several coal fields by carbonization in the ground. A method has been developed by which all the air and gas passages can be drilled from the ground surface; an oxygen blast has been tried to obtain a more intense rate of combustion. Hydromechanical coal raising—the cutting of coal by a jet of water and the transportation of the coal by the same water along gutters or pipes to the mine yard—was applied. Experiments were made with a fuelless locomotive, charged with steam from a stationary boiler. The absorption of sulfur dioxide from smoke by means of magnesia was held practical for large power stations near contact sulfuric acid plants. The use of lignite for running gas-producer automobiles was demonstrated to be feasible; wood- and peat-fueled taxicabs and trucks were tried. Small amounts of alkali are added to the flushing fluid in drilling for petroleum to lower the hardness of rocks.



JAMES SAWDERS

Newest and largest pulp mill in Finland, near Imatra



SOVFOTO

An installation in Leningrad for automatic high-speed welding

Gum formation in cracked gasolines was largely inhibited by 0.065 per cent beech tar or 0.01 per cent phenyl- or tolyl-*p*-aminophenol. In deasphalting distillates, it was found advantageous to use as solvents the propane and propylene fractions of cracked gases. Sulfonaphthenic acids were reported efficient emulsifiers for mineral oils in water. Transformer oils containing coumarone resin were shown to be more stable.

Metals

The Ural-Kuznetsk field, which now accounts for 30 per cent of the country's coal and iron production, may be developed further. In ferrous metallurgy much attention has been given to slag control, increasing open-hearth output, and effect of mold thickness. Research was also conducted on the treatment of air blast to ensure low hydrogen content of basic Bessemer steel. The causes for sticking of thin steel sheets were studied; the chief cause of crack formation in the coils of steel springs was found to be crazing of the steel surface. Steel containing chromium, molybdenum, vanadium, silicon, and manganese was developed as a substitute for high-tungsten tool steels. Cathodic deposition of iron-chromium-nickel alloy was accomplished. The aluminum alloy AN-2.5 containing 2.5 per cent nickel gave the best results as a substitute for high-tin babbitt in bearings. The most highly corrosion-resisting alloys of zinc-magnesium were in the region from the point of chemical combination to pure zinc. Copper-zirconium alloys have been used for electric equipment exposed simultaneously to high temperatures and severe usage.

Synthetic Resins

The Plastmass Institute of Leningrad investigated the effects of temperature and relative quantity of catalyst on the conversion of acetic acid into vinyl acetate. The resins obtained from phenols extracted from various peat tars were suggested for the preparation of Textolite and Cartolite. Addition of cannel coal up to 30 per cent to phenol-formaldehyde molding powder increased the mechanical properties, dielectric strength, heat endurance, and water resistance of the plastic. Lignofol is a plywood impregnated with a phenolic. The plastic Faolite was recommended as a substitute for lead. Corrosion-resistant compositions called Asbovinyl were prepared from asbestos and divinylacetylene lacquer, a by-product in the manufacture of Sovprene. Interpolymerization of methyl methacrylate with allyl methacrylate was found to yield products characterized by high softening point and resistance to organic solvents. Glycol sorbate gave hard films. Various resins were prepared by condensing at 180° and 190° tetrachlorophthalic and 4-monochlorophthalic anhydrides with glycerol or ethylene glycol.

Textiles and Rubber

The complete utilization of larch was outlined. Phthalic esters of cellulose were studied. Cellulose was best acetylated with acetic anhydride in the presence of pyridine. Sulfite liquor as an addition agent enabled higher current density without causing nodules and trees in cathode copper. Uses were sought for cymol. Virotsvet is a paper for color photographs. Verdol paper is employed for applying designs to textile fabrics. Cast iron in drums of textile machines was replaced by gypsum. No alteration was found in the hemicellulose content of flax before and after retting; the retting process came to an end when about half of the pectin substances had been decomposed. A new fabric consists of 50 per cent wool and 50 per cent fiber made from lupine seed albumin. Several experiment stations have been at work endeavoring to improve the silk industry. Novochrome Black N and Novochrome Fast Orange SRC showed a protective effect on the strength of silk. Dehydrated castor oil gave a soap of the same quality as that prepared from natural unsaturated oils. Interpolymerization of cottonseed oil with residues from manufacture of synthetic rubber afforded drying oils equal or superior to linseed oil. The adhesiveness of fractions of synthetic rubber became more pronounced with increase in molecular weight. Black synthetic rubber was reclaimed and its qualities improved. Aminobenzene is a vulcanizing agent of exceptional strength. The physical and mechanical properties of rubber vulcanized by the aid of high-frequency currents were superior to those of rubber obtained by the usual vulcanization procedure. Good results were had in using an aqueous suspension of synthetic rubber in cementing fabrics employed as leather substitutes. Chlorinated Sovprene was said to be better than other chlorinated rubbers for coatings. By treating half-velvet fabrics with a preparation having a chloroprene-latex base, falling out of the nap was prevented. Soviet authorities have been contemplating the expansion of the cultivation of the rubber-bearing plant known as kok-saghyz, whose more active development is obtained by periodic nitrogen fertilization with local application of superphosphate.



SOVFOTO

An automatic machine in Moscow for producing 35 liters of tomato juice a minute



AMERICAN FRIENDS OF HEBREW UNIVERSITY

Agricultural experiment station at Rehovoth in Palestine

Food and Marine Products

Passing a direct current through the soil helped the formation of water-resistant aggregates. The employment of sodium chloride as a fertilizer for sugar beets was beneficial on carbonate-containing soils. The application of boron increased enormously the seed yield of various lucernes. Chloropicrin added to the soil used for tobacco seedlings was efficient as a disinfectant. Tomatoes treated with ethylene (1:5000) ripened 5 to 10 days earlier than unharvested tomatoes; storage in peat also effected earlier ripening and decreased spoilage. About 23,500 tons of tea were produced in 1941, mainly in Georgia. In order to make tea more valuable for expeditions it was vitaminized by the addition of powdered hipberry concentrate. In extracting carotene from pine needles by a new method, chlorophyll and vitamins C, E, and K are obtainable as by-products. The soft outer shell of unripe walnuts contains a large amount of vitamin C. Nineteen varieties of essential oil plants have been cultivated; a special research institute has helped in the development of oil plant culture. A system for continuous fermentation of molasses, developed by arranging a battery of fermenters for wort to move in two streams, increased distillery output 30 per cent. A 99 to 100 per cent conversion of glucose to *d*-sorbitol was accomplished by hydrogenation at a pressure of 60 to 80 atmospheres. At a meat-packing plant in Moscow the sausage department has been handling 130 tons a day, and another part of the factory turns out 1,000,000 meat balls. Ninety-two thousand tons of fish were distributed in 1941. Seaweeds gathered in the far eastern waters of the Soviet Union have been exploited as raw materials for chemicals. *Laminaria* is regarded as suitable for the production of mannitol, potassium salts, and iodine; *Anfeltia plicata* and *Furcellaria* are thought best for the manufacture of agar. Odessa agar (from *Phyllophora nervosa*) and White Sea agar (from *Anfeltia plicata*) differ in certain respects from ordinary agar and it has been suggested they be termed "agaroids". Ammonium alginate has served as the starting material in research on the production of plastic masses; films of copper, calcium, zinc, aluminum, iron, and lead alginates are very brittle.

Palestine

The mandate government established a War Supply Board to function as an intermediary between Palestine industry and the Middle East Command. Industrial production has reached a value around £10,000,000 annually. Outstanding features have been the advances in the little metal and machine industries. Further expansion of potash, bromine, and other chemicals production occurred at the Dead Sea plant of Palestine Potash, Ltd.

Fourteen N^4-acyl-sulfanilamides and 15 acyl derivatives of 4-(benzene-azo)-1-naphthylamine were described. With support of the University of Jerusalem, young chemists have banded together on a cooperative basis to prepare pure chemicals for scientific institutions and hospitals. For a long time Tel-Aviv has had a laboratory supported by the local chemical society that practices analytical and consulting work and has discovered a means for making glass splinterproof.

Palestinian vegetables as a rule show a higher water content and a lower nutrition coefficient than the same kind of vegetables in other quarters; almost all fruits and vegetables of Palestine have a higher calcium content and also a lower phosphorus content, with a consequent higher Ca:P ratio, than similar foods in Europe and America. The production of hardened vegetable oils has been introduced. The mandate government established Citrus Control and Citrus Marketing Boards to ease difficulties of the industry. The stoppage of exports of citrus fruits by war conditions has led to consideration of expanding the manufacture of by-products. Neither the oil content of oranges and grapefruit nor the quality of the factory oil appears to depend definitely on the season or the rainfall. Physiological tests have revealed that diphenyl is harmless in quantities severalfold those to which workers are exposed in the manufacture and employment of impregnated paper in the citrus industry. Orange peel is used in bread.

Union of South Africa

The government voted £5,000,000 to be used for the promotion of new industries and expansion of existing manufactures, particularly coke and steel. The chemical industry is associated principally with mining and agriculture: the gold mines of the Johannesburg area require about 200 tons of explosives daily, 80,000,000 detonators annually, and large quantities of chemicals employed in extracting and refining processes, especially cyanide; agriculture needs around 300,000 tons of superphosphates a year. The Minerals Research Laboratory is conduct-

ing experiments on making chromates, dichromates, and chromic acid from domestic chrome ore, of which about 325,000 tons are produced annually in Southern Rhodesia.

An investigation was performed to determine whether the amount of water incorporated in coal-oil pastes could be reduced. Yields of 60 per cent of gasoline are obtained from torbanite oil at the Satmar refinery by combining topping and cracking with recovery from wet cracked gas. The government has been studying the use of charcoal as a motor fuel. Corundum deposits in Southern Rhodesia are under development. Natural earth pigments are being increasingly produced. Wonderstone, a pyrophyllite, has been found useful in certain refractories and for some building purposes. Cinnabar is being mined. A mixture of 4 per cent zinc sulfate and 0.6 per cent triolith is a recommended timber preservative.

Steps have been taken to manufacture synthetic glycerol. A company has been experimenting successfully with the fermentation of molasses by a special yeast under alkaline conditions. The dehydration of citrus fruit is under study and Transvaal farmers are considering the commercial production of avocado oil. At the University of Cape Town research is in progress on the therapeutic properties of fish-liver oils; the possibility of extracting oil from the liver of the gray shark is being accorded main attention. It has been concluded that cystine increases the milk production of rats.

India

Investigations recommended for adoption by the Board of Scientific and Industrial Research include manufacture of electro-acoustic and high-frequency apparatus, x-ray transformers, refrigerating machinery, photographic plates and photosensitizing dyestuffs, industrial preparation of essential oils and of ionone from lemon grass, production of thyroxin, extraction of sulfur from pyrite, and manufacture of optical glass. Projects completed by the board related to the manufacture of laminated paper products, resin-impregnated wood, dry cells, glass substitutes, and stoving enamel. Steps were taken to assist nascent and undeveloped industries through the Test House at Alipore. The Industrial Research Utilization Committee approved that a journal entitled *Indian Industry* be published.

Minerals and Chemicals

The Geological Survey has been investigating several deposits of sulfur and pyrite; research has been undertaken to ascertain the best methods of recovering sulfur from smelter and coke-oven gases and from the treatment of gypsum. Large deposits of sulfur have been discovered in Baluchistan. The possibility of developing a mica grinding industry is being studied. Refractory minerals such as sillimanite and kyanite have been claiming attention; Mysore abounds in raw materials for the manufacture of porcelain, and as several good deposits of clays are available the production of stoneware is being considered Electric tunnel kilns are used successfully in firing porcelain, A bulletin appeared on the purification of glass-making sands. A number of firms began the manufacture of China glass; other new lines include beads, imitation pearls, ornamental glass plates, lampware, vials, and tableware. Cadmium plating of iron was studied broadly. Silver and gold sols were found to have beneficial effects on the electrodeposition of nickel on iron; Prussian blue hydrosol came next in order of efficiency. The manufacture of surgical instruments from Indian steel is under investigation. Fifty-nine chemical manufacturing concerns are operating. The output of soda ash amounts to 12,000 tons a year. A heavy chemicals industry has been started at Mithapur; a sulfuric acid factory has been established at Petlad. The Hyderabad Government is considering factories for the manufacture of nitrates and ammonium sulfate and pilot plants for high-temperature carbonization and hydrogenation of coal. Mysore is the chief producing center of chrome ore and the manufacture of sodium dichromate is likely to be commenced soon. Matches made in India are on the English market. The pharmaceutical industry is progressing in its efforts to bring out substitutes for drugs formerly imported. Acetic acid, adrenaline tartrate, amyl nitrite, calcium lactate, chloroform, cresol and phenol, emetine hydrochloride, and formaldehyde are now being manufactured. Sodium citrate is being produced in the Punjab from lemons grown locally. The Imperial Veterinary Research Institute at Mukteswar is one of the largest establishments of its kind in the world; the production of vaccines and sera is among its activities.

Plant Products

The Imperial Council of Agriculture formed committees to link up research with practical requirements. Work has been carried out on the lining of canals to prevent water seepage and on the production of fuel gas from village rubbish. The triennial program of work, 1940–42, of the Forest Research Institute gives evidence of progress. Tests have been made on various types of lumber suitable for aircraft construction and repair. Because of the shortage of cork the institute has carried out experiments with wooden stoppers, suitably slotted to provide the necessary degree of resiliency; the timber used, *Cryptomeria japonica*, has had no previous commercial outlet. Difficulties encountered in the manufacture of charcoal from coconut shells have been largely surmounted. The consumption of plywood has been on the increase; the bulk of the plywood production of two factories in Assam is used in the manufacture of tea chests. Touri offers a very cheap and abundant source of tannin. To improve the quality of leathers, the government is making technical assistance available to tanners; there is a leather trade institute in Madras and a tanning school in Bombay. Markets are being sought for safflower seed oil, now used largely for cooking. The annual production of sandalwood oil at Bombay's only factory is estimated at 100,000 pounds. The spike disease of sandal, of virus origin, has been studied; the control of the insect culprit is probable in the near future. Among activities of the Indian Lac Research Institute was the demonstration of improved methods of lac cultivation and of simplified procedures for pest control. The suggestion has been made that India might export bleached shellac to the United States, a problem that could be solved by suitable refrigeration during transportation. Resins have been prepared with shellac-formaldehyde and melamine which are transparent and more thermohardening than other similar products; they yield promising baking varnishes. Cashew nutshell oil compounded with shellac affords resins giving water-resistant and elastic films. The introduction into industry of molding powders evolved in the institute has been under discussion. The utilization of casein in plastics and the production of phenolic and urea resins are to be studied. A technique has been developed for manufacturing varnishes and paints from bhilawan nuts. The Indian Institute of Science completed basic work on the manufacture of pigmented lacquers in powder form and the Department of the Director of Development at Cuttack finished an investigation on lacquers for wood products. The manufacture of white lead paint is being studied. A short time ago the Alipore Test House introduced luminous paints which have been tried in Calcutta. Almost all the commoner Indian vegetable oils can be used satisfactorily for Diesel engine fuel according to the results of a three-year investigation at Alipore. A method of refining castor oil and utilizing it in the manufacture of lubricants is being studied. An extensive research program has been drawn up for finding places for vegetable oils mixed with mineral oils as lubricants. Blown rape oil is being used in axle lubrication. The Industrial Research Bureau at New Delhi has been investigating the possibilities of utilizing vegetable oils as lubricants in internal combustion engines.

Paper is included among the industries showing activity under war conditions,

but newsprint is not produced. The facilities offered to cotton mills by the Indian Central Cotton Committee's Technological Laboratory in Bombay have been increasingly appreciated. In this establishment work was commenced on such uses of cotton as substitute for hessian cloth, cotton belting, artificial leather, cloth for road construction, and bags for sugar, flour, and cereals. A container made of canvas and a plastic, designed specifically for dropping fuel and water supplies from airplanes, was given experimental attention. Jute hessians are being employed to meet the shortage of canvas and the use of jute cloth hammocks in air-raid shelters has attracted attention. Improvements have been made in the techniques of spinning yarn from jute fiber. As experiments have proved that sugar bags made of rosella cloth are more suitable than those of jute from the point of view of moisture absorption, efforts are being made to reduce the hygroscopicity of the latter. Experiments have also been undertaken to find out if seaming twine can be made from jute to replace Italian hemp. A program of investigation on blended yarns of jute and flax has been laid down. The volume swelling of dry jute fibers calculated from the specific gravity is 45 per cent. The possibility of using sisal as a substitute for Manila cordage and rope is under study. Owing to its lack of smoothness the sisal bag is less easily repairable than the jute bag. The development of wool production and the improvement of sheep are being reviewed. The establishment of a wool research station has been recommended. The war has revived India's vegetable dye industry. According to the Forest Research Institute, kamala powder, if properly prepared, should regain favor with foreign importers as an orange dye for silk and wool; work on derivatives from kamala flowers for use as edible coloring materials was completed at Cawnpore. The University of Mysore is trying to employ myrobalans for preparing dyes. Experiments have been successfully made in Madras with several natural dye-yielding products of indigenous growth. Cyanine dyes of the pyridine series have been studied. The cowpea can be used for textile sizing and as a thickening material in calico printing. Formulas for antigasproofing fabrics were recommended by the Test House at Alipore.

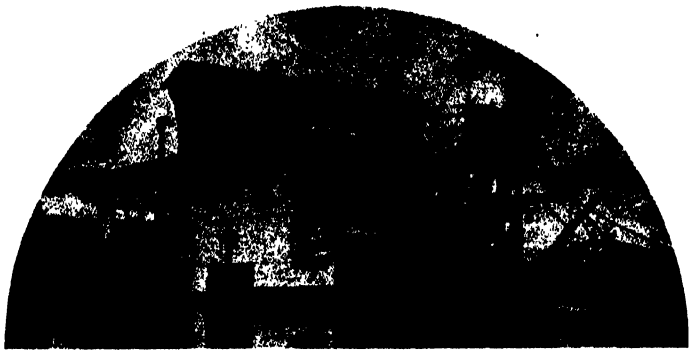
Foods

More than 60 diet surveys have been carried out in various parts of India and facts regarding the defects of Indian diets and improvements which are desirable have emerged from these studies. Efforts are being made to evolve varieties of rice suited to conditions of growth in the country. Information on papaya genetics has been gathered and seeds representing six different selections have been distributed for trial in Bihar and Madras. Practically all important fruits and vegetables grown in India have been studied under cold storage schemes in Bombay and the Punjab. A monograph on the poisonous plants of India was published. Two stations for research on cinchona have been under consideration. Among new schemes are investigations into diseases of rice, canning and preservation of fruits, preparation of wines, sheep breeding, and diseases of poultry. At the Indian Institute of Science in Bangalore it has been found that there are possibilities in growing plants in activated sludge tanks. A special process has been invented for drying potatoes, and experiments are in progress on the dehydration of other vegetables. The water chestnut has been found to be a good source of starch. It is generally believed that khandsari sugar and gur are much sweeter than pure cane sugar, owing to the fact that there are present in the crude sugar and gur aromatic flavors and organic acids which enhance the flavor. Much attention has been given to the improvement of methods of sugar-cane cultivation. Molasses has been tried in cattle feeds; road-surfacing compositions containing molasses have proved satisfactory; experiments on the fermentation of molasses to butyl alcohol, acetone, and acetic acid, and on the production of yeast have shown the practical possibility of development into paying manufactures. A method of disposing of sugar factory effluents has been evolved in the Imperial Institute of Sugar Technology at Cawnpore. The director of that institution also controls the Sugar Research and Testing Station at Bilari, the Bureau of Sugar Standards, and an experimental sugar factory. The hygroscopicity of sugars is an inverse function of the purity; pure sucrose can be stored safely at a relative humidity of 65 per cent between 30° and 35°. The Imperial Council of Agricultural Research began studies in candy manufacture at Cawnpore and Ravalgaon. The production of glucose is being investigated. The loss of vitamin A in ghee occurs as a result of the changes taking place in storage or exposure to heat and air; treatment of such ghee with hydrogen under pressure has been found to regenerate the vitamin. Studies have been carried out on the effect of the methods of preparation and feeding of oil cakes to dairy cattle on the physical and chemical constants of ghee. The cashew apple was shown to be a rich source of vitamin C. Vitamin C protects enzymes against inactivation by ultraviolet light. Oxalic acid inhibits markedly the oxidation of this vitamin. Kokum butter from the red mango tree was proposed as a substitute for cacao butter. The manufacture of margarine for British troops is under study. The dried fish and prawn industries are large, especially in Bengal, but the methods followed leave much to be desired. Increasing interest



DOROTHY HOSMER

The concentration of tin ore in Malaya. A pump elevates the tin-bearing gravel to a gallery of wooden planks where a continuous flow of water carries off the lighter elements, leaving the tin ore. Once a month the pump is turned off and the water allowed to evaporate so that the tin ore may be collected and packed in sacks. Coolies see to it that the gravel is not allowed to accumulate in large bulk and stop up the stream.



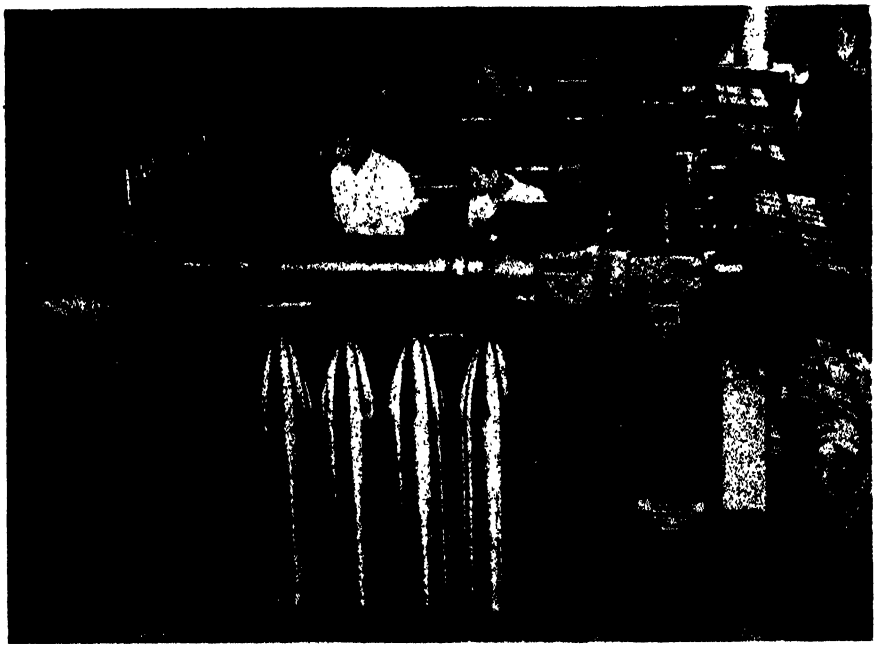
NETHERLANDS INFORMATION BUREAU

Dredge of the Billiton Tin Mining Co. in Netherlands Indies



NETHERLANDS INFORMATION BUREAU

A rolling machine in a Netherlands Indies rubber factory for carrying latex through the various stages of flattening



NETHERLANDS INFORMATION BUREAU

Production of shell cases in the munition factory of the Royal Netherlands East Indies Army at Bandoeng

partment of Science has investigated the production of solar salt and soybeans and has undertaken research on indigenous drugs.

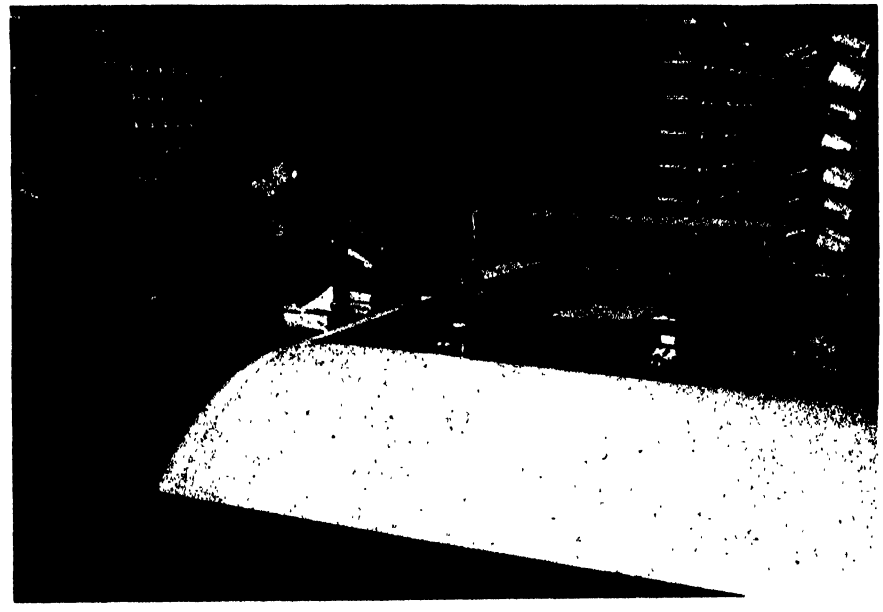
Netherlands Indies

New uses have been sought for molasses. The solubility of sucrose in various organic solvents has been investigated. The flavoring powder Ve-tsin consists principally of sodium glutamate. The manufacture of soap from fish oil has been studied. Work has been done on the production of vitamin A from fish liver oils and on the production of vitamin D from cholesterol. Investigations have been made on the use of fish oil in the manufacture of paints and varnishes.

is being taken in fish oil extraction, particularly in Bombay. At the Science Institute in Bangalore studies have been made on the preparation of liquid calciferols for use in artificial cod liver oil for the Indian Army. Work on the vitamin content of fish oils in the Nutrition Research Laboratories at Coonoor has played an important part in recent developments. Investigations have been completed on lemon grass oil and on using mahua oil for making soaps. The extraction of saponin from soap nut has been studied.

Thailand

Thailand has no rubber manufacturing industry, but rubber plantations have been improved. A factory to manufacture explosives was erected in 1941 and other chemical projects have been in the planning stage; the demand for chemicals has been growing as the trend toward industrialization has continued. The De-



NETHERLANDS INFORMATION BUREAU

Indonesia boy at a spool machine in a Netherlands Indies weaving mill



NETHERLANDS INFORMATION BUREAU

Crepe rubber production in a Netherlands Indies plant

facture of batik is estimated to require annually from 100,000,000 to 150,000,000 yards of cloth, principally cambrics. Ergansoga koening RN, an orange-brown dye used in the batik industry, was synthesized. There are two plywood factories. Government aid is being extended to the leather industry; the output of colored leathers has been improved and increased. The fat acids of H-acid are responsible for its coalescent effect on β-latex. A report was issued on the utility of latex as a protection against glass splinters during bombing raids. Mealorub, a partially vulcanized rubber in granular form, is possibly of importance upon blending with bitumens. The Netherlands Indies Crisis Cinchona Ordinance, designed to foster experimental work on cinchona, was extended for three years.

Australia

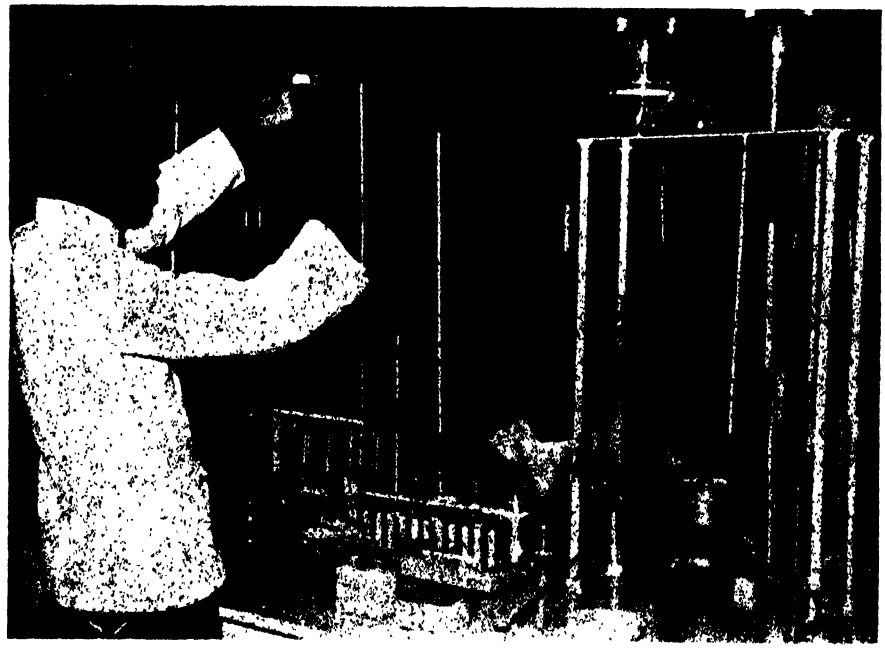
The rapidly increasing use of diamonds in mining and manufacturing has directed attention to the possibility of utilizing Australian stones. The Commonwealth Council for Scientific and Industrial Research has been making a thorough exploration of domestic potash resources; in Western Australia preparations have been under way to produce potash from alunite deposits in the bed of Lake Campion. It was decided to manufacture aluminum from domestic bauxite. An Aeronautical Research Committee was set up; it has been proposed to transfer to Australia a considerable part of the aircraft manufacturing of the United Kingdom. Mercury deposits are being developed.

Wood Products and Textiles

The addition of gasoline is regarded as a practicable method of obtaining increased power from an engine running on producer gas. Progress has been made in the introduction of producer gas, particularly with farm tractors. Hardwood charcoals have been examined as to suitability for gas producers. Phellandrene from eucalyptus is effective as an antiknock; the addition of eucalyptus oil to motor fuel increases power and mileage. Eucalypsum, made from eucalyptus leaves, is a preparation for removing scale from ammonia condensers. The Council for Scientific and Industrial Research published the nomenclature of Australian timbers. The first newsprint mill came into production; an output of 27,700 tons was expected in 1941. Softwoods from South Australian forests are being used to manufacture wood pulp for munitions. A fourfold increase in the production of flax was announced by the government. In the scutching of flax straw, for dew-retted and water-retted straw the best moisture content range is 9 to 13 per cent, and for unretted straw it should be between 13 and 15 per cent. In the treatment of wool by alkali, the most promising reagents are solutions of potassium or sodium hydroxide in ethyl alcohol which contains a small percentage of water; results of wearing and washing tests on garments made of wool so processed have induced continuation of investigation; at present a stocking manufacturer is employing the procedure and a woolen firm uses it for the treatment of wool in tops form. Research has been given to textile mildews.

Foods

Agricultural features of the potato industry were published. At the fruit products laboratory at Homebush studies have been carried out on the production of fruit juices and on general food canning problems. Work has been continued on the effects of the application to citrus fruits of thin waxy and other coatings. Studies are being made of materials which may be suitable for watertight containers for packaging boneless cuts of frozen beef. Meat powder might help solve Britain's meat storage and transport problem. An investigation indicated little or no future for ozone in the ripening of meat. Results appeared in the control of ectoparasites of sheep. Extensive research has been conducted on the preservation of fish and on the cold storage of smoked fish and eggs. The Council for Scientific and Industrial Re-



NETHERLANDS INFORMATION BUREAU

Natives carry on control tests in the sugar factory Petaroekan in Java

search has been investigating factors in the marketing of fresh fish in Eastern Australia; the conclusion reached in other countries that the flora of spoilage is similar to that of the slime and gut has been confirmed. Oysters could be grown more cheaply, to a better standard, and in greater quantities than they are at present. The southern bluefin tuna would form the basis for any large-scale tuna-processing industry. Yellowtail livers yield about 10 per cent by weight of an oil that is 40 times richer in vitamin A and 110 times higher in vitamin D than cod liver oil; the possibilities of other fish are under research. Agar-agar production is being studied.



The F. D. McMaster Animal Health Research Laboratory at the University of Sydney

New Zealand

Plans have been completed for the production of silico-superphosphate containing serpentine; the initial annual output will be 100,000 tons. Additions of coal have been used effectively for keeping the grinding bodies uncoated in the preparation of the raw meal for cement manufacture by the dry process. By an electromagnetic method a 90 to 95 per cent glauconite was produced from greensand; considerable potash was obtained from the glauconite by roasting and subsequent treatment with 1 per cent hydrochloric acid. Study is being given to the processing of bentonite. The iron ore of the Collingwood district forms deposits of potential economic importance south of Parapara Inlet; low-grade chrome ore occurs at several places and especially on the east coast of d'Urville Island; the production of scheelite has been increasing.

The United Kingdom will take 160,000 tons of cheese in the 1941–42 season. Dried milk production is also being stimulated. The government will devote 25,000 acres to fiber flax. In atmosphere exposure experiments, fine fibers were attacked more rapidly than coarse fibers, while wools from different breeds were unlike only in the initial amount of attack. The activation of charcoals was studied. The chemical treatment of dwellings infected with termites, without cost to the owners, has been undertaken by the Department of Scientific and Industrial Research.

The Philippines

Distillation curves were reported for Alkohl motor fuel, a mixture of ethyl alcohol, kerosene, castor oil, and acetone. Two plants were found to yield oils resembling bergamot and jasmine. The chemistry of pili nuts was reviewed. A superior grade of oil is obtained by pressing fresh undried coconut meats and breaking the emulsion by biochemical means. The expeller process for coconut-oil extraction is not economical; the roller method is better than the cage hydraulic press for obtaining the oil emulsions from fresh meats. Since 1928 the Philippine Sugar Association has been conducting entomological studies and also research on the breeding and testing of new varieties of sugar cane. Attempts to cottonize abaca have been unsuccessful. Efforts have been made to stimulate interest in the production of rubber.

China

The Ministry of Economic Affairs has been planning for mineral development and the National Geological Survey has been making studies of mineral deposits. China produces about 65 per cent of the world's tungsten. A process employs tung oil instead of water in gold recovery. China Vegetable Oil Corp. has been investigating the preparation of tannic and gallic acids at points of origin. Bamboo pulp has been made by the use of a hydrotropic solvent. Small quantities of protein were produced from soybean at Shanghai and Tientsin; some phenol, casein, and cellulose plastics were manufactured at Shanghai, where also a process was in use for removing color from silk in old stockings. 2-Methyl-1-hydroxy-4-aminonaphthalene hydrochloride, a water-soluble form of vitamin K, has been synthesized from α-naphthol. Teas on analysis show a high fluorine content. Work is in progress on fertilizers. The control of rice borers and other grain insects constitutes the foremost studies at the National Agricultural Research Bureau.



Knitting department in a Japanese textile plant

Japan

Coal in tests as a substitute for gasoline in taxis reduced the fuel cost 50 per cent. It has been proposed to vaporize alcohol and gasoline in separate carburetors and to inject the vapors, in proper proportions to each other and air, separately into combustion chambers; acetylene gas and gasoline could be used similarly. Coalite

can be employed as a motor fuel. Experiments have been made on the low-temperature carbonization of coal mixed with acid clay, Kanuma earth, and activated carbon. By heating cokes containing 17 per cent ash at 850° to 900° in a stream of chlorine the ash content was reduced to 7 per cent. After 12 years of investigation continuous operation of the liquid-phase hydrogenation of coal paste was accomplished in 1939. Basic production research on the process is being conducted at the Kyoto Imperial University and the Imperial Fuel Research Institute. At Kyoto there has been developed a catalyst composed chiefly of iron. More research is needed to evolve a catalyst capable of maintaining yield against poisons in the effluent gases. Coal liquefaction by the Fischer-Tropsch process and recovery of by-products from the distillation of coal tar will be the principal lines of the new Mitsui Chemical Industrial Co. A plan called for a synthetic fuel production of 2,000,000 tons in Japan and Manchukuo in 1941, but progress has been impeded by war. The thermal polymerization of methane has been studied.

Metals

Several new iron and steel plants were constructed in Chosen. Tungsten deposits were exploited at Yotoku and in the Diamond Mountains; a nickel deposit was discovered. Japan's nickel consumption in peacetime is 3,500 tons a year. Addition of aluminum, chromium, or manganese has been shown to increase the resistance of iron toward sulfur; vanadium or molybdenum to decrease it. Vanadium steel was made from low-phosphorus, vanadium-bearing ores by using a flux of soda ash. The aluminum industry is not predicted to reach self-sufficiency for at least three years. Aluminum is being produced from alunite but costs are high; processes using clay have been proposed but are not commercially successful. The mechanical properties of duralumin have been improved by the addition of cadmium, cobalt, chromium, molybdenum, lead, tungsten, and zinc, but the addition of silver, bismuth, iron, nickel, antimony, tin, and titanium had no effect. The addition of iron to superduralumin causes cracking of sheet during hot-rolling and deteriorates the age-hardening properties. The age-hardening of aluminum-copper and aluminum-magnesium-silicon alloys has been investigated. Strong aluminum alloys ESD and ESDC are in production. The fluidity of pure magnesium decreases on addition of 5 per cent aluminum, but increases on 10 per cent addition. Copper and cobalt deposits were discovered in Chosen. A new copper alloy, HB-5, was developed, containing aluminum, iron, manganese, zinc, and chromium. A study was reported on the effect of lattice strain on the reflectivity of silver. Tantalum has been recommended for ultrashort-wave tubes.

Chemicals

A chemical warfare department was set up. Employment in the chemical industry has increased 18 per cent since 1937. Rich gypsum deposits have been discovered in three places in northern Manchuria. A comprehensive report was issued on Bessi cupriferous pyrite, mined since 1690; the production is around 54,000 tons annually. Following the expansion of pyrite mining there has been increased production of sulfuric acid: there are 45 contact plants employing vanadium catalysts of American types; seven use the Mitsui-Osame catalyst; the Kyoto Imperial University has evolved another catalyst containing vanadium and phosphorus. The following industrial chemicals are in short supply: ammonium carbonate, boric acid, ethyl acetate, nitric acid, potassium dichromate, potassium permanganate, sodium peroxide, sodium sulfide, and tartar emetic. The mechanism of the nitrogenation of calcium carbide has been studied. High-pressure hydrogenation of phenol results in the formation of considerable proportions of methyl cyclopentane where molybdenum catalysts are used. It is expected that acetophenone will be obtained cheaply by condensation of benzene and acetyl chloride; the high-pressure hydrogenation of acetophenone and catalytic dehydration of methylphenylcarbinol have been described. There has been uneasiness over the availability of glycerol. One factory is said to be manufacturing glycerol from waste molasses; glycerol as well as alcohol and acetone are produced in Indo-China. Potato starch was found to glycerolyze easily. Official encouragement has been accorded to the production of tannin.

Plastics

Data relating to 30 synthetic resins were published. Laminated phenolic insulation for use on electric machinery is made by six manufacturers; Standlite synthetic resin bearings have been evaluated in electric motors and rolling mills. The derivative of Urushiol with indene gives a film having durability. Urea resin is used as an electrical insulating material for oil-immersed machinery; research has improved the water-resistance of this plastic. If egg white is hardened at pH 4.8 in formaldehyde and if the hardened material is molded with 10 per cent water, a plastic product of low water absorption and with little deformation can be obtained. The Manchuria Electrochemical Industry Co. is studying the production of synthetic rubber. Para rubber grown in Formosa has been used experimentally; some rubber from Hevea trees has also been secured in Formosa. Rubber of *Ficus retusa* has given promising results.

Textiles

In Formosa it is said a hemp substitute has been prepared from banana skins. Formosa is one of the largest jute-growing regions in the world. A nonmotile bacillus was isolated from the retting vats for jute fiber. About 80,000 hectares of flax were sown in 1941. Increased silk quality results from adequate feeding to worms of properly ripened mulberry leaves during the early stage when food consumption is greatest, followed by feeding of leaves of high-protein content during the later stage when they eat moderately. Japan is still far from self-sufficient in pulp for rayon and staple fiber manufacture. Kalampayan, Tankawang, Rongang, and Binoeang jantan give pulps suitable for rayon production. Cellulose has been made from rice straw, wheat straw, bamboo, bagasse, and Manchukuan reed by triple digestion with nitric acid and caustic soda. Research was done on the acetylation of cellulose with the use of sulfoacetic acid as catalyst. Direct wet-spinning of acetate silk filaments into a coagulating bath of sodium acetate and acetic acid gives best results where the bath contains 10 to 20 per cent of acetic acid and 20 to 30 per cent of sodium acetate. At present the fiber from soybean protein has only 0.8 to 1.0 g./denier of dry strength and 0.3 to 0.4 g./denier of wet strength. Soybean protein dissolved in 49.5 per cent urea solution is reported to be more stable than in caustic soda—a fact that is thought to deserve consideration for manufacturing soybean fiber. Waste from the production of soybean protein fiber has been satisfactorily purified by addition of 25 per cent of activated sewage sludge or 20 per cent of activated sludge from the waste itself. The hydrolysis of nylon has indicated it is composed of adipic acid and hexamethylenediamine. The direct preparation of adipodinitril from adipic acid, for the synthesis of nylon, has been studied by liquid and gaseous phase methods, yielding 50 and 60 per cent, respectively. A fish yarn, a wool substitute now under research, is prepared from whale or shark meat protein hardened with formaldehyde. The strength of casein fibers containing fish protein is decreased with the increase of the latter and increased with the acid or salt concentration of the coagulating bath.

Various Plant Products

The higher grade artificial butter is produced mainly from soybean oil. A factory has been erected in Fusan, Chosen, for the production of rice bran oil for cooking purposes. The effects of various chemicals on the gelation of tung oil have

been described; generally speaking, acidic substances accelerate and basic substances retard this gelation. The gelation time is greatly prolonged if 0.05 per cent of either sulfur or selenium is added. The temperature dependence of the gelation time of oiticica oil is similar to that of tung oil. A 20 per cent increase in perilla seed production was announced. Akatetu oil was described. Research was conducted on the catalytic reduction of camphor and borneol. The contents of carotene and vitamin C in various wild weeds were compared in various seasons. The Japanese Ministry of Agriculture and Forestry claimed success in cultivating a variety of seaweed used for agar-agar with a growing time of 40 days, compared to the usual two-year period.

We have traveled over a long road, and this trip has enabled us to see that in general World War II is giving industrial research new responsibilities, new types of utility. An effort has been made merely to record and not to linger over any of the principal results of this research. Perhaps our log will serve as a kind of tracing of things to come.

In wartime, scientific activities are both complex and spare; everything is surrendered to essentials. Under the largess of government, science steps outside the frame of the laboratory and wrestles with destiny.

Osborne Medal Awarded to R. A. Gortner



R. A. Gortner

One of the highest honors that can come to a biochemist has been voted to Ross Aiken Gortner, chief in the division of biochemistry, University of Minnesota, who will receive in 1942 the Osborne Medal presented by the American Association of Cereal Chemists to scientists who have rendered distinguished service in conducting research and training students in cereal chemistry. The medal will be presented at the annual meeting of the association next May.

Willard Gibbs Medal to Midgley



Thomas Midgley, Jr.

The Willard Gibbs Medal for 1941 has been awarded to Thomas Midgley, Jr., by the Chicago Section of the American Chemical Society and will be formally presented on May 22, 1942. This is the 31st award of a medal that has come to be recognized as one of the leading honors in American chemistry.

The citation on which Dr. Midgley was selected is:

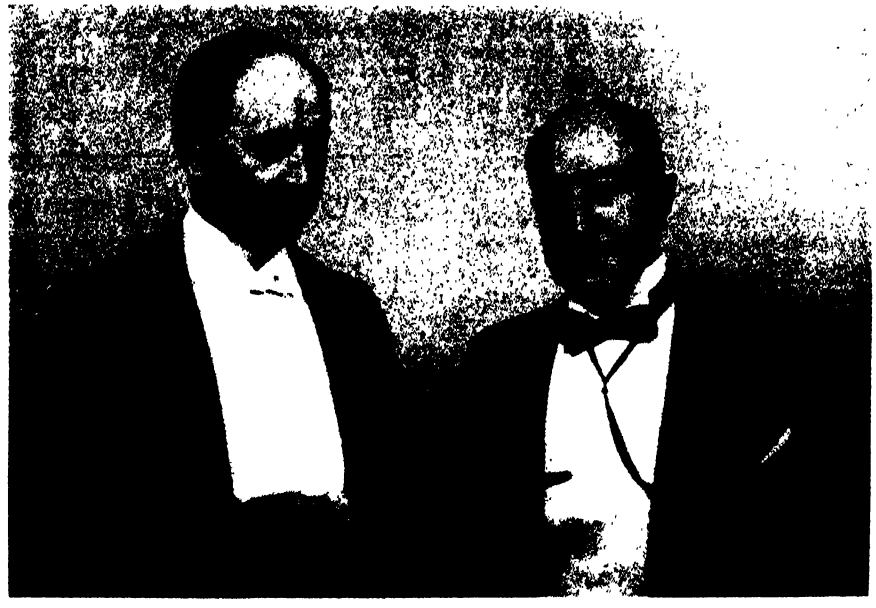
His attainments are almost too well known to necessitate repetition, but they include the development of the first satisfactory indicating device for determining what takes place in high-speed internal combustion engines (the Midgley indicator). He then worked out the detonation characteristics of various types of fuels and developed a whole series of chemical antiknock agents culminating in the discovery of tetraethyllead. He worked out methods of manufacture of this compound and has been active in solving many problems connected therewith, including the removal of lead deposits which formed with the straight tetraethyllead. He has contributed largely to the knowledge of the chemistry of rubber and the methods of synthesizing rubber. He developed the organic chlorofluorides which have become so important and widely used as nonflammable nontoxic refrigerants. He was associated with the important developments connected with the recovery of bromine from sea water. His discoveries are outstanding, both from the standpoint of pioneering in brand new fields and from the standpoint of the commercial importance of his discoveries.

Jones to Receive Pittsburgh Section Award



Webster N. Jones

Webster N. Jones, director of the College of Engineering, Carnegie Insti-



Ittner Receives Perkin Medal

Martin H. Ittner and Marston T. Bogert during the 1942 Perkin Medal presentation to Dr. Ittner January 9 at a joint meeting of American Section, Society of Chemical Industry, New York Sections of American Chemical Society, American Institute of Chemical Engineers, Electrochemical Society, and Société de Chimie Industrielle.

tute of Technology, will receive the 1941 Award of the Pittsburgh Section of the AMERICAN CHEMICAL SOCIETY at a dinner meeting of the section in the University Club, February 19.

Dr. Jones has been director of the Carnegie Tech Engineering College since 1932. Previously he taught at Purdue, Harvard, Maine, Missouri, and Montana and had a distinguished career as an industrial and research chemist with the B. F. Goodrich Co. During the first World War, Dr. Jones served in the Chemical Warfare Reserve Corps, conducted research on Lewisite, and served as chemical expert on the War Trade Board.

Alexander Silverman, of the University of Pittsburgh, received last year's award. Previous recipients were Edward R. Weidlein, George H. Clapp, and Francis C. Frary.

Hoffmann Scholarship of the Chemists' Club Awarded to Robert T. Olsen

THE Hoffmann Scholarship of The Chemists' Club has been awarded for the school year 1941-42 to Robert T. Olsen, a candidate for the Ph.D. degree in the Department of Chemistry at Massachusetts Institute of Technology. This scholarship, founded by the late William F. Hoffmann, is available in alternate years; the stipend is $800, payable in semiannual installments of $400.

Mr. Olsen did his undergraduate work in the Newark College of Engineering, receiving the B.S. degree in chemical engineering in 1936. In 1937 Columbia University awarded him the M.S. degree in chemical engineering, after which he worked for two years with the Eastman Kodak Co., Rochester, N. Y. In 1939 he entered Massachusetts Institute of Technology as a candidate for the Ph.D. degree in chemistry. He is completing this work under Ernest H. Huntress and will be eligible for this degree in June 1942.

Mr. Olsen chose as his thesis subject for the B.S. degree "Design of a Plant for the Manufacture of Propanol-2", and "Etherification in Hydrotropic Solution" for his M.S. degree. His Ph.D. dissertation involves study in the field of syntheses of coumarones.

Oil Exports from French Indo-China Are Hampered

EXPORTATION of essential oils produced in French Indo-China was handicapped, even before present difficulties, by requirements for export permits. Such permits were difficult to obtain. The country produces mainly such oils as aniseed, cajaput, and citronella, with lesser amounts of Indian vervain, ylang-ylang, and lemon grass, largely by several small native and Chinese growers, who sell to local French refiners and exporters.

Selective Service System Information

THE following memorandum (I-347) as released to local boards (Local Board Release 83) was sent to all state directors by Lewis B. Hershey, Director, Selective Service System, January 12, 1942:

The attention of local boards is again invited to the necessity of seriously considering for deferment students in certain specialized professional fields in which dangerously low levels of manpower are found to exist. This memorandum is in addition to and does not rescind those previously issued which apply to students in other critical fields.

Subsequent to the declaration of war, local selective service agencies have in many instances proceeded to classify registrants without regard to the fact that they are in training or preparation for activities, the maintenance of which is essential to the national health, safety, or interest, and war production. This is particularly true in cases of engineering, chemical, physics, medical, and dental students.

Admittedly there is an overlapping of the military and civilian requirements of a nation at war; however, it must be borne in mind the one is dependent upon the other. It is estimated that the expanding Army will eventually require doctors and dentists in numbers heretofore unknown. They will not be available if those students who show reasonable promise of becoming doctors and dentists are inducted prior to becoming eligible for commissions.

War industries are undergoing a hitherto unknown expansion. Aeronautical, civil, electrical, chemical, mining, metallurgical, mechanical, and radio engineers, together with physicists and chemists are essential to ensure a sufficient flow of materiel for the armed forces, and industry must look to the engineering, chemical, and physics students now in training to meet its present and future requirements.

It is equally important that instructors in these fields be seriously considered for occupational deferment. Shortages of qualified instructors are known to exist. The educational institution employing the instructor should be requested to file DSS Form 42A in all cases where deferment is sought.

In considering student deferment cases, certain local boards are requiring the execution of DSS Form 42A in addition to the affidavit of the college or university contained in Bulletin No. 10 issued by the American Council on Education. DSS Form 42A should not be required where the American Council on Education affidavit has been submitted.

Local boards will be informed when the manpower requirements necessary to the national health, safety, or interest, and war production become static. Until such time, the policy set forth in the Memoranda to All State Directors I-62, I-91, I-99 and I-150 remains in force.

In accordance with, Supplement to Bulletin No. 1 issued by the American Institute of Physics the following telegram was sent from General Hershey's office on January 8, 1942, to all state directors:

Complaints in increasing volume indicate local boards are reopening the cases of registrants deferred for occupational reasons and reclassifying such men in Class One A.

I direct that local boards be immediately informed of the continuing necessity for deferment of men necessary to activities, the maintenance of which is essential to the war production program and the national health, safety, and interest. State directors should avoid calls upon local boards except upon the basis of available Class One A men.

The following telegram was sent to the Texas State Director of Selective Service by General Hershey on January 9, 1942:

This office has been informed that your headquarters has issued instructions to local board that no graduate student can be considered for deferment. No such policy has been adopted by this headquarters and local boards should be informed that graduate students including part-time assistant instructors may be considered for occupational deferment on an individual basis in those fields in which a national or local shortage is known to exist.

William Campbell Fellowships Established

THROUGH the bequest of the late William Campbell, for many years Howe Professor of Metallurgy at Columbia University, two fellowships have been established. They are awarded primarily for graduate study and research in metallurgy.

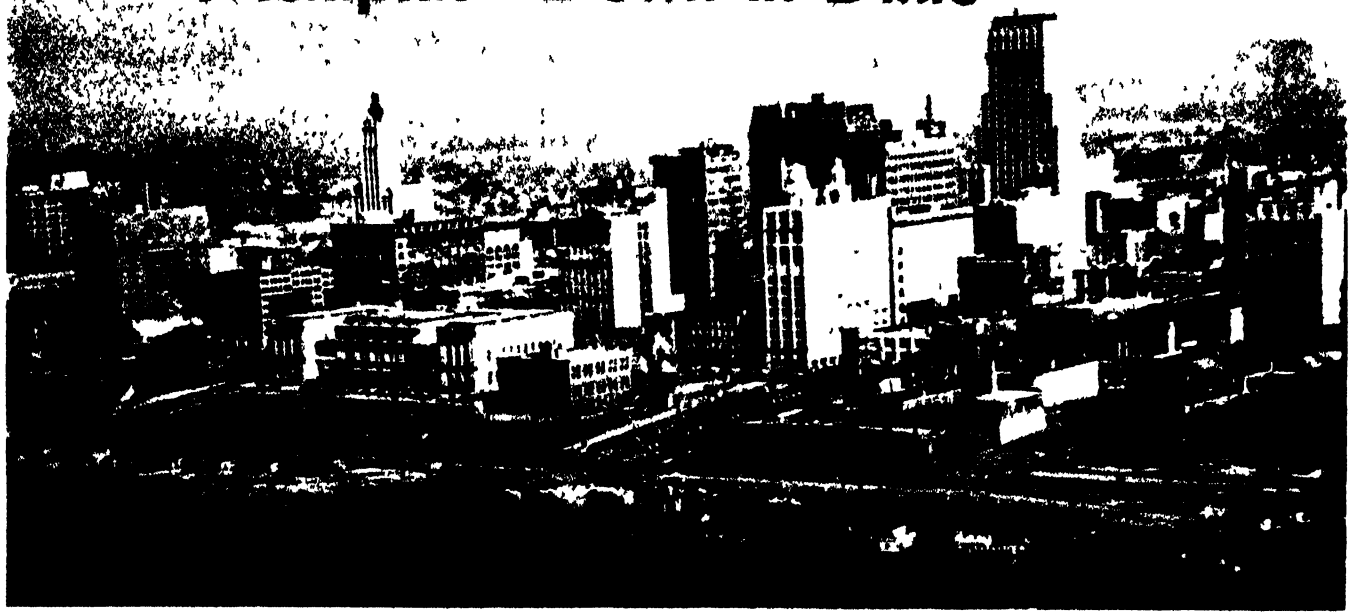
The stipend of each Campbell Fellowship is fixed at the time of award by recommendation of the Campbell Fellowship Committee and will normally be an amount sufficient to meet the necessary living expenses of the incumbent of the fellowship.

Applications accompanied by certified transcripts of academic records and statements of proposed research projects and fields of graduate studies should be filed with the secretary of the university before March 1. Practical experience in metallurgy or previous graduate study is desirable. Application blanks and announcements will be forwarded to interested persons by the secretary of the university on request. For other information write to Eric R. Jette, School of Mines, Columbia University, New York.

Raymond R. Rogers has been appointed chief chemist at the Welland Chemical Works, Niagara Falls, Ontario.

Lester N. Stanley, after six years with the Central Research Division, Monsanto Chemical Co., Dayton, Ohio, has accepted a position as research chemist with the Esso Research Laboratories, Standard Oil Development Co., Elizabeth, N. J.

Memphis—Down in Dixie



FOUR hundred years ago—it was the spring of 1541—Hernando DeSoto and his Spanish adventurers first glimpsed the great Mississippi River from the bluffs upon which Memphis now stands. The bearded soldier and explorer was the first white man ever to see the Mississippi. He called it the River of the Holy Ghost.

Today, that river, wide and deep, still flows by the towering Chickasaw Bluffs and still laps against the cobblestones of the Memphis levee, where picturesque old steamboats once churned the tawny waters of the Mississippi. Gone are Indian canoes. The golden age of the packet boats has passed. Modern towboats with their oil-powered motors now move with 20th century speed the ever-increasing freight of the Port of Memphis

High up above the river, on the bluffs where DeSoto once stood, stands modern Memphis, host to Meeting One Hundred Three of the AMERICAN CHEMICAL SOCIETY, April 20 to 24, 1942. City of cotton and carnival, sunshine and hospitality, where breezes from the past blow across the bustling present—that's Memphis.

Here you'll find picturesque Front Street, facing the river, where cotton has been king for generations, and beyond its quaint buildings with the wisps of white gold floating out of the windows, rise in the distance the warehouses of the cotton capital of the world. Here is the South's largest manufacturing and distributing center for drugs and chemicals, the world's largest cotton market, hardwood lumber market and mule market, Beale Street "where the blues began" and the equestrian statue of General Forrest, keeping watch over the tomb of the Confederate hero and his wife in beautiful Forrest Park.

While red brick buildings and black-paved streets are component parts of every city, it is not possible to measure a community's greatness by counting the number of new brick or measuring the feet of asphalt. It is the human factors involved that make some cities stand apart from others. Often it is called civic spirit Perhaps that is right, but that intangible something which goes to make a city outstanding can best be illustrated: in Louisville it is the Kentucky Derby, in New Orleans the Mardi Gras, while in Memphis it is the Cotton Carnival.

Begun only as a vague project, the Cotton Carnival was proposed in the early spring of 1931. There has been many a row chopped and many a bale ginned since the movement was launched that now has brought favorable national attention to Memphis for its campaign to recognize cotton. Starting out as a minor parade, the Cotton Carnival has through accretion become the South's largest party with emphasis placed on King Cotton and the multiplying uses for the long white gold from the plantations. This is perhaps the most widely publicized development in Memphis in the past 11 years.

But this year when less vital activities are giving way to the needs of the war effort, the Cotton Carnival has been postponed. Later, when the emergency has passed, the carnival will be resumed, and Memphis and the Mid-South will again link arms to uphold the throne of King Cotton and keep Memphis supreme as the world's largest cotton market.

Along with this commercial predominance has come the desire to maintain it by increasing the applications and distribution of cotton. The Cotton Research Foundation was created in Memphis in 1938 to find new uses for cotton through sponsorship of research projects at the Mellon Institute of Pittsburgh.

Planters, ginners, and those associated with the cotton trade have created the National Cotton Council with headquarters in Memphis. This organization is seeking to promote new uses for cotton and to increase world consumption as well as stabilize its production and marketing.

Monuments to the role of Memphis in the war between the states still stand guard along the waterfront. In DeSoto Park stands the great Indian mound which was the site of the fortress of Chisca, chief of the tribe inhabiting this region when first visited by the white man The Chisca mound was utilized in 1863 as an artillery redoubt and magazine fortress, Fort Pickering, and the top of the mound was excavated for that purpose Up above the center of the city, the forces of the river have deposited an island over the site of a gunboat battle during the war. There, under the guns of the defending battery in what is now Confederate Park, the Federal forces were victorious, and later General William T. Sherman took command of the city. In those days the Wolf River, a stream meandering north of Memphis, emptied into the Mississippi above the city. But in the years that followed, the silting deposits of the Mississippi formed an island in front of the mouth of the Wolf and extended it about three miles down stream to the center of the city.

A city that heard the tramp of Federal troops in 1862 is now proud to be the

headquarters of the Second Army of the United States, proud that Lieutenant General Ben Lear selected this central location to command troops stationed in Arkansas, Tennessee, Alabama, Kentucky, Illinois, Indiana, Missouri, Kansas, Michigan, Wisconsin, and Wyoming.

The position of Memphis at the crossroads of the South is amply proved by the six air routes into and out of the city. New Orleans, Chicago, Dallas, Houston, Washington, and Miami are only a few hours away. A 502-acre airport with mile-long paved runways is increasingly important in a civilian and military transportation system. Ten trunkline railways link Memphis with the Southeast, Southwest, and the industrial cities to the north and east. Eight national highways with a free bridge over the Mississippi River handle an increasing volume of private and commercial motor traffic.

Memphis is nationally recognized as having the greatest fire prevention organization in the country. In 1938 and again in 1939 Memphis was given the grand award among all cities in the United States for fire prevention. The Chamber of Commerce of the United States saluted Memphis as the only major city ever to have won this honor in two consecutive years.

The first southern city to receive the National Safety Council's highest honor was Memphis. The award was bestowed in 1938 for the previous year's traffic record and for leadership in motor vehicle inspection. Memphis was the first city to inaugurate a municipal inspection station for trucks and automobiles with tests made three times a year to determine and correct mechanical faults. At the present time Memphis leads the Nation in traffic fatality reduction. This record is due largely to the aggressive attitude toward traffic regulation including speed limit and horn blowing. The Anti-Noise Ordinance has made Memphis one of the quietest cities in the country.

Memphis has gone far in the matter of municipal ownership of its public utilities. For years the city has operated the world's largest artesian water systems, but only recently it purchased the city-wide electrical distribution system and facilities for handling natural gas from Louisiana. When the Tennessee Valley Authority was launched and power moved out over transmission lines from Wilson Dam on the Tennessee River, Memphis voted the necessary funds for the purchase of its utilities. Today, the City of Memphis supplies electricity, gas, and water to approximately 60,000 families.

Resulting low rates are bringing about increased consumption of kilowatt hours both in the home and in the factories, and new industries are turning an appreciative eye upon particularly attractive rate structures. The city's far-reaching step toward low power rates is casting a lengthening shadow along the highway that Memphis plans to travel toward becoming an increasingly important southern industrial center.

Memphis has grown to be the world's largest nonproducing steel center, with eastern steel companies establishing warehouses there and with movement of steel down the Ohio and Mississippi Rivers for redistribution by rail to the South, Southeast, and particularly to the oil fields of the Southwest.

Because of its location on the Mississippi River, Memphis has naturally benefited. In recent years there has been a general revival of activities in the Memphis harbor with approximately $122,000,000 worth of freight moving annually through this port. The river-rail terminal has been enlarged. A huge municipal grain elevator has been built with river and rail-loading equipment. This makes possible the movement of grain down the Missouri and Mississippi Rivers and the redistribution by rail from this point.

Not so picturesque perhaps as the Robert E. Lee or the Kate Adams, the modern twin-screw, oil-burning towboat handles far more freight tonnage in one trip from Memphis to New Orleans than the ornate steamers of the seventies. An old-time packet boat had a capacity of 1,800 tons. But a modern barge will carry more than that, and it is customary to have six to eight barges in one tow.

Since the beginning of cities, strategic location and transportation have been governing factors in expansion and development. Therefore, it is no surprise to Memphians when informed manufacturers look with favor on this city as a logical industrial and distribution point. The increasing trend of industry has been toward the South in the past six to eight years and a large number of concerns have begun operations in Memphis.



The Doughboy in Overton Park

The year 1941 will long be remembered as the date when the $20,000,000 British smokeless powder plant began producing explosives from cotton linters, 20 miles from Memphis. Also in this area is a huge shell-loading plant for the United States Army. Just outside the city limits and near the Municipal Airport is the $15,000,000 United States Quartermaster Depot. On the other side of the city is the $7,000,000 Fisher Memphis Aircraft Division of General Motors where airplane parts will be manufactured. With pardonable pride Memphians invariably round off any story of industrial expansion by referring to the $5,000,000 factory investment made by Firestone Tire and Rubber Co., in 1937.

A little more than 10 years ago Sears Roebuck and Co. invested $3,000,000 in wholesale and retail distribution units for Memphis. Sales have since proved that the appraisal of the Memphis market possibilities was justified. About a year ago this company spent nearly $1,000,000 in enlarging its physical plant in Memphis.

Memphis has not been a "Topsy" city—it has not just grown. The original city fathers set aside four downtown parks when the city was first laid out in 1819. As the city's boundaries spread out, the need for definite planning became apparent and in 1921 Harland Bartholomew, St. Louis engineer, drew up the Memphis City Plan. Zoning commissions have kept residential areas protected while at the same time definite parts of the city have been set aside for industrial expansion. Memphis' city plan has resulted in well laid out public parks, playgrounds, community centers, wide streets, and tree-lined parkways.

Modernized zoological gardens in Overton Park feature the moat system for displaying animals in their natural habitat. The unique monkey island, a fascinating example of this system, is inhabited by 100 India Rhesus monkeys and a goat. When the island was built several years ago, the goat was introduced to keep the grass down. He soon got used to the monkeys and let them climb on his back and ride around the island. When he tires of it, he just bucks them off. Among other interesting attractions at the zoo are the open bear pits and a pair of hippopotami with their ninth calf less than a year old. Also in Overton Park are the Brooks Memorial Art Gallery, the Memphis Open Air Theater, and a Municipal Golf Course.

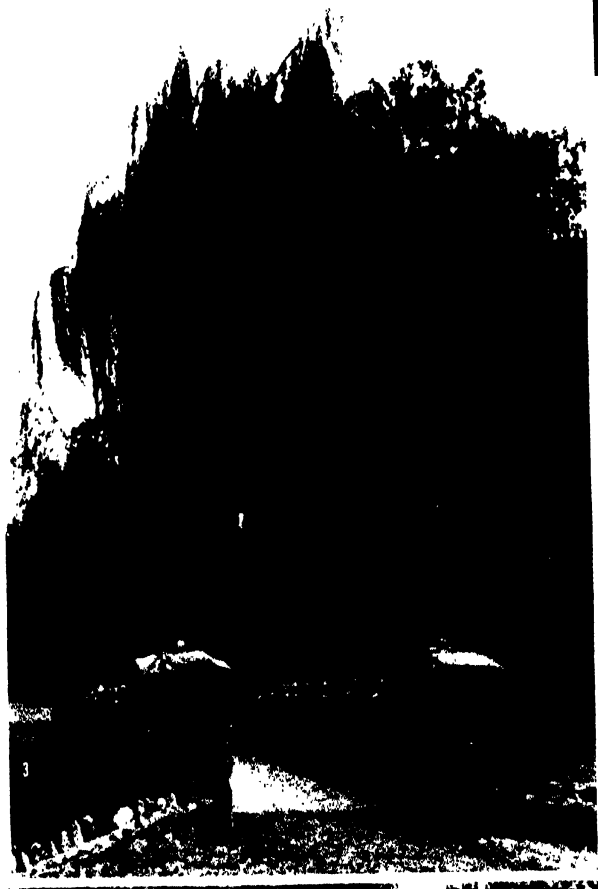
The residential subdivision of Chickasaw Gardens was once the estate of a millionaire grocer. His palatial home of pink Georgia marble, the "Pink Palace", now houses the Little Theater and the Memphis Museum of Natural History.

TO MEMPHIS A. C. S. MEMBERS

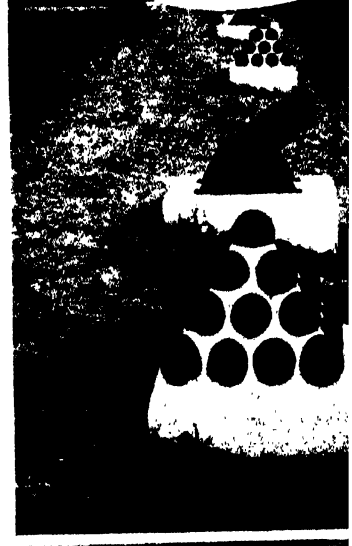
April 20 to 24

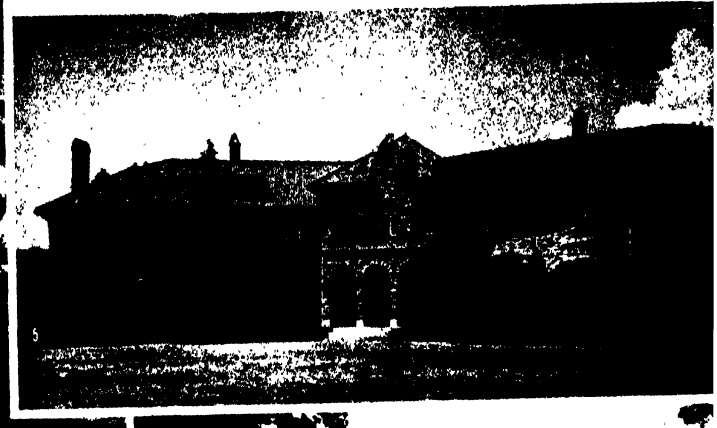






The Mississippi called DeSoto and his Spanish adventurers to the bluffs of Memphis 401 years ago. On April 20 to 24 the Mississippi calls A. C. S. members to the 103rd national meeting on the same bluffs. Meeting attendees will see modern Memphis as well as relics and monuments to its history. (1) Confederate Park. (2) The bears beg for peanuts at the zoo in Overton Park. (3) A footbridge on the Municipal Golf Course in Overton Park. (4) Fort Pickering in DeSoto Park. (5) The Pink Palace. (6) Monkey Island in Overton Park. (7) The Brooks Memorial Art Gallery situated in Overton Park.









A few years ago a park, Shelby Forest, consisting of 13,000 acres was created in a heavily wooded section on the banks of the Mississippi River a few miles north of the city. This is rapidly becoming a popular recreation area and has tourist appeal.

Glamour of the Old South still clings to Memphis. Romance and southern history abound here. Each spring brings forth memories of the past as wisteria drops its purple flowers above the old verandas and magnolias blossom in fragrant gardens. Yet Memphis is not living in the faded glory of many years ago.

Here on the bluffs above the Mississippi River is a metropolitan city made possible and perpetuated by the 2,500,000 people who live within a 200-mile radius. Below Memphis on both sides of the Mississippi River is the great agricultural empire that lies in the rich alluvial Delta. For generations this area has depended upon cotton as its main source of income. Spurred by the world economic situation and encouraged by the now nationally known Plant to Prosper program, farmers seriously began a diversified agricultural program in 1934. Last year more than 80,000 farm families in the Midsouth participated in this great agricultural adventure in living-at-home.

While the purpose of this program has been to improve farming conditions in the Midsouth and to provide other cash crops for farms where it was no longer profitable to raise cotton, there have been two striking and interlocking developments—the creation of pastures and the growth of the livestock industry. In Mississippi alone there are approximately 725,000 head of beef cattle, and officials estimate that annual cash income from beef cattle averages about $10,000,000 for Mississippi alone.

The importance of this agricultural program can hardly be overemphasized, for while Memphis has its smokestacks and its payrolls it still watches the rolling fields and the plantations, the small towns and the red hills, for it is from these sources that this Midsouth metropolis continues to draw its ever-stable wealth.

After all, Memphis has its roots in the soil and its future must always be chartered by Old Man River—the River of the Holy Ghost.

A. C. S. 100 Per Centers

ANOTHER organization joins the ranks of 100 per cent membership in the AMERICAN CHEMICAL SOCIETY.

All of the staff of the American Home Products Corp. (I. V. C. Division), Research and Control Laboratories, Richmond Hill, Long Island—S. Ansbacher, director of research, Oscar Gawron, Jerome F. Grattan, W. A. Wisansky, S. Fein, E. Gunsberg, Joseph E. Keating, and Charles La Rosa—are A. C. S. members.

The L. S. O. G. Exchange

Edited by A. A. Ashdown, Ed. F. Degering, J. E. Hawkins, and S. L. Redman

Send Items to Ed. F. Degering, Department of Chemistry, Purdue University, Lafayette, Ind.

THE Maine Section of the A. C. S., according to its constitution, exists for the encouragement and advancement of chemistry in all its branches and for the promotion of social intercourse among those interested in chemistry and the chemical industries. The majority of the members in the section are on the teaching or experimental staffs of three colleges and the state university, or are associated with the numerous pulp and paper mills of the State. There are few other chemical industries in the State.

The problems which face the section are those which result from geographic isolation and weather conditions during a large portion of the year. The plan in recent years has been to have two main meetings—one in the fall and one in the spring. One of these meetings is held in the western part of the State at Lewiston or Brunswick where are Bates and Bowdoin colleges. The other is usually at either Colby College in Waterville or at the university in Orono. Last year a third meeting was held at Portland in conjunction with a meeting of the Maine Science Club of that city. The uncertain character of the weather during the winter months and the distances which the members have to travel to attend sectional meetings make it almost impossible to plan for an important meeting during the months of most severe weather.

The membership of the section usually numbers about 50, which provides limited funds for bringing in outside speakers. In the past, however, these funds have proved adequate, especially when touring speakers have been obtained. These cooperative tours have proved extremely helpful. At the 1941 fall meeting a departure from recent years was tried when three members of the section presented papers. The success of this venture will undoubtedly lead to similar meetings in the future.—IRWIN B. DOUGLAS, Maine Section.

We are so young that probably we do not realize our problems. Financially we seem to be in good shape. This is because we have been reasonably careful in expenditures and have had relatively little expense for speakers. Nevertheless, our programs have been excellent, and we hope to maintain our level.

Our membership is growing, as we knew it would once we had a section charter and an active group.

We shall probably continue having one of our own group as the speaker for an occasional meeting. This of course costs us nothing. We have had three such meetings and feel that they are valuable in promoting acquaintance with each other and with the work of our members.—JOHN W. CHITTUM, Wooster Section.

As this issue of CHEMICAL AND ENGINEERING NEWS goes to press, 25 of the 365 days, or about 6.8 per cent, of 1942 will have become history. If this year is to represent the best yet for your section, approximately 7 per cent of your anticipated program should be checked off. Is it possible that you had on your agenda a column for the L. S. O. G. Exchange? If so, let us have your contribution before another month has slipped by. It is always informative and helpful to know what others are doing to solve their problems and to make this year the best in the history of their section.

The Philadelphia Section and National Defense

THE Speakers' Bureau of the Philadelphia Section of the AMERICAN CHEMICAL SOCIETY has proved so successful that it has been drafted by the Adult School Organization of Philadelphia, The Junto, to present a course in Civil Air Defense for the general public and interested defense workers.

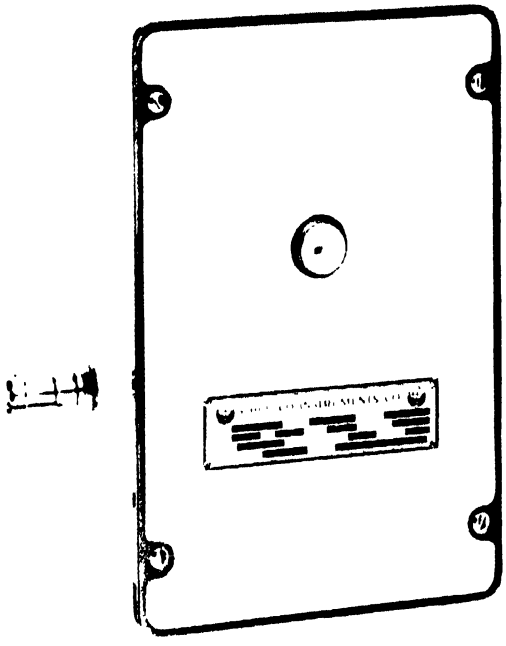
According to Donald L. Gibson, chairman of the Publicity Committee of the Philadelphia Section, the course will include chemical warfare defense and will give a more thorough background of the problem of defense against air and chemical attack than was possible for the city to give in the special course for air raid wardens. Starting Friday evening, January 23, the course will continue for 10 consecutive Friday evenings. Most of the instructors are or were officers in the Chemical Warfare Service.

The mounting satisfaction of audiences in the Speakers' Bureau has resulted in the Upper Darby Adult School presenting a course of popular chemistry lectures by speakers from the bureau for the third consecutive term. This series, called "The Importance of Chemistry in the Service of Medicine", started January 15. In addition, the Speakers' Bureau has again been asked by Philadelphia's Adult School, The Junto, to present two series of popular talks at the spring term, beginning January 19.

DONALD L. GIBSON

CONTROL LIQUID LEVELS

without floats or contacts



WHEELCO REMOTE CONTROLS

These *new* Remote Controls effect control action without any contact with the liquid to be controlled

They operate on a differential of .001 to .125 inches change in liquid level

They may be used with electrolytic liquids as well as dielectric liquids having dielectric constants as low as 1.8

They are capable of controlling the INTERFACE between 2 liquids—as described below

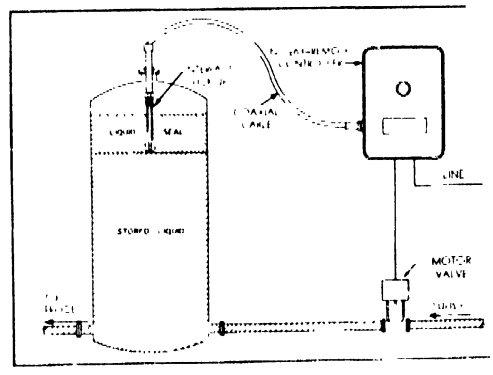
DESCRIPTION OF OPERATION

Remote Controllers employ Wheelco's famous "Radio Principle." A "Radio Principle" Control System consists, essentially, of an electronic tube and a relay assembly. The electronic tube is maintained in an oscillating condition and thereby generates a high frequency alternating current. This current is conducted to a Pick-up Unit by means of a special cable. Any material entering the field of the Pick-up detunes the oscillator. The resulting change in current through the relay operates its contacts.

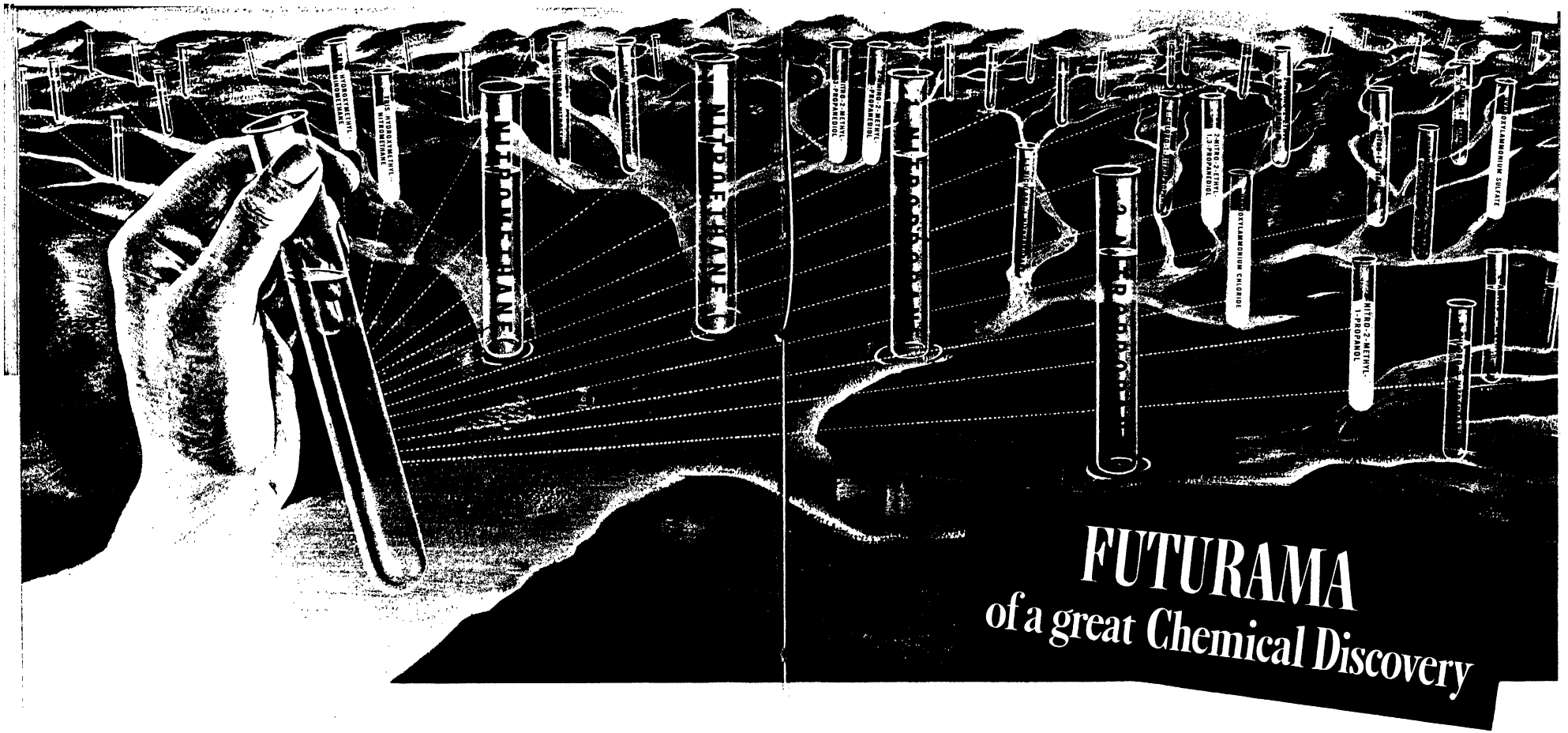
REMOTE CONTROLLERS ARE AVAILABLE FOR A LARGE VARIETY OF APPLICATIONS

Wheelco Remote Controllers can be utilized for almost any application where control is essential. Various Pick-up Units, other than the one shown, are available for special control applications.

INTERFACE CONTROL—An Interface Pick-up Unit is placed in the vessel with the tip at the point where the interface is to be maintained. A movement of the interface between the two liquids—which, for example, may be an aqueous solution and an organic material—causes control action. The Model 263 Remote Controller energizes the throttling valve motor to open or close the valve, according to the position of the interface with respect to the Pick-up Unit. At an intermediate interface position it will permit the motor to stop, thus "floating" the valve in the correct position to maintain the level desired.



For Complete Data on Wheelco Remote Controllers Write for Free Bulletin No. J2.



FUTURAMA of a great Chemical Discovery

The NITROPARAFFINS offer new opportunities for Chemical Exploration

Like the unexplored tributaries of a great river, the Nitroparaffins . . . Nitromethane, Nitroethane, 1-Nitropropane, and 2-Nitropropane . . . offer countless channels for exploration and discovery. And each new channel . . . each new derivative . . . opens rich, fertile fields to the chemical explorer.

From the four Nitroparaffins, over a thousand new and useful organic materials have already been derived . . . materials useful for their physical properties . . . valuable for their reactive qualities. These new chemicals have demonstrated their worth in many industries . . . as solvents, detergents, emulsifying agents, fumigants, insecticides, pharmaceuticals, and wetting agents. But equally important are the limitless possibilities they provide for chemical synthesis . . . serving as building blocks for the erection of new chemical structures.

"The most important advance in Chemistry since the Development of the Coal Tar Derivatives"

Seventy years ago, the *coal tar* family showed remarkable promise. Every chemist knows the rich rewards reaped by the research workers who developed those new products. Today the *Nitroparaffin* family offers comparable opportunities. New products . . . improved processes . . . lower costs . . . personal achievement . . . those will be the rewards of creative chemists with the vision and foresight to investigate *now* the Nitroparaffins and their derivatives.

WRITE FOR NEW BOOKLET

"The Nitroparaffins—New Worlds for Chemical Exploration"—40 pages of new and useful technical information about the NP's.



COMMERCIAL SOLVENTS
Corporation



American Chemical Society[1]

103RD MEETING. Memphis, Tenn., April 20 to 24, 1942.

104TH MEETING. Buffalo, N. Y., September 7 to 11, 1942.

105TH MEETING. Indianapolis, Ind., spring of 1943.

106TH MEETING. Minneapolis, Minn. fall of 1943.

NINETEENTH NATIONAL COLLOID SYMPOSIUM, Division of Colloid Chemistry. University of Colorado, Boulder, Colo., June 18 to 20.

Other Scientific Societies

AMERICAN ASSOCIATION OF CEREAL CHEMISTS. Edgewater Beach Hotel, Chicago, Ill., May 18 to 22. Annual meeting.

AMERICAN CERAMIC SOCIETY. Hotel Netherland Plaza, Cincinnati, Ohio, week of April 19. Annual meeting.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Boston, Mass., May 11 to 13. Semiannual meeting.

AMERICAN INSTITUTE OF NUTRITION. Boston, Mass., April 1 and 2.

AMERICAN PHYSICAL SOCIETY. Detroit, Mich., February 20 and 21.

AMERICAN SOCIETY OF BIOLOGICAL CHEMISTS. Copley-Plaza, Boston, Mass., March 31 to April 4.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS. Bellevue-Stratford Hotel, Philadelphia, Penna., January 25 to 29. Annual meeting.

INSTITUTE OF FOOD TECHNOLOGISTS. Minneapolis, Minn., June 15 to 17.

NATIONAL CHEMICAL EXPOSITION. Stevens Hotel, Chicago, Ill., November 17 to 22.

NATIONAL PETROLEUM ASSOCIATION. Hotel Cleveland, Cleveland, Ohio, April 16 and 17. 39th semiannual meeting.

SCIENTIFIC APPARATUS MAKERS OF AMERICA. Hotel Hershey, Hershey, Penna., June 1 to 3.

SIXTH PHARMACEUTICAL INSTITUTE. Center for Continuation Study, University of Minnesota, Minneapolis, Minn., February 16 to 18.

TECHNICAL ASSOCIATION OF PULP AND PAPER INDUSTRY. Commodore Hotel, New York, N. Y., February 16 to 19.

[1] The list of the SOCIETY's National Officers and Directors, Editors, members of Council, Divisional and Local Section Officers, Committees, and Chapters of Student Affiliates appears in CHEMICAL AND ENGINEERING NEWS three times a year—usually February 10, May 10, and October 10. The latest list is printed on page 1097 of the October 10, 1941, issue.

Local Sections

SECTION AND PLACE	FEB.	SPEAKER	SUBJECT
New York, Hotel Pennsylvania	6	**M. F. Behar, John A. Hipple, Thomas R. P. Gibb, Jr., and C. O. Fairchild**	Instruments and Methods
North Jersey, Winfield Scott Hotel, Elizabeth	9	**Henry Eyring**	Physical and Chemical Effects of Melting Transition
Northeastern, Huntington Hall, M. I. T., Cambridge, Mass.	12	**A. A. Blanchard**	Industrial Uses of Carbonyls
Rochester, Lower Strong Auditorium, River Campus, University of Rochester	2	**Per K. Frolich**	
St. Louis, Mo.	2	**D. B. Keyes**	Economic Appraisals
Virginia, Simon Baruch Auditorium, Medical College of Virginia, Richmond	13	**M. C. Teague**	Some Recent Textile-Latex Developments
Virginia Blue Ridge, Salem	14	**J. C. Forbes**	Vitamin B Complex
Washington, D. C., Cosmos Club	12	**W. Swietoslawski**	Precritical, Critical, and Posteritical Phenomena

Ninth National Organic Chemistry Symposium

Ann Arbor, Mich., December 29 to 31, 1941

MEMBERS of the Division of Organic Chemistry of the AMERICAN CHEMICAL SOCIETY and their guests assembled at the Horace H. Rackham Building of the University of Michigan on Monday, December 29, for the opening of the ninth biennial symposium on organic chemistry. After the meeting was formally opened by Divisional Chairman Lee I. Smith, Moses Gomberg welcomed the symposium to Ann Arbor and AMERICAN CHEMICAL SOCIETY President William Lloyd Evans responded on behalf of the Division of Organic Chemistry. Both pointed out the improved position of chemical industry and research compared with World War I days, and stressed the willingness of chemists to serve during the emergency. Later in the meeting Roger Adams spoke for the National Defense Research Council in thanking chemists who were working on war problems and expressed appreciation to the many others who have offered their services. He explained the necessity of centralizing effort on urgent problems. Suggestions and ideas on chemical war problems submitted to the NDRC will receive careful consideration.

After the introductory remarks, members of the symposium heard and discussed papers on structures, properties, and reactions of organic compounds. Papers on structure or syntheses of substances of biological importance were presented by W. E. Bachmann, Sex Hormones; Karl Folkers, Vitamin B_6; Roger J. Williams, Growth Substances; and Nathan L. Drake, who discussed the chemistry of certain substances related to cork. Organic reactions discussed included Dehydrogenation, by Homer Adkins; Chain Reactions, by M. S. Kharasch; Condensations Reactions, by Charles R. Hauser; Dehydration, Polymerization, and Depolymerization, by Frank C. Whitmore Progress in studies of particular classes of compounds were related by C. S. Marvel-Structure and Dissociation of Hexaryl, ethanes; S. M. McElvain, Ketene Acetals; R. L. Shriner, Flavilium Salts and Anthocyanidins; and L. G. S. Brooker, Absorption and Resonance in Dyes. Discussion groups were held after each morning and afternoon session.

Lithoprinted programs of 105 pages containing the material on the speakers' slides were supplied to members of the symposium. Additional copies may be obtained from the Secretary of the Division of Organic Chemistry for $1.00.

An exhibit of special apparatus useful in organic operations was held in the University of Michigan Chemistry Building on Monday and Tuesday evenings. The exhibit was well attended and attracted much interest. Members of the symposium are indebted to L. C. Anderson, who had charge of the exhibit, to the Michigan graduate students who helped to get it into operation, and to all who exhibited equipment.

The highlights of the meeting were the humble, inspiring, and very human reminiscences which Professor Gomberg related after the symposium dinner Tuesday night. Beginning with an apology for the use of the first person, Professor Gomberg sketched the beginning of organic chemis-

try in this country through his experiences. Few who heard his story will ever forget it.

Attendance at the symposium was surprisingly high. Members came from 29 states, the District of Columbia, Canada, Argentina, and Brazil. Attendance compared with previous symposia follows:

Year	Place	Registration
1925	Rochester	175
1927	Columbus	355
1929	Princeton	394
1931	New Haven	356
1933	Ithaca	274
1935	Rochester	447
1937	Richmond	466
1939	St. Louis	468
1941	Ann Arbor	488

Classsification of the registrations yielded the following:

	Registration	
	1941	*1939*
University	166	178
Industrial	213	173
Research institutions	18	29
Graduate students	86	83
Unclassified	5	5
Total	488	468

The Division of Organic Chemistry has received invitations from several local sections of the American Chemical Society to become their guests for the next symposium, scheduled for December 1943. No decision has been made concerning the place of the next symposium, and the Executive Committee of the Division of Organic Chemistry will appreciate additional suggestions.

The University of Michigan Section of the American Chemical Society and the Local Symposium Committee of M. Gomberg, W. E. Bachmann, C. S. Schoepfle, F. F. Blicke, J. O. Halford, J. M. Chemerda, E. C. Horning, and L. C. Anderson made every effort to see that the meeting ran smoothly, and their efforts are appreciated by the members of the symposium.

Arthur C. Cope, *Secretary*
Division of Organic Chemistry

National Association of Fan Manufacturers

The National Association of Fan Manufacturers, Detroit, Mich., will celebrate its 25th anniversary at its annual meeting to be held in Detroit, February 12. Its activities have been gradually enlarged to include research, engineering standards, educational work in the proper uses of air moving machinery, improved working conditions, etc. Its publications include standard methods for centrifugal fans and blowers, standard test code for centrifugal and axial fans, comparison charts for planing mill exhausters and cast iron volume fans, field test of fans, and abrasion.

Recent Developments in the Chemistry of Nonmetals

Recent Developments in the Chemistry of the Nonmetals, the topic of the Sixth Annual Symposium of the American Chemical Society's Division of Physical and Inorganic Chemistry, brought 120 chemists to Columbus, Ohio, over the period December 29 to 30, 1941. Although the competition of other meetings and the "seven-day-week" undoubtedly kept many from attending, there was no diminution in interest and in participation by those present. The program, comprising five half-day sessions, was made up of 18 papers originating about equally from university and industrial laboratories. The meetings successfully accomplished the correlation of investigations in the pure and applied aspects of several of the common nonmetals.

The social gathering Monday evening provided opportunities for conversation and "bull sessions" among old and new friends against a background of informal music and refreshments. Vocal talent among visiting chemists added to the evening's enjoyment. Many took advantage of the opportunity to visit the laboratories of the Battelle Memorial Institute and of The Ohio State University. Felix E. Held, College of Commerce and Administration, Ohio State University, addressed the group at the dinner Tuesday evening. The gathering was honored by the presence of President William Lloyd Evans and Past President William McPherson.

The symposium was arranged by a national committee under the chairmanship of W. C. Fernelius. Local arrangements were admirably cared for by A. B. Garrett, J. P. McReynolds, and L. L. Quill of The Ohio State University and R. O. Stith of the Battelle Memorial Institute.

Graduate Fellowships at Johns Hopkins

The Johns Hopkins University under its National Fellowship Plan offers graduate fellowships in chemistry. The Remsen Teaching Fellowships, named in honor of Ira Remsen, are designed for men interested in either industrial or academic research. The Chemical Foundation Teaching Fellowship is supported by funds donated by the Chemical Foundation, Inc. The York Ice Machinery Corp. is providing a fellowship for the graduate study of physical chemistry.

The stipend in each case is $1,000 annually. Applications must be sent before February 15, 1942, to A. H. Corwin, The Johns Hopkins University, Baltimore, Md.

New Courses at Brooklyn Polytechnic

Eleven new courses in chemistry and chemical engineering subjects will be offered during the second semester of the Graduate School at Polytechnic Institute of Brooklyn, which opens January 29. Courses are given one evening per week with registration starting January 22. Detailed descriptions of each subject may be obtained from the Dean of Graduate Study, 85 Livingston St., Brooklyn, N. Y.



Diatoms for Defense

A group from Dicalite Co. at dinner after a recent production-sales conference in Los Angeles. At right is C. A. Frankenhoff, president, at far end of table, A. L. Gossman, executive vice president. The purpose of the conference was to coordinate production and distribution from the company's two plants on a full wartime basis.

Engineers Discuss Applied Thermodynamics



Above. C. F. Prutton, Case School of Applied Science.



Authors of papers. *Above.* Walter Fuchs of Pennsylvania State College. *Left.* C. E. Reed, Massachusetts Institute of Technology.



Above. F. M. Whitacre of Case, member of the Local Arrangements Committee, and T. Chilton of du Pont. *Below.* C. C. Furnas of Yale, L. W. Bass of Mellon Institute, and C. F. Prutton, chairman of the Local Arrangements Committee, at the banquet.

THE eighth annual Chemical Engineering Symposium, Division of Industrial and Engineering Chemistry, A. C. S., at Case School of Applied Science, December 29 and 30, 1941, was attended by 116 engineers who heard and discussed 13 papers on aplied thermodynamics. The program appeared on page 1418, NEWS EDITION, December 10, 1941. The two-day meeting, held every year during the Christmas period to enable academic as well as industrial representatives to attend, was opened with introductory remarks by W. E. Wickenden.

A meeting of the executive committee was held at the close of the Monday afternoon session. The resignations of C. C. Furnas, chairman of the Symposium Committee, and W. L. McCabe were accepted. O. A. Hougen, University of Wisconsin, was made chairman of the Symposium Committee, C. M. Cooper was appointed in place of W. L. McCabe, and another member was added, K. M. Watson. A symposium title for the 1942 Christmas session (Process Design with Emphasis on Reaction Rates) was suggested and it was tentatively accepted by the committee. Monday evening a banquet was held at the headquarters hotel, the Tudor Arms. M. J. Rentschler acted as toastmaster and A. A. Bates, director of chemical research at the Westinghouse Electric & Mfg. Co., spoke on Metals *vs.* Plastics.

The symposium will be printed in *Industrial and Engineering Chemistry* and abstracts of the papers are available from Whitney Weinrich, Secretary, Division of Industrial and Engineering Chemistry.

During the symposium there were many requests for thermodynamic data to be used in connection with defense projects. The Cryogenic Laboratory and the new Thermochemical Laboratory of the School of Chemistry and Physics of The Pennsylvania State College will be glad to receive suggestions and inquiries as to any part it can play in obtaining adequate data as quickly as possible for use in defense studies or industries. Apparatus is available for complete entropy measurements, including vapor pressure data and heats of vaporization. Apparatus for work on accurate heats of combustion and on accurate gaseous heat capacity measurements up to 600° C. is nearly completed. Correspondence should be addressed to J. G. Aston or Frank C. Whitmore at Pond Laboratory, State College, Penna.



Above. Dysart Holcomb of the University of Michigan.



Above. B. F. Dodge, Yale, executive committee, Division of Industrial and Engineering Chemistry. *Right.* M. Dorcas, National Carbon.

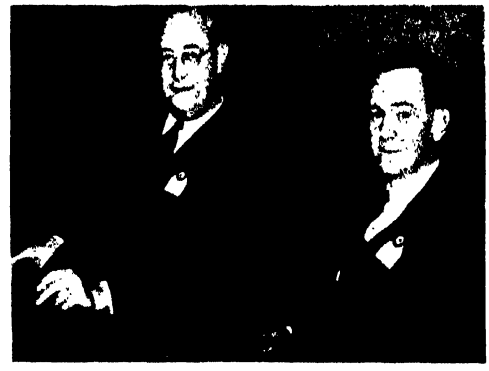


Above. R. York, Jr., of Carnegie Institute.



Above. H. P. Meissner of M. I. T.



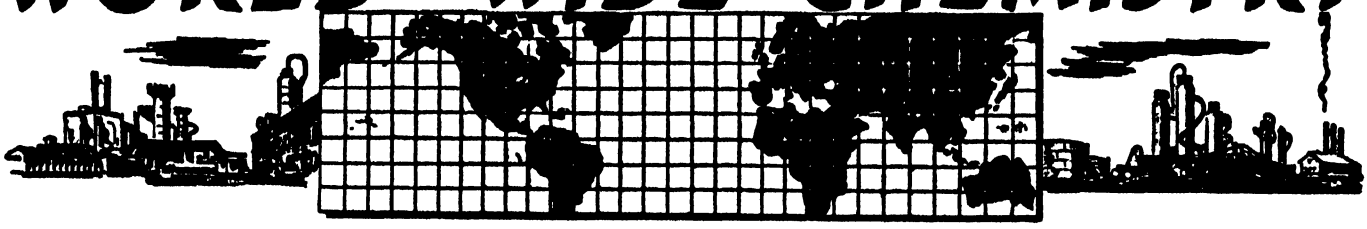


Above. E. D. Wilson, Worcester Polytechnic Institute, and L. W. Bass, Mellon Institute. *Below.* T. Chilton, E. I. du Pont de Nemours & Co., E. A. Arnold of Case, member of the Local Arrangements Committee, and B. F. Dodge of Yale University.





WORLD-WIDE CHEMISTRY



GERMANY

Increased utilization of local coal for the manufacture of synthetic motor fuel is a principal object of the planned rationalization of heavy industries in Upper Silesia, under direction of a special commissioner, Dr. Pott. With an annual output of somewhat over 25,000,000 tons, mines in the German part of Upper Silesia supplied only one fifth of the coal output of the Ruhr mines, but combined production from the German, Polish, and Czech parts of the province was about 80,000,000 tons a year before the war and may have increased since because of the transfer of industrial workers from western Germany.

Heretofore the only coal-oil plants supplied from Upper Silesia are the hydrogenation plant at Poelitz on the Baltic coast, which has a capacity of 150,000 tons or more a year of motor fuel and was originally intended to use Silesian coal as well as imported oil residues, and a much smaller one working by the Fischer-Tropsch process and operated by the Schaffgottsch interests. Several more coal-oil plants may be built in Silesia, although existence of several large hydrogenation plants using lignite and creosote only 200 miles to the west would make such an enterprise inadvisable in normal circumstances. The main difficulty at present is procuring necessary equipment. The two plants now in operation commenced production early in 1940 and took some 20 months to build.

Lacquered Cans Replace Tin Plate in Germany

Earlier experience in the use of lacquer-protected cans instead of tin plate has filled consumers in Germany with suspicions as to their suitability for food preservation, but recent advances in synthetic resins are claimed to permit use of lacquered cans for meat, fish in oil, fatty substances, and mild vegetables if these are not to be kept for too long. Usually two coats of lacquer are applied, one to ensure adhesion to the steel surface, the other to protect against corrosion. For welded and notched cans a hard lacquer is used; for cold-drawn cans the lacquer is blended with a suitable softener. More recently promising results are said to have been obtained by application of solid resin foils to steel cans. Polyvinyl chlorides, used for this purpose, give full protection against corrosion, but they absorb water during sterilization which gives them a white color. They cannot be used for welded cans.

Schering A. G. Reports Decline in Sales Abroad

Schering A. G., Berlin, a leading manufacturer of pharmaceutical products in Germany, reports that export sales for the past year have not been fully maintained, although deliveries to other European countries have increased. Sales of proprietary articles, products for the textile industry, and insecticides rose again. The subsidiary engaged in cosmetics manufacture reduced its production, but continued sales from stocks. The subsidiary concerned with photochemicals also sold from stocks and completed the "war-economical change-over". Prospects for the current business year are said to be favorable.

Synthetic Fiber Plants Draw on New Raw Materials

Use of new raw materials was discussed by several producers of synthetic fibers in Germany at recent shareholders' meetings. Flax, rape, and hemp residues, straw, reed, and thistles are among materials which have been employed experimentally or on a commercial scale. Production costs are generally higher for fiber made from these substances. Another difficulty is that some of the new raw materials, straw in particular, are difficult to obtain, with the result that the new capacity could not be fully utilized. New processes have been developed to prepare straw and residues for use in the normal machinery. One of these, the so-called Vorhydrolyse process, supplies by-products from which yeast for special protein food products can be prepared. Utilization of these by-products is to begin soon. Another new process now being tried out in a pilot plant is the so-called Direktiv process which aims at avoiding more expensive preparatory treatment by milling the raw material to a very small size. Extension of existing plants is reported from some firms working in eastern parts of Germany, but plans for one of these factories at Küstrin were delayed by lack of equipment.

While value of the thistle for spinning purposes is considered problematic, its low weight is said to make it an ideal substitute for kapok for filling cushions. The thistle fiber resembles kapok in that it has a smooth, silky touch and retains heat well, but it is not water-repellent. Thistle seed is stated to be a valuable poultry food, while the fiber is best used in conjunction with other materials.

Fertilizer Companies Formed for German-Occupied Eastern Europe

The formation of Stickstoff-Ost G. m. b. H., capital 100,000 marks, and Superphosphat-G. m. b. H., capital 20,000 marks, indicates the trend of German plans for the future of nitrogenous and phosphatic fertilizer plants taken over in annexed parts of Poland. Both these firms are to "advise" companies engaged in the fertilizer industry in the eastern territories and will carry out instructions received from the Minister of Economics. They are to cooperate closely with existing German syndicates for these fertilizers. Another company, Grossdeutscher Phosphat-Versand G. m. b. H., capital 100,000 marks, has been formed to act as the representative of the phosphatic fertilizer industry in all parts of Germany. To judge from its name, it will be concerned mainly with distribution and delivery.

Perlon Fiber Produced by I. G. Farbenindustrie

To overcome the drawbacks of the PeCe-fiber, a synthetic product derived from an acetylene basis, the I. G. Farbenindustrie has developed a new fiber, Perlon silk, described by Dr. Kleine to the Technical-Literary Society. It has a melting point above 270° C., possesses greater elasticity and strength than natural silk, has a specific gravity of 1.1, and is used for similar purposes as nylon. After spinning, the fibers are stretched to four times their length. PeCe-fiber,

EDITOR'S NOTE. Those interested in further details should address the correspondent whose name and address appear for each country, and enclose sufficient international coupons to prepay the reply. United States stamps should not be sent.

owing to its low softening point of 80° to 90° C., does not stand ironing and has proved of little value to the textile industries.



After earlier contradictory announcements it was officially stated that with approval of the governments in Berlin and Vichy the Société des Matières Colorantes et Produits Chimiques "Francolor" has been formed with a capital of 800,000,000 francs. The new company has taken over, as of January 1, 1942, the dyestuffs interest of Kuhlmann, St.-Denis, and Saint-Clair du Rhône. In return for the French dyestuffs factories, the three named firms receive 49 per cent of the shares in the new company. The German dyestuffs trust, I. G. Farbenindustrie, receives 51 per cent of the capital, but I. G. Farbenindustrie does not make any cash contribution. Instead, the three French companies are to be given shares in the German company. I. G. Farbenindustrie has undertaken not to compete with Francolor in the French interior market in so far as the new French company can supply it and will also hand over to the new company certain processes "the profitability of which under conditions prevailing in France is certain". In return the French company has undertaken not to compete with I. G. Farbenindustrie in the export business, and the three companies whose factories have been taken over will not make dyestuffs at all. Francolor will also produce certain chemical products apart from dyestuffs for distribution in France by the three founder firms, unless they decide to make those products themselves.

In justification of this transaction which subjects the French dyestuffs industry to German control, the I. G. Farbenindustrie has issued a lengthy statement referring to conditions which existed before 1914 when 88 per cent of the French dyestuffs market is said to have been in the hands of eight German firms. The capital of 800,000,000 francs is said to correspond to the internal value of the plant and equipment which was calculated "from the turnover consideration being given to the market differences between Germany and France". To finance the stocks taken over from the French founder-firms Francolor was to make use of a large franc credit.

France Plans Expansion of Magnesium Production

Although every effort is being made to increase the output of aluminum from bauxite available in large quantities in southeastern France, several leading chemical producers—Péchiney, Ugine, and Bozel-Malétra—have recently concentrated on possibilities of increased magnesium production. French output did not exceed 3,000 tons a year at the outbreak of war, but plans for extensions, which were then put into effect, are said to have made available additional plants such as the works of Lannemezan in the Pyrenees, soon to be completed. These enlargements have been furthered, also financially, by the Germans, and it is hoped that substantial quantities will be obtained before long. There are two raw material sources, the magnesium content of the Mediterranean which is to be extracted in existing salt pans near the coast and dolomite deposits in the country.

Difficulties with Motor Fuel Continue in France

Since Les Carburants Français was formed with a capital of 21,000,000 francs last spring, hopes for a substantial amelioration of the French motor fuel position by increased use of producer gas have been largely abandoned, although a new fuel basis has been developed in the form of peat deposits. Use of acetylene for automobiles has been prohibited. The authorities do not favor conversion of motor vehicles to gas generators until the raw material supply has been improved. The Paris bus company has been compelled to buy its own forests to secure enough charcoal. Sixteen thousand kilns operate throughout France, but in future no iron plates will be available for their construction. Something like 57,000 generator vehicles are said to be in use, most of them lorries, but some busses and taxis.

The General Commission for Substitute Fuels appointed last summer has investigated possibilities of producer gas, synthetic fuels, gaseous fuels, and alcohol. The only practical solution seems to be the grant of 250,000,000 francs to the Compagnie Française des Pétroles for prospecting and exploration work in southwestern France. Oil deposits are supposed to exist in Landes and Béarn, and systematic work is to be carried out in the whole of Aquitaine.



Increasing difficulties in the importation of nitrogenous and phosphatic fertilizers into Spain have caused Spanish industrialists to plan for the expansion of the production of chemical manures. It is hoped that after restoration of the Spanish mines potash output will at least cover home market requirements with something to spare for the Canary Islands.

The superphosphate trade suffers from uncertain deliveries of rock phosphates from French North Africa. Output of nitrogenous fertilizers seems to have increased, at least in so far as ammonium sulfate is concerned. A factory for the manufacture of synthetic nitrates is under construction, and it is reported that I. G. Farbenindustrie is building a plant to be operated by Nitratos de Castilla, a subsidiary of Saltos de Duero, under arrangements with the latter company. These new works may cover a substantial part of the demand for nitrates heretofore insufficiently covered by imports.

Cellulose to Be Made from Esparto Grass in Spain

Celulosa Almeriense, a company with a capital of 67,000,000 pesetas, intends to build two plants for production of cellulose from esparto grass. The factories are to be capable of a combined output of 22,000 tons a year. If commercial operations prove as successful as is hoped, a third plant will be built by the company.

G. Abrahamson
150 Halfway St.
Sidcup, Kent
England
December 27, 1941

Australian Subsidiaries of English Company Consolidated

A number of subsidiaries in the antipodes of Imperial Chemical Industries, Ltd., an English company, have been consolidated under an organization named Imperial Chemical Industries (NZ), Ltd., at Wellington, New Zealand. The new company is capitalized at £300,000 (New Zealand currency).

Like its parent firm, the Imperial Chemical Co. of Australia and New Zealand, Ltd., it is also a subsidiary of the English company. Formerly the various sections of the Australian and New Zealand company were represented in New Zealand by agents or subsidiaries. The subsidiary now distributes in the dominion all chemicals produced by the Australian and English companies. A move is under consideration for broadening dominion production activities whenever this seems practicable.

Australia Approaches Self-Sufficiency in Drug Output

With war stretching closer every day, Australian production of drug needs from available domestic materials has progressed to a stage where the country can be self-sufficient if overseas supplies are cut off.

Domestic production of anesthetics and antiseptics is under way, and laboratories are now working to produce sedatives, the one remaining requirement to make Australia self-sufficient in this field. The country was found to grow a large number of plants of the same genus as those from which overseas drug supplies have been made, and steps have been taken to develop such supplies as well as processes for making synthetic drugs and medicines.

POTOMAC POSTSCRIPTS

Priorities and Allocations

Burlap. Following issuance of Conservation Order M-47 limiting the use of burlap and burlap bags, officials of OPA, OPM, and OADR have been carefully considering the problem of bags for the movement of fertilizer. It is indicated that arrangements will be made for sufficient bags, either fabric or paper, for the spring's shipments. Plans have not been completed.

Cellophane. The ban on use of cellophane and similar transparent materials derived from cellulose for certain packaging or manufacturing purposes has been extended to cover a list of 24 general categories. The original ban applied to only 10 general uses.

The new order, issued as an amendment to Limitation Order L-20, is now effective and expires February 15. It does not apply to stocks of cellophane in users' hands on or before January 8, nor to stocks held by suppliers which were cut, processed, or printed prior to January 8 in such a way that they could not be used by persons unaffected by the order. Defense orders, as defined, and use of off-grade, waste, or defective cellophane also are exempt. Producers are required to make periodic reports on sales or deliveries of waste material.

Methyl Alcohol. Manufacturers accustomed to making antifreeze compounds containing methyl alcohol will be forced to seek substitutes during the coming winter months, by terms of Amendment No. 2 to General Preference Order M-31. The order, now in effect, forbids use of methyl alcohol for manufacture into, or packaging as, an antifreeze agent and applies to all stocks on hand as of January 1.

Persons having supplies of methyl alcohol originally intended for antifreeze uses are required to report all details to the Chemicals Branch of OPM, and in the meantime must hold such stocks for disposition as ordered by the Director of Priorities. Exempted from the prohibition are orders placed by the armed services of the United States, and the governments of Lend-Lease countries.

Substitutes for methyl alcohol are available.

Polyvinyl Chloride. The Priorities Division has announced Amendment No. 1 to Preference Rating Order M-10, the polyvinyl chloride order, which extends the effective term indefinitely.

Sheet Steel. General Preference Order M-45, affecting sheet steel for steel drums to be used for overseas shipment, has been amended so that hot rolled sheet steel of any gage may be used for the manufacture of sheet steel drums and the drums may be used for all kinds of products shipped overseas. The original order restricted sheet steel for the manufacture of steel drums to 16- and 18-gage and the use of the drums to shipment abroad of oil, gasoline, and petroleum products.

The order was also amended to make its expiration date indefinite.

At the same time, Preference Rating Order P-76 was amended to enable manufacturers of steel drums for foreign shipments to acquire sheet steel of all gages for such purposes. The original order covered only 16- and 18-gage steel.

Sugar. Support of the Nation's beverage distilleries in the war effort was enlisted with issuance of the third of a series of orders designed to conserve sugar. The orders affect molasses, ethyl alcohol, and distilled alcoholic beverages.

Order M-69 provides that all distilleries which have the facilities to manufacture 190-proof ethyl alcohol from corn or grain shall use them only in the production of that type of alcohol, effective January 15. It is estimated that 60 per cent of the distilling industry's capacity is subject to the order.

Order M-69 also provides that from time to time the Director of Priorities will direct that specified deliveries of 190-proof alcohol be made, such as to smokeless powder plants, for Lend-Lease requirements, or to industrial alcohol plants for denaturing and storage or distribution.

The two previous orders are M-30, limiting certain less essential uses of alcohol, and M-54, which limits many less essential uses of molasses. Purpose of the three orders is to reduce consumption of molasses, from which the bulk of ethyl alcohol is produced. Requiring distilleries which can produce ethyl alcohol from grain to do so will relieve the molasses situation. With less molasses going into alcohol and other manufactures, more refined sugar can be produced. Alcohol demand is up 300 per cent over normal because of its use in manufacturing explosives and plastics, and this constitutes a drain on sugar which the series of orders is designed to eliminate.

Some modification of the distillery order may be possible later, depending upon the outcome of legislation now before Congress. A present federal law prohibits the manufacture of industrial alcohol and alcoholic beverages in the same plant. A change in this law has been asked to permit distilleries to produce alcohol for war demands and to produce beverages after alcohol demands have been met.

Sulfite Pulp. A program to allocate sulfite pulp among the regular customers of three producers whose plants are widely engaged in war work has been announced by the Director of Priorities. During January, 4,200 tons of sulfite pulp will be set aside under the program.

Under General Preference Order M-52 sulfite pulp will be made available to the regular customers of Rayonier, Inc., Brown Co., and Eastern Corp. These three firms, which together have an annual pulp producing capacity of approximately 500,000 tons, are using part of their facilities to produce nitration pulp for explosives.

The order, effective January 9, requires all sulfite pulp producers in the country, some of whom are not immediately able to produce nitration pulp of the required quantities, to contribute proportionately part of their production each month to make up the tonnage to be allocated.

The Pulp and Paper Branch of OPM felt that an allocation program offered the best method of avoiding shutdowns of mills usually served by Rayonier, Brown, and Eastern. The mills could not purchase pulp directly from other producers because market supplies were completely covered by existing contracts. No immediate way could be found to supply the mills by increasing domestic consumption or imports.

Synthetic Rubber. The synthetic rubber order, M-13, has been changed by the Director of Priorities to include in its provisions new types of synthetic rubber developed since the original order was written and to extend it indefinitely. All types of synthetic rubber are subject to complete allocation by terms of the revised order.

Synthetic rubber has been produced in this country since 1931. Production was small until war demands caused a large expansion in 1941. Production in 1940 was about 4,000 tons and is expected to reach a rate of more than 140,000 tons by the end of 1942. Practically all present synthetic rubber, about 12,500 tons in 1941, is used for war production in self-sealing gasoline tanks for airplanes, linings for tanks, and the like.

Tin. Use of tin, except in cans and containers, has been rigidly restricted in Conservation Order M-43-a. Twenty-nine items for which tin cannot be used after March 31 are listed. Consumption of tin in specified items between January 1 and March 31 is limited to 50 per cent of the amount used in the corresponding period of 1940. No restriction is placed on use of tin for cans and containers other than those already in force. A conservation order to be issued shortly will limit the production and use of cans and containers.

All manufacturers using tin, except for containers and for the uses listed in the

order, must limit their consumption in any calendar quarter, starting January 1, to 50 per cent of the amount used in the corresponding quarter of 1940. Exceptions, to the extent that substitutes are impractical, are items produced on ratings of A-1-j or higher, for certain governmental agencies or to comply with underwriter or other safety regulations.

The order covers tin, tin alloys, and scrap, with the exception of tin in type-metal for re-use in the printing and publishing trades. General Preference Order M-72 makes Priorities Regulation No. 1 applicable to all transactions in tin and lead scrap and provides for monthly reports by scrap dealers and consumers. A scrap dealer is forbidden to accept deliveries unless, during the preceding 60 days, he has disposed of scrap in an amount equal to his inventory on the date of delivery. Provision is also made for direct allocation of tin or lead scrap if this is necessary.

It is expected that Order M-43-a will eliminate a potential demand for 15,000 tons of tin in 1942.

Tung Oil. Tung oil has been placed under strict priority control by General Preference Order M-57. Stocks of tung oil, obtained chiefly from China, are relatively low and domestic production is small. Arrangements are being made for Defense Supplies Corporation to purchase all existing supplies and all future imports.

By the terms of the order, deliveries of tung oil are prohibited except to fill the following orders, and use of tung oil is prohibited except in connection with such orders: defense orders having preference ratings of A-2 or better; placed by Defense Supplies Corporation; for the manufacture of can linings for cans to contain food products for human consumption; for the manufacture of outside can coatings where wood oil is essential to withstand normal food processing; for uses to comply with Underwriters' Regulations, Health, Sanitary or Safety Regulations, or laws issued by Government authority, provided the pertinent provisions of such laws or regulations were in effect both on December 1, 1941, and on the date of such use and specifically require the use of tung oil or a product required specifically to be made from tung oil.

Provision is made for appeal to OPM in cases involving special hardship.

Price Regulations

Acetic Acid. A single ceiling price of 6.93 cents per pound, f. o. b. works in tank cars, has been established for acetic acid, whether of wood or synthetic origin, in an extensive revision of Price Schedule No. 31 issued by OPA. Other changes include specific provision for exports; an increase in the ceiling prices for acetic acid sold in barrels and drums; separate maximum prices for western territory; and several revisions in the text for purposes of clarification.

Establishment of a uniform ceiling price for acetic acid of any origin follows three months of observation of the operation of OPA's original schedule, issued September 25. At that time separate maximum prices of 7.25 cents per pound for acid of wood origin and 6.25 cents per pound for acid of other origin were imposed. These were delivered prices and applied to glacial acetic acid and to weaker acetic acid of commercial grade in terms of 100 per cent acid content.

The ceiling price of 6.93 cents a pound was arrived at by using the 7.25-cent "wood origin" price and deducting the 32-point freight absorption that had applied to producers of "wood origin" acid. As revised, the maximum price is f. o. b. works in tank cars to all sellers.

In the case of export sales, excepting sales to Canada and Mexico, the amended schedule allows the addition to the maximum prices of 3 cents per hundred pounds when the sale is more than 3,000 pounds but less than 5,000 pounds; 1.5 cents per hundred pounds when the sale is 5,000 pounds or more but less than 25,000 pounds; and 1 cent per hundred pounds when the sale is 25,000 pounds and more. On sales to Canada or Mexico, domestic ceiling prices apply.

Ceiling prices for various concentrations of technical and pure acid when sold in barrels or drums in carload quantities, f. o. b. seller's shipping point, have been increased by amounts ranging from 20 to 70 cents per one hundred pounds. The differentials for carload sales in carboys or cases and for less-than-carload sales of 3,000 pounds or more in barrels, drums, carboys, or cases have been retained.

On the Pacific Coast, according to the revised schedule, maximum prices range from $7.29 to $16 per hundred pounds in carload lots in barrels and drums, f. o. b. seller's warehouse in western territory. The same differentials as apply to eastern territory are allowed for sales in carboys or cases and for less-than-carload sales of 3,000 pounds or more in barrels, drums, carboys, or cases.

The revised language of the schedule specifically excludes the cost of containers from all of the maximum prices. In this connection, Leon Henderson, administrator, stated that careful check would be made to see that container prices were not inflated. Any unreasonable charges for containers will be dealt with as an evasion of the schedule.

Copper Scrap. Permission to buy for chemical use limited amounts of specially prepared copper scrap at a price higher than the ceiling has been granted to three chemical producers by OPA.

The premium price approved is 11.25 cents a pound, f. o. b. shipping point, which compares with the ordinary ceiling of 10 or 10.5 cents a pound, depending on the quantity purchased. Respective monthly requirements of the three chemical concerns are 50, 120, and 125 tons and their purchases at higher-than-ceiling prices are limited to these amounts.

To meet rigid manufacturing requirements, extra cost to dealers is involved in preparing copper scrap for these three users. The price which they have been permitted to pay is the same as that permitted in Price Schedule No. 20 (Copper Scrap) for users of crucible copper, which requires approximately the same amount of preparation.

Each of the companies has been authorized by OPM to purchase copper scrap and is required to report its purchases of copper wire to OPA at the end of each month. OPA reserves the right to review its decision at any time and to reconsider the whole matter at the end of six months.

Fats and Oils. Using October 1, 1941, market levels as the "ceiling standard", Price Administrator Leon Henderson has issued a revised schedule of maximum prices for some 1,800 fats and oils. The original temporary schedule, announced on December 13, 1941, set the fats and oils ceiling at the levels of November 26, 1941. The effect of changing the temporary ceiling base date back to October 1 is to raise the general level of fats and oils prices by a minimum of 11 per cent.

Except for butter, essential oils, and mineral oils, the revised schedule covers all raw, crude, and refined fats and oils and their by-products and derivatives, as well as greases. Specifically excluded are sales of fats and oils (except olive oil) through wholesale and retail channels; sales directly to the baking, restaurant, hotel, and other cooking trades; and sales of lard destined for human consumption without further processing. By-products, as used in the schedule, means substances obtained in the course of processing or treating the fats and oils.

The schedule provides that any changes since October 1, 1941, in ocean freight, war risk insurance, and marine insurance rates shall be added to or deducted from the established maximum prices.

Steel Barrels or Drums. The price schedule covering used steel barrels or drums has been modified to assure dealers an adequate operating margin. Effect of the change is to establish a ceiling price of $1.25 each for "raw" used steel barrels or drums (50- to 55-gallon capacity, 18-gage steel) when sold by the emptier to any person. Formerly the schedule only imposed this ceiling price when such drums were sold direct to users. This left sales by emptiers to others than users free of any restriction. Prices were bid up and, since dealers could only charge $1.60 upon the resale, their operating margins narrowed to the point that they were in danger of being forced out of business.

The Chemist and Chemical Engineer in Civilian Defense

Some months ago the Office of Civilian Defense was set up by proclamation of the President of the United States, and now that the country is actually at war there is considerable activity which becomes greater as one nears the seacoast. Many chemists are properly interested in civilian defense activities and they, as well as others in the profession, are being asked endless questions about gas, how to detect it and what to do about it, decontamination problems, how to handle incendiaries, what to do for first aid in case of gas attacks, and the line of questioning often applied to chemists usually follows.

Those who have been trained in chemistry and chemical engineering do have a special knowledge which can be put to great use in civilian defense and naturally those qualified are anxious to discharge their full duty. On January 5 the Secretary of the American Chemical Society addressed a letter to local sections, suggesting that each section have a committee of its own to cooperate with local defense councils since there are a number of questions involved that require chemical knowledge. It was not suggested that local sections initiate other activities which would be likely to complicate rather than to help matters, and it was pointed out that, in the Secretary's opinion, the members of our local sections and others can best aid their country by simply offering cooperation with local organizations which have been or will be established.

Since this letter was mailed a considerable number of publications have come from the press for the use of the Office of Civilian Defense. There is a group of planning guides for distribution to staff executives and appropriate committees. There are memoranda for the use of technical personnel, textbooks for technical personnel and instructors, lectures for instructors, a considerable number of training guides, also for instructors, and several handbooks prepared for individual issue to enrolled volunteers. These publications are to be ordered through the state council, office of Civilian Defense, or local offices of this agency. Four publications will be of special interest to the average chemist or chemical engineer, while others who can give more time to this activity will wish additional publications and perhaps the entire set.

We recommend that those interested equip themselves with Textbook No. 1, "Protection against Gas"; Textbook No. 4, "First Aid in the Prevention and Treatment of Chemical Casualties"; Training Guide No. 15, "A Training Guide for Decontamination Squads"; and Handbook No. 6, "Handbook for Decontamination Squads".

Any questions on the activity or any of its phases should be put to the Chief of the Chemical Warfare Service, Civilian Defense Division, Building F, D and 23rd Sts., N. W., Washington, D. C.

Symposium Scheduled by Society of Rheology

Viscosity, Molecular Size, and Molecular Shape is the subject of a symposium to be sponsored by the Society of Rheology at Brooklyn Polytechnic Institute, February 20. M. L. Huggins, Eastman Kodak Research Department, will speak on "Theoretical Fundaments Concerning the Connection between Viscosity, Molecular Size, and Molecular Shape". "Experimental Methods and Facts" will be discussed by M. A. Lauffer, Rockefeller Institute for Medical Research".

Western Reserve Gives Lecture Series

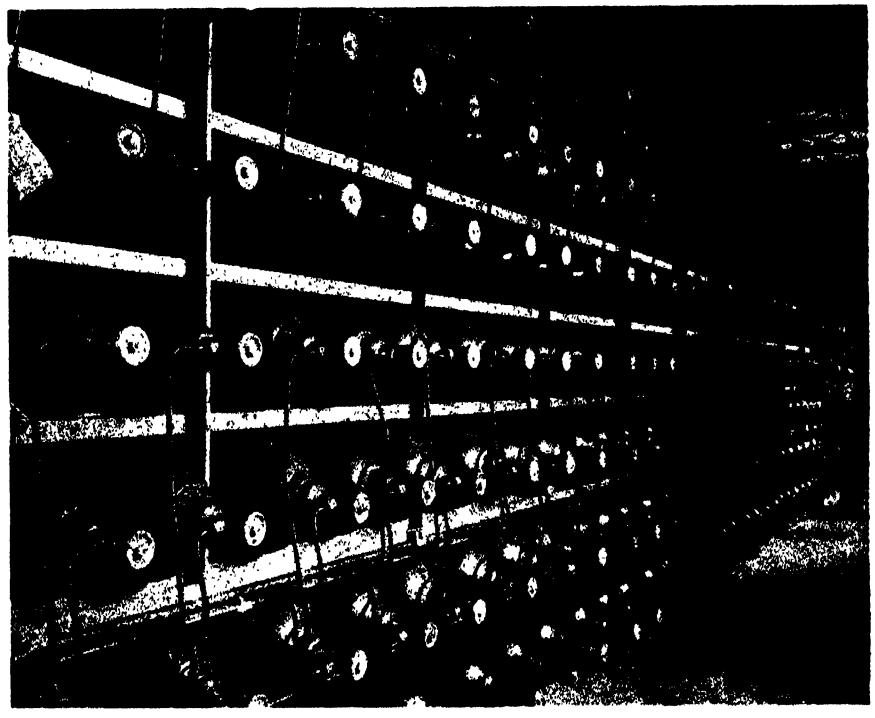
Western Reserve University will present 12 of America's distinguished scientists in a series of lectures, "Frontiers in Chemistry", on successive Fridays beginning February 13. Each speaker will present two related lectures—one from 5:15 to 6:05 P. M. and the second from 7:35 to 8:25 P. M. Parts I and II may be taken separately at $10 for each part. Applications should be made to Wilbur W. White, Dean, Graduate School, Western Reserve University, Cleveland, Ohio.

Part I. Chemistry of Large Molecules

Feb.	13	H. Mark. Kinetics of Polymerization, X-Ray Evidence in the Field of High Polymers.
Feb.	20	E. O. Kraemer. Colloid Aspects of High Polymeric Chemistry, Ultracentrifuge Studies, etc.
Feb.	27	C. S. Marvel. Organic Chemistry of Vinyl Polymers.
March	6	R. M. Fuoss. Studies of the Electric Properties of High Polymers.
March	13	H. Eyring. Viscosity Theory and Its Applications.
March	20	Emil Ott. Chemistry of Cellulose and Its Derivatives.

Part II. Chemical Background for Engine Research

April	3	E. F. Fiock. Survey of Combustion Research.
April	17	F. Rossini. Thermodynamics in Relation to Hydrocarbons and Their Combustion.
May	1	F. C. Whitmore. Synthetic Methods for Hydrocarbons.
May	8	G. von Elbe. Kinetics of Flame and Combustion.
May	15	B. Lewis. Experimental Side of Combustion Research in Engines.
May	22	O. Beeck. Some Physicochemical Aspects of Lubrication.



Reducing Oxygen Hazards

Oxygen hazards are reduced by housing cylinders in a separate building 350 feet away from the new Westinghouse Fluorescent Lamp Plant, Fairmont, W. Va. The oxygen in the cylinders at 2,000 pounds pressure is connected to a manifold system and reduced to approximately 100 pounds. It is then piped underground into the main building and reduced to about 10 pounds pressure for use on lamp machinery which requires oxygen and gas or air. To eliminate corrosion and reduce possible hazards in the oxygen gas lines, all the piping and fittings are made of copper. Special pipe-line filters at each machine take out foreign material. The oxygen is delivered in liquid form by a service truck fitted with special devices to convert the liquid into gas and pump the 2,000 pounds pressure into the cylinders.

C. S. Examinations for Junior Assistants and Student Aids

THE United States Civil Service Commission has announced the annual junior professional assistant and student aid examinations designed to recruit young college graduates and junior and senior students for positions in the government service. Applications must be on file with the commission's Washington office not later than February 3.

Optional branches included in the junior professional assistant examination are agricultural economist, agronomist, aquatic biologist, archivist, bacteriologist, biologist, chemist, entomologist, forester, geologist, junior in household equipment, olericulturist, pomologist, public welfare assistant, range conservationist, soil scientist, State Department assistant, and statistician—all in the junior grade at $2,000 a year. A four-year college course leading to a bachelor's degree is required, with major graduate or undergraduate study in the field of the optional subject. Senior or graduate students may be admitted to the examination, and may upon attaining eligibility receive provisional appointment, but cannot enter on duty until evidence of successful completion of the required college course is furnished. Applicants must not have passed their 35th birthdays.

In the student aid examination are four optional subjects—engineering, political science, public administration, and statistics. Applicants must have completed at least three years of college study, and must have indicated at the college or university their intention of majoring in the optional subject chosen. No applicant may enter the examination who completed the third year of college study prior to May 1939. Provision is made for the acceptance of applications from junior students who expect to complete their junior college year not later than July 1, 1942. Student aid positions pay $1,440 a year. Usually employment is during the school vacation periods. When furloughed, appointees may return to their college studies. Applicants for these positions must not have passed their 30th birthdays.

Copies of announcements and application forms may be obtained at first- and second-class post offices or from the Civil Service Commission, Washington, D. C.



New-Tread Tire

Application of Firestone camelback is the first step in making a New-Tread tire from one that is worn smooth. It will be vulcanized to produce a tread capable of giving up to 80 per cent of the original mileage of the tire. Each retreaded tire consumes less than one half of the rubber required to make a new tire of the same size.

Kodak Announces Nitrogen Isotope N^{15}

NITROGEN isotope of atomic weight 15 (N^{15}) is now available in the form of ammonium nitrate in which the nitrogen of the ammonium radical has been enriched by the chemical exchange method of H. C. Urey[1]. Two concentrations are available—approximately 30 atom per cent N^{15} and approximately 7 atom per cent N^{15}.

The material is to be sold on the basis of N^{15} in excess of normal concentration. The price will be 15 cents per milligram of N^{15} at approximately 7 atom per cent concentration and 20 cents per milligram of N^{15} at approximately 30 atom per cent. As this is a special research laboratory product, distribution will be on a direct basis only. No discounts will be given from the above prices. Standard packaging units will be 100 mg. or multiples thereof.

Orders or communications should be sent to the Eastman Kodak Co., Research Laboratories, Department WOK, Building 59, Kodak Park Works, Rochester, N. Y.

[1] *J. Chem. Phys.*, 5, 856–68 (1937); 6, 296 (1938) 7, 34–39 (1939).

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Waterproof—Acid Resistant Stays Plastic

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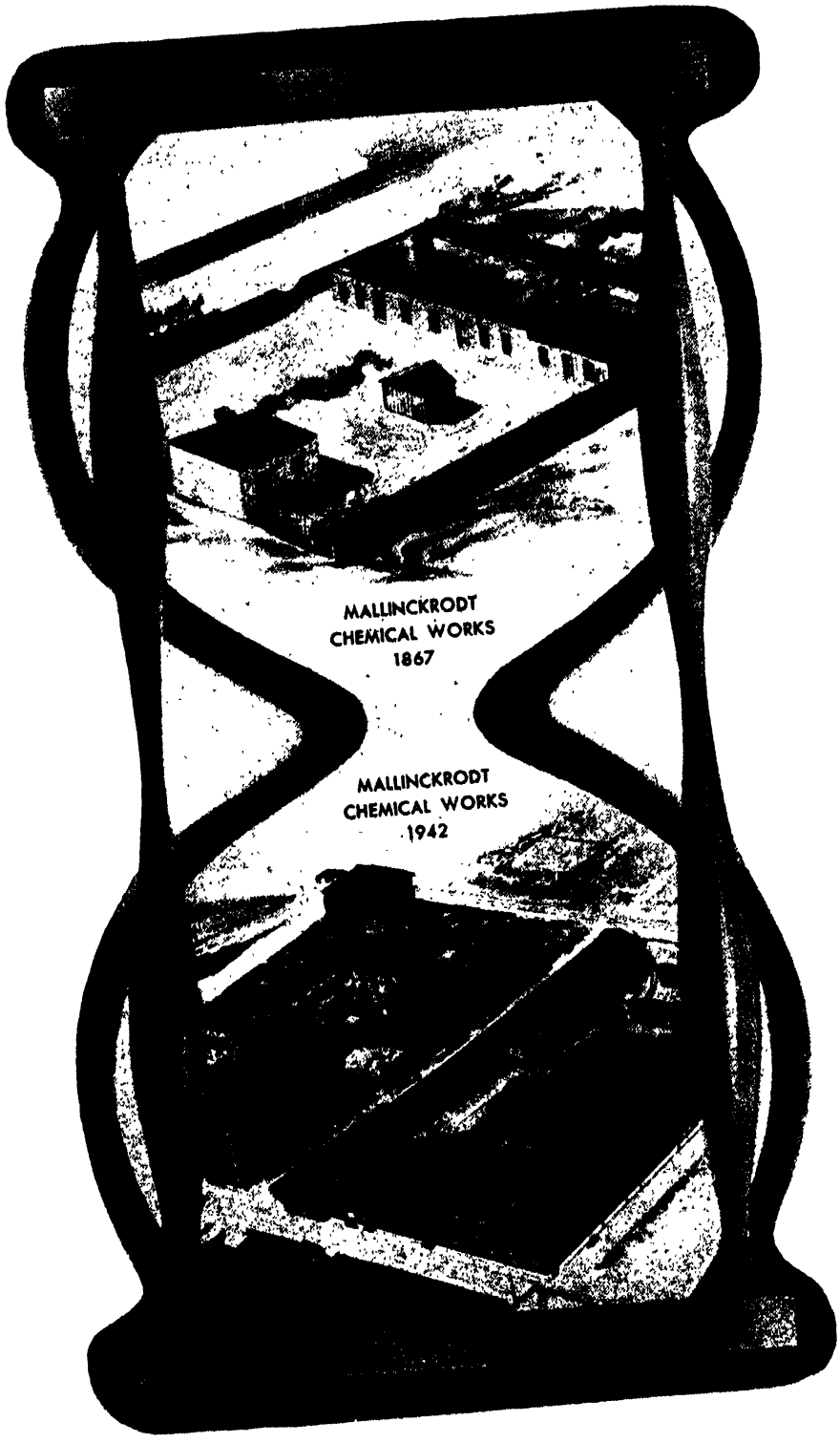
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75 Years of Service

TO CHEMICAL USERS



This year, the 75th Anniversary of Mallinckrodt Chemical Works, we can look back with modest pride on a long period of achievement and service to users of chemicals for cosmetics, pharmaceuticals, laboratory, industry, and photography. From a humble beginning in 1867 with a little one-story plant and four employees, Mallinckrodt now renders nationwide service from one hundred factory and office buildings in the U. S. and Canada through a staff of over 1500 men and women. A few simple materials first manufactured by Mallinckrodt now have become more than 2000 items. Today there is hardly a field of endeavor in which Mallinckrodt chemicals do not play their part.

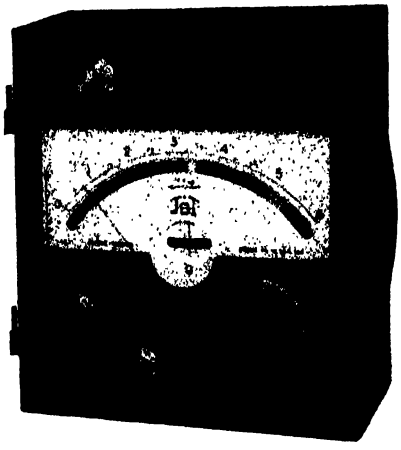
The words of one of our founders, Edward Mallinckrodt, spoken years ago, express the ideals of Mallinckrodt: "We realized from the start that business depends on reciprocal relations and confidence; that we would have to establish a reputation for fair, honorable, liberal dealings and to make it to the interest of the buyer to place his orders with us, by supplying service and endeavoring to satisfy our customers as far as possible in every respect."

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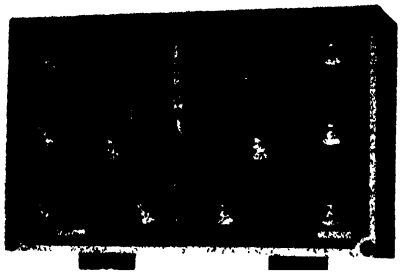
of Industrial Temperatures SUB-ZERO TO 3000° F !



Whenever accurate knowledge of temperatures is required: for process protection, for testing samples and apparatus, for remote reading of thermocouple temperatures (in degrees F. or C., millivolts or milliamperes), J-B-T Model 70-PO is a permanently efficient and reliable standard.

MODEL 70-PO is a direct deflection potentiometer-pyrometer that requires no standard cell and can be depended upon to maintain its calibration almost indefinitely. Once adjusted for the particular thermocouple being used, readings on scales of 0–4000° F. and over can be made without any further balancing. On lower ranges, only one balancing per reading is required. The instrument is especially useful in following changes as they occur, to an accuracy within ½ of 1% total scale deflection. Model 70-PO also withstands vibration and changes in ambient temperature.

Portable or mounted models assure the convenience of thermocouple use with the reliability of the potentiometer method.



MODEL S-12-11 SELECTOR SWITCH measures with 10 or less thermocouples in connection with Model 70-PO. Slotted adapters permit thermocouples of varied size and length to be brought to uniformity. Thereafter, readings are taken merely by rotating the knob.

Designed for use where contact resistance must be low and remain constant, the switch has an average contact resistance of .00075 ohms or less.

PORTABLE MODEL S-15-11 (not illustrated) is similar, but has carrying strap and binding posts on top for easy connection.

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NECROLOGY

James A. Branegan

JAMES A. BRANEGAN, president of the Kali Manufacturing Co., Philadelphia, Penna., died December 23, 1941. Mr. Branegan was born January 15, 1873, and was educated at Pratt Institute. From 1897 to 1899 he was chemist with the Martin Kalbfleisch Chemical Co., from 1899 to 1917 technical representative of the General Chemical Co., and since 1919 had been president of the Kali Manufacturing Co. In 1911 he was winner of the Widman Medal for original chemical work. During the World War he served in the office of the Alien Property Custodian. He was the author of "Popular Textile Chemistry", "Chemistry and Science in Prehistoric America", and technical articles. He was the inventor of the Branegan acid siphon and tin hydrometer. Mr. Branegan had been a member of the AMERICAN CHEMICAL SOCIETY since 1902.

Franklin G. Hills

FRANKLIN G. HILLS, chief chemist of the metallurgy department of the Colorado School of Mines, died December 23, 1941, at Golden, Colo., at the age of 73. Mr. Hills was on the faculty of Columbia University for six years, later was superintendent of the smelter operated by the American Smelting & Refining Co. at Leadville, Colo., and superintendent of the Colorado Fuel & Iron Co. smelter in Pueblo. In 1927 he joined the faculty of the Colorado School of Mines and had devoted his research activities principally to the discovery of rare elements in various types of ore from all over the world. He was a member of the AMERICAN CHEMICAL SOCIETY.

Harold Johnson

HAROLD JOHNSON, chief chemist of The Warner-Jenkinson Manufacturing Co., St. Louis, died December 10, 1941, at the age of 65. He had been in failing health for several years. Dr. Johnson was born in Canterbury, England, and received his early education in England. His chemical training was completed at the University of Brussels.

In his earlier career as a consulting chemist to the fermentation industries, he traveled extensively to British possessions and spent several years in India. Later he came to Canada, and in 1912, when the Warner-Jenkinson Manufacturing Co. was in its infancy, he was called to St. Louis as its first chemist. In addition to directing the development of this company's extensive line of flavors and allied products for the ice cream and carbonated beverages industries, he became interested in dyes for coloring food products during the early years of World War I. At that time the list of permitted coal-tar food colors was very limited, and reduction of imports eliminated some of them from the American market. This was especially true of the triphenylmethane dyes.

His researches resulted in the production of an American-manufactured Light Green SF Yellowish of relatively high purity, superior to the imported variety, and this was promptly accepted by the Bureau of Chemistry, U. S. Department of Agriculture for certification as a food dye.

Further work on nontoxic dyes, carried out in later years in the Warner-Jenkinson laboratory under Dr. Johnson's direction, produced three new colors—Fast Green FCF, Ponceau SX, and Sunset Yellow FCF. These were accepted by the Color Certification Laboratory and added to the official list of U. S. certified food colors.

He had been a member of the AMERICAN CHEMICAL SOCIETY since 1921.

WE ANNOUNCE with regret the death of the following:

Rafael Aguilar-Santillan, Sociedad Cientifica Antonio, Alzate, Apartado 77–98, Mexico City, Mexico. Member since 1917.

James M. Bush, W. J. Bush & Co., Ltd., London, England. Member since 1909.

Thomas G. Elliot, Messrs. Hadfields, Ltd., Sheffield, England. Member since 1935.

Francis E. Francis, University of Bristol, Bristol, England. Member since 1930.

Edwin R. Hadley, Venice High School, West Los Angeles, Calif. Member since 1935.

Ralph W. Higbie, assistant professor of chemical engineering, Speed Scientific School, University of Louisville, Louis- St. Louis, Mo. Member since 1920.

Robert E. Kresge, chief chemist, American Rolling Mill Co., Butler, Penna. Member since 1927.

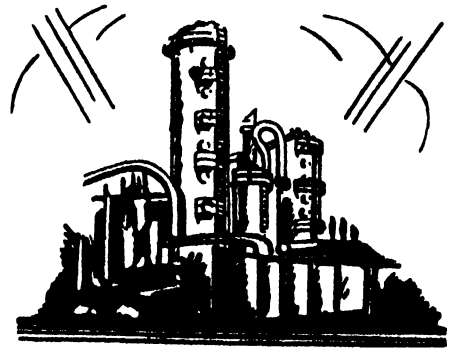
A. J. Murphy, managing director, Murphy & Son, Ltd., Wheathampstead Herts, England. Member since 1912.

W. C. R. Murray, Oakland, Calif., Clorox Chemical Co. Member since 1923.

Axel W. T. Nibelius, 32 West 40th St., New York, N. Y. Member since 1906.

George R. Pensel, vice president, Ritter Chemical Co., Inc., Amsterdam, N. Y. Member since 1917.

Leland M. Willey, General Electric Co., Schenectady, N. Y. Member since 1907.



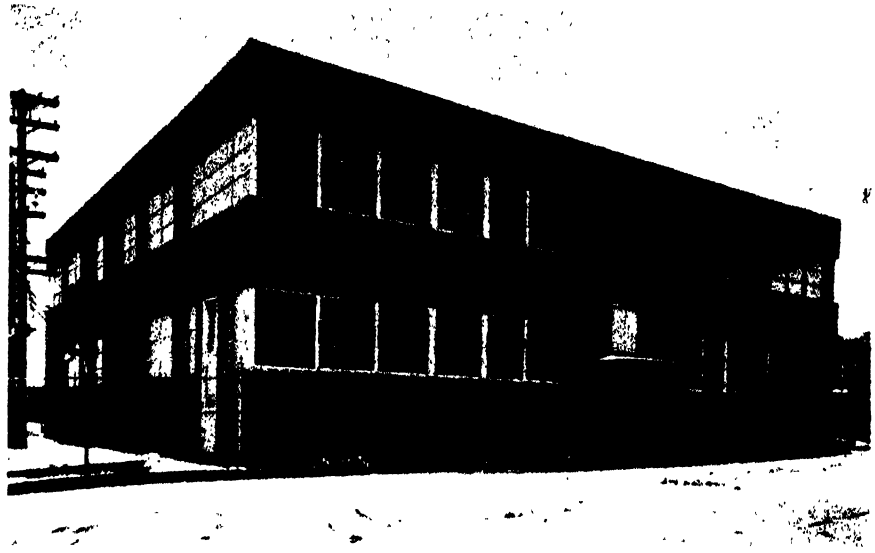


EXPLORER . . . 1942

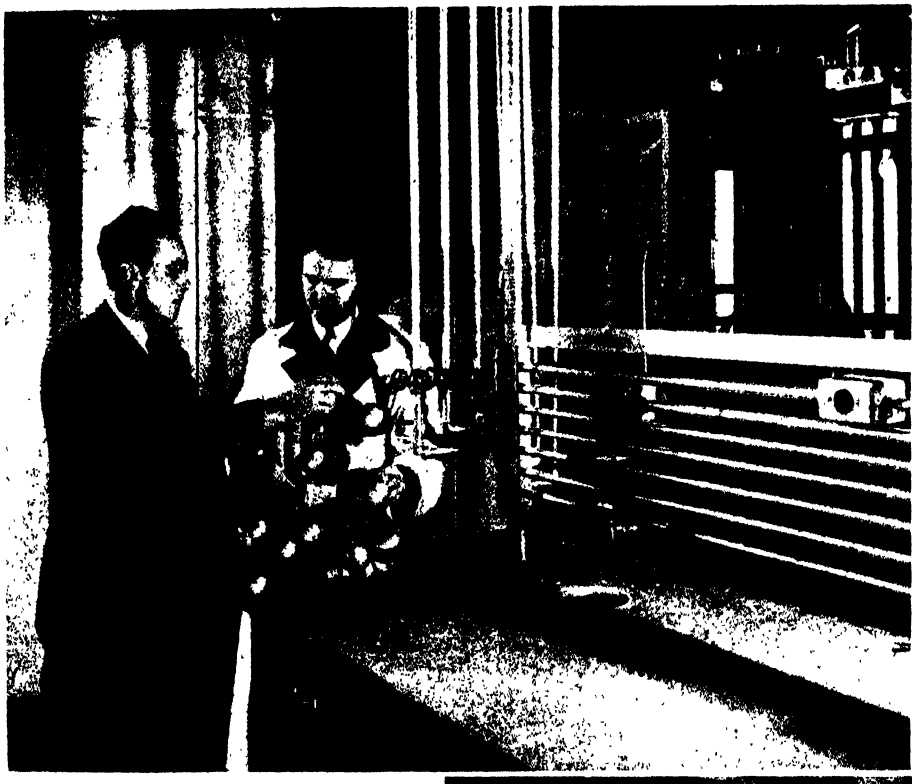
In the field of exploration, the binoculars have given way to the microscope! For with virtually all of the geographic world and its resources known, man has now turned his attention toward the fullest utilization of these resources. ¶ In them, he finds new realms of discovery. And these are mightily affecting our industrial lives . . . methods . . . products . . . and costs. Yet, great as his discoveries have already been, man has barely ventured "out of sight of land"! ¶ In the field of Centrifugal Force, for example, Sharples Engineers and Chemists have traveled far in the last quarter-century. But as they reach a goal they see another . . . then, after that, still another! Food . . . paint . . . petroleum . . . textile . . . shipping . . . automotive . . . and chemical are a few of the industries already profiting by the utilization of this force. Others have similar opportunities . . . and Sharples will gladly cooperate!

THE SHARPLES CORPORATION

New Petroleum Research Laboratory Formally Opened



Sohio's new research laboratory adjacent to the Western Reserve University campus



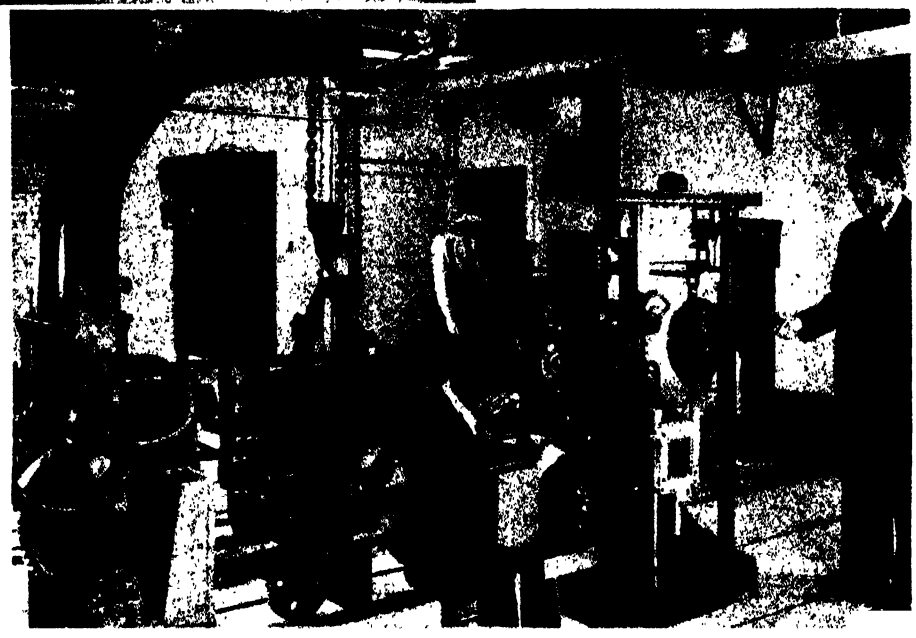
THE Standard Oil Co. of Ohio's new research laboratory adjacent to Western Reserve University in Cleveland was formally opened December 30, 1941, with a public reception, and immediately went into action on vital research problems linked directly to America's fight for victory.

Several hundred educational and business leaders inspected the modern two-story laboratory building which was located alongside the university campus to further the interchange of manpower and facilities under a long range program for cooperation between industry and educational institutions.

W. T. Holliday, president, and other officers and directors of the company were hosts at the open house. Guests were ushered through a maze of special research and testing equipment by members of the 25-man laboratory staff headed by R. E. Burk, professor of chemistry at Western Reserve and director of chemical research for Sohio.

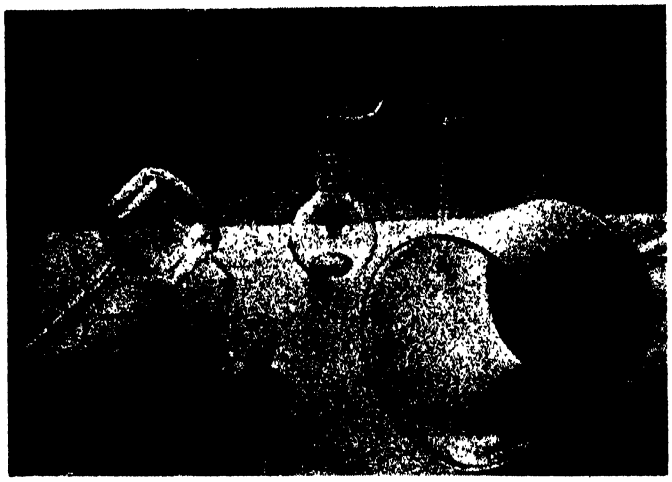
Five separate laboratories, a large en-

CONTINUED ON PAGE 132



Above. E. C. Hughes (left), senior supervisor of experiments at the laboratory, and W. E. Scovill, junior supervisor, are pictured with the model of the long heptane molecule which has been transformed into a ring form to make toluene.

Right. R. E. Burk (right), director of the Sohio research laboratory, checks the new dynamometer installed in the engine testing room. Hugo Martinson, mechanic, is setting up the initial tests. The engine which is to be tested is hanging on the portable crane. Einar Kropp, chief research engineer, is testing the new fuel research engine in the background.



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New Petroleum Research Laboratory Opened

CONTINUED FROM PAGE 430

gine testing room, and cold room provided in the building combine practically every known facility for development of higher octane gasolines, Diesel oils, and other fuels, new lubricating oils and greases, better asphalt products, and new by-products of the refining process.

The research staff will be concerned with development of improved manufacturing processes as well as improvement of petroleum products and their more efficient use. For this reason one lofty room, two stories high, with a large hatch in the roof, has been provided to accommodate any experimental refinery set-up they might have occasion to erect. A completely equipped machine shop has been included in the layout and will enable the laboratory to build any required experimental equipment.

An elaborate ventilating system, specially designed to meet requirements for control of conditions in the laboratories and engine testing rooms, delivers filtered air throughout the building, ensuring a complete change of air every six minutes. While the entire structure, including the offices, has only 14,000 square feet of floor space, it has more than a mile of steel pipe in the various systems which distribute gas, water, steam, compressed air, and vacuum to the work tables, test stands, and equipment in the several laboratories.

More than 2000 different chemicals, including many rare substances not available anywhere else in the locality, will be carried in stock in the large chemical storage room on the second floor. In keeping with the cooperative principles which led to the location of the laboratory at the university campus, the rarer chemicals will be available for use by other departments of the university on a replacement basis.

Under arrangements between Sohio and the university, the company's research library in the new building will be available for use by chemistry students and the laboratory staff will have equivalent access to the university library. The company will sponsor four fellows who are studying for their doctors' degrees in chemistry and is also employing about ten Reserve chemistry students part time in the laboratory.

H. P. Lankelma, professor of organic chemistry at Western Reserve University, who has been identified with this Standard Oil research program since its inauguration in 1929, will be a consulting member of the staff which includes E. C. Hughes, senior supervisor of experiments, and Einar Kropp, chief research engineer.

Government Needs Chemists

Two examinations for chemists and biochemists are reannounced by the Civil Service Commission.

For analytical and research chemists (Announcement 185) the salary is $2,600 to $5,600 a year. Any specialized branch of chemistry is included. Analytical chemists at $2,600 to $3,200 are needed for chemical testing of materials, for compliance with specifications, checking health hazards by chemical methods, and other analytical chemistry work.

Pharmacologists and toxicologists (Announcement 186) will receive $2,600 to $4,600 a year.

In both examinations, responsible professional experience must be shown, except for partial substitution of graduate study. Provided all other requirements have been met, college teaching will now be considered acceptable for any grade of the research chemist or the pharmacologist or toxicologist examination when accompanied by a reasonable amount of scientific research in the appropriate field. Pertaining to the recency of education and experience in the chemist examination, all persons otherwise qualified may now apply, but those eligibles will be considered first who show that part of their education and experience has been acquired within the past 10 years.

Applicants must not have passed their 60th birthday, unless they are entitled to military preference, in which case they must be under the retirement age. Non-veterans over 60, otherwise qualified, may apply and their names may be listed for possible use.

The need is urgent. Both examinations are open until further notice, but qualified persons should apply at once. Persons rated eligible under the 1941 examinations—No. 25 and 58—need not reapply, for their eligibility will continue under the new examinations. Further information and application forms may be obtained from the Secretary, Board of United States Civil Service Examiners, at any first- or second-class post office or from the Civil Service Commission, Washington, D. C.



Victory Poster

Symbolizing the spirit of American industry in the greatest wartime production in history is this poster designed and produced by The Firestone Tire & Rubber Co., Akron, as an inspirational message for its employees.

BOLIVIAN refined sulfur exports in the first nine months of 1941 attained a level of 2,084 tons. Most of the production is shipped to Argentina. Deposits are reported to be fairly numerous along the Bolivian-Chilean frontier, with the largest reserves believed to be about 5,000,000 tons with a sulfur content of 65 per cent.

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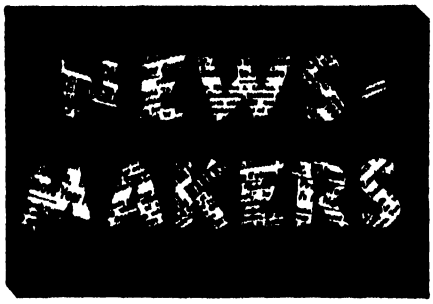
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Horace Bassett has been promoted to the position of factory manager of the Wolverine Tube Co., Detroit, Mich.

Max Bender is now doing chemical research and development work for the Aridye Corp., Fair Lawn, N. J.

R. E. Bingham has been appointed district manager for the Indiana territory by the Jessop Steel Co., Washington, Penna., with headquarters in Indianapolis.

Lela E. Booher, for five years chief of the Foods and Nutrition Division, Bureau of Home Economics, U. S. Department of Agriculture, is now director, Institute of Nutrition, Milwaukee Children's Hospital, Milwaukee, Wis., where she is engaged in nutrition and biochemical research and in a program of nutrition education.

Bert M. Brock, for the past year director of industrial relations, Pittsburgh District, Carnegie Illinois Steel Corp., has been appointed manager of industrial relations for the John A. Roebling's Sons Co., Trenton, N. J.

Gustavus J. Esselen has been appointed a member of the Massachusetts State Board of Registration of Professional Engineers by Governor Saltonstall.

J. Harry Jackson has been appointed a research engineer on the technical staff of the Battelle Memorial Institute, Columbus, Ohio, and assigned to research in metallurgy.

Z. I. Kertesz, chief in research in chemistry at the New York State Experiment Station at Geneva, has been granted a six months' leave of absence to engage in research on the production of citrus products on a project sponsored by the Government at Dunedin, Fla.

C. J. Krister, Grasselli Chemicals Department, E. I. du Pont de Nemours & Co., Inc., Cleveland, Ohio, has been chosen as editor of *Isotopics*, publication of the regional sections of the AMERICAN CHEMICAL SOCIETY, succeeding **Gordon M. Forker**. The new business manager is **Emil W. Milan**, Lake Erie Chemical Co., who succeeds **A. G. Horney**.

D. R. McCormick has been appointed assistant chemist in the Division of Chemistry, Agricultural Experiment Station, State College of Washington, Pullman, Wash., to continue work on fruit and vegetable products. He takes the place of **A. M. Neubert**, who has been appointed to a position in the Bureau of Chemistry and Engineering, for continuation of work in the field of fruit and vegetable products in the federal laboratory located on the campus of the State College of Washington.

J. Ernest Nachod, Jr., formerly with E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has accepted a position as chemical engineer in ammonia operations with the Hercules Powder Co., Hercules, Calif.

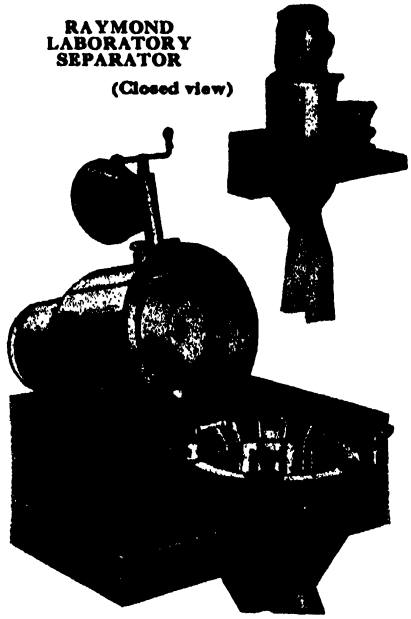
Charles A. Reichelderfer has joined the research staff at the Battelle Memorial Institute, Columbus, Ohio, and been assigned to the division of nonferrous metallurgy. He was previously associated with the Jones and Laughlin Steel Corp.

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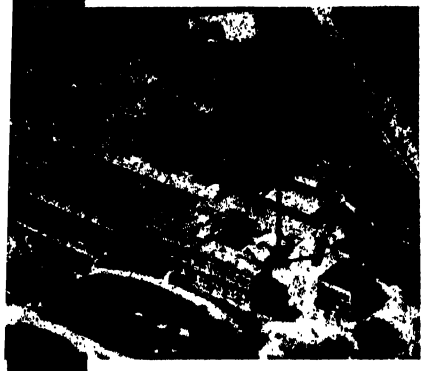
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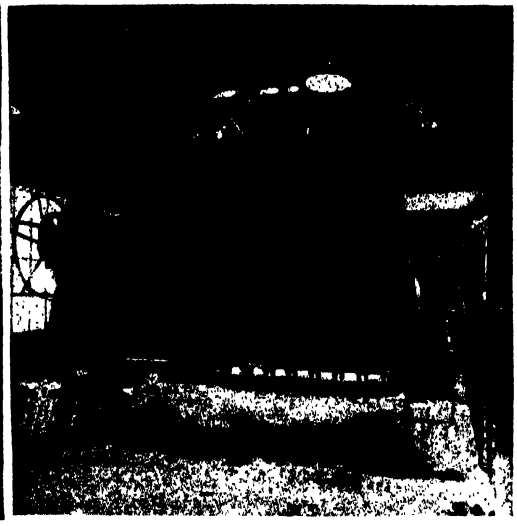
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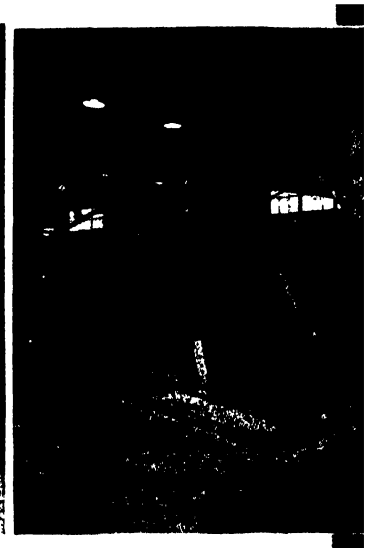
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Rubber Supply Problem Reviewed

In "Rubber's Return to the Western Hemisphere", a 4-page statement by P. W. Litchfield, chairman of the board of The Goodyear Tire & Rubber Co., Akron, Ohio, the rubber situation in the United States and steps taken toward solution of the problem are analyzed and reviewed.

Dr. Litchfield concludes with a summary of how America stands today in the grave matter of rubber supply:

We have nationalized emergency stock of natural crude rubber brought from the Far East during the past year. This stock pile, wholly owned and controlled by our Government, will keep the American war machine in smooth operation for another year and probably much longer.

We have manufacturing plants for the production of reclaimed or regenerated rubber. These reclaim plants have a high total capacity and at this very moment are turning out large supplies of reclaim which can be converted into tires and other rubber products. Tires of regenerated rubber definitely do not have the wearing qualities of tires made from crude rubber but they will prevent American wheels from coming to a stop.

We are rapidly expanding our facilities for the production of synthetic rubber, and within the next 12 months under the present program our country's total capacity for synthetic can reach more than 80,000 tons per year. This can be rapidly expanded to any extent our emergency needs may require, using only materials which are produced within continental boundaries of the United States.

Rubbers which normally have a more restricted use than Hevea, such as Castilloa and Guayule, are already grown to a small extent in the Americas. Gathering and planting of these rubbers can piece out the total available supply during the period of emergency.

A substantial foundation has been laid for the development of rubber-growing areas in the Western Hemisphere. Of necessity, results in this field cannot be expected for a matter of years. This development, in the long run, will combine the factors of safety and economy to a much greater extent than any other approach to the problem.

The immediate prospect may not seem too bright, Dr. Litchfield adds, but it certainly cannot be said America is without at least a partial solution.

The statement is being sent to Goodyear stockholders, employees, and others who may be interested.





Diversified Electric Furnaces for speeding production of heat-treated parts for airplane accessories are being used by the Eclipse Division of Bendix Aviation Corp. Specially designed Westinghouse furnaces at the Philadelphia plant typify advanced practice for heat treating large and small metal parts. *Above.* Big parts are automatically bright hardened without decarburization at a rate of 500 pounds per hour, gross, by this 80-kw. electric pusher furnace using an atmosphere of re-formed city gas, Endogas. Hardened parts are loaded on the belt conveyor of this 55-kw. drawing furnace (left rear). With forced convection this furnace heat treats 360 pounds an hour, net. *Below.* Batch tempering is done by lowering a deck basket of parts into a 68-kw. pit furnace using a controlled atmosphere of Exogas, generated from city gas. Production averages 1,000 to 1,200 pounds every four hours.

Patriotic Role of Chemical Exposition Cited

If the war is a long one, the National Chemical Exposition, scheduled for November 17 to 22 at the Stevens Hotel, Chicago, expects to play an important part in winning it, says Victor Conquest, chairman of the Exposition Committee of the Chicago Section, American Chemical Society. It is generally conceded, he adds, the winner will be the country that can advance the fastest technically with its methods, materials, and machines. Rapid technical advances create unprecedented problems, and quick solutions require personal contact, not only between individuals, but with materials and machines, according to Mr. Conquest. The National Chemical Exposition and the National Industrial Chemical Conference will bring together an audience from almost every state in the Union with urgent problems to solve.

Within three weeks after the distribution of floor plans of the National Chemical Exposition, a little over 85 per cent of the space was reserved. Two additional halls have been added to accommodate the increased number of exhibitors expected to participate.



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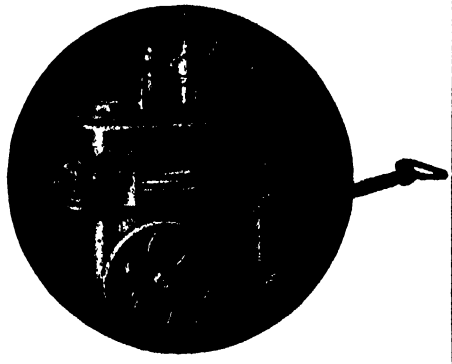
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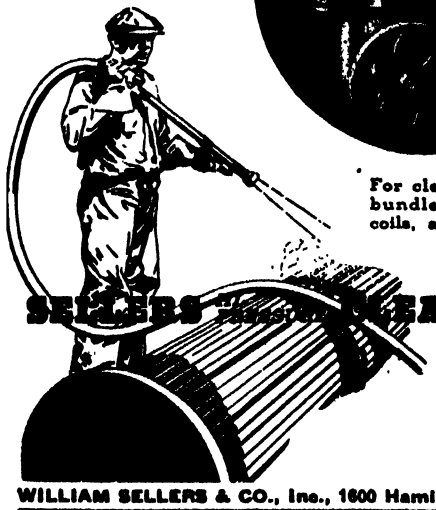
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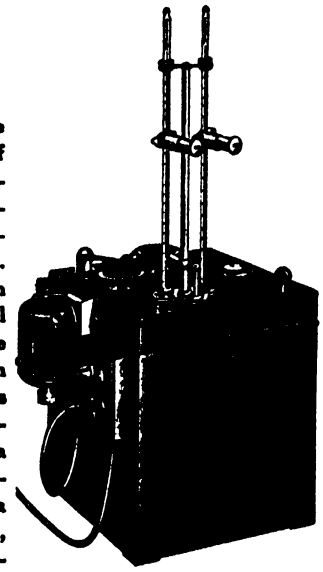
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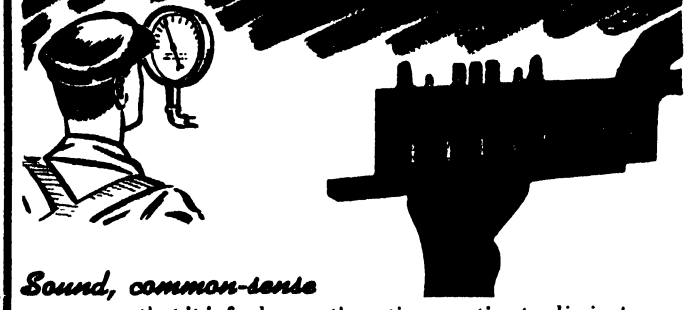


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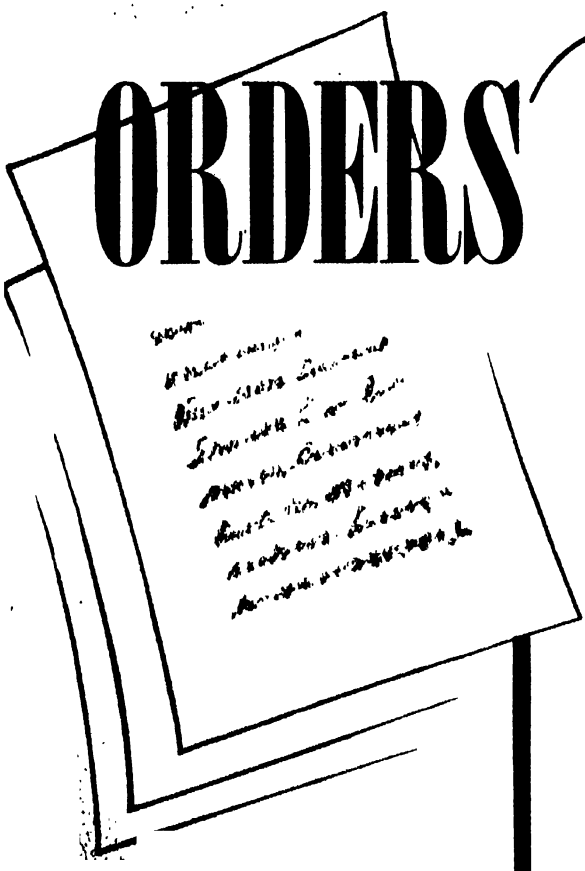
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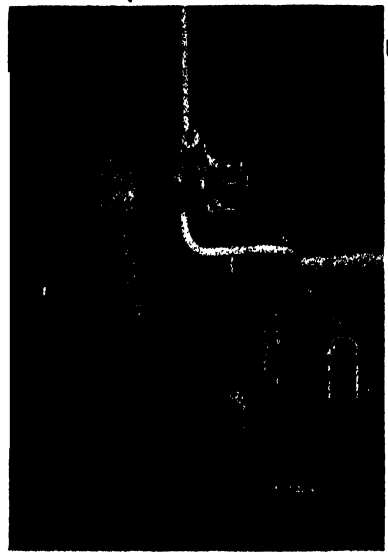


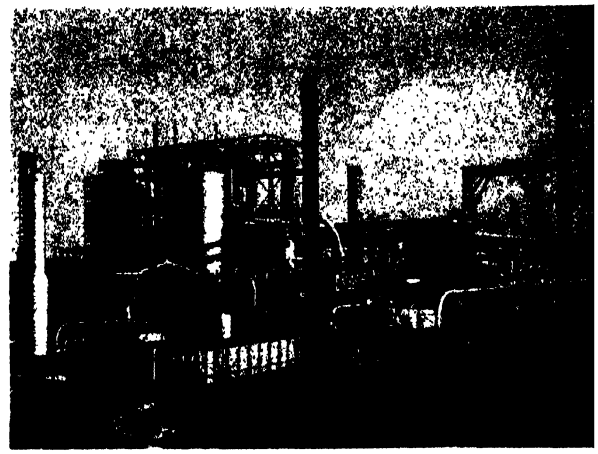
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Physical and Chemical Methods of Sugar Analysis. *C. A. Browne* and *F. W. Zerban.* 3rd ed. 1353 pages. John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y., 1941. Price, $15.

THE first edition of Browne's Handbook of Sugar Analysis, which appeared in 1912, and a later, slightly amplified edition filled a long-felt need in the English language. So much work has appeared in this field since the last publication of the old edition, which has been out of print for some time, that sugar chemists have been patiently and eagerly awaiting a new edition. The third edition, which bears the title, "Physical and Chemical Methods of Sugar Analysis", has been prepared under the joint authorship of C. A. Browne and F. W. Zerban.

Although this edition bears the same chapter titles as the old one, it is to a great extent a new book. This is particularly true of the six chapters on miscellaneous physical, qualitative, reduction, and special quantitative methods, the analysis of sugar mixtures, and selected methods for miscellaneous carbohydrate products. Treatment of these subjects has increased from 217 pages in the old edition to 687 pages in the new one. The earlier chapters on sampling, determination of moisture and dry substance, use of the refractometer, and polarimetric instruments and methods have grown from 306 to 496 pages.

With commendable scholarship and thoroughness the authors have covered the many new developments in apparatus and methods. The new immersion sugar refractometers, for example, and various double-polarization methods, including the two-enzyme method of Paine and Balch and the double-acid method of Zisch of particular interest to beet sugar chemists, are fully described. In the complexity of reducing sugar methods the authors might have been more drastic in rejecting some of the older, little used methods, but they have at least left enough to suit, if not bewilder, the most curious user.

Various physical methods for evaluating the quality of sugar factory products are treated amply. Included are methods of determining color, turbidity, and specific conductance of sugar solutions, besides many specialized means.

In all the new material the authors have done justice to the work of American as well as foreign investigators. The reviewer agrees with some regret that the authors have done wisely in eliminating the 261 pages of Part II of the old edition relating to properties of sugars. They could make suitable amends by preparing a new text on this subject, and it is hoped they will do so.

The appendix of 38 tables shows judicious selection. All new tables of importance seem to be included, although the authors state that they have necessarily been bound by limitations of space.

The reader who knows exactly what he is looking for will find it in the well-prepared index. The searcher for information on a general subject will have more difficulty in orienting himself in a work of such encyclopedic dimensions. An amplified table of contents, with section and subsection titles, would improve the usefulness of the book in this respect.

The book is printed in large easily read type, and the make-up is attractive. Since thinner paper has been used than in the old edition, the volume is not excessively bulky for its size. Although the price of the book, which is not disproportionate to its size, however, may prevent wide circulation, the new edition will be found indispensable to every sugar chemist.

S. J. OSBORN

Thermochemical Calculations. *Ralph R. Wenner.* 1st ed. 384 pages. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York, N. Y., 1941. Price, $4.00.

THE usual textbooks on thermodynamics are concerned primarily with development of a pure science of highly mathematical nature and pay scant attention to practical applications of the formulas developed. Conversely, books on industrial and engineering phases of chemistry deal ordinarily with a maze of specific data and have little regard for the theoretical background underlying the equations employed. Both of these viewpoints have merit, but clearly they need cross connection to supplement each other. "Thermochemical Calculations" bridges this gap in a more than adequate fashion.

The first part of the book is devoted to thermochemical principles with only enough simplified problems to illustrate use of the equations developed. Relationships among the thermodynamic functions, such as heat capacity, enthalpy, free energy, entropy, etc., and their variations with pressure and temperature are logically developed for gases, liquids, solids, solutions, and chemical reactions.

Estimation of thermochemical data by theoretical and semiempirical methods receives particular attention. Among the former is an exceptionally lucid discussion of the meaning and utility of partition functions. The semiempirical methods consist mainly of a set of rules for estimation of entropies and heat capacities based on structure.

The second part of the book applies various principles developed earlier to a wide variety of industrial problems, such as solubility calculations, potentiometry, reaction possibilities, flame temperatures, apparatus design, air conditioning, gas liquefaction, and various phases of fluid flow. The author performs adequately the rather difficult feat of approaching these problems from the viewpoint of the large number of average chemists who are frequently confronted with them rather than of the professional physical chemist.

Make-up of the book is worthy of special mention. Chapter, section, and page numbers are readily found. Equation numbering is fitted into the general pattern in such a manner that cross references are easily located. Even in literature references, which are profuse and up to date, the page is given in cases where it is likely to be helpful.

"Thermochemical Calculations" is definitely a "must" book for technologists confronted with the solution of practical chemical problems.

E. H. SMOKER

Elements of Engineering Thermodynamics. *James A. Moyer, James P. Calderwood,* and *Andrey A. Potter.* 6th ed., rewritten. xiv + 217 pages, 14.5 × 23 cm. John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y., 1941. Price, $2.50.

THIS revision of a well-known and widely used text on engineering thermodynamics follows the pattern of earlier editions. It is slanted for use in technical colleges giving special courses in engineering thermodynamics as well as steam turbines, internal combustion engines, heating, refrigeration, and other applications of thermodynamics.

New material includes treatment of uniform flow processes and new vapor tables. A uniform flow process is defined as one in which the working medium flows uniformly into the process and leaves in a similar manner. The authors adopt the usual engineering tradition of developing their theory on the basis of properties of the perfect gas and the Carnot cycle. Numerous typical cycles in various applications to engines, refrigeration, compression, steam jets, etc., are given and these are in most cases illustrated by pressure *vs.* temperature, temperature *vs.* entropy, heat content or enthalpy *vs.* entropy, and pressure *vs.* volume diagrams. Steam tables, a double-page insert showing the Mollier Chart for steam, and a psychrometric chart are given.

Numerous problems illustrate the text, and solutions of many problems are given in full. The notation and methods are strictly those of the mechanical engineer. Although the mercury vapor cycle is discussed, thermodynamics of air and hydrocarbon liquefaction, solid carbon dioxide manufacture, or organic vapor heating systems are not treated. The reviewer regrets that so large a gulf remains between the thermodynamics of the chemist and of the engineer.

MERLE RANDALL

Organic Analytical Reagents. *John H. Yoe* and *Landon A. Sarver*. ix + 339 pages, 14.5 × 22.5 cm. John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y., 1941. Price, $4.00.

ORGANIC ANALYTICAL REAGENTS was written with a fourfold purpose: (1) "to assemble the literature on organic analytical reagents, (2) to discuss the theoretical aspects of the subject, (3) to furnish an up-to-date and reasonably complete bibliography on organic analytical reagents, and (4) to suggest further research in this important field of analytical chemistry".

After a brief introduction the first part of the book (Chapter II) classifies reagents. The remainder of Part I is concerned with a more detailed discussion of the reagents classified in Chapter II. The subjects considered are organic solvents and wash liquids, organic acids and bases, oxidizing and reducing agents, indicators (hydrogen-ion, redox, and adsorption indicators), primary standards in volumetric analysis, valence and complex compounds, the salinogenic reagents, photometric aids, and miscellaneous organic reagents.

Part II includes a list of organic reagents employed for detection or determination of various elements; the reagents are classified alphabetically under the elements. Following this most valuable table is a glossary of reagents arranged alphabetically containing references to literature citations which are given in a bibliography following the glossary.



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Twenty-four hundred and nineteen references are listed in the bibliography which covers the literature up to July 1940. If the book contained only Part II it would be a valuable addition to the literature of analytical chemistry.

The authors have achieved the purposes set forth above in an entirely satisfactory manner. The formulation of the various organic substances is clear, and well-arranged structural formulas are used freely. This book will be welcomed by all chemists and should be available in every chemical library.

NATHAN L. DRAKE

The Industrial Chemistry of the Fats and Waxes. *T. P. Hilditch* (of Liverpool). 532 pages. D. Van Nostrand & Co., Inc., 250 Fourth Ave., New York, N. Y., 1941. Price. $7.50.

THIS book is a rather complete and enlarged revision of the first edition, and follows the original in arrangement of material, being divided into nine sections, each with several chapters and a fairly complete bibliography. This bibliography does not seem to cover fully American material, containing in particular few references to oil and soap, in which much of American material appears. The author also does not mention "Mechanical Pressing of Cottonseed" by Woolrich and Carpenter, a very good book. The book sections cover the chemical nature of fats, their composition, methods of preparation of both fats and glycerol, and the uses of the fats in edible and inedible fields, the latter including soap, candles, paints, varnishes, and lubricants, and also in the textile industry. The fields are very well covered in general.

There are a few errors, from American practice.

On page 195, Hilditch mentions "bulk" shipments of palm oil "in some instances". Nearly all of our palm oil is received in steamers' deep tanks in bulk.

On page 196, cottonseed is not "oil rich" according to Hilditch's definition as it contains 15 to 22 per cent of oil. The kernels or meats, however, contain 35 to 40 per cent.

On page 198, *all* American cottonseed is dried by hot air currents as received in the mills to reduce the moisture content to 10 per cent or below and prevent heating and decomposition.

On page 203, we "cook" meats with temperatures of 210° to 240° in ordinary cookers and in pressure cookers at higher temperatures.

On page 224, he mentions Tonsil which is not used very much here. Filtrol, an American activated earth, is used, but our practice is to use ordinary clays and in much smaller percentages than he mentions, as 1 or 2 per cent is sufficient for nearly all oils. Also activated carbon we use in very small percentages, such as 0.1 to 0.3 per cent, but mixed with 0.5 to 1 per cent of fuller's earth.

On page 232, we use 28° Bé. caustic rather seldom in plant refining, our lyes usually running from 8 to 12 per cent NaOH.

On page 235, he makes no mention of the sale of soapstock in tankcars, whereas here nearly all of it is thus handled (using oil of cassia to prevent fermentation).

On page 236, he neglects to mention the necessity of completing saponification before distillation. It is possible to distill fatty acids only, and neutral oil (one third of the original soapstock fat) would be a total loss in this process as it would remain in the pitch. He also does not discuss "flash" or continuous stills here, although he mentions them on pages 239 and 240 for the deacidification of oils. We use them for distilling fatty acids, and obtain yields which run as high as 97 per cent as compared to 90 to 92 on batch stills. Owing to the short period of heating the acids, the products are much better, and there is very little increase in the amount of unsaponifiable produced by decomposition, whereas distillate from batch stills increase in unsaponifiable from 2 per cent at the beginning of a run to 10 or even 14 per cent at the finish. Also by tapping the various plates of the still, particular fatty acids in fairly pure forms can be obtained, such as products containing about 90 per cent myristic acid, etc.

On page 267, he discusses using completely hydrogenated fat and liquid oils to make shortenings, etc. This process was used here 15 years ago but was not satisfactory, and nearly all of our shortenings now are made by partially hydrogenating the total quantity of fat.

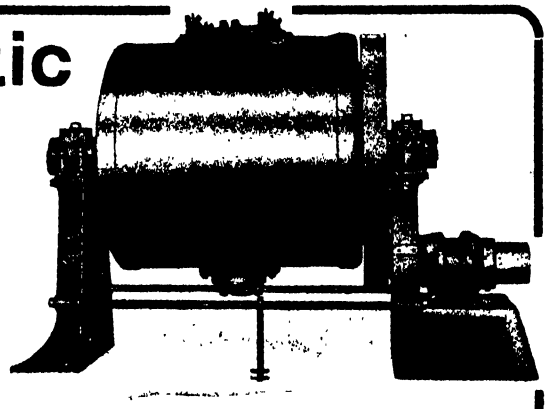
The Kreis test for rancidity discussed on page 325, is very capricious, as was reported by the A. C. S. Fat Analysis Committee several years ago. He also makes no mention of "stability" tests of oils by such methods as the Swift stability method. In these tests, it can be determined in eight hours whether an oil has any tendency towards rancidity. There are numerous papers on this by Irwin, King, Freyer, Wheeler, etc.

On page 316 he discusses "Fats for Frying" as something new. We have sold "cooking" oils, deodorized straight cottonseed, and other oils for this purpose for 40 years. Our other type of cottonseed oil, which is also sold in large quantities, is "salad oil", a "winterized" oil made by refrigerating and pressing cottonseed oil, etc., and used for mayonnaise and salad dressings.

On page 493, he discusses "Synourinol", a dehydrated castor oil, as if it were a laboratory curiosity. The process of dehydrating castor oil and making drying oils from it has been in commercial use here for several years.

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In general, however, the book is well written and should be a valuable reference book for chemists working with fats and those who use fats or fatty products. The book is well arranged and printed, the type is clear, and the presswork and binding are good.

H. P. TREVITHICK

Bibliography of Nomographs Dealing with Viscosity

THE following references are drawn from "A Bibliography of Chemical Engineering Nomographs", 84-page Document 1599, compiled by Roy Myllynen and D. S. Davis of Wayne University and filed with the American Documentation Institute, Science Service Building, 1719 N St., N. W., Washington, D. C. It is obtainable on microfilm for $1.04 or in photocopies readable without optical aid for $8.60.

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Womersley, J. R., "Fluidity Calculations for Cellulose Solutions", *J. Textile Inst.*, 26, T165–70 (1935).

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Grosholtz, R., "Viscosity Conversion Charts from Temperature Relations", *Natl. Petroleum News*, 29, 151 (Jan. 13, 1937).

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Viscosity Index

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Nutritional Charts

THE 10th edition of "Nutritional Charts", published by H. J. Heinz Co., is a brochure of tables and descriptive literature on the nutritive values of foods. In the new edition information on unsaturated fatty acids and inositol and on the newer members of the vitamin family has been included. New additions cover quantitative data on the nicotinic acid content of foods, application of the science of nutrition to dietetics, human nutritional requirements as recommended recently by the Committee on Nutrition of the National Research Council, and minimum daily needs of vitamins and minerals as given by the U. S. Food and Drug Administration in the tentative regulations for the labeling of foods represented to have special dietary uses.

The publication has been done under supervision of E. R. Harding, head of the Heinz investigational work at Mellon Institute of Industrial Research, assisted by L. L. Lachat. Copies are available free of charge from Mellon Institute, Pittsburgh, Penna., to all bromatologists, nutritionists, and other specialists who request them.

Metallic Alloys Review

WORKING on metallic alloys at the University of Oxford for more than 15 years, W. Hume-Rothery has published reports of his research in more than 30 papers. Dr. Hume-Rothery has written a concise 20-page review of the work setting out the plan, aims, and main conclusions. A list of published papers giving detailed results is included. Entitled "Researches on the Structure of Alloys", the bulletin is published by the British Non-Ferrous Metals Research Association as Research Report R. R. A. 562 (June 1941). Copies may be obtained from the association, Euston Street, London, N. W. 1, England, at 2s.6d. (or 50 cents) post free.



New Safety Measures Planned for Blackout



The invisible rays from ultraviolet lamps light this display of new implements for blackouts. Dr. Hibben demonstrates the visibility curve of fluorescent chemicals.

A NEW type of blackout in which camouflage, lights, and fluorescent chemicals will play an important part in protecting vital seaboard cities was discussed by S. G. Hibben, Westinghouse wartime lighting expert before 2,000 state officials, air raid wardens, firemen, police, and FBI men at Bridgeport, Conn. He described the eight months of research on the problem of blacking out strategic objectives within a city rather than the whole city.

Hydrants, sidewalks, curbs, bomb shelters, motor cars, and clothing can be marked with fluorescent and phosphorescent chemical paints which glow brilliantly when irradiated by invisible ultraviolet rays. London's blackout is created by permanent shields and low wattage lamps which will have to remain for the duration of the war. The American blackout will be controlled from power stations and by police and civilian patrols. Thus cities suffering only infrequent raids will be able to return to normal lighting almost instantly after a raid.

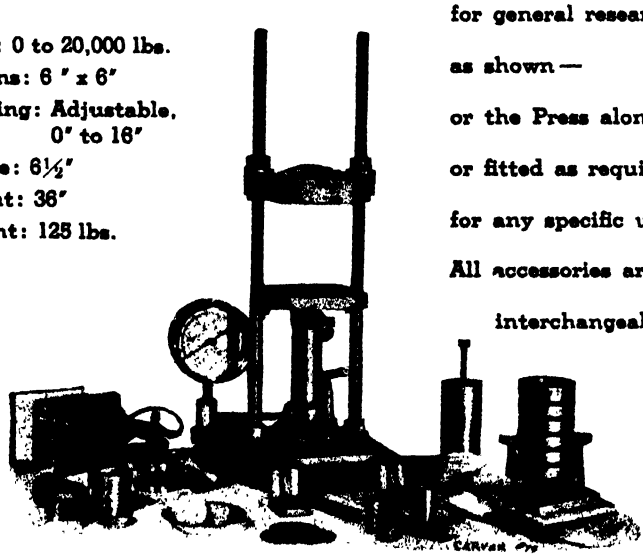
By use of camouflage lights, engineers will be able to build decoy airfields, bridges, and other faked military objectives in deserted areas. The illusion of an important bridge span might easily be created by stringing rows of lights across a river in some isolated section. A well-lighted empty meadow several miles from a city could pose as an airfield if the city itself were not completely darkened.

Military experts expect American coastal cities to be susceptible to small but powerful "hit and run" air raids. United States plans are aimed at guarding against swift raids which would attempt to cripple specific life lines of a city, instead of spreading bombs at random.

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Industrial Uses of Platinum

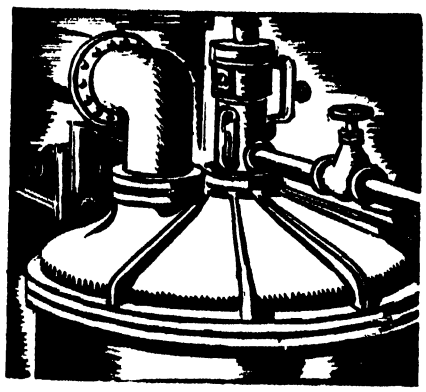
RAPID growth in industrial use of platinum metals was the outstanding feature of 1941, said Charles Engelhard, president of Baker & Co., Inc., in reviewing the platinum metals industry for the year. More platinum metals are used now in industrial products and equipment than in jewelry, formerly of prime importance in platinum consumption. Mr. Engelhard pointed out that the Allied nations practically have both the world's sources and supply of platinum metals at their disposal.

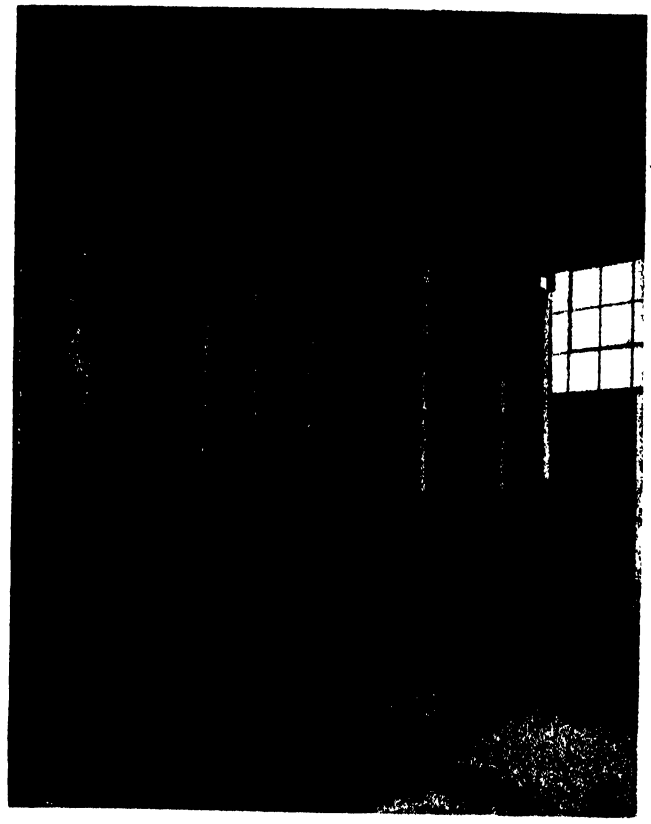
Platinum is used as a catalyst in producing nitric acid and much of the contact sulfuric acid, he said. Palladium is employed increasingly as a catalyst in hydrogenation of organic compounds. Glass wool fiber is made from molten glass passed through small orifices in platinum alloy feeder dies. In rayon fiber production, the viscous solution is extruded under pressure into an acid bath through platinum metal alloy spinnerets.

In making electrochemical products, such as potassium perchlorate and persulfuric acid, exposed surfaces of insoluble anodes are of platinum. The new platinum-clad metals in such forms as tubing and sheet are being used in electrochemical processes and adopted elsewhere in the chemical industries for heat exchangers and similar apparatus, Mr. Engelhard explained. Electrical contacts of platinum metal alloys are required in electrical instruments and equipment of the Nation's fighting forces and huge industrial efforts. Numerous thermocouples of platinum or platinum-rhodium alloy are used in temperature control and other instruments.

For dental purposes consumption of platinum and palladium as alloying elements with gold gained markedly. In jewelry ruthenium-platinum alloys are replacing iridium-platinum alloys because iridium is being conserved for war work under an OPM order.

With the exception of iridium, prices for the platinum metals remained practically unchanged during 1941. Iridium, quoted at $275 per ounce at the beginning of the year, dropped to $175 an ounce in February and remained at approximately that figure during the rest of 1941.





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Bulletin B-3.

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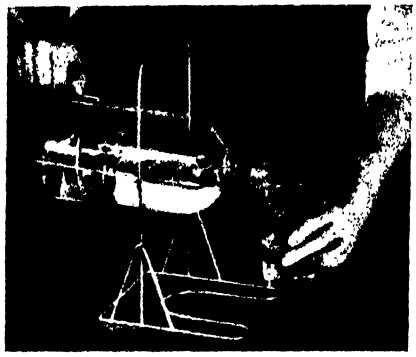
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Because aluminum alloy sheets are proof against expansion and contraction, tools can be built up directly on them without trahscribing and measuring. Toolmakers simply fit the attachments to lines on the photoprint made with the giant camera.

Robot Draftsman

Most prolific defense worker, the Glenn L. Martin Co.'s robot draftsman, has acquired a twin. In the form of the world's largest camera, covering two rooms, the older unit has turned out around 750,000 man-hours of work in the last year—in effect adding 307 able technicians, almost impossible to find otherwise in these times. The new robot will double the figure for the aircraft company.

Developed over the past four years and representing the first successful application of photography to drafting, the Martin photographic reproduction process takes loft layouts in full scale and projects them back on sensitized surfaces of metal, wood, cloth, paper, and a variety of other materials. The system allows instant changes of scale, from full-size to scale-model size for wind-tunnel and towing-basin operations.

Saving untold hours of time that otherwise might be spent in redrafting, the process has expedited shop work since reproductions on metal form the actual base of jigs and fixtures in which airplane parts are assembled. It has aided the diemakers, who may work directly from the lines on their metal, instead of laboriously scribing the patterns. It has abetted the diecasters, who no longer have to use shrink scales because the camera can enlarge the drawing just the proper amount to allow for shrinkage of the cooling metal. Experimental workers find they can cut out whole pieces of a new airplane by simply sawing along the lines photographed onto bare metal. Similarly pieces of mock-up (full-scale wood models of the projected plane) can be cut along lines reproduced directly on wood surfaces.

Two rooms make up the camera itself. The bellows of the photo unit projects through the connecting wall, and a variety of lenses, the largest with a prodigious 70-inch focal length, are used. In the room before the lens, a huge copy board, suspended from an electrically-powered, remotely controlled overhead carriage, travels back and forth according to the size of the image to be reproduced. The original drawing on coated metal is placed against the copy board and held there by strong suction through holes in the board. The negative is placed in a rack on another traveling carriage in the other room. A powerful light travels across the copy board, giving even illumination to lines of the drawing. The exposed negative is developed and put back in the rack, while the original drawing is removed from the copy board and replaced by a sensitized sheet of coated metal in exactly the same position. Another mercury vapor light on the traveling carriage behind the negative projects the image back through the camera onto the sensitized sheet. For the largest layouts, all of the two rooms become the camera itself.

The exposed sheet is developed by progressive immersion in four stainless-steel tanks, each containing 100 gallons of liquid. With developer, short stop, hypo and running-water wash, the process is like that of any photographic darkroom, but on a heroic scale.

CHEMISTRY AND TECHNOLOGY OF RUBBER

Edited by: C. C. Davis and John T. Blake

NOTE: The prospect of a severe and long-continued shortage of rubber makes it more necessary than ever for the industrial consumers of rubber to understand its properties. Such knowledge will greatly aid them in determining what substitute materials can be used to greatest advantage.

This book is designed for all those connected with the rubber industry, whether research workers, analysts, compounders or development engineers. It is an authoritative reference work for both the theorist and the practical man.

Outside the rubber industry, this Monograph will prove invaluable to students, and to research and development men in numerous industries which supply raw materials for the manufacture of rubber goods. Engineers in the petroleum and chemical industries, on whom the responsibility of stepping up synthetic rubber production will now fall, will be greatly helped by the chapters on the physics of rubber and on substitute rubbers. Finally, this book will be useful to large-scale consumers of rubber: to textile plants, which now employ latex extensively; to the footwear and clothing industries; to automotive and other mechanical engineers; and to industrial maintenance engineers everywhere, who have become dependent on mechanical rubber goods for factory and field installations.

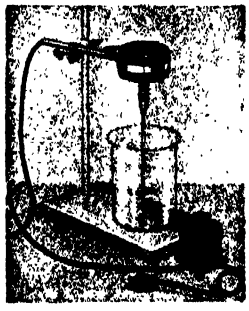
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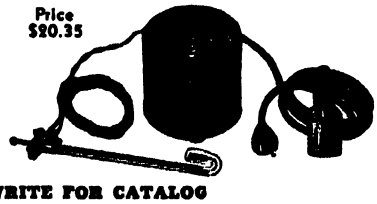
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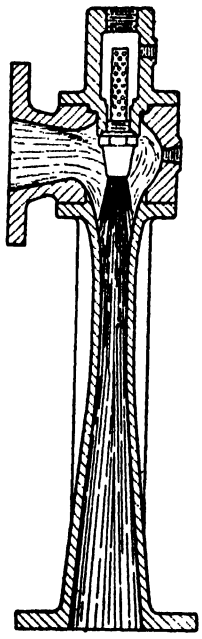
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Numerous Croll-Reynolds Evactors are working overtime maintaining high vacuum in plants making explosives, synthetic rubber, airplane lubricants and a long list of other ordnance materials. They are maintaining high vacuum on engines and turbines of dozens of American ships sailing the seven seas.

While the large and special units require up to three months or more for fabrication the smaller ones are sometimes made in two weeks, or less, when the demand is urgent. These include single and multi-stage units for vacuum up to a small fraction of 1 mm. absolute, also small condensers and vacuum chilling equipment.

A recent development is a vacuum-cooled condenser for maintaining condensing temperatures down to 34° F. Inquiries will be handled as promptly as possible under the circumstances.

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THE WALL STREET OF CHEMISTRY

	Annual Earnings		Per Common Share	
	1940	*1941*	*1940*	*1941*
Celotex Corp.	$747,628	$1,749,099	$0.94	$2.51
Firestone Tire & Rubber Co.	8,652,607	11,262,428	3.02	4.37
Lautaro Nitrate Co.	£664,509	£590,890	..	..
Lee Rubber & Tire Corp.	$981,887	$1,482,954	3.66	6.14
West Virginia Pulp & Paper Co.	3,670,621	4,270,312	3.03	3.70

The **Dow Chemical Co.** and subsidiaries for the six months ended November 30, 1941, reported consolidated net income of $4,052,370 which, after providing for dividends on outstanding preferred stock, was equivalent to $3.12 per share on common. This was after providing $3,139,206 for federal normal income taxes, surtaxes, and excess profits taxes, and including dividends of $750,000 from an associated company. For the preceding year net income was $3,585,015 or $3.02 per common share. The cost of completed emergency plant facilities, $1,226,067, is being amortized over a period of 60 months.

The **Firestone Tire & Rubber Corp.** reports sales 43.3 per cent over a year ago, a record high, for the year ended October 31, 1941. Provision for federal, state, and foreign income taxes amounted to $14,262,604, compared to $3,824,056 for the previous year. During the year the company refunded $44,600,000 in outstanding 3.5 per cent debentures maturing in seven years with a $50,000,000 issue of 3 per cent debentures maturing in 20 years. During the year the company's new plants in Brazil and India and factories in England, Canada, South Africa, and Argentina operated at capacity. Total investment in foreign countries now amounts to $36,003,447, including plantations in Liberia. Early in 1942 production of synthetic rubber is expected to begin in the new plant, later to be increased to 10,000 long tons annually. New buildings are being erected to increase facilities for manufacturing products needed by the Army, Navy, and air forces.



Plastic Spools for Textile Industry

Plastics latest contribution to the textile industry is a molded spool for seaming thread used in hosiery and sewing thread for apparel, shoe, and other industries. Uniform in size to the thousandth of an inch, the spools have advantages of aiding in uniform winding and eliminating any possibility of yarn breaks due to snagging. The plastic used is Resinox, produced by the Plastics Division of Monsanto, Springfield, Mass. Spools, Inc., Providence, makes the holders for Premium Thread Co.

Blackout Paints

THE development of a complete line of blackout and camouflage paints to meet the current war emergency has been announced by the Paint Division of the Pittsburgh Plate Glass Co., Pittsburgh, Penna. The paints are designed for domestic and commercial use in areas subject to possible air raids. They obscure interior illumination when applied to windows, skylights, and other glazed openings. The blackout and camouflage paints have been developed in four principal colors—black, smoke gray, earth drab, and neutral brick.

Agi-Mixer

THE Agi-mixer, a product of Eppenbach, Inc., Long Island City, N. Y., combines the turbine feature of the company's Homo-mixer with a paddle and scraper agitator arrangement. It is designed to give continuous mixing throughout various viscosity phases, as in the saponification of fatty acids. It will prevent coagulation of setting of the material around the base of the tank, especially during a cooling process.

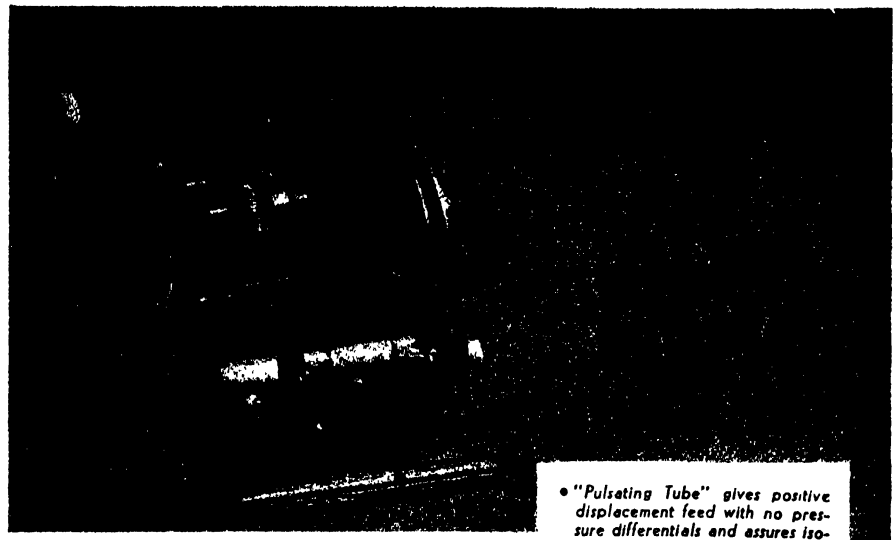
Bakelite C-9 Resins for the Paint and Varnish Industry. A new booklet describes the types of Bakelite C-9 resins developed for the production of heat-reactive and air-drying coatings, and indicates suggested applications. Emphasis is placed on their use with domestic oils, such as linseed, soybean, and dehydrated castor. This is an entirely new group of resins, supplementing the phenolic synthetic resins, and based on Carbic anhydride. *Booklet IE.* BAKELITE CORP., 30 East 42nd St., New York, N. Y.

Stainless-Clad Steel. A new 16-page price list for Silver-Ply stainless-clad steel contains base prices for sheets and plates for 12 grades of cladding, in proportionate thicknesses from 5 to 50 per cent. *Price List IE.* JESSOP STEEL CO., 534 Green St., Washington, Penna.



Stainless-Clad Head

One of 18 stainless-clad A. S. M. E. code flanged and dished heads, 1 5/16-inch minimum thickness by 72 inches in outside diameter. The heads were fabricated from Jessop Silver-Ply stainless-clad steel by American Locomotive Works for the du Pont company.



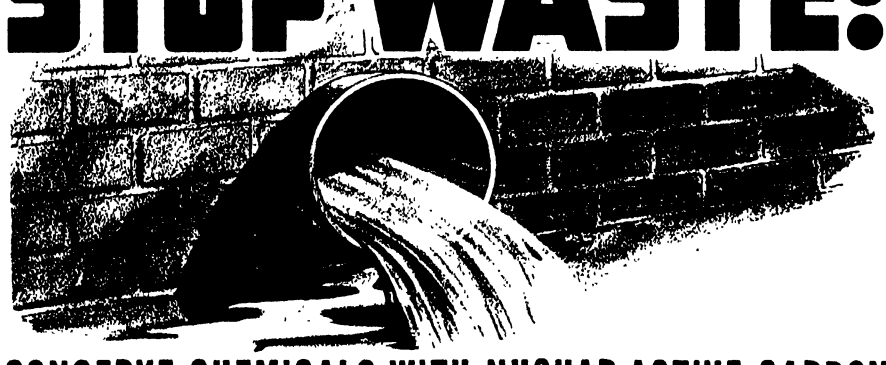
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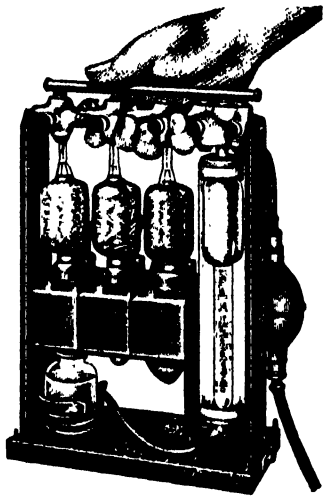
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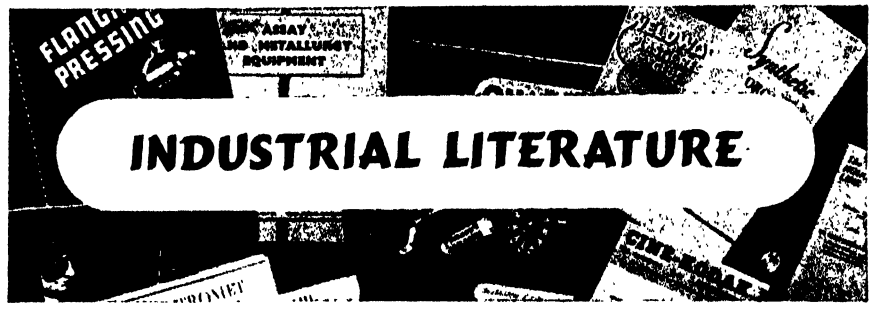
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Listed publications should be requested directly from the company concerned. Use business stationery, mention bulletin numbers, and refer to this journal. Publications will be sent free unless otherwise noted.

Air Classifiers. A series of three illustrated bulletins describes cyclone-type air classifiers in plant and laboratory sizes. A series of photomicrographs illustrates the narrow limits of classification obtained with this equipment. *Bulletins 5, 25, and 26 IE.* FEDERAL CLASSIFIERS SYSTEMS, INC., 127 North Dearborn St., Chicago, Ill.

Air Conditioners. A leaflet covers the glass-filament capillary-cell type element, and several installations into which it is being built. Complete conditioner units are pictured. The cells are said to filter air while humidifying it. In certain cases the units may be used to absorb or condense chemical fumes or gases. *Capillary Air Conditioners Leaflet IE.* AIR REFRIGERATION CORP., 475 Fifth Ave., New York, N. Y.

Air-Conditioning Unit. This pamphlet discusses a system composed of a humidifying or dehumidifying unit and a solution reclaimer. A special liquid medium is used to convey moisture to or from the air, its moisture properties being governed by temperature. Air is said to be cleansed by the unit. *There's Trouble in the Air Pamphlet IE.* SURFACE COMBUSTION CORP., Toledo, Ohio.

Anodizing Aluminum. A 21-page booklet details the chromic acid process. The booklet suggests how anodic operations may be improved, consumption of chromic acid reduced, and a more uniform product obtained. Several charts and graphs, as well as a suggested tank design, are included. *Anodizing Aluminum by the Chromic Acid Process Booklet IE.* MUTUAL CHEMICAL CO. OF AMERICA, 270 Madison Ave., New York, N. Y.

Automatic Bearing Lubrication. Described in this 8-page bulletin is a centralized lubricating system which connects frequently lubricated bearings to a multiple injector unit. By either manual or time-clock operation each bearing is given its predetermined quantity of lubricant. *Form 167 IE.* THE FARVAL CORP., 3293 East 80th St., Cleveland, Ohio

Automatic Valves. A 124-page catalog discusses in detail the selection, installation, operation, and maintenance of pressure-reducing regulators, temperature regulators, pump governors, relief valves, and other valves. While all models are supplied for regulation of steam, some are supplied for air or certain liquids or gases. Copies will be sent to executives or engineers in defense industries, if their requests are written on their companies' letterheads. *Catalog 70 IE.* FOSTER ENGINEERING CO., 109 Monroe St., Newark, N. J.

Colloid Mills. This 4-page bulletin covers construction, operation, and applications of commercial size colloid mills. Dryers, kilns, crushers, pulverizers, conveyors, and other items of the manufacturer's line of process equipment are briefly described and illustrated. *Bulletin 93 IE.* THE C. O. BARTLETT & SNOW CO., 6400 Howard Ave., Cleveland, Ohio.

Comminuting Machine. A 4-page bulletin features a new machine capable of grinding and pulverizing or of slicing, chopping, or dicing. It meets the sanitary requirements of the food and pharmaceutical industries. The rotating blades are flat on one side for impact operations, and sharp on the other side for cutting. Direction of rotation is reversible. *Model D Comminuting Machine Bulletin IE.* W. J. FITZPATRICK CO., 111 North Canal St., Chicago, Ill.

Conductivity Instrument. This catalog sheet is written about a conductivity instrument that indicates solution concentration, operates warning signals, and controls corrective equipment. It is for use with many industrial solutions, water, or other liquids which must be maintained within certain concentration limits. *Form RE-103 IE.* INDUSTRIAL INSTRUMENTS INC., 156 Culver Ave., Jersey City, N. J.

Corrosion-Resistant Equipment. A new 8-page catalog gives descriptions of plastic-molded pipe, fittings, towers, hoods, tanks, and floor covering. A table lists the corrosion resistance obtainable. *Corrosion Resistant Chemical Equipment Catalog IE.* HAVEG CORP., 16 Chapel St., Newark, Del.

Dryers. This 10-page bulletin is devoted to a new continuous dryer for wet-solid and plastic materials. The equipment takes filtered or settled material to be dried, and automatically preforms it before it enters the dryer, by means of either an extruder, drum, or granulator feed. *Bulletin 100 IE.* PROCTER & SCHWARTZ, INC., Philadelphia, Penna.

Fluorometric Assay of Vitamins B. A collection of five papers relates to methods and equipment for the fluorometric assay of vitamins B. *Bulletin T-108 IE.* COLEMAN ELECTRIC CO., INC., 310 Madison St., Maywood, Ill.

Frozen Water Ribbons. An 8-page bulletin explains the new form in which water-ice is being produced. This new form of water-ice has many features, such as lower temperature, dry surface, and better packing qualities, which are said to assure it a permanent place in the commercial ice field. Production equipment is illustrated. *Bulletin 39350-i IE.* York Ice Machinery Corp., York, Penna.

Glass-Lined and Stainless Tanks. This catalog of 24 pages describes a series of vertical and horizontal tanks for use in the food industry. Agitator and piping accessories are included. *Sani-I-Tanks Catalog IE.* Metal-Glass Products Co., Belding, Mich.

Government Specification Finishes. A file folder of data sheets gives widely used Army and Navy specification finishes. Each sheet contains sufficient information to enable a defense-goods manufacturer, not heretofore familiar with government specification finishes, to figure his unit costs accurately and establish the most efficient production schedule in keeping with his particular equipment. *Facts about U. S. Government Finishes. Data Sheets IE.* Roxalin Flexible Lacquer Co., Elizabeth, N. J.

Heat Exchangers. This pamphlet covers a line of spiral-constructed heat exchangers. Several advantages are listed for the spiral construction. *The Spiral Heat Exchanger Pamphlet IE.* American Heat Reclaiming Corp., 1270 Sixth Ave., New York, N. Y.

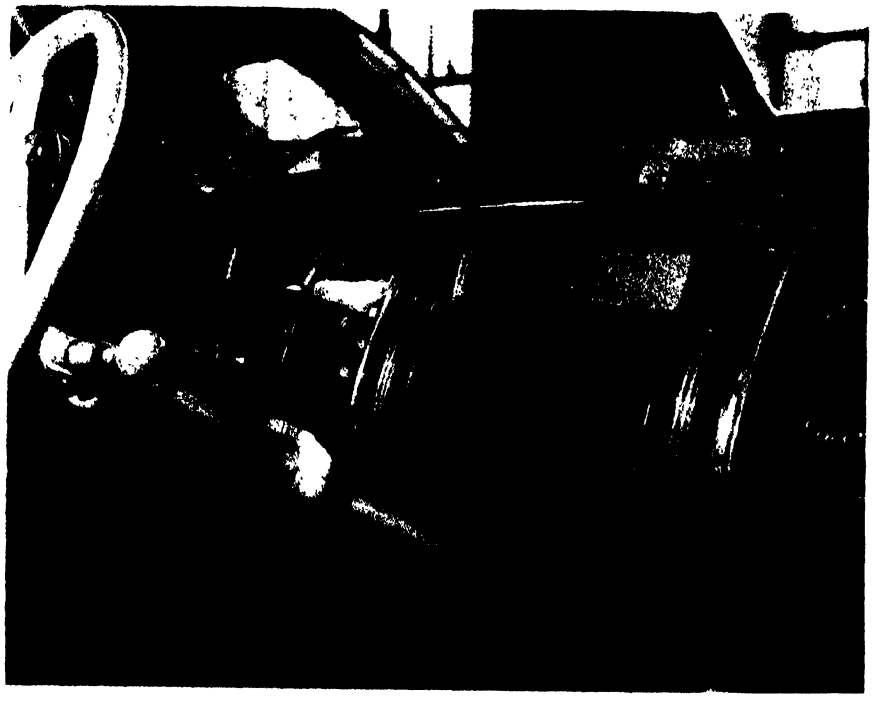
Industrial Control Devices. This new 56-page catalog is virtually a treatise on automatic control. Forty-two electric and pneumatic controls are listed. Each instrument is fully illustrated and described. *Catalog 8301 IE.* The Brown Instrument Co., Philadelphia, Penna.

Industrial Products from Milk. A 21-page booklet points out uses for such products as casein, lactose, lactic acid, and lactates. A number of new applications are suggested. *Industrial Uses for Milk Booklet IE.* Sealtest, Inc., 230 Park Ave., New York, N. Y.

Isomerization Process for Isobutane An 8-page bulletin details a process for isomerizing butane catalytically to isobutane. A flow diagram is included Isobutane is an important intermediate in production of high-octane blending stock for aviation gasoline. The process is of fundamental importance for operating in conjunction with alkylation plants. *Bulletin 0-41-13 IE.* Foster Wheeler Corp., 165 Broadway, New York, N. Y.

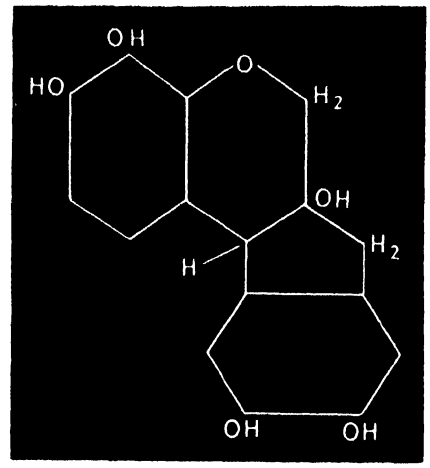
Jar and Bottle Rolling Machines. This bulletin is devoted to laboratory- and production-type rolling machines for use in wet or dry grinding, pulverizing, and mixing small batches of solids. A table of dimensions, capacities, etc., is included. Also illustrated are two tumbling machines. *Bulletin 56 IE.* Abbe Engineering Co., 50 Church St., New York, N. Y.

Liquid Processing Equipment. This new 36-page catalog describes and pictures portable and stationery mixers, pressure filters, pumps, glass-coated tanks, bottle fillers, cappers, and labeling equipment. The new sealed disk-type pressure filters are said to have desirable speed and capacity characteristics for their size. Disks used are discardable. Varying degrees of filtration fineness are obtainable through selection of disks. *Catalog 941 IE.* Alsop Engineering Corp., Milldale, Conn.



Plastics in Auto Interiors

An example of the increasing use of plastics in car interiors is this radio grille dash section produced by the Bay Manufacturing Division, Electric Auto-Lite Co., from Resinox, made by Monsanto's Plastics Division, Springfield, Mass. This is one of the largest phenolic plastic molded sections ever used in the automotive field.



HEMATOXYLIN

TECHNICAL

Available for the first time in pilot plant quantities sufficient for research and development work.

PROPERTIES

PHYSICAL:—Light brown needles, odorless, sweet tasting, non-hygroscopic and easily recrystallized. M. P. —$3H_2O$ at about 140°C.

Solubility:

Water, 2.5% at 25°C. very soluble hot.

Lower Alcohols, very soluble.

Ether, slightly soluble.

Hydrocarbons, insoluble.

CHEMICAL:

General; easily oxidized by air, especially in direct sunlight, to hematein ($C_{16}H_{12}O_6$).

pH indicator, changing from yellow to violet at about pH 6 on addition of alkali to solution.

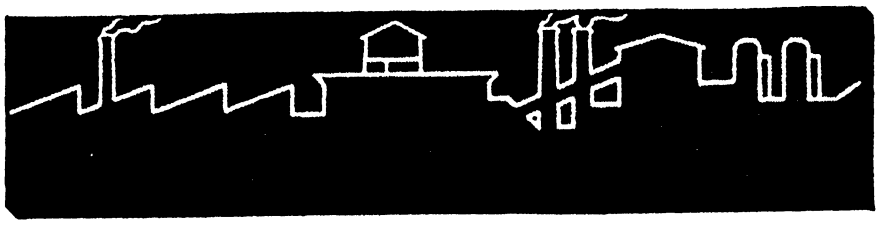
Specific: typical phenol reactions such as methylation, acetylation and formation of salts with heavy metals.

SAMPLES and INFORMATION *upon request*

AMERICAN DYEWOOD COMPANY

Research Department

BELLEVILLE, N. J.



Water-Repellent Jackets for the Army

THE best made uniforms ever put on a soldier are being issued to the men in the United States Army.

An example is the Army jacket, worn both on and off the post. It is made of a cotton poplin, tightly woven, treated with a durable water-repellent such as du Pont Zelan at the textile mill, and lined with wool where added warmth is required. The poplin will not soak through except in driving rain, when waterproof coats are in order. Nongreasy spots may be sponged off with a damp cloth. The jacket serves as a wind-breaker yet, unlike leather or rubber coats, it allows the body to breathe.

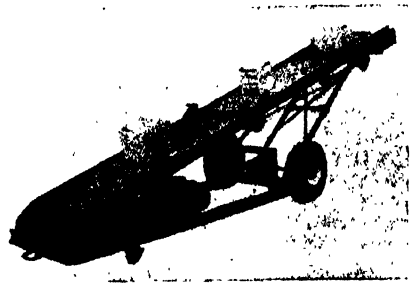
Chemically-treated fabrics are being used by the Army for numerous purposes. The tank corps, parachute troops, and ski troops have special water-repellent and spot-resistant uniforms in addition to the regulation jackets. Caps and reversible tents are being treated with Zelan with satisfactory results.

Allen Laboratories Move

THE Allen Laboratories, Fine and Rare Chemicals Division of W. F. Straub & Co., announces its removal to larger quarters at 5520 Northwest Highway, Chicago. The new facilities with the old will greatly increase its capacity for research and production.

To mark the first year of the company's existence, a dinner was given December 19 at the Lake Shore Athletic Club.

Portable Belt Piler



A REVERSIBLE portable belt piler with rubber tire wheels designed for piling, loading, and unloading box cars is announced by the Standard Conveyor Co., North St. Paul, Minn. The rubber tire wheels make it possible to move the machine from one site to another by simply hooking the lower end to a motor truck. Casters are rubber covered so that the piler moves easily. The carrier is raised and lowered by a crank on the side. This particular machine has a safe maximum piling height of 8 feet but it will pile up to 10 feet. The minimum piling height is 4 feet. It is also provided with a rough top belting to keep the commodities from slipping when set for the high elevation of 10 feet piling height.

Ten-Year Chevron for Pyrometers

ON JANUARY 2, 1932, a small group of people arrived in Foxboro, Mass., to become the nucleus of the Foxboro Pyrometer Department and carry on the production of a line of instruments begun under the name of Wilson-Maeulen Co. in 1907.

Through cooperation of the existing Foxboro organization and the old Wilson-Maeulen group, records, stock of parts, and machinery and furniture had been set up and production started almost immediately. With the department started in the midst of a depression which had several years to run, a lot of adjustments and adaptations had to be made by both the old and new personnel to attain harmony of cooperation.

On the 10th anniversary of the event, the company has a coordinated activity which has brought out a new potentiometer recorder, a potentiometer recording controller, and a group of potentiometer indicators. All the original designs have been completely replaced, with the exception of the nonrecording controller, which has been improved. New items have been added. This 10th year at Foxboro has seen the largest production in number of instruments and the largest dollar volume in this line since Charles H. Wilson began one of the pioneer American instrument businesses 33 years ago.

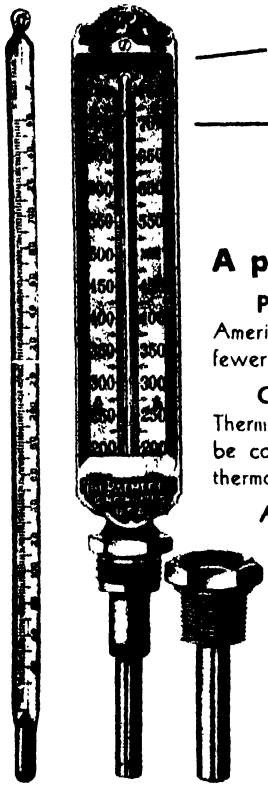
Microphotometer



A RAPID and convenient method for analyzing spectrographic plates or films is provided by a recording microphotometer announced by the Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Penna. Because the plates or films are mechanically scanned by a motor-driven scanning unit, and the relative positions and densities of spectrum lines are automatically recorded, this microphotometer eliminates the eyestrain and "human equation" of visual methods, and does

CONTINUED ON PAGE 155

A New STAR To Follow In 1942



ECONOMY!

A paramount issue of the Day

Palmer Thermometers, made with extreme care, by skilled American workmen, mean extra life to these instruments, and fewer repairs.

Careful annealing, which is a feature of every Palmer Thermometer, gives you a round dollar value, which should be considered before you sign your next order, for any thermometers.

And "Red-Reading-Mercury" . . . the easy to read RED column, costs you no extra. Buy thermometers that will give you real service.

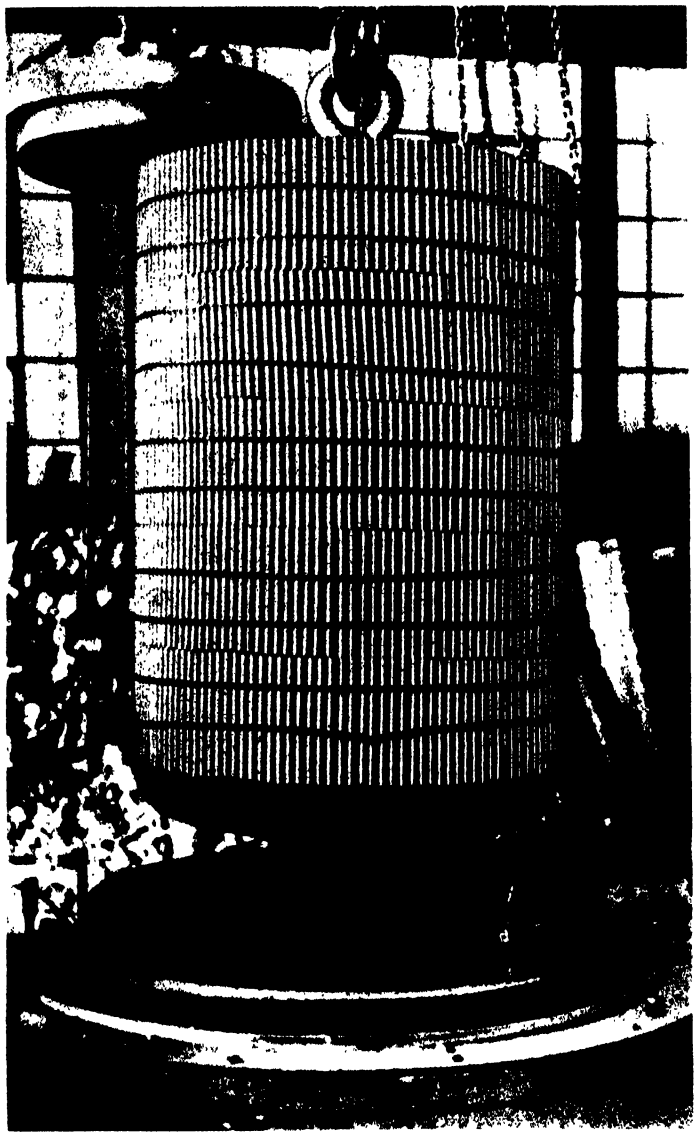
WRITE FOR CATALOG & PRICES

THE PALMER CO., MFGRS.

Industrial, Laboratory, Dial and Recording Thermometers

2517 Norwood Ave., Cincinnati, Norwood, Ohio

Canadian Plant: King and George Sts., Toronto



Mass Production of Nitrided Tank Parts

An unusual heat-treating operation is the mass production of nitrided tank tractor pins as carried out at the Campbell Wyant & Cannon Foundry Co., Muskegon, Mich. Loads of 12,000 pounds containing 10,000 track pins are being nitrided to a depth of 0.025 to 0.030 inch. Nitriding is carried on in two Lindberg cyclone nitriding furnaces, equipped with alloy retorts 38 inches in diameter and 54 inches deep. In the period of about six months since installation over 300,000 pins have been nitrided withou the loss of a single pin. Weekly output is around 20,000 pins.

Chemistry Courses Offered in ESMDT Program

THE Extension Services of The Pennsylvania State College are conducting a special course in the production, properties, and utilization of plastic material. The course includes lecture and laboratory work on all plastics of industrial importance. Classes meet from 7:00 to 10:30 P. M. two nights each week for 14 weeks.

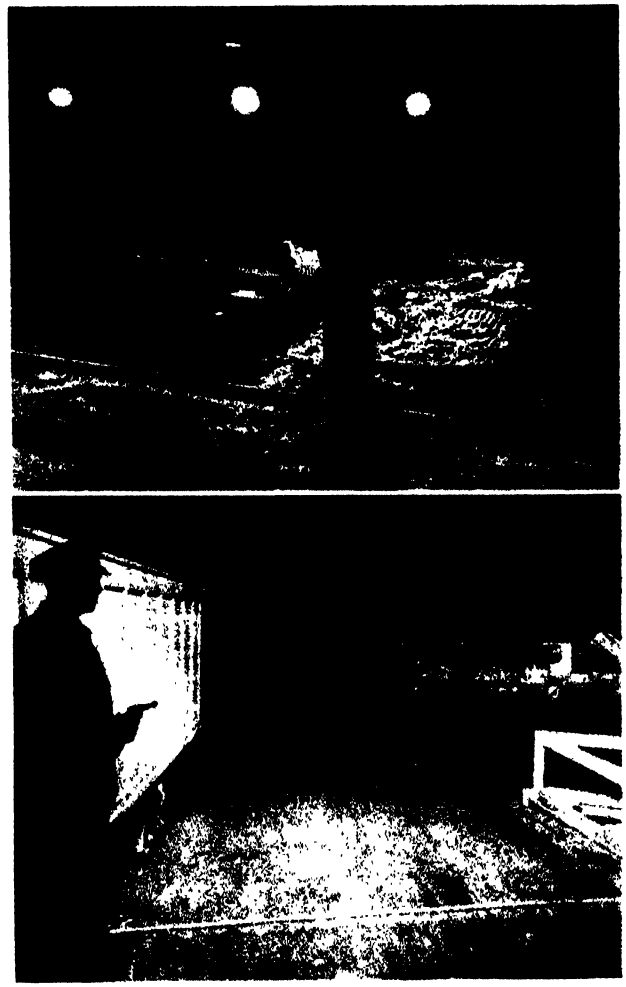
The present course is being given in three different locations—Lancaster, Scranton, and Pittsburgh. Instructors are P. O. Powers assisted by L. H. Dunlap in Lancaster, S. L. Kaye in Scranton, and Roger Spencer in Pittsburgh. Organization and supervision of the course have been carried on by J. W. Richardson, Chemistry Extension Services, The Pennsylvania State College.

Nearly 100 students were enrolled for the courses. All have either a bachelor's degree in chemistry or considerable specialized experience to qualify for the work of the course, which is given under the current ESMDT program of the U. S. Office of Education.

The Extension Services of The Pennsylvania State College are also conducting ESMDT classes in Technical Analysis, Chemistry of Engineering Materials, and a basic course in Foundations of Engineering Chemistry. Over 1200 students were enrolled in 55 class centers. This program is under general supervision of Arthur Rose, A. W. Hutchison, S. C. Schuman, A. J. Currier, and J. C. Underwood of the resident Chemistry Department, The Pennsylvania State College.

Niacin as Synonym for Nicotinic Acid

THERE has been much popular objection to the enrichment of bread with nicotinic acid, the vitamin necessary to prevent pellagra, because of confusion with the poisonous alkaloid, nicotine. The recommendation of the Food and Nutrition Board of the National Research Council that "niacin" and "niacin amide" be adopted as synonyms for nicotinic acid and nicotinic acid amide has been accepted by the Federal Security Administrator as not inconsistent with requirements of the Food, Drug, and Cosmetic Act. The NRC committee was composed of C. A. Elvehjem, W. H. Sebrell, and Tom D. Spies. The committee also recommended that the terms "nicotinic acid" and "nicotinic acid amide" be used in scientific literature and that the new terms be used only where there may be objection from the public.



Protection by Glare

Glare, anathema of lighting engineers, is now welcomed as an ally in the present defense against the saboteur. Westinghouse engineers are using it to blind a would-be intruder to a war materials plant. A Fresnel lens throws a flat, fan-shaped beam of light. A row of these luminaires is set on posts several feet away from the buildings, aimed so light is projected slightly downward. The space between the luminaires and buildings is virtually in darkness. *Above.* What the would-be intruder sees of a plant protected by the lights. *Below.* What the guard sees.

EMPLOYMENT INFORMATION

RATES to be paid in advance. Standard setting 5c a word, minimum charge $2.00 each; include 8 words for box address. Exceptions see ⟶ Display, $7.50 per column inch. No discounts or allowances.

SEND advertisements with remittance to INDUSTRIAL AND ENGINEERING CHEMISTRY, 332 West 42nd St., New York, N. Y., to reach there not later than 10:00 A.M. on the 10th and 25th, closing dates for NEWS EDITIONS of the 25th and 10th, respectively. Insertions made in order of receipt provided necessary remittances are complete.

Employers are requested to mention in their announcements the section of the country in which the open position is located to ensure replies only from those who are geographically available.

In printing these advertisements the SOCIETY assumes no obligations as to qualifications of prospective employees or responsibility of employers.

Unemployed members of the AMERICAN CHEMICAL SOCIETY seeking employment for themselves are allowed in one calendar year 3 free announcements, one per issue, set in standard style and limited to 50 words each, including 8-word box address. Excess words 5c each. Additional standard announcements 50% of regular rate.

Employed members of the AMERICAN CHEMICAL SOCIETY seeking new positions are permitted 3 standard announcements during the calendar year at 50% of the regular rate—include 8 words for box address.

Employers seeking chemists and chemical engineers are permitted 3 standard announcements, not to exceed 50 words each including box address and not more than one per issue, during the calendar year without charge, provided they agree in writing to acknowledge all replies (excess words 5c each), otherwise full rate applies.

The AMERICAN CHEMICAL SOCIETY is vitally interested in the welfare of its members and in seeing that the chemical industry is manned with competent chemists and chemical engineers. These pages are part of our service in that connection. In addition most of the larger sections of the AMERICAN CHEMICAL SOCIETY and several of the smaller ones have active employment committees. Local section secretaries in your area will inform you as to any employment aids that may be available locally.

An Employment Clearinghouse is operated at each national meeting of the SOCIETY for the purpose of bringing together representatives of industry looking for chemists and members and student affiliates in attendance wishing to make such contacts. For further details, consult the preliminary and final programs as printed in the NEWS EDITION prior to each meeting.

In the New York area, special employment facilities are offered by the Employment Bureau of the Chemists' Club, 52 East 41st St., New York, N. Y., and by the Chemist Advisory Council, Inc., 60 East 42nd St., New York, N. Y. In the Chicago area, the Chicago Section maintains an employment service at 413 Stevens Hotel, Chicago, Ill.

Those replying to announcements should be careful to send copies and not original documents. Advertising circulars will not be forwarded and to that end all letters will be opened at the forwarding office.

SITUATIONS OPEN

Those announcements in which the letter "P" is part of the address key have paid in full and are not committed to acknowledge replies The Society regards acknowledgment by employers of all applications as an act of common courtesy but can assume no responsibility for their failure to do so.

ORGANIC RESEARCH chemist, Ph.D., under 30, with wide experience in synthetic organic chemistry for development of research department in large mid-west industry. Submit full details of education, experience and complete personal data. Include salary expected and recent photo.
Box 14-N-1, Ind. & Eng Chem., Easton, Pa.

WANTED BY large Eastern concern for immediate employment: Chemists or chemical engineers for research and development work in petroleum and polymer chemistry. Our own employees have been advised of this advertisement Replies will be treated in strictest confidence.
Box 22-N-1, Ind. & Eng. Chem., Easton, Pa.

POSITION TEACHING "General Chemistry," "Teaching of Chemistry," "History of Chemistry," in large, fully accredited, mid-western university. Success will be measured by teaching results, activity in Division of Chemical Education, effectiveness in contacting and leading secondary school science groups. Send full particulars in first letter.
Box 24-N-1, Ind. & Eng. Chem., Easton, Pa.

PLASTICS CHEMIST with good general knowledge of molding techniques and the properties of commercially available plastics to supervise their selection and use in a Western New York industry. Salary between $3000 and $4500 per year depending on training. Send personal data and photograph.
Box 10-TP-1, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST with nutritional background and administrative ability to supervise large active bioassay laboratory. Should have Ph. D. or equivalent in experience. Opportunity for publication of research and attendance at scientific meetings. State full particulars including salary expected and enclose photograph. Replies held in strictest confidence.
Box 11-T 1, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST Ph.D. with 2 or 3 years' experience. Must have good foundation in physical and organic chemistry, and capable of undertaking enzyme and vitamin research. Applicants should give educational history, scholastic grades, experience, age and other personal data, and recent photo Excellent opportunity for qualified person in research laboratory of prominent food organization.
Box 23-TP 1, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST wanted with actual working knowledge of formulation and production of synthetic resins, particularly of the phenolic type, to develop new thermo-setting resins from certain natural raw materials.
Box 28-T-1, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST

to conduct investigations for well known manufacturing organization for further development of its product for emergency use as well as for post war expansion. Ph D or other graduate training in chemical engineering and several years' chemical research experience in electroplating or electrochemistry preferred Northwestern Pennsylvania district. Send resume of experience including age, place of birth, education, earnings record, and salary desired
Box 33-TP-1, Ind. & Eng. Chem., Easton, Pa.

GOOD OPPORTUNITY for Chemist experienced in production or research on manufacture X-ray intensifying screens. Give complete details including education, personal history, experience, salary desired, references. Include small recent photograph. Location New York City.
Box 35-T-1, Ind. & Eng. Chem., Easton, Pa.

ENGINEERS. Several openings for capable mechanical or chemical engineers with old established engineering organization having a number of Defense projects. Prefer technical graduates with at least five years experience in the design of industrial and chemical plants. Reply by mail giving full details of personal qualifications, technical training, experience, references and salary. Include a recent photograph. E. B. Badger, & Sons Company, 75 Pitts St., Boston, Mass.

WOMAN CHEMIST, American born, wanted for literature work in a library connected with a petroleum research laboratory situated in the Chicago area. Applicant must be thoroughly grounded in organic and physical chemistry; and she should be able to read German and to type.
Box 44-TP-1, Ind. & Eng. Chem., Easton, Pa.

RESEARCH ASSISTANT fats, oils, surface active materials. B.S, with good training in organic chemistry. Industrial experience not necessary. Location New York area. State age, education and draft status.
Box 47-T-1, Ind. & Eng. Chem., Easton, Pa.

YOUNG B.S. or M.S. wanted for duration near Boston. B record in analytical and organic chemistry, knowledge of bio-chemistry desirable. Draft status immaterial. Must be citizen. State training with grades, extensive references, experience and age. Enclose photograph.
Box 48-T-1, Ind. & Eng. Chem., Easton, Pa.

PHARMACEUTICAL CHEMIST, university graduate, to take charge of Laboratory for Applied Research and Specialty Development wanted by large concern in New York area. Further information obtainable from Chemists' Club, Employment Bureau, 52 East 41st St., New York City. About ten years' practical experience in drug manufacturing is desirable. When applying, state training, experience and salary desired.
Box 50-TP-1, Ind. & Eng. Chem , Easton, Pa.

ORGANIC CHEMIST with about ten years' experience in drug manufacturing wanted by large pharmaceutical concern in New York area. Applicant should be capable of running his own and supervising other processes. Further information obtainable from Chemists' Club Employment Bureau, 52 East 41st Street, New York City. When applying, state experience and salary desired.
Box 51-TP-1, Ind. & Eng. Chem., Easton, Pa.

WANTED: Dyestuff Plant Foreman, age 35-45 yrs. Small plant, good opportunity, location Pennsylvania. State age, experience, education, salary expected, etc.
Box 54-TP-1, Ind. & Eng. Chem., Easton, Pa.

WANTED: GRADUATE Assistants in Chemistry for 1942-43 at $500 with free tuition, exemption from laboratory fees Must have physical chemistry, calculus and second year physics. Send for application blank to Dept. of Chemistry, University of Pittsburgh, Pittsburgh, Penna.

SITUATIONS WANTED
(A.C.S. MEMBERS)

SPECIAL LIBRARIES ASSOCIATION will recommend trained chemical and technical men and women librarians at no cost to employer or member. Competent persons are now available. Write to the Executive Office, 31 East Tenth Street, New York, New York, for additional information.

PHYSICAL CHEMIST, Ph.D., 1937. Nine years college teaching, general, analytical, physical. Research in electro organic and catalysis. Expert glassblower. Polarograph. Sigma Xi. Age 30, married. Research or teaching position desired in East.
Box 49-T-10, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, BIOCHEMIST, bacteriologist. A.B., 16 years' experience in foods, biological and bacteriological products, plant management including production, maintenance, personnel, and accounting. Successful research and sales records. Patent experience. Age 39, married, Protestant. Continental U. S. preferred.
Box 66-T-10, Ind. & Eng. Chem., Easton, Pa.

FOOD CHEMIST with over twenty years wide experience in the food industry, in direction, research, process development, quality control, and factory problems. Desires a responsible position.
Box 48-T-11, Ind. & Eng. Chem., Easton, Pa.

CHEMIST B.S. 1940. One year towards M.A., A.C.S. approved universities. Single, 23, draft deferred. Analytical, physical, crystal structure, and some organic research. Read French, German. Desire research, development, or position leading thereto. Far west preferred, but will consider anywhere. Available immediately.
Box 76-T-11, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST Ph.D. 1924 with 17 years' experience in development and production of glandular and vitamin products. Special interest in development of new products and clinical ___ Desires position in either laboratory and plant development or promotion and sales. Available immediately.
Box 13-T-12, Ind & Eng. Chem., Easton, Pa.

PROFESSORSHIP Ph.D., Phi Beta Kappa, listed in Who's Who, Protestant. Experienced in teaching General, Organic, and Industrial Chemistry, also as industrial research laboratory director. Now employed, but interested in return to teaching because of opportunity for essential constructive work
Box 31-N-1, Ind. & Eng. Chem., Easton, Pa.

EXPERIENCED PHYSICAL Chemist, excellent scholastic standing, available for research position. Eleven years' successful research in gas reactions, hydrocarbon chemistry, catalysis. Many publications, patents. Author of books recognized as standard works in their respective fields. Married, 35. First papers obtained (British subject).
Box 32-N-1, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, ORGANIC, Ph.D. in 1942 from Eastern University. Available immediately. Research in enzyme chemistry and analytical organic. Publications. Broad background in major field including synthetic organic. Minor in physical and biochemistry. 4 years' experience in teaching organic and inorganic. Eastern location preferred but not essential.
Box 36-N-1, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 155)

Address communications to the box number indicated and Mail to Easton, Penna.

The American Chemical Society has no information concerning the position advertised—or in regard to those seeking employment.

(Situations Wanted Continued)

ORGANIC CHEMIST Chemical Engineer: A.B., M.A., 3½ years' towards Ph.D. (evenings). 5 years' experience industrial research, principally in organic chemical lines, cosmetics, and pharmaceuticals. Wants position in production or research with good chance for advancement Draft deferred. Available immediately.
Box 37-N-1, Ind. & Eng. Chem., Easton, Pa

PHYSICAL CHEMIST, Ph.D. 1938, B.S. in Pharmacy. Two years' each industrial research and teaching. Thesis electrokinetics. Thorough training organic chemistry and physics Graduate assistant three years. Honorary societies Publications. Married, 34, Protestant. Draft status deferred. Employed. Desires teaching position.
Box 12-T-1, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, executive, mature, reliable, seeks work. Background: analysis, processing, supervision, some purchasing. Foods, sugar, pharmaceuticals. Further details gladly furnished.
Box 13-T-1, Ind. & Eng. Chem., Easton, Pa

CHEMICAL ENGINEER (Ch.E.), young man, three years' laboratory and plant experience, sixteen years' industrial sales. Forceful speaker; good, clear writer, effective organizer. Now employed, desires position where he can serve Nation more effectively.
Box 14-T-1, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S., Ch.E. Age 29, single. 5 years' experience, 2 years' in vegetable oils and foods, 2 years' in insecticides, 1 year in boiler feed water and corrosion control. Employed. Available for interview N. Y. metropolitan area.
Box 15-T-1, Ind. & Eng. Chem., Easton, Pa

ORGANIC CHEMIST, Ph.D. Feb. 1942, large eastern university. Research on naturally occurring organic bases, sugars, proteins. Good background in synthetic organic. Two years' in research institute and teaching. Desires position in research. 24, single, 2A draft. Phi Lambda Upsilon, Sigma Xi.
Box 16-T-1, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, B.Ch E. 1933. Textile dying silk and rayon knitted goods — two years. Instructor in General College Chemistry — one year. Vocational Guidance and Personnel work — four years. Age 31, married, in good health and citizen of U.S.A. Available immediately.
Box 18 T 1, Ind. & Eng. Chem., Easton, Pa

ORGANIC CHEMIST, Ph.D., 1941, age 27. Research experience in organic synthesis, sulfur and nitrogen compounds, sterols, hormones. Biochemical and physiological research. Publications. Excellent theoretical training. Desires research position with progressive industrial firm or institution. Employed.
Box 19-T-1, Ind. & Eng. Chem., Easton, Pa.

COLLEGE TEACHING or research, Ph.D., 1940. Organic major Two years' college teaching, general, organic, analytical; two years' graduate assistant. Phi Beta Kappa, Sigma Xi, fellowships, publications. Available June, 1942. Woman, single
Box 21 T 1, Ind & Eng. Chem., Easton, Pa

ORGANIC BIOCHEMIST, Ph.D, 1942. Available March 1. Experience in vitamin D and sterol research, including spectrophotometric and chromatographic technique. Interested in vitamin, enzyme, or drug research. East preferred. Age 26, single, draft deferred. Protestant Member of Phi Lambda Upsilon, Sigma Xi Publication.
Box 24 T-1, Ind. & Eng Chem , Easton, Pa.

INDUSTRIAL HYGIENIST wants a position in defense industry, B.S. in chem. M S. in Eng. Harvard. Age 38, married. 15 years' experience in lead petroleum, gas mask and insurance engineering fields. Last six years supervisor large engineering company. Specialties: Court work, industrial hygiene, boiler feed water treatment. Experienced public speaker. Prefer New England or upstate New York.
Box 29-T-1, Ind. & Eng. Chem., Easton, Pa.

RESOURCEFUL CREATIVE research and development chemist. M.S. organic and physical chemistry. Thorough industrial background in synthetic resins and their applications. Extensive experience in fermentation, distillation and food industries. Now employed but desires more responsible position in above related fields
Box 30-T-1, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST, B.S. Age 53, married, white, Protestant. Experience; petroleum products, paint analysis and exposures, steel, boiler water, non-ferrous alloys, coal. In charge of laboratory employing eight men. Due to working conditions desires to make change.
Box 32-T-1, Ind. & Eng. Chem., Easton, Pa

CHEMIST, 23, draft deferred, M.Sc. 1941. Over 75 semester hours chemistry. Thorough training in organic and analytical chemistry, micro quantitative organic analysis, research in organic chemistry. Desire position with chance for advancement. Eastern U. S. or New York preferred. Available immediately.
Box 36-T-1, Ind. & Eng. Chem., Easton, Pa.

ORGANIC, CHEMIST, M.S. 1941 recognized university. Organic major, physical minor. Experience in research, two years' teaching. Outstanding record. Activities, honors, publication. Age 24. Draft deferred. Now employed but available on short notice.
Box 40-T-1, Ind. & Eng. Chem., Easton, Pa.

RESEARCH and INDUSTRIAL Chemist, Ph.D. desires research or directing position with progressive company offering wide opportunity for both broad and specialized experience. Wide experience carbohydrates generally, preparation cellulose derivatives, varied synthetic resins, rubber derivatives, and associated fields including films, stabilizers, plasticisers, molding, coating, solvents, adhesives. Generally familiar and experienced with terpenes, emulsions, waxes, synthesis, agricultural waste plastics, literature and economic surveys, patents, research through pilot plant. Employed, married, Protestant, adaptable. Desire broader opportunity.
Box 41-T-1, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST M.S. 1941 Physics minor. Teaching fellowship for two years. Scholarship honors, outside activities. Age 25. Single, draft deferred. Employed in research Desires position with future either in industry or teaching
Box 42-T-1, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST Microscopist. M.Sc in biochemistry; minor in physical chemistry. Also recent year of graduate study. Head, small college department. Published articles American Institute of Chemists. Available soon Research, teaching etc.
Box 43-T-1, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED (NONMEMBERS)

CHEMIST and BACTERIOLOGIST, M.S. Six years' experience in chemical and bacteriological work, over four years' in food industry. Specialized training in food and sanitation. Research in food and detergents. Desires change for advancement and future. Married, age 29, Protestant. Philadelphia area preferred
Box 31-T-1, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, extensive experience in academic and industrial research in gas reactions, spectrographic analysis, chemistry of high temperatures, fuel chemistry, activated charcoal and adsorption, reactions in solids, metallurgy, refractories. Exceptional background in crystal structure, X-ray diffraction methods and their industrial applications. Extensive experience in development of industrial processes. References
Box 34-T-1, Ind. & Eng. Chem., Easton, Pa

AGRICULTURAL BIOCHEMIST, B.S. in industrial chemistry. Course work completed for Ph.D. degree Major in Agricultural biochemistry, minors in Soils and Plant Physiology Five years' experience as Assistant Chemist in Fertilizer and Plant Chemistry. Married, 25, draft deferred. Publications. Employed. Desires research or position leading thereto. Location immaterial
Box 38 T-1, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, B.S., two years' research on synthetic drying-oils. Excellent background in organic synthesis, analysis, Phi Beta Kappa.
Box 39-T-1, Ind. & Eng. Chem., Easton, Pa

PHYSIOLOGIST PHARMACOLOGIST now in university post desires change to pharmaceutical work. Prefer directorship of research. Wide background that would be useful where varied program is anticipated Proficiency with vitamins and hormones. Speak Spanish
Box 46-T-1, Ind. & Eng. Chem., Easton, Pa.

GRADUATE, B.S., 1939 from accredited western university. Single, Gentile, age 24. Two years' graduate research in plant alkaloids, research in soils. Desire position with pharmaceutical house or fertilizer company as analyst.
Box 52-T-1, Ind. & Eng Chem., Easton, Pa

Industrial News

CONTINUED FROM PAGE 152

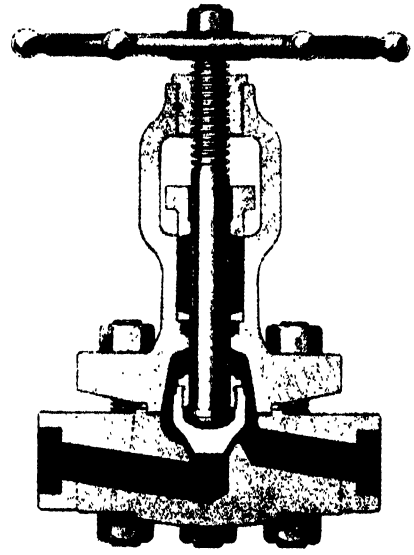
away with the delays and limitations of photographic processes.

Designed to accommodate plates or films as large as 4 by 10 inches, the scanning unit includes on a heavy cast base, an optical system, a plate stage, a drive mechanism for the plate stage, an amplifier, and controls grouped at a convenient location.

Integral Seat Valves

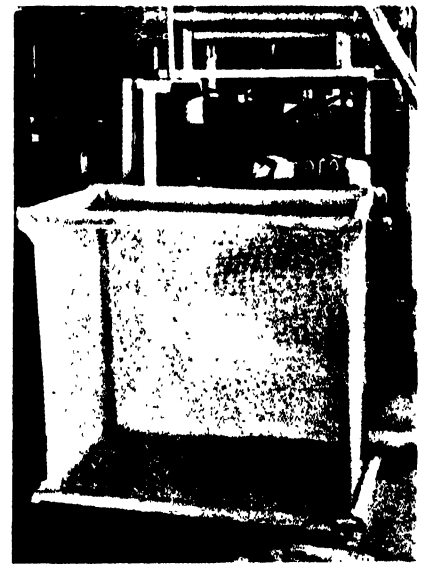
EDWARD Intex valves, hard-surfaced integral seat globe stop valves for pressures to 1500 pounds at 950° F., are made by The Edward Valve & Mfg. Co., Inc., East Chicago, Ind.

Carrying the trade name Intex (integral seat valves of extra value) these globe



valves are specifically designed for high-pressure and high-temperature service. The disk and integral seat are faced with Stellite, a high hardness alloy, which is extraordinarily resistant to both erosion and corrosion. Minimum weight with abundant strength has been accomplished by equalizing the distribution of metal around the body flow areas, so that in heating and cooling there is no distortion.

Plating Tank Nets



A NEW aid to good electroplating practice has been placed on the market by the Hanson-Van Winkle-Munning Co., Matawan, N. J., as the HVWM tank net. These nets are placed in plating tanks so that any work dropped may fall into the net and be easily recovered.

This net is made of 0.5-inch stretched mesh, hung square, 6-thread medium

MISCELLANEOUS

BUSINESS OPPORTUNITIES • FOR SALE • WANTED • ETC.

Five cents a word, minimum charge $2.00; display available at $7.50 per inch; in advance. No discounts or allowances

MICRO-ELEMENTARY ANALYSES: C, H, N, S, P, Halogens, Methoxyl, Mol. wt., etc., U.S.P. and other official tests, Purity tests, Microinorganic assays, Spot tests, Micro-distillations, Toxicological investigations, and typical micro-chemical research work. Dr. Carl Tiedcke, 366 Fifth Avenue, New York, N. Y.

INDEPENDENCE and SPLENDID income to chemist or chemical engineer who will propose well paying chemical manufacture based on thorough practical experience, line indifferent Box 22 T-1, Ind. & Eng. Chem., Easton, Pa.

WANTED: Process for the production of powdered iron for the powder metallurgy industry. Box 20-T-1, Ind. & Eng. Chem., Easton, Pa.

WANTED: Helvetica Chimica Acta, V. 1-22, 1918-1939. Comptus rendus hebdomadaires des seances de l'academie des science, 1900-1940. Please state condition and quote price. Please quote f.o.b. Peoria, Illinois, and mail quotations to Northern Regional Research Laboratory, Peoria, Illinois

WE OFFER: 1500 lbs. Copper Fluosilicate, 5 tons each Calcium Fluosilicate, Barium Fluosilicate also Calcium Levulinate, Levulinic Acid, Sodium Glutamate, Allantoin, Tryptophane, d-Ribose, Dulcitol, Fucose, Mucic Acid, Raffinose Hydrate, Xylose. Box 25-T-1, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Chemical abstracts, v. 2-25, 1908-1931 Lacks Decennial indexes. Newly bound in 73 volumes. Lafayette College Library, Easton, Pennsylvania.

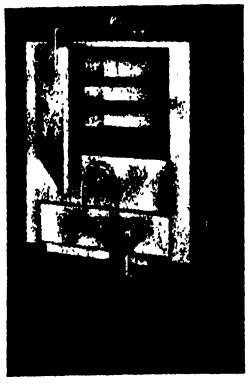
FOR SALE: Used Aluminum Jacketed Kettle, 5½ feet diameter by 7½ feet high, capacity 1000 gallons. Located in Central States. Box 26-T-1, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: 100 lbs. each Chalcopyrite, Cinnabar, Pyrrhotite, Hematite, Apatite, Rhodonite, Malachite, Azurite, Optical Quarts, Euxenite, Samarskite, Polycrasite, Gadolonite, Columbite, Halite, Anorthite, Carnotite, Molybdenite concentrates, Wollastonite, Limonite also Fluorescent Minerals. Box 27-T-1, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Journal of Physical Chemistry, vols. 1-39, complete; Trans., American Institute of Chemical Engineers, vols. 1-35 bound; Trans., American Electrochemical Society, vols. 1-61, bound. W. Westerfield, 612 West 112th Street, New York, N. Y.

twine. It can be used in nickel, cyanide copper, Mazic zinc, acid zinc, and cadmium solution to advantage. It is not suitable for alkaline cleaners or sodium stannate tin solutions.

Explosion-Proof Cabinet



THE Precision Scientific Co., 1736-1754 North Springfield Ave., Chicago, Ill., announces a new series of explosion-proof constant-temperature cabinets, heated by steam and approved by Underwriters' Laboratories, Inc., for use in hazardous locations, Class I, Group C and Group D, in which flammable volatile liquids, highly flammable gases, mixtures, or other highly flammable substances are manufactured, used, handled, or stored in other than their original containers.

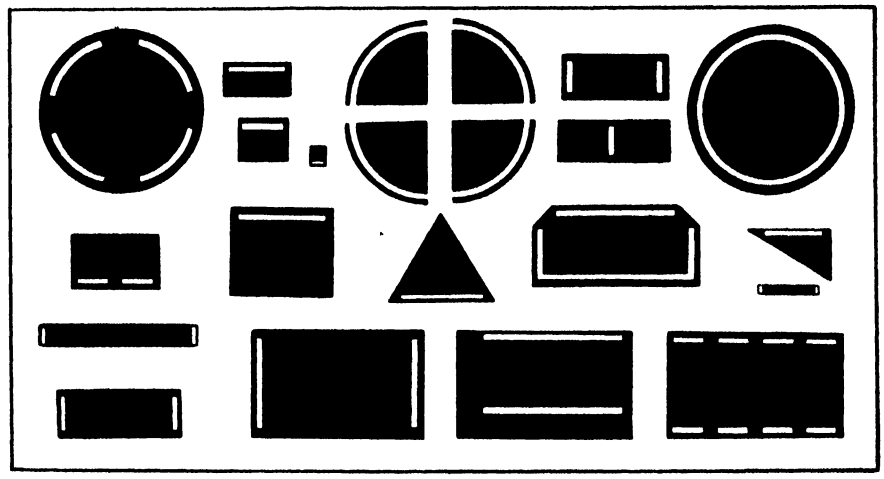
Basically the cabinet is a precision-Freas mechanical convection model in which a motor-driven turboblower produces a forced circulation of heated air across the working chamber. Steam, instead of electricity, is used for heating.

Temperature is automatically controlled by a pneumatic thermostat which opens or closes an air-operated steam valve to control the steam supply. Should the air supply fail, the valve automatically closes, turning off the steam supply completely. Control accuracy is between ±2° and ±3°, depending upon the temperature at which the cabinet is operated. Temperature range is 35° to 150° C.

Photronic Dry-Disk Photocells

THROUGH the development of a new manufacturing technique, a stable, dry-disk photocell can now be supplied in a wide variety of shapes and sizes, including multiple cell circuits on a common electrode.

These cells can be furnished to meet specifications as to output, resistance, spectral response, etc., regardless of the quantities involved, by the Photronic Division, Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark, N. J.



Some of many shapes in which Weston Photronic photocells are available.

FOR SALE *Equipment for complete unit for the production of*

10,000 Cu. Ft. REDUCING GAS PER HOUR

Gas is free of oxygen, hydrogen and is dry. The equipment includes:

1 duplicate gas generating units and auxiliaries.
2 charging platform, bucket and hoist.
3 primary and secondary coolers.
4 sawdust scrubber cleaner.
5 air drier or dehydrator.
6 gas drier or dehydrator.
7 gas exhauster.
8 oxide purifiers for the removal of H_2S.
9 gas, steam and air piping.
10 regulators and instruments.

For particulars as to location, price, terms, etc., address

Box 17-T-1, Ind. & Eng. Chem., Easton, Pa.

EDWAL *Special Chemicals*

1. BISMUTH SODIUM IODIDE
2. DI ALLYL SULFIDE
3. NITROSO BETA NAPHTHOL

Without cost or obligation to you, quotations will be furnished on these and other chemicals. Write for free 16 page book on Services and Chemicals of our manufacturing division.

THE EDWAL LABORATORIES, INC.
Manufacturing Division
732 FEDERAL STREET • CHICAGO, ILLINOIS

CHEMICAL AND ENGINEERING NEWS

HARRISON E. HOWE, Editor

PUBLISHED BY THE AMERICAN CHEMICAL SOCIETY

VOLUME 20 FEBRUARY 10, 1942 NUMBER 3

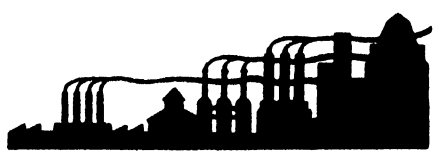
The "Production Army" vs. The "Combat Army"

THE present war is to be fought and won, or lost, by two groups of men—namely, the "production army" and the "combat army". The combat army of the United States, Great Britain, and the other United Nations has no hope for success if the production army loses its battle or is seriously retarded. The "officers and men" in the production army constitute as real an army and are as necessary to the war effort as the combat forces. They wear no uniforms and are neither commissioned nor drafted. In order that the public may be aware of their status, it is hoped that they will be furnished with some insignia to show that by government direction they are serving in a special branch of the Army where, by use of their extensive training, they are making their most effective contribution toward winning this war. *Chemists, chemical engineers, physicists, and other essential technical men are officers of the production army. It cannot function without them.*

There is far greater immediate danger to the ultimate outcome of the war from shortages of such manpower than there is from any lack of officers and men in the combat forces. Without production of essential materials the war will be lost, since the combat forces cannot exist without materiel. In establishing the Selective Service System, this situation was foreseen. Brigadier-General Hershey deserves great credit for so implementing procedures through the 6,000 local boards that chemists and chemical engineers (except those already mortgaged to the combat army through the R. O. T. C. and the Army and Navy Reserves) are for the most part still engaged in production and supply. It is, however, true that some three hundred or more chemists and chemical engineers have been inducted into the service where their specific training cannot be utilized. At present their years of training are lost to the Nation.

Early in December 1940, on request of the Defense Committee of the AMERICAN CHEMICAL SOCIETY, General Hershey met with them to discuss this general situation. At his request, a questionnaire was sent to a number of colleges and universities and to 29 companies selected by the committee as a cross-section of chemical industry. From the replies received and the data collected, the impending shortage of chemists and chemical engineers was evident. With these data, and after further corroborative advice from the U. S. Department of Labor, the Selective Service classified chemists and chemical engineers as groups "in which it is expected that the demand currently exceeds, or in the immediate future will exceed, the supply of qualified workers". A memorandum to this effect was sent to the state and local Selective Service Boards. Until recently the local boards have, in general, acted to alleviate the situation described. Since Pearl Harbor and the declaration of war, there has been an increasing tendency to consider that real urgency lies only in service in the combat army, with a decreasing realization of the grave danger that it might become inoperative if inroads are made on production.

As this situation became known, it was evident that another survey should be conducted to obtain current information. Accordingly, on December 23, 1941, the following letter and appropriate questionnaire were sent to the colleges and universities whose departments of chemistry and chemical engineering have been approved by the AMERICAN CHEMICAL SOCIETY, and to the same 29 chemical industries which were circularized a year before:



AMERICAN CHEMICAL SOCIETY
OFFICE OF THE SECRETARY

WASHINGTON, D. C.
1155 Sixteenth St., N. W.
December 23, 1941.

Because of the war, the increased number of draftees, and impending reclassifications, the Defense Committee of the AMERICAN CHEMICAL SOCIETY deems it necessary again to obtain, as promptly and accurately as possible, current information to enable the AMERICAN CHEMICAL SOCIETY to act with intelligence. We know that questionnaires are a pest, but hope for your aid and forebearance on account of the exigencies of the situation.

We again need, and need badly, facts concerning the demand for, and availability of, chemists and chemical engineers for the chemical plants of America upon which the country must depend for its supplies in this national emergency. These facts, when obtained, will enable us to give Selective Service authorities explicit data that will aid them in making an intelligent decision as to the deferment of chemists and chemical engineers in order that the defense program may proceed with the acceleration that is already underway.

Please answer the attached questions and send to me in care of the AMERICAN CHEMICAL SOCIETY BUILDING, 1155 16th St., Northwest, Washington, D. C.

ROGER ADAMS, *Chairman*
JAMES B. CONANT
WARREN K. LEWIS
THOMAS MIDGLEY, JR.
CHARLES L. PARSONS
EDWARD R. WEIDLEIN
ROBERT E. WILSON
Committee

Demand for Chemists and Chemical Engineers

College Questionnaire

1. Please estimate the present number of graduates of your institution in chemistry and chemical engineering who are now unemployed: (*a*) A.B. or B.S.; (*b*) M.A. or M.S.; (*c*) Ph.D. or D.Sc. Comments are desired.

2. In your opinion, has the shortage shown last year of properly trained chemists and chemical engineers at the bachelor's, master's, or doctor's levels declined or been aggravated, and to what extent?

3. Are you receiving more or less requests for chemists and chemical engineers with the B.A. or B.S., M.A. or M.S., or Ph.D. degrees than in the past three years? Please compare the number of those graduating at the different levels in June 1942 who have already accepted positions with the number who graduated in 1941 and were placed as of December 23, 1940. This information is especially important.

4. To what extent will advanced R. O. T. C. training divert your 1942 graduates from the production army into the combat forces?

5. If you have distinct departments of chemistry and chemical engineering, please see that a reply is sent from each.

One hundred, out of 118 educational institutions addressed, have reported. The details of the replies are so similar that the picture is as clearly painted as if every institution had responded. An appalling shortage of trained individuals in chemistry and chemical engineering is shown. By far the greatest proportionate demand is for those to be graduated at the doctorate level, most of whom have accepted positions pending receipt of their degrees. The colleges report almost without exception that chemical or chemical engineering alumni are all employed and that current demands cannot be supplied. Only a few persons are known to be unemployed and these because of chronic illness, physical defects, or objectionable personal characteristics. No good purpose can be served by printing here the institutional detail. However, the following comments from letters of transmittal describe the general situation:

A Few Pertinent Quotations from College Replies

Buffalo, University of, Department of Chemistry

In common with other schools, we feel very keenly the necessity for a more definite policy with regard to chemistry students and the Selective Service. Our university is developing plans for a more rapid completion of the work for the bachelor's and advanced degrees by elimination of vacation time, at least in part. For the maintenance of our work, it is imperative that we be able to depend upon deferment or exemption for graduate students and assistants. I feel that your committee has a very important defense task in impressing the Selective Service authorities with the importance of this matter.

California, University of, Department of Chemistry

The Army and Navy have removed from the supply of men a large percentage of the more able students.

Georgia School of Technology, Department of Chemical Engineering

R. O. T. C. and Naval training will divert approximately 40 per cent of this year's graduating class into the combat service. This includes an even larger percentage of our best men.

Harvard University, Department of Chemistry

The shortage of trained chemists is the most serious in our experience, especially at the doctor's level.

Illinois, University of, Department of Chemistry

We are now receiving three or four times as many requests for chemists and chemical engineers as we did a year ago. At Christmas time last year about one fourth of the Ph.D. candidates had been placed, while half of the 1942 class is already placed.

Iowa State College, Department of Chemistry

We not only have no alumni unemployed but are having a very difficult time to maintain our teaching staff. Candidates for part-time positions this past year are below the average of previous years, in ability and in training in chemistry. All the Ph.D. candidates for graduation the remainder of this college year have been placed as against 50 per cent placement at the same date last year.

We shall continue to need chemists in greater numbers and for a longer period of time than we had anticipated for reasons now apparent to all. It is most important that we have good faculties to do the training and high-grade young people to train.

Kansas State College, Department of Chemical Engineering

The shortage shown last year of properly trained chemists and chemical engineers at the bachelor's, master's, and doctor's levels has been aggravated in recent months. This is particularly true of master's and doctor's men. Many of these men are leaving school before completing their work because of the unfortunate attitude of many Local Selective Service Boards.

Maryland, University of, Department of Chemical Engineering

Advanced R. O. T. C. training has diverted our past graduates from positions in industry to combat forces and will continue to do so. All of our 1941 graduates are now in the combat forces.

The shortage of properly trained chemists and chemical engineers appears to have increased very much from last year in all three levels, bachelors, masters, and doctors, particularly in the field of doctors.

Massachusetts Institute of Technology, Department of Chemical Engineering

About 42 per cent of the seniors in chemical engineering will become Reserve Officers.

Massachusetts Institute of Technology, Department of Chemistry

We are receiving more requests for chemists of all three grades as compared with the last three years. The graduates of June 1942 with the Ph.D. or M.S. degrees are placed at the present time to the extent of 88 per cent of our total.

New York University, Department of Chemical Engineering

Practically all students are accepting commissions in the Army or Navy.

Pennsylvania State College, The

Shortage has increased for all levels; greatest for Ph.D. training in organic chemistry.

Pennsylvania, University of, Department of Chemistry and Chemical Engineering

Judging by the number of inquiries received, the shortage of properly trained chemists and chemical engineers, which was evident last year, has been extensively aggravated. For months I have been compelled to tell potential employers that the only way I knew to secure a properly trained chemist or chemical engineer was to attract him away from someone else.

Polytechnic Institute of Brooklyn, Department of Chemical Engineering

I trust that the work of your committee may serve to alleviate the conditions we are continually faced with in regard to the drafting of students—a particularly difficult problem in our graduate courses, which are given on an evening basis, and where men are employed in chemical industries. We have found some cases where the draft boards refused deferment for men who are not only engaged in important chemical engineering work in vital industries, but who are also receiving graduate training in evening work. Such an attitude on the part of the draft board of course intensifies the problem of industry in maintaining an adequate force of competent chemists and chemical engineers for their increased production schedules.

Polytechnic Institute of Brooklyn, Department of Chemistry

We could have placed during the past year twice the number of men who have obtained degrees in that time. Even the men of rather low scholastic standing and with rather poor personalities have been placed.

In our opinion, the shortage of properly trained chemists shown last year has been aggravated. This shortage was then and is now most noticeable at the doctor's level.

Purdue University, School of Chemical and Metallurgical Engineering

There have been a great many more offers made than at the same time last year

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Annual subscription rate, $2.00. Foreign postage to countries not in the Pan American Union, $0.60; Canadian postage, $0.20. Single copies, $0.15. Special rates to members.
No claims can be allowed for copies of journals lost in the mails unless such claims are received within 60 days of the date of issue, and no claims will be allowed for issues lost as a result of insufficient notice of change of address. (Ten days' advance notice required.) "Missing from files" cannot be accepted as the reason for honoring a claim. Charles L. Parsons, Business Manager, 1155 16th St., N. W., Washington, D. C., U. S. A.

and about 50 per cent more interviews granted. I do find, however, that the boys are much more choosy than they were last year; witness the fact that a number of our seniors have had from three to seven offers and have not yet been placed.

Yale University,
Department of Chemistry

One visiting industrialist emphatically stated that his company is only 20 per cent ready, both from a production and from a personnel standpoint, to meet the newest emergency. He urged us to keep chemical students enrolled at Yale and thus prepare themselves for industrial service.

In the graduate level 50 per cent of our Ph.D.'s of June 1942 are already placed and we have many conferences scheduled with industrialists during the week following the opening of school on January 5. Judging from the tenor of the letters from these industrialists, the remainder of the Ph.D.'s will be placed early in the year.

In addition to this survey of the approved colleges, the AMERICAN CHEMICAL SOCIETY Committee on the Professional Training of Chemists made a survey as of June 1940, 1941, and 1942, showing that the output of chemists and chemical engineers is not increasing and that a large number of prospective technical men have, through a mistaken patriotism, ceased to train themselves for the production army. Now it appears certain that no increase in the annual output can be expected; indeed, a decrease is likely to take place. The details of this survey follow:

Census of Chemical and Chemical Engineering Graduates

Comparative Data, 1940, 1941, 1942

Number of Colleges, 506

	1940	*1941*	*1942**
CHEMISTS			
B.S.	4,284	4,472	4,400
M.S.	697	910	812
Ph.D.	399	723	571
TOTAL	5,380	6,105	5,783
CHEMICAL ENGINEERS			
B.S.	1,840	1,709	1,862
M.S.	203	183	168
Ph.D.	29	23	45
TOTAL	2,072	1,915	2,075
GRAND TOTAL	7,452	8,020	7,858

* Replies received from 450 colleges—56 added by proportion.

Requirements for Chemical and Chemical Engineering Personnel

Industrial Questionnaire

1. (*a*) To the best of your judgment has the current shortage of chemists and chemical engineers been aggravated since you reported a year ago? (*b*) How much?
2. How many additional chemists and chemical engineers do you anticipate will be needed by your company to carry on efficiently throughout 1942?
3. Please compare the approximate number of competent chemists and chemical engineers that you will need in 1942 with the number employed in 1941 at the following educational levels: (*a*) B.A. or B.S.; (*b*) M.A. or M.S.; and (*c*) Ph.D. or D.Sc.
4. Are your requirements for chemists and chemical engineers likely to increase or decrease in the next two years?

Twenty-eight of the 29 leading employers of chemists and chemical engineers addressed have reported. They estimate a need for 2,152 more such persons in connection with this year's expanding operations. One of these corporations will need 500, two require 300, one estimates 125, and three, 100 each, down to a minimum of five. These 29 corporations comprise only a fraction of the chemical companies of America. Essential industry needs in 1942 from 2,000 to 3,000 more chemists and chemical engineers than will be graduated or are otherwise available. No one knows from whence they are to come.

Magnesium, aluminum, transparent plastics, rubber, explosives, medicinals, and innumerable minor but essential supplies needed by the Army, Navy, Signal, Sanitary, and Medical Corps, can be produced only under the guidance of trained engineering and chemical personnel. The Army and Navy are deeply concerned. Investigations made by this organization prove that trained personnel to produce this material is lacking. Not only the finished product but also the raw materials going into smokeless powder, rubber, etc., can be produced only under the active control of experienced chemists and chemical engineers.

Per contra, the Army and the Navy have been wide awake to obtain the best specimens of genus homo for officer personnel through the Reserve Training Corps. Agreements have been made with our brightest and most physically able college students whereby they are expected, and even required, to accept commissions in the Army upon graduation. Among these are many chemists and chemical engineers whose specific training has little bearing upon their selection or upon their duties after they are enrolled. In other words, these chemists and chemical engineers are to be enrolled as officers for their mental and physical abilities rather than with any thought of applying them to chemical problems or production.

Nonstudent reserve officers who have been called into service are, except for the relatively small number in the Chemical Warfare Service, assigned to positions which have little bearing upon the subject for which they have been scientifically trained. Many of these officers have asked us to urge the responsible officials to have them transferred to more appropriate occupations, but it appears impossible to obtain such assignments. The extent to which these Reserve Officers have been called into service constitutes a grave emergency. The number can be ascertained only from military records.

According to our information, the Chemical Warfare Service has 1,300 reserve officers on duty, of whom 85 per cent are chemically trained. Six hundred additional C. W. S. reserve officers are available but have not yet been called to service. Approximately 400 C. W. S. officers are on duty with other arms of the services. We believe that at least 50 per cent, and possibly 75 per cent, of these men could be replaced by nonchemically trained men without loss of efficiency. The Chemical Warfare Service informs me that it needs 3,000 such officers.

We have in this office records of highly trained chemists and chemical engineers, many of them Ph.D.'s, who have been taken from the production army for service in the Field Artillery, Coast Artillery, Infantry, and the Marine Corps. Many complaints are being received from our chemical companies that production is falling off and that future production is jeopardized by the withdrawal of these production officers from industry. While we recorded no detail, we know from many letters and telephone calls that industry has protested in hundreds of cases against the taking of these essential men from the production army. Only in extreme cases have these production officers been allowed to continue in the industry. This office has been swamped with requests for assistance in maintaining the chemical staffs in essential industries so that production might continue.

Both the Army and Navy have perfectly legal mortages on their reserve officers. These officers have a moral obligation to abide by their commitments and, of course, will do so. The Army and Navy had the foresight to involve them years in advance. The chemical departments of the colleges failed to see that their graduates were left free to serve where their special training and talents could be used in essential industry. Replies indicate that about 25 per cent of all graduates in institutions with R. O. T. C. or Naval Reserve training have signed these mortgages upon their future. Massachusetts Institute of Technology, one of our very best institutions, reports that 42 per cent of its 1942 chemical engineers are so involved. The question arises: Shall the Army and Navy foreclose their mortgages with the practical certainty that production and supply will be hamstrung? The choice to foreclose or not is theirs. It is the duty of the AMERICAN CHEMICAL SOCIETY to see that they act with their eyes open.

The 6,000 Selective Service Local Boards, although made up of patriotic men, are by no means omniscient; nor are they aware in many instances of the key positions filled by chemists and chemical engineers in production and supply. General Hershey has gone as far as he felt he could, within the law, in making suggestions to the boards and recently reiterated the policy to be followed. This has always

been his personal attitude, and we are sincerely appreciative. However, it has not been seconded by all of his subordinates, to the great confusion of the Local Boards, and, to a lesser extent, of the Appeal Boards.

An editorial entitled "Defeat" which appeared in the February issue of *Industrial and Engineering Chemistry* clearly portrays this very unfortunate situation, a situation which is not allowed to exist in England, Germany, or, so far as we can determine, in the armed forces of any other combatant. A list of these misplaced soldiers has been sent to Selective Service Headquarters, which states this is outside its jurisdiction. The Chemical Warfare Service, to which the list also was sent, claims to be helpless to remedy the situation under rulings of G-3, although it has made every effort to do so.

Until quite recently students of chemistry and chemical engineering have been allowed to continue their training, even to the doctorate grade, but in the past two months misunderstood communications to the Local Boards resulted in very great confusion. Numerous men "in training for" necessary industry have either been forced to discontinue their studies or have received information that in all probability it would be impossible for them to go on to graduation. This has been particularly true of candidates for the doctorate degree. General Hershey is very rapidly correcting this impression as indicated by the following two communications:

January 8, 1942

MEMORANDUM TO ALL STATE DIRECTORS (I-341)

SUBJECT: CLASSIFICATION-NECESSARY MEN (III)

Confirming Telegram of January 7

Complaints in increasing volume indicate Local Boards are reopening the cases of registrants deferred for occupational reasons and reclassifying such men in Class I-A. I direct that Local Boards be immediately informed of the continuing necessity for deferment of men necessary to activities, the maintenance of which is essential to the war production program and the national health, safety, and interest. State directors should avoid calls upon Local Boards except upon the basis of available Class I-A men.

HERSHEY

Telegram to Texas State Director of Selective Service

January 9, 1942

This office has been informed that your headquarters has issued instructions to Local Boards that no graduate student can be considered for deferment. No such policy has been adopted by this headquarters and Local Boards should be informed that graduate students including part-time assistant instructors may be considered for occupational deferment on an individual basis in those fields in which a national or local shortage is known to exist.

HERSHEY

Additional quite unambiguous instructions are being formulated and will probably be issued to clear up the situation.

In our opinion, if the production army, with increased output and new material demanded of it, is to supply the combat forces, it is essential for the War Production Board, the Army, and the Navy to see that:

1. Definite and unambiguous instructions are issued to Local Boards and especially to Appeal Boards that chemists and chemical engineers in the production army or in training therefor are *de facto* necessary men.

2. Reserve Officers now serving in the production army are not called to the combat forces, and that many already called be returned in order to assure supply.

3. Officers and men in the Army, Navy, and Marine Corps, who are trained chemists and chemical engineers be assigned to chemical work or released to the production army.

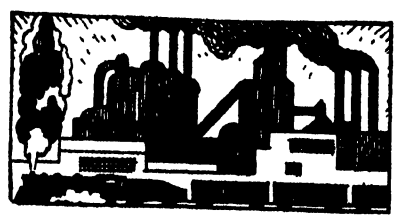
4. Students of chemistry and chemical engineering now enrolled in the R. O. T. C. or Naval Reserve be released by the Army and Navy to the production army without discredit.

5. Students of chemistry and chemical engineering, considered by their instructors to be qualified, be allowed to complete their education and when graduated be allowed a reasonable time to become connected with the production army or to become instructors for those in training. Such training should be accelerated through the Office of Education with federal financial aid where necessary.

It is our belief that the officers of the combat forces will cooperate if they realize that otherwise there is little prospect of procuring the necessary supplies for their upkeep and instrumentation.

All of these data, with full detail, have been officially presented to high authority. Whatever the outcome of the battle being fought by the production army, the AMERICAN CHEMICAL SOCIETY will have sounded a clear warning. PERSONNEL, NOT MATERIEL, WILL BE THE BOTTLENECK; LARGELY THROUGH WASTE. It is not yet too late.

CHARLES L. PARSONS, *Secretary*
AMERICAN CHEMICAL SOCIETY



Nazis Exhibit Synthetic Resins in Switzerland

GERMAN authorities recently placed on exhibit at Zurich, Switzerland, German synthetic resins and similar construction materials, intended to show the progress made in adapting modern plastics to engineering use as an aid to conserving metals for war needs.

For fabricating gas masks, for instance, a nonflammable celluloid substitute, Cellon, was shown in a wide range of applications. Also exhibited were a phenolic resinoid, Trolitan, for use in electrical insulation, and what was said to be a new product, Trolitax, a synthetic resin-impregnated paper of high dielectric value, used in constructing transformers, electric motors, and similar apparatus.

As a substitute for hard tropical woods there was Lignafol. Pollopas, a urea-formaldehyde plastic for making utilitarian small parts, and trolit and trolitul, dye-cast synthetics, were also included.

American Source of Pyrites in Cyprus Closed

WAR conditions have closed an American source of pyrites in the Crown Colony of Cyprus, where production has virtually ceased. An American concern engaged in this industry there closed out production completely in 1941, and dwindling output was reported for local companies.

Of 1940 exports, 75,745 tons of cupreous pyrites went to Europe. Of 26,723 tons of cupreous concentrates, the United States took 19,111 with 7,612 tons going to Japan. Total output in 1940 by local mine organizations was 247,932 tons, compared to no production in the first five months of 1941. However, one company is reported to have engaged to supply about 10,000 long tons of pyrites for Egyptian consumption, and to furnish this quantity, a resumption of mining will be necessary.

Exports of Derris from Netherlands Indies Jeopardized

THRIVING new cultivation of derris in the Netherlands Indies and its export in any quantity have been jeopardized by war inroads.

Cultivation of derris in the Netherlands Indies was not started until about 1937, but by 1941 estates had 8,000 hectares planted in addition to a rather large native cultivation. Virtually the entire amount was exported to the United States and Britain. In 1941 it was estimated that exports would total 1,000 metric tons, and in the coming year 1,200 metric tons were expected to be available for export.

However, shipping space for derris root has been greatly reduced for many months to make room for more strategic products, and present war conditions probably have aggravated the situation.

Travel to Memphis

MEMPHIS, the convention city of the AMERICAN CHEMICAL SOCIETY from April 20 to 24, 1942, is one of the few substantial cities in the United States which has grown because it must. It is situated in the midst of the most fertile lands in America, and as these lands were developed Memphis necessarily grew to meet the demands of the people in the surrounding area.

Of course Memphis was established as a city because of the natural environment. It is located on the highest point of land in the Mississippi Valley between the Great Lakes and the Gulf of Mexico. Beyond any historical records Memphis was a meeting place for the Indians, who established trails like spokes of a great wheel, with the Chickasaw Bluffs as the center. These trails are today great highways of hard-surfaced roads so that access to the city from all parts of the country is easy and pleasant. In the early days of steamboating the people of Memphis built their own boats. When railroads began to be constructed they, too, followed the spokes of the Indian wheel. Thus Memphis became one of the great commercial centers of the South. In the old steamboating days it was not unusual to find 75 to 100 packet steamers tied up at the Memphis wharves, but today the barge lines handle twice as much freight as in the best days of the steamboat.

With the development of commercial aviation, American Airlines used, and still uses, Memphis as one of its east and west transportation centers. It was followed almost immediately by Chicago and Southern Airlines, and later by Eastern Airlines. Additional lines were projected but will have to await war developments. However, Memphis is one of the great air transportation centers of the United States and has one of the finest airports in the country.

The eight national highways, ten trunk-line railroads, and three air lines which enter Memphis from every direction afford easy access to this city for the chemists of North America.

But of the several modes of travel the automobile offers by far the most pleasure to the visitor who will take time for the interesting stop-overs and side trips to enjoy the beauties of the Southland in the springtime. In the middle of April spring is in full glory in the Midsouth, wisteria and azaleas are in full bloom, the rainy season is over, and the weather is perfect for travel because the long hot days of early summer have not arrived.

The route from the northeastern seaboard leads through historic Virginia and over the Skyline Drive, the scenic motorway through Shenandoah National Park. The park itself lies in the Virginia section of the Blue Ridge Mountains and includes an area of magnificent beauty extending for a distance of approximately 100 miles along the crest of the mountains. From Front Royal on the north to Waynesboro on the south, this is a region of sharp ridges, narrow valleys, and unbroken forests. One of the sights on this direct route is Natural Bridge, the miracle in stone that was once purchased from George III by Thomas Jefferson. Alternate routes from Washington, D. C., might include visits to the historic spots of eastern Virginia, such as Richmond, Yorktown, Jamestown, and the colonial restoration at Williamsburg.

Continuing from the Skyline Drive, however, is the partially completed Blue Ridge Parkway leading through Asheville to the Great Smoky Mountains National Park. These are the most massive mountain uplifts in the East and are the oldest mountains in America. The name comes from the blue haze, sometimes as dense as smoke, which almost always hangs over the mountain peaks. Or the more direct route to Knoxville may be taken by branching off at Roanoke. Knoxville is the seat of the University of Tennessee and headquarters of the TVA. Near by is Norris Dam, highest unit in the Tennessee River development.

From Knoxville there are two routes to



STATE OF TENNESSEE, DEPARTMENT OF CONSERVATION

The Great Smoky Mountains of Tennessee and North Carolina

ON TO MEMPHIS



CLINE STUDIO



STATE OF TENNESSEE DEPT OF CONSERVATION



STATE OF TENNESSEE DEPARTMENT OF CONSERVATION

Above. The Great Smoky Mountains in east Tennessee. *Below.* Stanton Hall in Natchez, Miss. *Left.* Reelfoot Lake situated near Memphis.

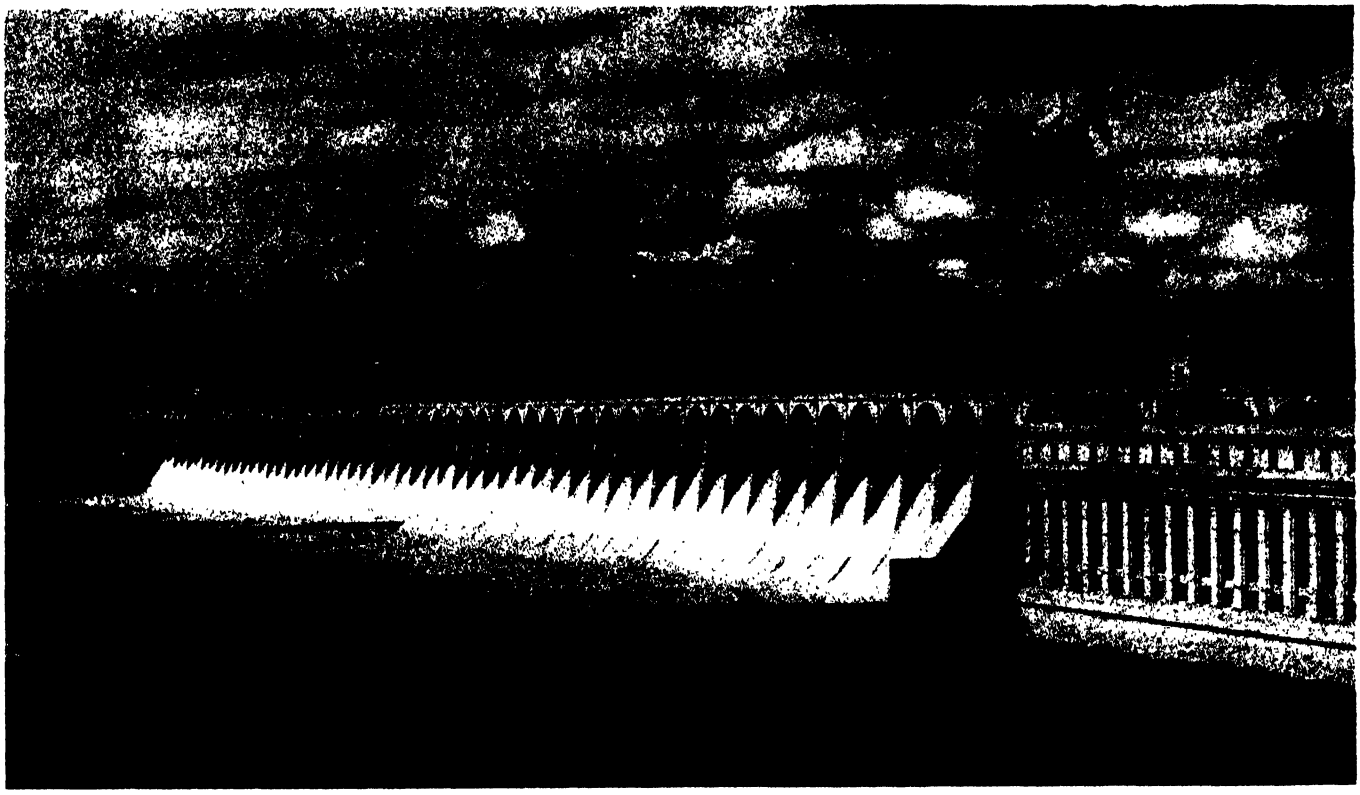
DIXIE MOTOR CLUB





A. C. S. MEETING

April 20 to 24



Wilson Dam in northern Alabama, source of TVA power for the city of Memphis

Memphis. One is through the Cumberland Mountains to Nashville, capital of Tennessee and former home of Andrew Jackson, whose "Hermitage" is open for inspection. The other leads along the southern border of Tennessee through Chattanooga. From here Sherman began his march through Georgia and in this vicinity were fought some of the bloodiest battles of the Civil War including Chickamauga, Missionary Ridge, and Lookout Mountain, the "Battle above the Clouds". Near Memphis is Shiloh National Military Park, scene of the second great battle of the war between the states.

Just across the border in Alabama is Muscle Shoals and the great Wilson Dam, cornerstone of the TVA. The dam was begun in 1918 as part of the project to develop a government nitrate plant to produce military explosives and was completed in 1925. The facilities of the nitrate plant were utilized during the years before the present war for the production of fertilizer from near-by limestone and phosphate rock deposits. The part of the nitrate-producing equipment that was not necessary for this work, however, was kept in standby condition and the precaution has proved a wise one.

Another spoke of the wheel leads from Cincinnati and Louisville through the Blue Grass Region of Kentucky. Along this route are Mammoth Cave and the birthplace of Abraham Lincoln which is preserved as a national park.

Within two hours drive north of Memphis is Reelfoot Lake, the fisherman's paradise, on the road from Chicago and St. Louis. The lake was formed during a series of earthquakes in 1811 and 1812 when the wrenching of the earth caused a great fault at this point, and the sinking of 20,000 acres formed the basin. The shallow bed of the lake is a natural spawning ground, and fish propagate so fast that a closed game fishing season or artificial restocking have never been necessary. A stop-over at Reelfoot Lake, which is reached from either Union City or Tiptonville, would be a new experience for those chemists who are followers of Isaac Walton. Irving S. Cobb has said, "Reelfoot Lake is an afterthought of creation. It is the newest big thing in Nature on this hemisphere. It is the best game and fish country, natural or artificial, that is left in the South today."



Confederate fortification in Vicksburg National Military Park

Once more the wheel turns. The approaches to Memphis from Texas, the West, and the Northwest all pass through the Ozark Mountains and converge upon Little Rock, capital of Arkansas. Near Little Rock is Hot Springs National Park, noted year-round resort where 18 bathhouses apply modern methods of water treatment. This was the first national park reservation in the country, for in 1832 the hot springs and four square miles of land surrounding them were set aside by Congress for the future disposal of the United States. Today the 47 springs have a daily flow of 1,000,000 gallons. The water is collected into one central system from which it is distributed to all of the bathhouses, and the rates are fixed by the Secretary of the Interior.

The traveler to Memphis might

like to make the return trip by a different route. For this, a trip south through Mississippi to New Orleans with its unique French Quarter and Mobile where the famous Bellingrath Gardens are open the year around is recommended. There are two direct routes to New Orleans. One leads through Sardis, about 35 miles from Memphis, where the formation of Sardis Lake followed the largest earthwork dam in the world. Further down is Jackson, capital of Mississippi. The other route is through the Mississippi Delta to Vicksburg and Natchez. In the National Military Park at Vicksburg are preserved the battlefields and monuments to the siege which won it the name, "The Gibraltar of the Confederacy". Vicksburg is chiefly noted among the world's battlefields for its distinctive topography and for the extensive remains of battlements—nine major Confederate forts, ten Union approaches, and many miles of breastworks, gun emplacements, and rifle pits. Free guide and museum service is available to visitors under the direction of the historical staff of the park.

Natchez was a booming river town in the heyday of the Confederacy, but its star waned with the declining fortunes of the South during the years that followed. In the last decade, however, interest in the quaint old city has been revived with the pilgrimage and garden tours. Virtually untouched by the Civil War, Natchez has what is probably the finest collection of ante-bellum homes in the South today. By throwing them open and dressing the hostesses in the garb of yesteryear during the pilgrimage season in March, the city has become a mecca for tourists and is now "Natchez—Where the Old South Still Lives".

The old towns and cities of Mississippi have their quota of ante-bellum homes in various states of repair. Some are just as the Civil War left them, but many have been restored and are now occupied, sometimes by descendants of the original owners, but invariably by people who are proud to display them as living monuments to a glorious past. These mansions of the classic revival were a characteristic expression of the feudal fortunes made on cotton during the first half of the last century. And to the desire for companionship and fraternity, sharpened by the isolation of the huge plantations, are traced the beginnings of the Southerners' reputation for hospitality.

But in these modern times when the Indian trails have been transformed into concrete highways and ribbons of steel, southern hospitality is still a heart-warming welcome, and travel through Dixie affords many opportunities to enjoy its pleasures. Travelers by rail have the same stop-over privileges as autoists, and either mode of travel can make the trip to Memphis interesting.

Progress Report by Committee on Economic Status

THE attached table contains a preliminary tabulation of returns of the mail questionnaire survey received by the Bureau of Labor Statistics as of January 10, 1942. It should be noted that 24,490 questionnaires were mailed to individual members of the AMERICAN CHEMICAL SOCIETY resident in the United States and its possessions.

Plans are being formulated for the making of final tabulations and the necessary tables to be presented in the preliminary report of the A. C. S. Committee on Economic Status.

Distribution of Regular and Junior Members Who Reported Educational Level and Sex

(As of January 10, 1942)

EDUCATIONAL LEVEL	TOTAL	CHEMISTRY	CHEMICAL ENGINEERING	OTHER FIELDS OF SCIENCE OR ENGINEERING	ANY OTHER FIELD
GRAND TOTAL	**17,304**	**12,413**	**3,846**	**839**	**206**
Regular Members					
TOTAL MEN	*15,422*	*11,022*	*3,482*	*742*	*176*
Doctors	6,387	5,620	416	300	51
Masters	3,681	2,463	997	174	47
Bachelors	4,742	2,554	1,893	235	60
Incomplete college	514	328	153	27	6
No college	98	57	23	6	12
TOTAL WOMEN	*636*	*573*	*7*	*44*	*12*
Doctors	336	303	4	22	7
Masters	211	194	3	12	2
Bachelors	87	75		10	2
Incomplete college	2	1			1
No college	0				
Junior Members					
TOTAL MEN	*1,201*	*775*	*356*	*53*	*17*
Doctors	45	39	3	1	2
Masters	218	151	53	12	2
Bachelors	740	433	271	29	7
Incomplete college	167	128	25	11	3
No college	31	24	4	0	3
TOTAL WOMEN	*46*	*43*	*1*	*0*	*1*
Doctors	1	1			
Masters	11	10			1
Bachelors	30	29	1		
Incomplete college	2	2			
No college	1	1			

Number received but not coded for sex	860
Number received but not coded properly for educational level	445
Number received but not coded for year of entering profession	58
Total	1,363
Total regular and junior members from table	17,304
GRAND TOTAL	18,667[a]

[a] Seventy-six per cent of the original mailing list of 24,490.

Marie Curie Lecture

EMMA PERRY CARR, chairman of the Department of Chemistry, Mt. Holyoke College, will deliver the third annual Marie Curie lecture at the Pennsylvania State College, February 20, 1942, on "Fingerprinting Molecules".

The Marie Curie lectures were inaugurated by Palladium Chapter of Iota Sigma Pi, national honorary chemical society for women, in May 1940 as a memorial to Mme. Curie, an honorary member of the society. The lectures are given each year by some outstanding woman chemist on her work in chemistry and are semipopular.

Dr. Carr has been engaged in research on the ultraviolet absorption characteristics of the simple unsaturated hydrocarbons, data which will lead to a better interpretation of the carbon-carbon double bond of organic chemistry. She was the first recipient of the Garvan Medal, Women's Award in Chemistry, in 1937 and is an honorary member of Iota Sigma Pi.

Films Featured on Program of St. Louis Section

A PREMIERE showing of a Hollywood technicolor production, "Unfinished Rainbows", presented by the Aluminum Co. of America, and still photos using the new additive system of color photography by O. H. Schunk, Prismacolor, Inc., were given before a recent meeting of the St. Louis Section, AMERICAN CHEMICAL SOCIETY. In addition, the regular program consisted of a talk on "Polystyrene" by T. S. Carswell, Monsanto Chemical Co., and two group lectures on "Drying of Granulated Solids" by N. H. Ceaglske, Washington University, and "Marketing Research" by H. E. Thayer, Mallinckrodt Chemical Works.

National Labor Board Decision Upholds Professional Status of Chemists

In a momentous decision handed down on January 13, 1942, the National Labor Relations Board held that professional employees cannot be forced into a heterogeneous bargaining unit sought by a labor union in its negotiations with an employer unless a majority of the professional employees through a vote confined to the professional group express their desire so to be included. The decision of the board was rendered In the Matter of The Shell Development Co. and the International Federation of Architects, Engineers, Chemists, and Technicians, Case No. R-3245, and was unanimous. The controversy was submitted to the board on petition of the F.A.E.C.T. to set up a bargaining unit composed of both professional and nonprofessional employees. The petition was filed after the company and the Union had been unable to agree upon the composition of such a unit for collective bargaining purposes.

Following the filing of the petition for representation by the Union, the National Labor Relations Board ordered a hearing before one of its Trial Examiners. The hearing opened on October 27, 1941, at San Francisco, and concluded on November 4, 1941.

At the commencement of the hearing Vanan C. Irvine, Seaver A. Ballard, H. K. Sutherland, Ahlborn Wheeler, Chester C. Crawford, Kenneth D. Detling, Frederick B. Hilmer, Harold Byck, Donald S. LaFrance, and Clarence L. Dunn, all of whom are professional employees of the Shell Development Co. employed in professional work, filed a motion for permission to intervene in the proceeding. In support of their motion, each of the moving parties represented that he is a chemist employed by the Shell Development Co. and further that his employment is professional employment in the course of which he is engaged upon highly confidential work. Each of the intervenors represented that he had an interest in the proceeding and asked that he be allowed to intervene for the purpose of presenting evidence to show that he and others similarly employed should not be included in a heterogeneous bargaining unit consisting of a miscellaneous group of employees including, *inter alia*, unskilled and skilled laborers and professional men for the purpose of selecting representatives for collective bargaining with the company. Notwithstanding vigorous opposition by counsel for the Union, the motion of the intervenors was granted by the Trial Examiner and thereafter through counsel they presented testimony during the hearing. Following the hearing the entire record was forwarded to the National Labor Relations Board in Washington which ordered an argument upon the contentions of the various parties. The argument was held on December 11, 1941. The company, the petitioning Union, and the intervenors were all represented by counsel at the argument.

Prior to the hearing in San Francisco, the intervening professional workers who are members of the American Chemical Society asked the Society to assist them in their effort to maintain the right of professional men to have their wishes considered in such a proceeding. By direction of the Board of Directors of the Society, Elisha Hanson, its counsel, flew to San Francisco for conference with the intervenors and with Justin M. Jacobs, the attorney who represented the intervenors at the hearing before the Trial Examiner.

When the matter was set for hearing before the board in Washington, Mr. Jacobs, counsel for the intervenors, and the intervenors requested Mr. Hanson to argue the case for the intervenors before the board. This he did. The decision of the board reflects the thorough preparation and presentation of the intervenors' case both in hearing and in argument.

Prior to argument the company, the petitioning Union, and the intervenors each had filed a brief with the board.

In its decision the board pointed out that the Union had conducted negotiations with the company during April and May 1941 for a collective bargaining agreement. These negotiations failed because the parties were unable to agree upon an appropriate bargaining unit. The Union requested a unit composed of all types of employees in the plant, but excluding employees in the administrative department, engineering department, safety inspection department, photographic department, general office department, secretaries-stenographers department, stenographic department, technical files department, and library department, the kitchen staff, executives, the associate director, the assistant directors, and department heads. The company agreed that the unit proposed by the Union was an appropriate unit provided that professional employees were excluded therefrom and that nonprofessional employees in the engineering, safety inspection, and photographic departments should be included in the unit.

The intervenors contended that professional and nonprofessional employees should not be merged into one unit. Thus, when the case came to the board for hearing, the issue was squarely presented as to whether a Union, by reason of having signed up a certain number of employees in a particular plant, could reach out and corral an almost equally large number of employees who had no desire to have that particular Union represent them and arbitrarily exclude from its proposed unit numerous other employees whom it had been unable to interest in its scheme because their inclusion in any voting unit undoubtedly would mean the loss of an election.

The board disposed of the Union's contention by ordering two elections and designating two units for the purpose of the elections. The one unit is composed of all the skilled and unskilled employees in the plant. The other unit is composed of all the professional workers in the plant. Department heads and supervisory employees were excluded from the vote. In thus resolving the issue as it did the board afforded the professional employees an opportunity to express themselves in a group composed entirely of professional employees on the question of union representation for collective bargaining. It laid down the principle that professional employees should not be corralled into a bargaining unit composed of a miscellaneous group of skilled and unskilled workers as well as professional employees.

In its decision the board said:

> Upon the entire record, we find that the professional employees might properly be considered either as a separate unit or as part of a larger unit composed of professional and nonprofessional employees. Under such circumstances, we apply the principle that the determining factor is the desires of the professional employees. We shall therefore direct separate elections in order that we may ascertain the wishes of the professional employees.

Before entering its order the board had previously found as follows:

> The company employs at the plant approximately 200 professional employees, including chemists, junior chemists, physicists, junior physicists, engineers, and junior engineers, as distinguished from nonprofessional employees, such as laboratory assistants, probationary laboratory assistants, laboratory helpers, technicians, engine operators, engine mechanics, experimental plant operators, glass blowers, handymen, roustabouts, warehousemen, glass washers, and janitors.
>
> Research projects are assigned to various research groups. Such groups are usually composed of both professional and nonprofessional employees; sometimes, particularly in the early stages of the work, a group may be composed of professional employees only. The composition of a

given research group may change from time to time, both in number and classification of employees. Professional and nonprofessional employees work together in the laboratory, and the successful completion of a project depends on the ability, productivity, and cooperative efforts of both classes of employees. Each research group usually has a leader, who is generally a chemist, physicist, or engineer, who is the link between the group and a department head. The leader directs and integrates and is responsible for the work of his group. Members of a research group may seek advice and assistance from individuals in other groups and departments.

All but 24 of the professional employees hold college degrees. The 24 who do not hold college degrees are regarded by the company as having had sufficient training and experience with it to merit a professional rating. The nonprofessional employees generally have had at least a high-school training; some of them have had 1 or 2 years of college or junior college work, but very few hold college degrees. The nonprofessional employees usually learn the rudiments of manipulative work in the sciences through their general science courses in high school or college, but for the most part their specialized skill in laboratory work is acquired at the plant.

The professional employees, by reason of their wider educational background and experience, by and large are primarily engaged in the theoretical aspects of research, the planning of solutions to the problems, the correlation of the laboratory data, and the drawing of deductions and conclusions from such data; however, they also frequently do manipulative, mechanical work. The nonprofessional employees by and large are primarily engaged in the manipulative, mechanical aspects of the research project (such as the taking of readings, the running of distillations and filterings, and the making of laboratory analyses); however, they sometimes contribute to the theoretical aspects of the work, draw conclusions from data, and are at times consulted by the professional employees on the feasibility of conducting certain experiments.

The professional employees are generally given their assignments in broad outline and enjoy considerable latitude in performing their functions, while the nonprofessional employees generally receive detailed instructions. Also, the nonprofessional employees are more easily transferable from project to project.

The weekly laboratory reports, which are compilations of data, may be prepared by a professional or nonprofessional member of the research group, but the quarterly research progress reports, in which theories are propounded, conclusions drawn, and prognoses made, are generally written by professional employees only. These reports, as well as patents issued and articles published in scientific journals, bear the names of all employees, professional and nonprofessional, who have participated in the laboratory work covered by the report, patent, or article.

Professional and nonprofessional employees are paid twice a month, their salaries are fixed at a monthly rate, and they enjoy substantially the same vacation privileges. However, the salaries of professional employees generally are higher than those of nonprofessional employees. Also, classes of nonprofessional employees, unlike professional employees, generally have fixed minimum and maximum rates of compensation.

Evidence introduced at the hearing disclosed the range of salary scales as follows:

Classification	Minimum	Maximum
Laboratory helper	$130	No increase until promoted to next highest classification.
Probationary laboratory assistant	$145	No increase until promoted to higher classification.
Laboratory assistant	$160	$195
Technician	$160	$230
Junior chemist	$170 or more	No limit
Chemist (Ph.D.'s start at $245 or more)	Depends on man	No limit

The brief filed by the professional employees who intervened in the proceeding reviewed the hearing thus:

The testimony introduced on the bargaining unit issue consisted of the testimony of eleven witnesses. The only witness called by the Union on that issue was David E. Adelson, a chemist. The company called two witnesses, J. F. M. Taylor, its president, and William E. Vaughan, a department head, both of whom are chemists. The intervenors called: Vanan C. Irvine, a chemist; Frederick B. Hilmer, a chemist; Howard O. Ruliffson, a junior chemist; R. Robert Brattain, a physicist; Seaver A. Ballard, a chemist; Edward B. Wist, an engineer; John R. Griffin, an engineer; and Chester C. Crawford, a chemist.

Over the objection of the intervenors, the Union's witness, David E. Adelson, a chemist, without any foundation whatever, was permitted to testify generally in terms of his opinion and conclusions as to the work done by the 201 professional men and the 203 nonprofessional men included in the heterogeneous unit claimed by the Union. He attempted to show that there was no difference. His testimony was flatly contradicted by the testimony of the company's witnesses, J. F. M. Taylor and William E. Vaughan.

In fact, the Trial Examiner stated that the testimony of the Union witness Adelson had been met by that introduced by the company. He said:

> I think that the company has already met that (Adelson's testimony) in generality.

The intervenors' witnesses (many of whose duties are substantially the same as Adelson's) testified that they could only testify accurately to the work done in their own research groups and departments.

For the purpose of utterly destroying Adelson's generalizations and conclusions, the intervenors attempted and offered to call one witness from every department and from every research group to testify specifically as to the vast differences between the work done by the professional men and that done by the nonprofessional employees in each department and on each research group. The Trial Examiner prevented the intervenors from so doing. He instructed the intervenors to withdraw their witness Chester C. Crawford and not to call other witnesses for that purpose.

In their brief the intervenors pointed out that the board's Exhibits 12 and 16 introduced in the hearing illustrated the heterogeneous nature of the bargaining unit proposed by the Union as follows:

Professional Men	
Chemists	103
Junior chemists	76
Physicists	7
Chemical engineers	1
Engineers	7
Junior engineers	7
Total	201

Nonprofessional Employees	
Janitors	15
Glass washers	4
Window washer	1
Engine operators and mechanics	19
Pilot plant operators	39
Night watchman	1
Various roustabouts, handymen and helpers	7
Laboratory assistants	60
Laboratory helpers	31
Technicians	12
Curator	1
Storekeepers and clerks	6
Glassblowers	5
Glassblowers' helpers	2
Total	203

Fourty-four of the professional men have obtained the degree of doctor of philosophy in their respective scientific fields. All of the professional men (except 24 men who have obtained training in the laboratories of the Company, which the Company believes to be the equivalent of a university training) hold either bachelors, masters, or doctors degrees from accredited universities n their respective scientific fields.

Further in their brief the intervenors made the following representations to the board:

The issue in this proceeding does not involve the question of whether professional men who desire so to do should be permitted to retain their status of individualists for bargaining purposes. The issue is solely one of the compulsory inclusion of professional men in such a heterogeneous group as that here proposed.

The intervenors are neither opposed to nor concerned with collective bargaining for nonprofessional workers. Nor are they opposed to collective bargaining of professional men in professional groups.

The intervenors do, however, strenuously oppose the compulsory inclusion of themselves and other professional men similarly situated in such a heterogeneous bargaining unit as that proposed by the Union in this proceeding.

Intervenors Expressed the Desires of the Overwhelming Majority of Professional Men

The Overwhelming Majority of Professional Men do not Desire the Inclusion of Professional Men in Such a Heterogeneous

Bargaining Unit as That Now Sought by the Union.

The National Labor Relations Board has, by its decisions, indicated that in the determination of what constitutes an appropriate bargaining unit it will give cardinal significance to the desires of the employees affected by the proposed bargaining unit.

Matter of General Electric Co. and Pattern Makers' League of North America (1941), 29 N.L.R.B., No. 29, pages 4, 5, and 6.

Matter of Philadelphia Inquirer Co. and Newspaper Guild of Philadelphia and Camden (1941), 31 N.L.R.B., No. 7, pages 8 and 9.

For the purpose of advising the board of the desires of the professional men, the intervenors obtained and offered in evidence the affidavits of 129 professional men (none of whom is a department head or managerial employee) in the Emeryville plant of Shell Development Co., Inc.

Each affiant stated under oath:

That his said employment is professional employment, in the course of which he is engaged upon highly confidential work.

That he is opposed to the designation of any heterogeneous bargaining unit which would consist of a miscellaneous group of employees, including, *inter alia*, unskilled and skilled laborers and professional men, for the purpose of selecting representatives for collective bargaining with Shell Development Co., Inc.

Each affiant petitioned the board to exclude the professional men from the proposed heterogeneous bargaining unit, as follows:

That he respectfully requests the National Labor Relations Board to exclude himself and all other professional employees, including junior chemists, chemists, junior physicists, physicists, junior engineers and engineers, from any bargaining unit that may be designated in the above-entitled proceeding.

The Trial Examiner excluded these affidavits from evidence on the ground that evidence of the desires of individual employees was immaterial to the issue.

The rulings of the Trial Examiner were manifestly erroneous.

He permitted the Union to express its desires.

He permitted the company to express its desires.

Yet he attempted to prevent the men who are, of necessity, most vitally concerned from expressing their desires.

The Trial Examiner sought to justify his ruling on the ground that the evidence was in effect an election from the witness stand to determine whether a majority of the employees desired the *petitioning union*. He said:

Well, there is only one union asking for this unit. In effect, it becomes an election, whether or not they want this union. If there were several labor organisations acting for different units it might be somewhat different.

On the contrary, the evidence was addressed to a much more basic proposition. It was addressed to the question:

Do the professional men want this unit?

It is inconceivable that this board would not be vitally interested in the desires of a distinct group of men on that question. Indeed, in this particular case, where the Union seeks to merge two wholly separate and distinct groups of employees into a single heterogeneous unit, the fact that an overwhelming majority of one of those groups does not desire its inclusion should be the controlling factor.

There are many professional men, in addition to the 129 whose affidavits were offered in evidence, who are opposed to the inclusion of professional men in the proposed unit.

The intervenors attempted to prove through Seaver A. Ballard that a minimum of 150 and a maximum of approximately 180 professional men were opposed to the proposed heterogeneous unit. The evidence was excluded, whereupon the intervenors made the following offer of proof:

MR. JACOBS. I offer to prove by this witness that a minimum of 150 and a maximum of approximately 180 of the professional men in the employ of the Shell Development Co.—and by that term I mean to include chemists, junior chemists, physicists, junior physicists, engineers, and junior engineers—are opposed to the heterogeneous bargaining unit that is proposed by the union in this proceeding.

Do I understand, Mr. Examiner, by your ruling that I will not be permitted to make that showing through this witness?

TRIAL EXAMINER WHITTEMORE. That is correct.

In sharp contrast to the showing made by the intervenors, there is not a particle of evidence to show that any of the professional men (other than Dr. Adelson) desire such a unit as that now proposed.

Indeed, there is absolutely nothing to show that anyone desires the heterogeneous unit except the officers of the petitioning union.

The intervenors in their brief also pointed out that it was manifest that there were two basic and inherent defects in the unit.

First, the attempted exclusion of a portion of the nonprofessional employees and the inclusion of the balance; likewise, the exclusion of a portion of the professional employees and the attempted inclusion of the balance. In each case there is no sound basis for distinction between those attempted to be included and those attempted to be excluded.

Second, the attempt to disregard the fundamental differences between, and to merge into one heterogeneous unit, the professional men on the one hand and the nonprofessional men on the other hand, which, of necessity, must and do constitute two wholly separate and distinct groups.

The intervenors are more vitally affected by the second defect and we intend to devote this brief primarily to that defect.

In passing, however, and by way of specific example of the first defect, we call to the board's attention:

The testimony of Edward B Wist, an engineer whom the Union seeks to *exclude;* and

The testimony of John R. Griffin, an engineer whom the Union seeks to *include.*

Mr. Wist is an engineer who holds both a degree of bachelor of arts and a degree of mechanical engineer from Stanford University, obtained as a result of six years' study in engineering. He is an engineer in charge of construction and design work in the "pilot" plant at Emeryville. His duties consist of the design and construction of equipment to be used in the "pilot" plant in connection with the experimentation done in the "pilot" plant on projects initiated and partially completed in the laboratories.

Mr. Griffin is an engineer who obtained a bachelor of science degree and a master of science degree in mechanical engineering from the University of California as a result of six years' study in engineering. He is engaged in the problem of testing aircraft engine lubricants and in devising a suitable test procedure for that purpose.

The testimony of these two engineers shows conclusively that there is absolutely no basis for distinction between their training or the character of work which they do; that both of them are engaged in professional work, and that the attempted inclusion of the one and the exclusion of the other by the Union is purely arbitrary.

However, since it is our position that all professional men should be excluded, we shall leave any further discussion of the first defect to the other parties to this proceeding.

The Professional Group Includes the Chemists, Junior Chemists, Physicists, Engineers, and Junior Engineers

Although the Union's attorney at the hearing professed ignorance at what is meant by the term "professional group", there is no uncertainty as to what employees of the company are professional men as distinguished from nonprofessional workers.

From an examination of the decisions which we have cited and quoted below and the definitions contained in the various dictionaries, it appears that the term "professional" means:

An individual who has acquired knowledge of an advanced type in a field of science or learning customarily acquired by a prolonged course of specialized intellectual instruction and study as distinguished from:

(*a*) a general academic education, or

(*b*) an apprenticeship, or

(*c*) a training in the performance of routine mental, manual, and physical processes, and who applies his knowledge in work that is predominantly intellectual and varied in character as distinguished from routine mental, manual, mechanical, or physical work, whose work requires the constant exercise of discretion and judgment in its performance, whose work is predominantly original and creative in character in the field of his science or learning, and is of such a character that the result accomplished by his work cannot be standardized in relation to a given period of time.

United States v. Laws, 163 U. S. 258, 41 L. Ed. 151;

Cummins v. Pa. Fire Ins. Co., 134 N. W. 79 at 82;

Ex parte Aird, 276 Fed. 954;

Mayor and City Council of Baltimore v. Smith, 177 Atl. 903;

State v. Cohn, 165 So. 449;

People v. State Tax Commission, 26 N. E. (2d) 955, 957.

The United States Supreme Court, in United States *v.* Laws, supra, held:

1. A chemist employed on a sugar plantation in Louisiana was a professional man engaged in the practice of his profession;

2. Such a chemist was a professional man engaged in the practice of his profession:

(*a*) notwithstanding the fact that he limited his practice to the specialised field of chemistry connected with the manufacture of sugar; and

(*b*) notwithstanding the fact that he limited his practice to one employer.

The Supreme Court said (41 L. Ed. 155):

The chemist who places his knowledge acquired from a study of the science to the use of others as he may be employed by them, and as a vocation for the purpose of his own maintenance, must certainly be regarded as one engaged in the practice of a profession which is generally recognized in this country * * * *

It may be assumed that the branch of chemistry which he (the chemist) will practice will be that which relates to and is connected with the proper manufacture of sugar from the sugar cane, or possibly from sorghum or beets. *He is none the less a chemist, and none the less occupied in the practice of his profession because he thus limits himself to that particular branch, which is to be applied in the course of scientific manufacture of sugar* any more than a lawyer would cease to practice his profession by limiting himself to any particular branch thereof or a doctor by confining his practice to some specialty which he particularly favored and was eminent in.

* * * * *

The fact that the individual in question, by this contract, had agreed to sell his time, labor, and skill to one employer, and in one prescribed branch of the science, does not in the least militate against his being a professional chemist, nor does it operate as a bar to the claim that while so employed he is nevertheless practicing a recognized profession. It is not necessary that he should offer his services to the public at large nor that he should hold himself ready to apply his scientific knowledge and skill to the business of all persons who applied for them before he would be entitled to claim that he belonged to and was actually practicing a recognized profession * * * * So long as he is engaged in the practical application of his knowledge of the science, as a vocation, it is not important whether he holds himself out as ready to make that application in behalf of all persons who desire it, or that he contracts to do it for some particular employer and at some named place.

Manifestly, the considerations which caused the United States Supreme Court to hold that a *chemist* actively engaged in a particular branch of chemistry is a professional man engaged in the practice of his profession would require the same conclusion with respect to a physicist engaged in the application of his specialized knowledge in the performance of his work.

In ***Ex parte Aird***, supra, the District Court of the United States held that an *engineer* engaged in the practice of engineering is a professional man engaged in the practice of his profession. In that case the engineer was employed by Bethlehem Shipbuilding Corp. and was required to apply learning and skill in marine engineering in performing his work of designing marine turbine engines and auxiliary machinery connected with them. The court held that he was engaged in "a recognized learned profession". The Court said (276 Fed. 958):

It is clear that the relator, in the employment he entered this country to perform, was not engaged in labor, skilled or unskilled, within the accepted meaning of those words. *He was a "brain toiler"; his work required technical training, skill, and learning in various branches of science. What he did, he did not perform with his hands or mercly as a skilled mechanic would through application of mere mechanical skil.* His employment, in designing marine turbine engines or auxiliary machinery connected with them, is one in which the planning and working out of the details must be originated in the mind of the designer.

The fact that a professional man may perform some manual or mechanical work obviously does not change his status from a professional to a nonprofessional. The Court of Appeals of Maryland so held in Mayor and City Council of Baltimore *v.* Smith, supra, where, in answer to an argument that the duties of a professional nurse required the performance of such manual work as cleaning tables, chairs, and other articles for use in the wards and the preparation of beds for patients, the Court said (177 Atl. 905):

The answer to this is that the manual labor mentioned is simply incidental to the profession of nursing and does not destroy its principal and essential quality, which is the special and professional knowledge, technical skill, and experience that comes from the instruction, training, and exercising of the nurse's mental faculties.

The same rule was applied in State *v.* Cohn, supra, where the Court, after quoting and considering various dictionary definitions and decisions quoted in its opinion, at page 452 said:

The test as stated by the foregoing definitions and authorities is whether or not the intellectual quality predominates over manual skill in performing the duties of the particular calling. *If the mental aspect is controlling, then the pursuit is classified as a profession. If skill in the manipulation of the hands, tools, and machinery is emphasised over the mental side, then the calling is classified as a mechanical pursuit.*

From the decisions which we have quoted and cited above (and we have found none to the contrary), it clearly appears that chemistry, physics, and engineering are all professions and that men who have acquired an advanced learning in those professions and apply their learning in their work are professional men engaged in the practice of their respective professions.

The Uncontradicted Evidence Conclusively Shows That the Chemists, Physicists, Engineers, Junior Chemists, and Junior Engineers Are Professional Men Engaged in the Practice of Their Professions

The witnesses of all parties, without contradiction or conflict, each testified that he had acquired an advanced knowledge of his particular science by a prolonged course of specialized intellectual instruction and study: Vanan C. Irvine, a chemist, called as an intervenors' witness, so testified; Frederick B. Hilmer, a chemist, called as an intervenors' witness, so testified; Howard O. Ruliffson, a junior chemist, called as an intervenors' witness, so testified; R. Robert Brattain, a physicist, called as an intervenors' witness, so testified; Seaver A. Ballard, a chemist, called as an intervenors' witness, so testified; Edward B. Wist, an engineer, called as an intervenors' witness, so testified; and John R. Griffin, an engineer, called as an intervenors' witness, so testified.

David E. Adelson, a chemist, called as the Union's witness, so testified.

All of these witnesses, without contradiction or conflict, testified to facts which show that their work is professional work in that it is predominantly intellectual and varied in character as distinguished from routine, mental, manual, mechanical, or physical work; in that it requires the constant exercise of discretion and judgment in its performance; in that it is predominantly original and creative in character in the fields of their respective sciences, and in that it is impossible for them to determine at the time a project is assigned to them when the solution of that project may be realized.

Even David E. Adelson, a chemist, the Union's witness and the international vice president of the Union, on cross-examination testified:

Q. (by Mr. Jacobs) Dr. Adelson, is it not a fact that your work is predominantly intellectual as distinguished from manual work?

(Objection by Mr. Leonard)

A. In the sense that my work is embracive of such things as correlation, planning, and writing reports, I would assume that the major portion of my time is devoted to intellectual pursuits. I certainly wouldn't want to go on record to the contrary.

Q. (by Mr. Jacobs) I wouldn't think so, Doctor. Is it not a fact, Doctor, that your work is varied in character so that the problem, the specific problem on which you may be working today in a specific field, may be different from a problem on which you are working, a specific problem, say, a week from now? In other words, isn't your work of a varied nature within the realm of chemistry?

A. Naturally, my work varies as the products and processes that we concern ourselves with change from time to time; but the basic method of attack is essentially the same. We have certain tools with which we pry into the unknown problems and they are applied to a more or less degree in the various problems we concern ourselves with.

Q. (by Mr. Jacobs) Exactly. In prying into these unknown problems you fall back on all of the training and experience that you have gained in your former education and in your past experience, don't you, in attempting to find an answer to those unknown problems?

A. Yes. I fall back on that. I also fall back on the experience and training of the other members of my team.

Q. Surely. Your work, Doctor, requires a constant exercise of discretion and judgment, does it not?

A. Yes.

Q. When you have a problem presented to you, Doctor, at the time it is presented to you can you normally tell when the answer is going to be found, or will that period of time vary with a great deal of elasticity due to the nature of the problem?

A. That will vary over a complete range of time.

Q. From an hour up to a year or something like that, depending on the problem?

A. And you may never solve it.

Q. Right. The work that you do, Doctor, requires the knowledge, the advanced knowledge in chemistry that you have obtained in your formal education and your past experience, does it not?

A. Yes, it does.

Q. And normally a person could not acquire your knowledge and background without spending a good deal of time in study and training, could he?

A. If you include by that, the experience, I think that is essentially correct.

Q. The purpose of your work, Doctor, is for you to produce original and creative ideas, is it not, in the attempt to solve these unknown problems?

A. That is one function.

The intervenors also pointed out the sharp distinction between the education and training of the professional men as a group and the nonprofessional men as a group. Then the intervenors called the attention of the board to the fact that in previous controversies before it, it had excluded professional men from proposed heterogeneous bargaining units. In conclusion the intervenors pointed out that professional men are supervisory employees, whereas nonprofessional workers in the unit proposed were not; that professional men make recommendations with respect to promotions; that the work of professional men is highly confidential; that there is a radical difference in the compensation of the professional group on the one hand and the nonprofessional group on the other; that professional men within a given classification are not readily interchangeable, whereas nonprofessional men within a given classification are readily interchangeable, and finally that the proposed bargaining unit would not be advantageous to any of the employees.

In its brief filed with the board prior to argument the Union claimed its right to select a unit in such a manner as to assure it of success in the election which it sought from the board. The position of the Union in respect of its claim to representation was as follows:

The petitioner commenced to organize respondent's employees at least as early as 1938. By October of 1940, petitioner had so well organized all of the employees in the maintenance department that a memorandum agreement concerning the wages, hours, and working conditions of those employees was entered into between petitioner and respondent. At this time also petitioner had other classifications of employees, including so-called "professionals" among its members. It did not bargain for them because it had not reached that degree of strength which justified its so doing as a matter of trade union strategy. Shortly thereafter, petitioner attempted to bargain collectively with respondent for certain other classifications of workers, but no agreement was reached because of a controversy concerning the appropriate bargaining unit. In the meantime, organizational activity throughout respondent's plant continued and by April of 1941, petitioner requested the right to bargain for all of the respondent's employees in the unit as set forth in the amended petition on file herein. There were negotiations between respondent and petitioner during the months of April and May 1941 but they broke down upon the question of unit. The petitioner contended for the unit set out in the amended petition, while the respondent, asserting that certain classifications of its employees were unfit for collective bargaining, desired to have them excluded from the unit. Furthermore, despite the fact that other unions, both AFL and CIO, had jurisdiction over certain departments which had not therefore been organized by petitioner, and were not sought to be represented by it, the company attempted to inject itself into this matter by insisting that workers in those departments be included within the unit. For these various reasons, at least, negotiations did not result in any agreement and the question concerning representation arose.

* * * *

As was pointed out by the intervenors in their brief, there was no evidence in the record that any professional employee other than Dr. Adelson belonged to the petitioning Union or wanted the Union to represent it in collective bargaining. There was the tender of proof by the intervenors that by far the greater majority of professional employees did not want to have the Union designated as their representative for collective bargaining and further that they did not want to be included in a unit made up of a miscellaneous group of employees and so constituted through the process of Union section as to ensure the Union a majority in any vote ordered.

While the board in earlier decisions had granted professional employees the right to express their choice in the matter of bargaining units, the decision in the Shell Development case goes further than any prior decision of the board in establishing the right of professionals to self-expression within their group.

BRITAIN counts on the United States for phosphatic fertilizers, essential in the expansion of cultivated land in that country for war needs. Increased production by British sources of nitrogenous fertilizers and of lime is anticipated.

THE United States and Canada have been the sources for Cuban imports of calcium carbide, of which the country took 2,038 metric tons valued at $98,352 in 1940 and 2,265 tons at $98,981 in 1939.



Solvent Recovery Unit at Koroseal Plant

What is believed the largest solvent recovery unit in the Akron area is being operated by The B. F. Goodrich Co. at its recently opened Koroseal spreading plant. The photograph shows the three towers comprising the unit. The largest, right, is 10 feet in diameter, 78 feet high, and weighs 130,000 pounds. The center is 6 feet, 6 inches in diameter, 68 feet high, and 51,000 pounds in weight, while the smallest is 2 feet, 6 inches in diameter, 54 feet high, and weighs 12,000 pounds. All of the towers were received on the site completely assembled and were erected in one piece.

Advances in Botany

THOMAS G. PHILLIPS
The University of New Hampshire, Durham, N. H.

INTEREST continues in the organic acids which appear to be concerned in the intermediary metabolism of plants. Pucher and Vickery (*39*), of the Agricultural Experiment Station at New Haven, have determined the distribution of succinic acid in the tobacco plant at various stages of its development. The amounts found were small, but the variations recorded would appear to show that this acid is one of the more active metabolites of plant tissue.

Damodaran and Venkatesan (*8*) have shown the presence of succinoxidase in many plant parts, though it does not appear to occur universally. Its occurrence in parts in which asparagin formation is active would indicate that the change it catalyzes, succinic acid to fumaric acid, may take part in the plant's amide metabolism.

James *et al.* (*22*), of Oxford University, tested cell-free barley saps under aseptic conditions with various additions. Their results indicated a formation of pyruvic acid from glucose through a phosphorylation cycle similar in outline to the reactions of yeast.

Virtanen *et al.* (*60*) determined oxalacetic acid in various legumes. Samples taken at midday contained 30 to 100 micrograms per gram fresh weight. If the samples were stored in the dark, amounts of the acid decreased below limits of the analytical method, which was 10 micrograms per gram.

On growing excised barley roots in nutrient media, Ulrich (*58*), of the University of California, found that, when cations were absorbed in excess of anions, organic acids increased markedly, provided carbohydrates were available. When anions were absorbed in excess, organic acids decreased rapidly. Changes in the respiratory quotient paralleled these changes. This balancing mechanism was not associated with changes in the NH_3 or amides present.

Hanes (*16*), in England, prepared a phosphorylase from potato tubers. It catalyzed both the formation of starch from glucose-1-phosphate and the reverse reaction. Unlike natural starch, that formed by this synthesis was almost completely hydrolyzed by β-malt amylase. Since this starch on methylation and hydrolysis yielded no tetramethylglucose, which would measure end groups, Hassid and McCready (*17*), University of California, concluded that the chains of glucose molecules must either be extremely long, so that the end groups escape detection, or exist in the form of continuous loops. Green and Stumpf (*15*), of Harvard, greatly concentrated the potato phosphorylase preparation. A catalytic amount of starch or dextrin must be present for synthesis to occur. The starch synthesized in the reaction cannot serve this purpose.

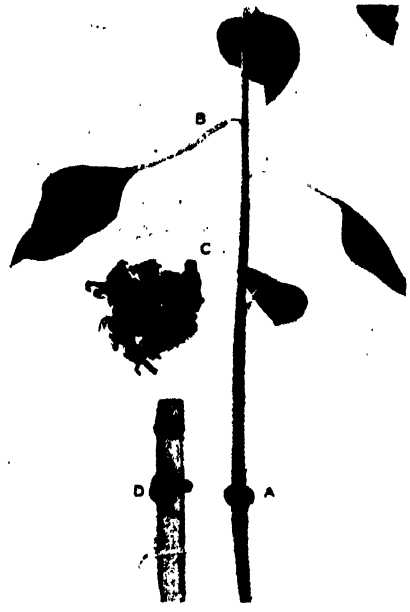
In a continuation of studies mentioned in a previous review (*36*), Miller (*31*), of the Boyce Thompson Institute, exposed gladiolus corms alternately to ethylene chlorohydrin and *o*-chlorophenol. The former appeared in the plant tissue as its β-*d*-glucoside, the latter as its β-gentiobioside. The sugar combined with the foreign compound appears to depend on the nature of the compound and also on the species of plant, since chloral hydrate and similar compounds are combined with gentiobiose by the tomato plant and by gladiolus corms, but with glucose by a species of gourd.

When Dawson (*9*), University of Missouri, grafted scions of tomato on tobacco stocks, the resulting tomato plants contained appreciable amounts of nicotine, which is not normally present. If tobacco was grafted on tomato, no increase in nicotine occurred in the tobacco plant. The author concluded that the nicotine synthesizing mechanism must be located in the roots of the tobacco plant.

Science Supplement (*51*) has noted a report from the U. S. Department of Agriculture that *Nicotiana rustica*, a half-wild cousin of ordinary tobacco, is extremely rich in nicotine and nicotinic acid and may provide an important commercial source of these valuable chemicals.

Last year Kertesz *et al.* (*24*), of the New York State Agricultural Experiment Station, described the use of calcium chloride for increasing the firmness of canned whole tomatoes. The improvement has (*27*) been shown to be caused by formation of calcium pectate in the tissues of the fruit.

A fungus, *Phytophthora cactorum*, causes a wilt of many plants and bleeding canker of hardwood trees, apparently due to a filtrable toxin produced by the fungus. As an effective antidote for this toxin in culture solutions, Howard (*20*), of Rhode Island State College, has used the dihydrochloride of diaminoazobenzene with Helione orange as a solvent and penetrant. Some hundreds of trees naturally infected with the disease have been injected with the antidoting solution. A marked improvement in the condition of these trees has been noted.



J. A. CARLILE

Crown-gall production by bacteria-free tumor tissues. *A.* Primary tumor from inoculation of sunflower with gall-producing bacterium. Bacteria can usually be recovered from these tumors. *B.* "Metastic" secondary tumors in petiole of the fourth leaf above point of inoculation, usually but not always free of bacteria. *C.* Tissue culture made of cells from the interior of secondary tumor grown through 10 passages in vitro. Only such cultures as are demonstrably bacteria-free in the first passage are maintained. *D.* A tumor produced by grafting a culture like C into the stem of a healthy plant, resulting in a typical crown-gall tumor, free of bacteria by all the tests so far applied.

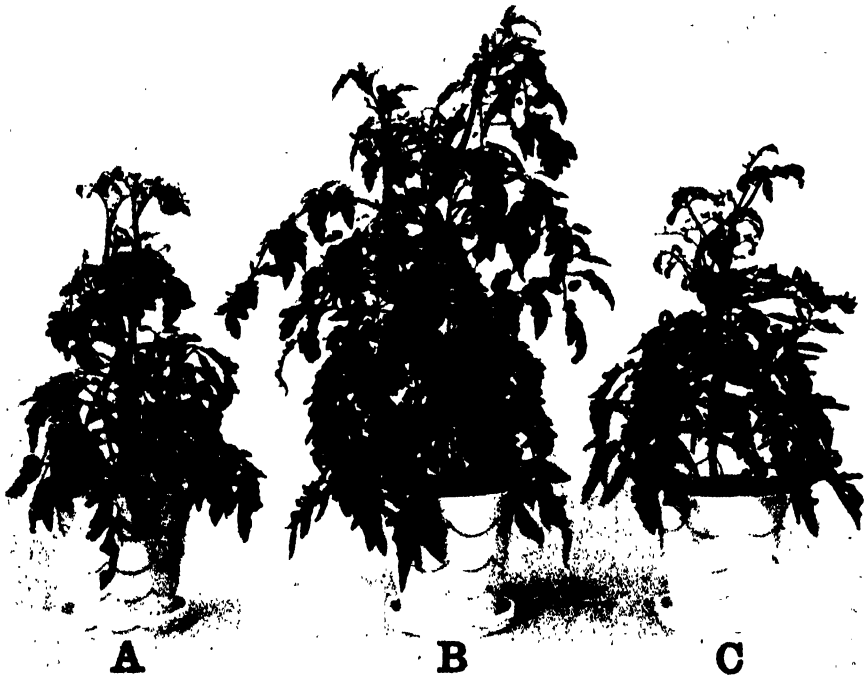
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Isotopes

In a study of the action of heavy metals on plants, Mazia and Mullins (*28*), Universities of Missouri and Rochester, placed leaves of the water plant, *Elodea canadensis*, in very dilute solution of the chloride of radioactive Cu^{++}. A large proportion of the Cu^{++} accumulated in the leaves in a form not removed by water. The active Cu^{++} in the leaves exchanged with ordinary Cu^{++} and with Au^{++}, but not with ions of the alkali metals.

Radioactive phosphorus was detected by Arnon *et al.* (*2*), University of California, in the tips of tomato plants 6 feet high 40 minutes after it was supplied to the roots. The phosphorus was found in both seeds and pulp of green fruit, but only in the pulp of ripe fruit. If the phosphorus supply was restricted, the fruit drew upon the supply in the leaves.

When Biddulph (*4*), of Washington



These plants were grown for 42 days in quartz sand supplied with a complete culture solution. Then all were continued 16 days: *A* without boron but with optimum calcium in the culture solution; control *B* as before; and *C* with optimum boron but deficient calcium. The visible symptoms of the boron deficiency in *A* are identical with symptoms of calcium deficiency in *C*. The so-called boron deficiency symptoms in *A* apparently also represent calcium deficiency symptoms since it has been found that calcium does not function effectively in the plant in the absence of boron.

State College, injected radioactive phosphorus compounds into leaves of bean plants, they migrated down the plant much more rapidly than up. The rate of migration toward the top varied with light, but the two maxima did not coincide.

Hevesy *et al.* (*18*) supplied ammonium sulfate containing N^{15} to sunflower plants after the lower leaves were formed. The plants were analyzed after two or three more pairs of leaves had developed. The older leaves had not grown appreciably, but 12 per cent of their protein nitrogen had been replaced by N^{15}. They concluded that there is considerable hydrolysis and synthesis of proteins, and exchange of materials between old and new leaves.

Burris and Miller (*7*), Columbia University, grew the free-living nitrogen-fixing organism, *Azotobacter vinelandii*, in an atmosphere enriched with N^{15}. No selective action between the isotopes was apparent in the fixing of nitrogen, and there was no evidence of exchange between molecular nitrogen and the nitrogen fixed in the culture.

Burris (*6*) also was unable to detect fixation of N^{15} by sterile cultures of barley, red clover, germinating pea seeds, excised root nodules, or root nodule bacteria in absence of the host plant. Red clover infected with *Rhizobium trifolii* fixed N^{15} abundantly.

Cultures of the single-celled green alga, *Chlorella*, were grown by Ruben *et al.* (*47*), University of California, in water containing 0.85 per cent O^{18} buffered with ordinary potassium bicarbonate and potassium carbonate. On exposure to light the oxygen evolved in photosynthesis had the same isotopic composition as that in the water. It was concluded that the oxygen came entirely from the water and that, when respiration and photosynthesis went on in the presence of O^{18}, no exchange reactions involving molecular oxygen occurred.

Smith and Cowie (*53*), of the Carnegie Institution, exposed leaves of sunflower plants to carbon dioxide containing radioactive carbon. In the dark carbon dioxide was absorbed in the three forms usually mentioned—in solution in the cell sap, by reaction with the buffer system, and as an insoluble carbonate, presumably of calcium. Additional carbon dioxide was fixed in a noncarbonate derivative of which little is known. On illumination this absorbed carbon dioxide could be used in photosynthesis. This newly formed photosynthate was used quite rapidly in respiration.

Frenkel (*14*), University of California, used *Nitella* cells in a study of this apparently organic form in which carbon dioxide is fixed in the dark. With these cells the cytoplasm and vacuolar sap can be separated from the chloroplasts, and each part examined separately for radioactivity. After exposure to carbon dioxide in the dark the reduced carbon was entirely in the cytoplasm and vacuolar sap. After exposure in the light the chloroplasts contained the greater proportion of the fixed carbon. Intact cells were essential to the dark fixation of carbon dioxide as well as to photosynthesis.

This organic compound formed by the fixation and at least partial reduction of carbon dioxide in the dark has been investigated further by Ruben and his associates (*44*, *45*, *46*). Experiments with the ultracentrifuge indicated that its molecular weight is about 4 times that of sucrose. Diffusion tests led to a minimum value of about 1,000. The carbon dioxide fixed appeared to be entirely in the carboxyl group of this compound. It was suggested that the formation of this compound may be similar to the introduction of carboxyl into catechol or pyrogallol when treated with carbonates under



Calcium-treated canned tomatoes, firm enough for use whole, sliced, or halved in salads



Canned tomatoes 10 minutes after the can was opened. At left is the control. At right, those canned with the permitted amount (0.07 per cent) of calcium chloride.

proper conditions. The authors suggested also that reduction of carbon dioxide may be a very general reaction in living cells. This has been shown to occur in cultures of certain bacteria, and by Evans and Slotin (*13*), University of Chicago, in minced pigeon's liver supplied with pyruvic acid. In these cases, however, the organic compounds of which the fixed carbon became a part were relatively simple propionic acid and oxalacetic acid.

In the presence of chlorophyll and light, photochemical reduction of the carboxyl to alcohol may occur. Successive reactions of this kind could produce long chains from which sugar molecules might split off. Thus no simple intermediate compound would be involved in photosynthesis.

Using cultures of a diatom, Dutton and Manning (*11*), of the University of Wisconsin, measured the quantum efficiency of photosynthesis in lights of different wave lengths. In the shorter visible region, where the carotenoids caused a large proportion of the total absorption, the efficiency was so high that the light absorbed by the chlorophyll could not possibly account for the result. It was concluded that light energy absorbed by the carotenoids may be used in photosynthesis.

Minerals

The possible role of molybdenum as a plant nutrient has received attention recently. Oats grown by Piper (*37*) without this element showed some necrotic areas on their leaves at about the time the panicles emerged. The panicles developed normally, but the grain consisted entirely of empty husks. To allow normal seed formation, 0.02 mg. of molybdenum per liter of nutrient solution was more than sufficient.

Certain blue-green algae fix nitrogen when growing photosynthetically in mineral salt solution. According to Bortels (*5*), salts of molybdenum accelerated this nitrogen fixation markedly. A similar but much smaller effect was caused by salts of tungsten and vanadium.

Hoagland (*19*), University of California, grew plum seedlings in water cultures. There was evidence of deficiency symptoms for both molybdenum and copper.

With cultures of *Lemna* as experimental material, Steinberg (*57*) found that molybdenum, iron, manganese, boron, gallium, and probably copper are essential.

Richards (*40*), of Imperial College, London, was able to increase greatly the growth of young barley plants suffering from potassium deficiency by supplying them with small amounts of rubidium. Larger amounts of rubidium caused abnormalities. The effect appeared to depend on the Ca-NH_4 status of the plant and on its phosphorus supply. Lithium, sodium, and cesium did not have the same effect as rubidium.

Shive (*52*), of the New Jersey Agricultural Experiment Station, has emphasized the reciprocal relations of minerals. The amounts of iron and manganese supplied to plants are not so important as their relative amounts. Thus, symptoms of iron deficiency may also be those of manganese toxicity and vice versa. Symptoms of boron deficiency are much like those of calcium deficiency, and there is a close proportionality between the amounts of soluble boron and soluble calcium in plants.

Biologically Active Substances

Spoiled sweet clover hay causes a hemorrhagic disease in animals. As the result of a long series of experiments by Link and his associates (*55*), at the University of Wisconsin, the active agent has been isolated, identified, and synthesized. It is 3,3'-methylenebis (4-hydroxycoumarin).

English (*12*), at Yale University, has synthesized several compounds similar in structure to traumatic acid, the plant wound hormone, Δ^1-decene-1,10-dicarboxylic acid.. They included Δ^5-undecene-1,11-dicarboxylic acid, $\Delta^{1,7}$-octadiene-1,8-dicarboxylic acid, and several each of the types $HOOC(CH_2)_nCH{=}CHCOOH$ and $HOOC(CH_2)_nCH{=}CH{-}CH_2COOH$. All proved to be active wound hormones, more active than the corresponding saturated compounds.

Mitchell *et al.* (*32*), of the University of Texas, have extracted from spinach leaves and concentrated to a high degree of purity a substance which is essential to the growth of certain lactic acid bacteria. In microbiological tests a concentration of 0.00012 microgram per milliliter gave about one-half maximum growth. The substance contains nitrogen, but no sulfur or phosphorus. It appears to be widely distributed, and is especially abundant in yeast and mushrooms. Since they prepared the substance from leaves, the authors proposed the name "folic" acid for it. There was some evidence that it may have vitamin-like properties for animals.

Hutchings *et al.* (*21*), University of Wisconsin, prepared a similar substance from yeast. An acid which also contains an amine group, it is probably a growth requirement for chicks as well as for lactic acid bacteria. These authors objected to folic acid as a name for this substance, since it is quite general in its distribution and was first isolated from yeast. They preferred to delay naming the substance until its identity is established.

In studies of artificial parthenogenesis it was necessary to grow young embryos of the plant *Datura* in vitro. Moderately young embryos grew well on a standard culture medium to which known growth-promoting substances had been added. For the growth of very young embryos (14 days) Van Overbeek, Conklin, and Blakeslee (*59*), California Institute of Technology and Carnegie Institution, found the addition of coconut milk satisfactory. Search for the active substance is in progress.

White and Braun (*61*), of the Rockefeller Institute, have grown bacteria-free secondary crown galls in vitro aseptically through 13 transfers with a theoretical increase in volume of about 450,000 times. After 10 transfers some of these growths were grafted to normal healthy sunflower plants where they grew well and produced galls. No doubt the stimulation to tumor growth came from bacteria in the primary gall, but it was maintained in extensive reproduction of sterile tissue.

p-Aminobenzoic acid nullifies the effect of sulfanilamide on the growth of bacteria. The experiments of Wiedling (*62*), in Sweden, have shown that it has a similar effect on an autotrophic plant, a fresh water diatom. The author believes that this substance may be of universal significance in the growth of plants.

Miss Day (*10*), of Smith College, has found vitamin B_6 (pyridoxine) of distinct benefit in the growth of excised tomato roots in an agar medium. Neither glu-

tamic acid nor glycine in the amounts used was able to replace it.

According to *Science Supplement* (*50*), the ether extract of corn pollen, tested by Mitchell and Whitehead of the U. S. Department of Agriculture, was extremely active in promoting plant growth. As this extract was a complex mixture, the effective substance must be by far the most active growth promoter yet found.

Field results indicate quite definitely that the growth of peach seedlings is inhibited by the presence of roots of peach trees in the soil. Proebsting and Gilmore (*38*), University of California, growing peach seedlings in sand cultures, found the alcoholic extract of the bark of peach tree roots toxic. The active substances have not yet been identified.

Miller and his associates (*33*, *34*), Michigan State College, have developed a large-scale laboratory method for separating the unsaponifiable lipid material from alfalfa leaf meal. The concentrate contained 60,000 units of vitamin A per gram (as β-carotene) and apparently a natural stabilizer which protects the carotene from oxidation. On irradiation high antirachitic activity was developed without appreciably affecting the carotene.

Viruses

Spencer (*54*), of the Rockefeller Institute, has tried the effect of varying levels of nitrogen supply to the host plant on development of the virus infecting it. From the 5th to the 12th day after inoculation the virus content of the low-nitrogen plants increased to 20 times its original value, that of high-nitrogen plants to 200 times. The latter plants were 2 to 3 times as large as the former.

Ten days after inoculation external nitrogen was withheld from part of a group of plants. After 16 days virus protein and soluble leaf protein in these plants were unchanged in amount, while in the plants supplied with nitrogen, both had increased fivefold. A certain degree of independence in the metabolism of host and pathogen was shown by the fact that, even when starved for nitrogen compounds, neither could make use of the protein of the other but both required external sources of nitrogen for the formation of new protein.

Bawden and Pirie (*5*), of Rothamstead and Cambridge, studied the effect of urea on four viruses. All were irreversibly denatured, with loss of infectivity and serological activity. For each there was a critical concentration of urea below which no irreversible effect on infectivity occurred. Urea inactivation of the tobacco mosaic and tomato bushy stunt viruses was accompanied by the separation of the protein and nucleic acid, but this did not occur with the potato *x* and tobacco necrosis viruses.

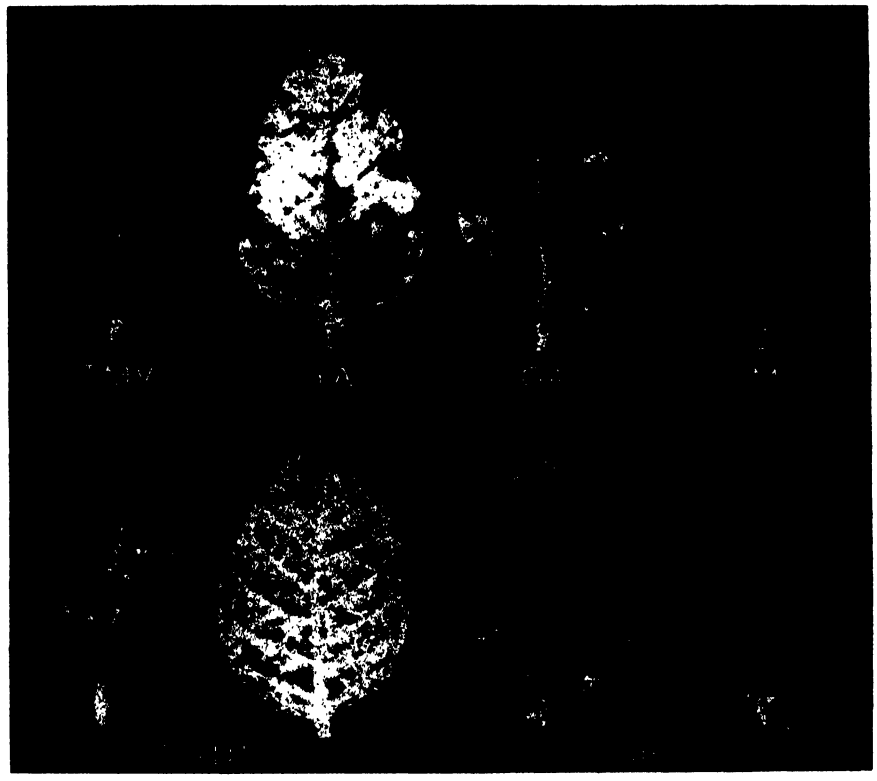
The effect of sodium hydroxide on tobacco mosaic virus was complex. Very mild treatment increased infectivity. If the treatment was slightly more severe, infectivity was lost but serological activity remained. More severe treatment destroyed all characteristic properties. In the presence of alkali, sodium dodecylsulfate destroyed the virus, separating the nucleic acid from the protein.

Lauffer and Dow (*26*), of the Rockefeller Institute and Pennsylvania State College, denatured tobacco mosaic virus by high pressure. Inactivation was more rapid than coagulation. The inactivated but not coagulated material contained particles with sedimentation constants much lower than those of the normal virus. The nucleic acid was largely liberated by denaturing, as the coagulum contained very little phosphorus.

By treating with sodium hydroxide at low temperature, Pfankuch (*35*) split the giant molecule of the tobacco mosaic virus into 50 to 100 pieces of comparable constitution. He stated that the high-molecular nucleoproteins may have two types of arrangement: (1) The huge protein molecule has nucleic acid groups attached to it as side chains; (2) protein and nucleic acid units alternate. He considered the former characteristic of enzymes, the latter of viruses.

To test this point, Schramm (*48*), Berlin Dahlem, used a nucleotidase prepared from calf intestinal mucosa to split the virus molecule. The nucleic acid was completely removed without apparent change in the protein portion. Infectivity was practically entirely lost, but not serological activity. This would indicate that the nucleic acid units are attached as side chains to the protein part of the virus molecule.

Comparison of some of the properties of normal tobacco mosaic virus with those of several variants produced by radiation was made by Kausche (*23*). Differences were found in turbidity in various solvents, viscosity, sedimentation constant, velocity of migration in an electric field, and phosphorus content. Knight and Stanley (*25*) found the phosphorus content of six strains of tobacco mosaic and two of cucumber virus remarkably uniform. Tyrosine, tryptophane, and phenylalanine in five of the strains of tobacco mosaic amounted, respectively, very closely to 3.8, 4.4, and 6.1 per cent. In Holmes' rib-grass strain these figures were 6.4, 3.5, and 4.3, and in the two cucumber strains very close to 3.9, 1.5, and 10.1. The authors concluded that the amino acid make-up of the protein of the virus has more to do with its specificity than its content of nucleic acid.



JOURNAL OF BIOLOGICAL CHEMISTRY, PHOTO BY J. A. CARLILE

Leaves of Turkish tobacco plant showing symptoms typical for each of six strains of tobacco mosaic virus. TMV = tobacco mosaic virus; YA = yellow aucuba; GA = green aucuba; M = Holmes' masked strain; J14D1 = a derivative, isolated by L. O. Kumkel, of J. H. Jensen's J14 virus; and HR = Holmes' rib-grass strain. The leaf showing the masked strain (M) is practically indistinguishable from the normal leaf, although it contains an appreciable amount of virus. The J14D1 and HR viruses differ from the other strains shown in giving distinct primary lesions on the inoculated leaves as well as typical secondary symptoms. In each of these cases, the first leaf shows characteristic primary lesions and the second leaf the secondary symptoms.



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(1) Ultracentrifugally isolated tobacco mosaic virus applied to a collodion membrane at a concentration of 0.01 mg. per cc., showing particles having a width of about 15 millimicrons. X 13,700. (2) Mixture of same tobacco mosaic virus preparation used for (1) at a concentration of 1 mg. per cc. with an equal volume of normal rabbit serum and applied at a 1 to 100 dilution. The width of the virus particles is unchanged. X 13,800. (3) Mixture of same tobacco mosaic virus preparation used for (1) and (2) with an equal volume of an anti-tobacco mosaic virus rabbit serum and applied at a dilution of 1 to 100 to the collodion film 1 hour after mixing. Particles appear more dense, and are about 60 millimicrons wide. X 13,200. (4) Virus antiserum mixture of (3) applied at a dilution of 1 to 100 several hours after mixing. Note that thickened virus particles have fuzzy profiles and have formed an irregular framework. X 13,700.

According to Ross (*41*), glycine and histidine appear to be absent from the tobacco mosaic virus protein. No differences in analytical results were found between chemically and centrifugally separated samples.

A study of the behavior of a virus protein, with some of its chemically active groups masked by combination, should aid in determining what structures are essential to activity. At least two reports of such experiments have been made. Perhaps it is not surprising that they are not in perfect agreement.

Schramm and Müller (*49*) treated a preparation of tobacco mosaic virus with ketene until the free NH_2 groups were just acetylated. The electrophoretic charge was changed, but not the molecular weight or activity. Longer treatment with ketene inactivated the virus. Other samples were treated with phenyl isocyanate until all the free NH_2 groups were combined. This treatment did not change the sedimentation constant or the activity of the virus. Similar independent experiments by Miller and Stanley (*30*), of the Rockefeller Institute, resulted somewhat differently. Complete acetylation of the NH_2 groups by ketene required long treatment. Preparations in which about 70 per cent of these groups were covered, as indicated by the Van Slyke method, retained their infectivity. More complete acetylation decreased activity. It appeared that some of the tyrosine but none of the tryptophane had been acetylated.

The virus protein was still fully infective when up to 63 per cent of its NH_2 groups had been masked by treatment with phenyl isocyanate. In neither of these preparations did tests by the centrifuge or by electrophoresis give any evidence of the presence of virus molecules that had escaped the treatment. Oxidation of the sulfhydryl groups of virus protein did not change its specific activity. In all three of these cases the modified virus was infective but, as it multiplied in the host plant, normal virus was formed.

When Ross (*43*) inoculated tobacco plants with alfalfa mosaic virus there was an increase in the amount of virus from the 4th to the 12th day and then a rapid decrease. This is in contrast with the behavior of tobacco mosaic virus which, according to Spencer's studies cited above, continued to increase for a much longer time. Ross (*48*) also reported the particles of this alfalfa mosaic virus to be the smallest of any yet measured.

Crystals of a new tomato mosaic virus "Dahlem 1940" were prepared by Melchers *et al.* (*29*). This was very similar to tobacco mosaic virus, but different in some biological properties and in the average length of rods shown by the electron microscope.

Stanley and Anderson (*56*), of the Rockefeller Institute and the RCA Laboratories, have examined five viruses with the electron microscope. Particles of tobacco mosaic virus and of cucumber mosaic viruses 3 and 4 were rods of similar dimensions about 15 millimicrons by 280 to 300 millimicrons, although aggregation made the measurements of length somewhat uncertain. The particles of the viruses of tomato bushy stunt and of tobacco necrosis were spherical, with diameters of about 26 and 20 millimicrons, respectively. These dimensions agree well with those derived by proper interpretation of physical and chemical measurements.

Anderson and Stanley (*1*) also observed with the electron microscope the effect of mixing tobacco mosaic virus with its antiserum. Mounts made one hour after mixing showed a considerable increase in the diameter of the particles. The rather fuzzy outline of these new units led to the conclusion that the particles of the antibody arrange themselves radially around the virus rod. Some hours after mixing, an irregular framework of thickened virus particles was seen. This makes up the antigen-antiserum precipitate. Interpretations of the electron micrographs must be made with caution. The drying of the mount and its exposure in high vacuum may alter the form of the material appreciably.

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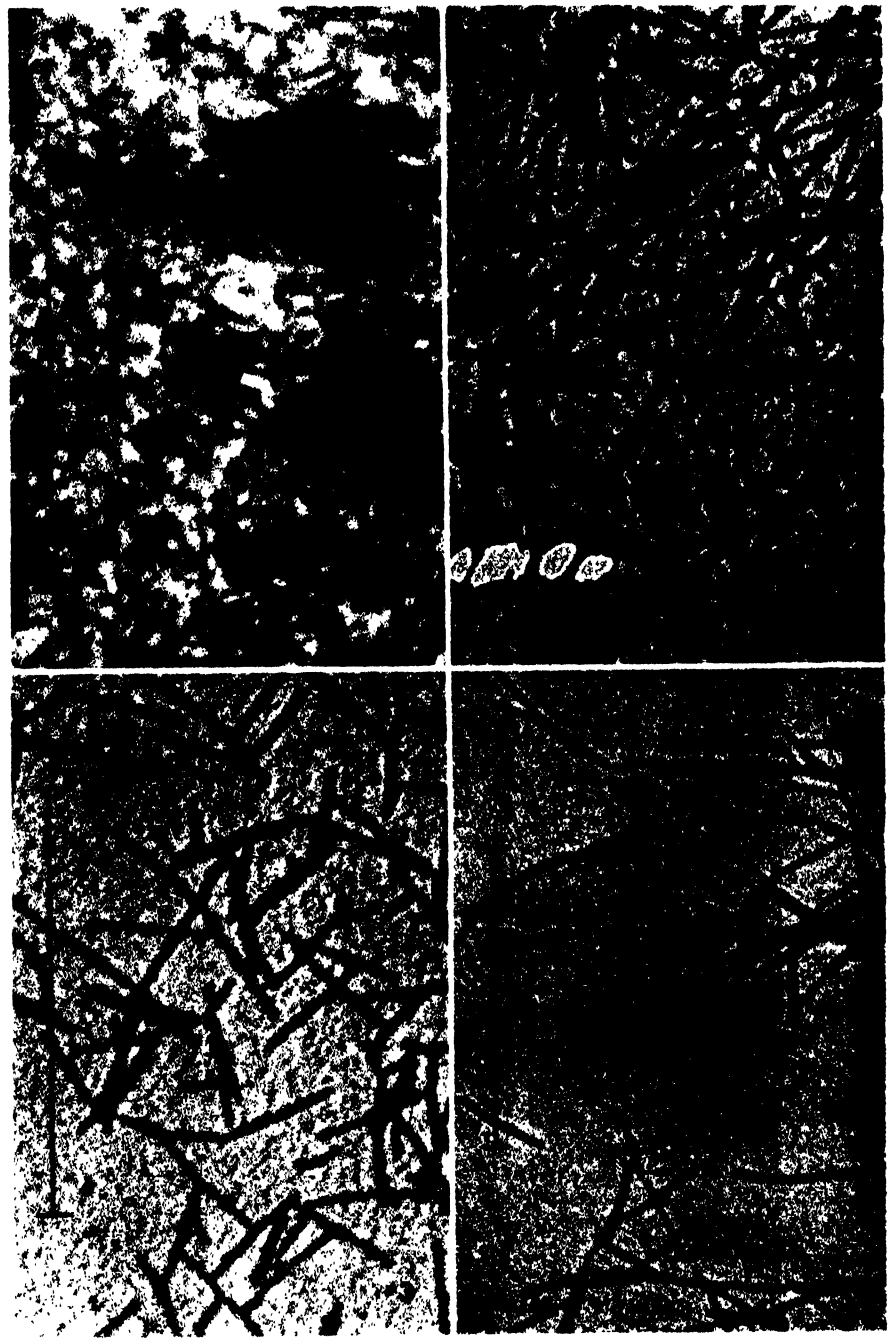
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J. E. Hutchman has been granted leave of absence from The United States Rubber Co. to go with the War Production Board, Washington, D. C.

U. S. Sets Up Two Subsidiaries In Canada

UNITED STATES chemical concerns established two subsidiaries in Ontario, Canada, during November, it has been announced. One concern is launching production of textile assistants, finishing agents, sulfonated oils, wetting out agents, and other chemicals.

A Pennsylvania glue company will establish a branch at Kitchener, Ontario, for production of vegetable, casein, and resin glues.



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(1) Area near center of mount prepared with an aqueous solution containing 0.2 mg. of ultracentrifugally isolated tobacco mosaic virus per cc. X 55,000. (2) Area nearer edge of mount used for (1). X 54,000. (3) Area near edge of mount used for (1). X 55,000. (12) Ultracentrifugally isolated cucumber mosaic virus 3 applied at a concentration of 0.001 mg. per cc., showing single particles and characteristic aggregation. X 39,000

Recent Advances in Physics

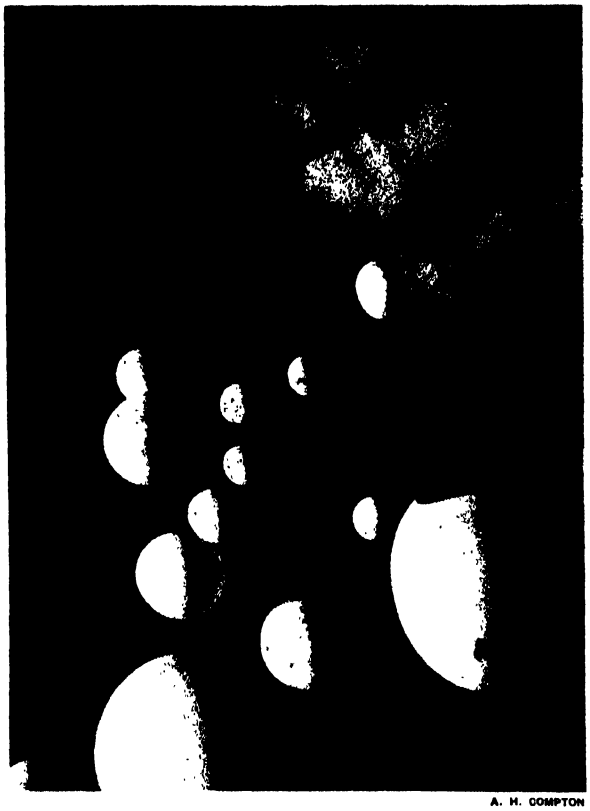
THOMAS H. OSGOOD
Michigan State College, East Lansing, Mich.
and
RALPH B. BOWERSOX
University of Toledo, Toledo, Ohio

APPLICATION of nuclear physics to other fields of research has been one of the most important developments in modern physics. Historically the earliest applications were made in medical work over 40 years ago, shortly after the discovery of radium, while other applications have been increasing in variety and scope during the succeeding years. Robley D. Evans (*4*), at a meeting of the American Association for the Advancement of Science, outlined the progress made along these various lines. Prominent is the use of isotopes as tracers, both in the stable and radioactive form. In either case, Dr. Evans pointed out, the isotopes are really not tracers in the sense that a dye might be added to a stream to trace its subsequent course. The word "spy" might be more accurate since there is no difference chemically between the "spy" atom and the others. Ordinarily one such spy atom is used for each 10^{10} to 10^{15} normal atoms. Use of the stable isotopes as tracers was made possible by the development of the mass spectrograph, with which the relative abundance of the isotopes can be accurately determined. The normal ratio of the abundances of the isotopes is well known for nearly all of the elements, and the presence of the tracer is made known by an excess amount of this particular isotope. This method is particularly valuable in work involving organic materials, and has recently been applied to the problem of determining the earth's age by a study of the stable isotopes of lead resulting from radioactive decay of uranium and thorium.

The radioactive tracer isotopes disintegrate after a relatively short period with the emission of alpha or beta particles or gamma rays. These emitted particles or rays may be detected by Geiger-Müller counters or an ionization chamber and serve to indicate the presence of the tracer. Many of the radioactive isotopes can now be obtained in commercial quantities, and more than 350 such isotopes of the stable elements are known. This method is somewhat more sensitive than that using stable isotopes, but the decay periods of some of the radioactive ones are inconveniently short.

One application of the work on the abundance of the isotopes of the elements was made by Nier, Thompson, and Murphey (*8*), University of Minnesota, in calculating the geological age of some minerals containing uranium and thorium. These two elements are known to disintegrate ultimately into three of the isotopes of lead (206, 207, and 208). From a knowledge of the number of atoms of these istopes relative to the number of uranium, AcU, and thorium atoms present in a sample, the geological age of the mineral can be calculated, since the decay constants of uranium and thorium are well known. The intermediate members of the radioactive families have comparatively short half lives, so the following equations relating the numbers of atoms may be used:

$$N(Pb^{206}) = N(UI)(\exp[\lambda(UI)\,t] - 1)$$
$$N(Pb^{207}) = N(AcU)(\exp[\lambda(AcU)\,t] - 1)$$
$$N(Pb^{208}) = N(Th)(\exp[\lambda(Th)\,t] - 1)$$



A. H. COMPTON

Balloons supporting the cosmic ray recording apparatus in flight at Bauru

λ is the radioactive decay constant, and t is the age of the mineral. The relative amounts of uranium, thorium, and lead were found by chemical analysis, and the mass spectrometer was used to find the relative abundance of the lead isotopes. A very small correction to the number of lead atoms was made for the amount of common lead impurity present, as indicated by the abundance of the Pb^{204} isotope. (Pb^{204} seems to occur in primal lead only and is not a radioactive product.) By applying the equations above, three different estimates of the geological age of the mineral may be given. Discrepancies among these estimates seem to indicate some alteration in the minerals. The ages of the eight samples studied ranged from about 60,000,000 to 2,000,000,000 years. The latter represents the oldest sample so far studied.

It is important to the physicist and the metallurgist to know the rate of diffusion of atoms of one material through another or of one material through itself, in the solid state. Carburization of steel, rates of hardening, and heat treatment of castings all depend on this diffusion process. Progress is being made toward measurement of these rates by means of radioactive tracer isotopes. Floyd R. Banks (*2*) has made use of radioactive zinc[65] as an indicator to measure the rate of self-diffusion in zinc. Zn^{65} was produced by proton bombardment of copper and was then electrolytically deposited on the polished, flat, etched surface of a single crystal of high-purity zinc. This crystal was held for a fixed time at an elevated temperature to allow diffusion to proceed, and then 10 thin sections 0.002 inch thick were cut from the surface by a lathe. The activity of each section, as measured with an electroscope or Geiger-Müller counter, was used as an indication of the penetration of the radioactive zinc atoms. The values of the diffusion coefficient calculated from the data varied from about 10^{-8} cm.^{2}/day at 685° K. to 2.5×10^{-6} cm.^{2}/day at 610° K.

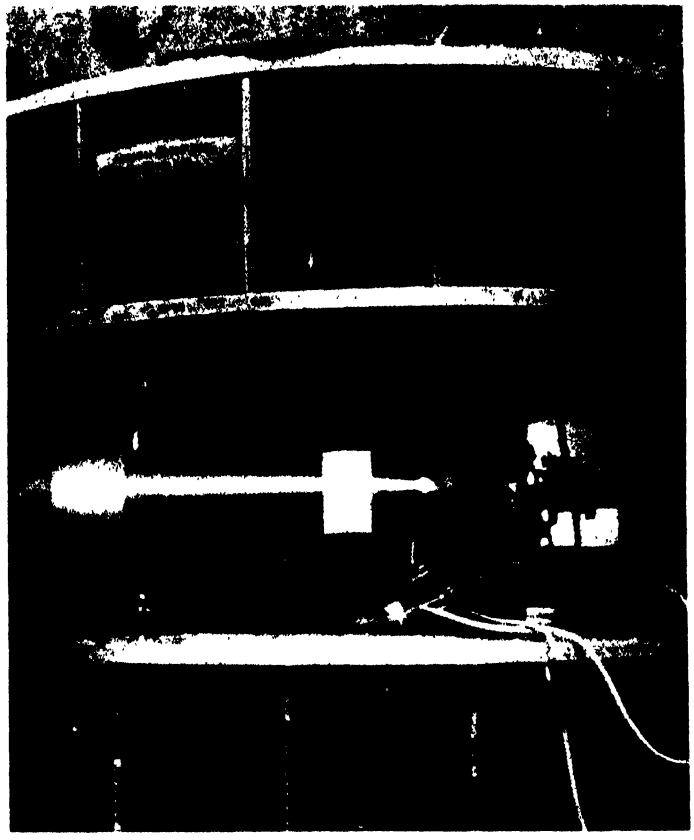
By a similar technique using radioactive sodium, Joseph Steigman (*11*) has investigated the electrolysis of sodium through the glass wall of an electric light bulb and has found that the metal deposited on the inside actually comes from the sodium in the glass.

Over a year ago, it was discovered that thorium as well as uranium could be split into two fragments by a fission process. This year two new methods of splitting these heavy elements have been found—one the fission of thorium and uranium by protons and the other the fission of uranium by alpha particles. Dessauer and Hafner (*3*), at the University of Rochester, allowed a beam of 6.9 m. e. v. protons from the cyclotron to fall on a very thin sheet of thorium. Recoiling fission fragments were collected on a suitable aluminum foil a short distance away. The decay curve of the recoil fragments exhibited many different periods, indicating the presence of several different products. The threshold energy for thorium fission by protons was found to be 5.8 m. e. v. Uranium fission was produced in a similar way.

The potential barrier of a uranium atom for alpha particles is estimated to be 30 m. e. v., which lies within the energy range of the 60-inch cyclotron at Berkeley. Fermi and Segrè (*5*) used 32 m. e. v. alpha particles to bombard ammonium uranate and found isotopes of iodine and tellurium among the products, indicating the fission of uranium by this method. Thus gamma rays and all the simple massive particles, neutrons, protons, deuterons, and alpha particles are now known to be effective in splitting the heavy nuclei. The probabilities of occurrence of the various processes differ by factors of 10 to 1,000, some of them so small as to be at the lower limit of observation.

When slow neutrons are used to produce uranium fissions, the fragments all have atomic numbers between 35 and 57, except for 44 to 50, inclusive. With increasing neutron energy, some fragments are found in the 44 to 50 gap, and at present the only element not yet reported is tin (50).

Gillespie and Breck (*6*) at M. I. T. have performed an interesting and fundamental experiment with a thermal diffusion apparatus like that of Clusius and Dickel. Apparatus of this kind, frequently used in the separation of isotopes, consists of two long concentric vertical cylinders, with the inner one maintained at a high temperature with respect to the outer, and the fluid under investigation introduced between them. Convection currents are set up and in normal operation the heavier component or heavier isotope, which becomes relatively more concentrated on the colder wall, will be carried to the bottom of the apparatus. Gillespie and Breck used ternary liquid mixtures, particularly two solutes in water, to determine whether the behavior of each of the solutes is independent of the other.



G. DESSAUER

A 7 m. e. v. proton beam from the cyclotron such as was used to produce the fission of thorium and uranium

Acetic acid in water solution was enriched at the cold (lower) end of the apparatus even though sodium acetate was added. The acid and the salt in this case seemed to diffuse approximately independently. Enrichment of ferrous chloride in water at the cold end was considerable, but in the presence of 1 *M* hydrochloric acid, the enrichment occurred at the hot end! In the presence of sulfuric acid, there was no enrichment. Zinc chloride in hydrochloric acid and water reacted oppositely to the ferrous chloride. In some cases a heavy constituent of a ternary liquid solution apparently can migrate from the lower to the upper end, against the direction normally expected. The heavier component is defined to be the one which has the greater density when pure: it may have a smaller molecular weight.

The present concept of the nature of primary cosmic radiation, developed from many experiments during the past decade, has been made more exact by recent experiments. Swann (*12*) emphasized four points in a discussion of the problem.

(1) The primary rays coming in to the earth's atmosphere are of one type of massive charged particle, probably protons.

(2) The primary rays give birth to mesotrons in the upper atmosphere, probably indirectly.

(3) Those mesotrons born approximately at rest have such short lives that they disintegrate in the stratosphere and give rise to electrons emerging equally in all directions.

(4) Mesotrons formed with higher energy have longer lives and disintegrate at lower altitudes, giving rise to electrons possessing an average forward component.

In support of these statements, the following arguments are advanced. The primary rays are charged particles because they are affected by the earth's magnetic field, *i. e.*, they are most intense near the equator. Cloud expansion chamber photographs show tracks of electrons, mesotrons, and protons among the cosmic ray particles, and the mesotrons have such a short lifetime that they are probably not the primary rays. Finally, the electron has been eliminated from consideration by the experiments of Schein, Jesse, and Wollan (*10*), who sent recording apparatus to high altitudes in free balloons. The primaries are not electrons because they are non-"shower" producing, whereas electrons are. Primaries are much more penetrating than electrons and they come from all directions at high altitudes, while electrons can penetrate the earth's field only in a nearly vertical direction. Thus, the primaries must be protons. During the past summer, Professor Compton, together with Messrs. Jesse, Wollan, Hughes, and Hillberry from the University of Chicago, performed similar experiments in South America.

Somewhat of a controversy has arisen among ranks of the x-ray research workers over the interpretation of certain spots and streaks found on photographs taken by passing a narrow beam of x-rays through a crystal. These extraneous reflections generally occur very close to the spots reflected from the regular crystal planes, but they do not fit into the Laue pattern. Two theories have been put forth during the year to account for their presence.

Raman and Nilakantan (*9*) assume that the incoming x-ray beam sets up elastic vibrations in the crystal lattice by an inelastic impact and that in consequence the frequency of the primary x-ray photons is altered slightly. This

modified beam will then be reflected to a spot near the one to which the unmodified beam is reflected, since the angle of reflection depends on the wave length and thus on the frequency.

W. H. Zachariasen's (*13*) theory assumes that elastic vibrations are set up because of the thermal agitation of the atoms in the crystal and that the x-ray beam will be somewhat diffusely reflected as a streak from this oscillating lattice. Under appropriate conditions, sharp intensity maxima occur in these streaks so that they appear as spots. At present insufficient experimental evidence has been found definitely to favor either theory, although Zachariasen's seems to be somewhat the simpler of the two.

Several methods of attack are open to the research worker who wishes to examine a surface under the high magnification possible with the electron microscope. If the specimen is thick, the usual method of transmission of the electron beam through the material being investigated cannot be used. Recourse is had to the use of thermionic electrons from the surface itself or to electrons reflected from the surface. The second method is not very satisfactory, and the first method is limited to those metals which can be heated hot enough to emit electrons. Another indirect method involves scanning the surface with a very fine electron beam probe and reproducing an image of the surface on a cathode ray tube screen by a process similar to that used in television. This latter method at the present stage is not much better than the use of a microscope with visible light.

V. K. Zworykin and E. G. Ramberg (*15*) of the RCA Research Laboratories have reported a new method involving the preparation of a thin replica of the surface. This replica may then be investigated with the transmission-type electron microscope. A thick layer of metal (silver) is evaporated on the surface in question and then stripped off. Collodion is applied to this negative replica surface, and the metal is dissolved away from the collodion by means of acid. This leaves a thin positive collodion replica of the original surface whose ridges and hollows may be deduced from the density of the final photograph. The density at a point on the photograph is inversely proportional to the thickness of the collodion film at the correspondence point, so that a bright spot on the photograph would represent a high spot on the original surface.

Another development is the new 300,000-volt electron microscope reported by Zworykin, Hillier, and Vance (*14*). Preliminary tests indicate that it may be used on organic specimens 1 to 2 microns thick and that it shows a certain amount of the internal structure of the specimen.

It has heretofore been necessary to apply full voltage to an accelerating tube to produce a high-speed beam of electrons. The cyclotron will not work because its operation depends on the constancy of the mass of the particle being accelerated, whereas the relativistic change of mass of a 2 m. e. v. electron is about 500 per cent. This would mean a period of revolution five times as long for the paths of largest radius, thus throwing the beam out of phase with the accelerating voltage. D. W. Kerst (*7*) has recently constructed an electron accelerator, looking somewhat like a small cyclotron but embodying a radically different principle. The magnetic field is supplied by 600-cycle alternating current, thus producing an induced circular electromotive force within the evacuated glass accelerating chamber. Electrons liberated from a filament inside the chamber are accelerated in circular orbits nearly 8 cm. in radius. There is an electromotive force of about 15 volts for each revolution, and the acceleration is completed during the quarter of a cycle while the field is increasing. Perhaps 200,000 revolutions may be performed in this time, however, and the author estimates the total path length as about 60 miles. So far, 2 m. e. v. electrons have been produced, and there seems to be no reason why much higher energies may not be obtained[1]. The instrument shows great promise as a source of high-energy x-rays for medical and nuclear research. In addition it may be possible to bring the high-speed electrons themselves out of the apparatus after they strike the target.

An entirely different method of approach to the problem of the measurement of the velocity of light is represented by an experiment performed by Wilmer C. Anderson (*1*) at Harvard University. Instead of the usual method involving measurement of the time taken for a beam of light to traverse a measured path between mirrors, he has made use of the well-known law equating the velocity of propagation for a periodic disturbance to the product of the frequency and the wave length of that disturbance. The light wave itself was used as a "carrier wave" modulated in intensity with a Kerr cell at a measurable frequency of 19.2 megacycles. The "wave length" of this modulation, about 16 meters, was measured by an interference method similar in principle to the interferometer. An electron multiplier tube was used to detect the intensity minima. The velocity of light was found to be 299,776 ± 14 km./sec. and was constant within the accuracy of the experiment over a long period.



A. H. COMPTON

Automatic recording cosmic ray apparatus at the start of a balloon flight at Bauru, São Paulo, Brazil. The man in foreground is listening for sound of the clock. Apparatus such as this was used by Schein, Jesse, and Wollan (*10*).

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[1] With a later model built at the General Electric Laboratories Dr. Kerst has obtained 13 m. e. v. electrons.

WORLD-WIDE CHEMISTRY



The Inter-American Chemists Congress, scheduled at Santiago de Chile in January 1942, had to be postponed. Probably it will be held during the third week of September. Particulars can be obtained from the secretary of the organizing commission, Juan Hepp D., Casilla 3725, Santiago de Chile. The president of the committee, Eduardo Cruz Coke, is senator of Chile and candidate of the conservative party for the vacant presidency of the republic. The elections are in February and, if Dr. Cruz Coke is chosen, he will probably resign as head of the committee.

Mining and Geology Congress to Be Held

To the first Inter-American Congress of Mining and Geology, to be held in January at Santiago, will come delegations from the United States, Argentina, Brazil, Colombia, Peru, Bolivia, Mexico, Cuba, Nicaragua, and probably Canada and Honduras. The program includes excursions to mines, nitrate plants, and the steel works at Corral and Valdivia.

Aniline Dye Plant Being Constructed at La Catrina

The Sociedad Industrial de Colorantes S. A. is building a big aniline dye plant at La Catrina, near Santiago. Until now manufacturing was done in the building of the Inst. Médico Técnico Sanitas, but Colorantes will take over when the plant is ready. The Corporación de Fomento is participating in the company with 450,000 Chilean dollars.

Materials Chile Must Import from U. S. Listed

The Chilean Government has given its ambassador in Washington the following list of materials, which represent the minimum needs Chile can import only from the United States.

Material	Metric Tons
Zinc	1,300
Tin plate	13,000
Iron and steel	50,000
Iron wire	18,000
Copper wire	1,800
Paints	2,800
Paper pulp	15,000
Mineral oil	700,000
Diesel oil	60,000
Rayon yarns	1,200
Cotton yarns	35,000
Lubricating oil	14,000
Iron tubes	5,000
Tiles	5,000
Asphalt	2,000
Turpentine	1,100
Lubricating grease	5,000
Paper	10,000

Native Minerals to Be Exhibited at Samples Fair

In February an international samples fair will be held in Santiago. An exposition will be given by the Chilean nonmetallic mining industry, with 40,000 samples of different minerals including minerals of metallic ores.

Coal Deposits to Be Exploited for Synthetic Gasoline Manufacture

Preparations have started for exploitation of big bituminous coal deposits at Mahoma, district Los Lagos, province of Valdivia. The coal will probably be used for manufacture of synthetic gasoline.

Law Halts Development of Oil Deposits on Private Land

The government is absolutely determined to find oil in Magallanes or other parts of Chile. A United States prospector has been hired for about $6,000 a year, and $4,500,000 has been reserved for exploration during the next three years.

The oil situation in Chile is curious. Because of the various scandals in Mexico between foreign oil companies and owners of oil lands in that country, Chile has made a law that oil found on land in private hands passes at once to the government, which will pay the owners of the land a certain sum of money, to be fixed by government officials. This measure was directed against foreign oil companies, but the real result is that there seems to be no oil, because everybody hides it. During the big earthquake in the south of Chile in January 1939, there were not only eruptions of earth gas, but actually filterings of asphalt and naphtha in many places, especially in the department of Constitución, province of Maule. This is a public secret. But of course no landowner has ever seen anything like it, and the government cannot requisition the land on suspicions. Public opinion is that, until this law is abolished, not very much oil will be found. This holds true in Magallanes, too, because even the United States prospector cannot prospect on private lands.

Sodium Sulfide Declared in Overproduction in Chile

Sodium sulfide has been declared in overproduction. This means the two existing plants may not increase output, and no other factory may produce it without special permission from the government. Sodium sulfide is exported regularly, mostly to Brazil, Argentina, and Peru. The average export price is about 5 Chilean dollars per kilogram, f. o. b.

New Export and Import Regulations Announced

The government is introducing a new surtax on imported goods, which are regarded as luxuries. The surtax is 10 per cent over the value c. i. f. plus duties, and includes passenger cars above $1,000, radios and musical instruments, phonograph records, firearms, glassware, perfumes and cosmetics, and liquors.

Export has been forbidden in 1942 for so-called cod liver oil, which is actually liver oil of the *Congrio*.

Because of the high price of shoes, export of leather has been prohibited for 1942. Previously the Chilean leather industry exported about 30 per cent.

Editor's Note. Those interested in further details should address the correspondent whose name and address appear for each country, and enclose sufficient international coupons to prepay the reply. United States stamps should not be sent.

The government of Brazil has bought 10,000 tons of nitrates in Chile in exchange for the equivalent in sugar, which Brazil will export to Chile.

Insecticide Company Bought by Imperial Chemical Industries

Mussla Ltda., which manufactures insecticides for agriculture, has been bought and taken over by the Chilean branch of Imperial Chemical Industries, Ltd.

Miners and Smelters Contract with Metal Reserve Company

The Metal Reserve Co. has made a contract with the Sociedad Nacional de Minería, which represents the independent miners and smelters. The contract is for 18 months but can be terminated within six months. The Metal Reserve Company pays in U. S. money, f. a. s. Chilean port, standard copper 11.75 cents per pound, mercury $190 per flask, and manganese ore, 44 per cent, 42 cents per unit.

RUDOLFO ZOELLNER J.

CLASIFICADOR 208
SANTIAGO
December 21, 1941



Government control over British chemical markets continues to expand. During the last month tin, the only important commodity left with a free market, was brought under supervision of a Ministry of Supply Controller who has requisitioned all stocks in the country, fixed maximum prices, and reserved the right to allocate supplies. Rubber, under a controller of its own since April last, is now under the charge of a Rubber Control Board. Exports of all rubber manufactures have been subjected to the usual license system, and manufacture of nonessential rubber goods has been prohibited. To help the Ministry of Supply in distribution, the Wood Tar and Pitch Importers' Association has been formed along the line of other recent organizations for resins, starch, and other import commodities. Starch and dextrin control has been tightened by prohibition of the use of starch, flour, and dextrin made from sago or tapioca for any purpose whatsoever.

Far Eastern War Causes New Controls in Chemical Industry

The more important of recent controls have been caused by extension of war to the Far East, but they must not be regarded as indicating an actual shortage of tin, rubber, and similar commodities in the British Isles. The measures are precautionary, taken despite well-known existence of large stocks in consuming countries including Great Britain. Prices have increased substantially, however, in some markets of other Eastern commodities such as menthol, benzoin, dragon's blood, peppermint oil, agar-agar, and camphor, and extension of control to certain of these products would not cause surprise. The quantities of these and similar articles on the British market have been very small for some time and some products are purely nominal at present.

Demand for Industrial Chemicals Continues High

Demand for industrial chemicals is heavy. There is a large call for sodium hydroxide, a steady demand for refined sodium nitrate, a moderate business in sodium percarbonate, while dichromates are rationed, chlorates are in short supply, and yellow sodium cyanide can be obtained on the open market in restricted quantities only. Steady deliveries of sodium ash and sodium bicarbonate do not preclude a fair amount of new inquiry, and the market is steady for all available quantities of such products as potassium permanganate, liquid chlorine, bleaching powder, and borax. No relaxation of pressure is reported for formaldehyde, as well as barium chloride and carbonate. Demand for calcium carbide is strong, for hydrogen peroxide fair, and for gray calcium acetate firm.

New Outlets Sought for Coal-Tar Pitch

Heavy accumulations of coal-tar pitch caused by the big call for other coal-tar products have stimulated research into new outlets for the product. The Coal-Tar Controller recently expressed himself strongly in favor of increased use of creosote-pitch mixtures and pitch for heating. Development of new outlets for pitch helps maintain production of naphthalene, anthracene, tar acid, carbolic acid, and other vital products at the present time. It is hoped to stimulate use of tar products as fuel after the war, although this is largely an economic problem dependent upon the competitive power of pitch in normal market conditions. Several types of creosote-pitch boilers have been used for years, and experience generally has been satisfactory.

Desulfurization of Coal Being Studied in Midlands

Desulfurization of coal by crushing and washing has been studied by the Midland Coke Research Committee. Experiments have been conducted on Ganister coal from South and West Yorkshire, a good coking coal which heretofore could not be used for coke because of its high sulfur content of 4 per cent. Float-and-sink tests on coal crushed to different maximum sizes showed that crushing as fine as 200 mesh (the Institute of Mining and Metallurgy Series) fails to release all the pyrites which are the chief cause of the high sulfur, but crushing to 0.1 inch frees 50 per cent of the pyritic sulfur. To avoid difficulties of handling very fine coal, it was concluded that crushing the coal to 0.1 inch, dedusting at 60 mesh, and washing the oversize in a trough washer would reduce the sulfur content to 3 per cent. The high physical quality of the coke would in many circumstances with lean ores compensate for its high sulfur content.

Colonial Oil Plants Studied as Motor Fuel Possibilities

The Colonial Office reports that preliminary work is in progress at the East African Agricultural Research Station on the possibility of preparing petrol from vegetable oils or fatty acids obtained from them. Distinctly hopeful results have been obtained. Large stocks of these products are now in East Africa.

Alternating Double Filtration Urged for Sewage Purification

Alternating double filtration is a new process for biological purification of sewage and trade effluents developed by the Water Pollution Research Board over a number of years. It is based on the discovery made in the laboratories of the Birmingham Drainage Board that excessive accumulations of solid matter in the top layer of single filters can be removed and the filter again brought into a satisfactory condition if the filter is treated for a week or two with purified effluent from another filter. Two experimental filters are now treating about three times as much sewage as can be treated by single filtration. The change-over from single to alternating double filtration requires installation of more tanks and pumps, but the saving in capital and construction materials is considerable.

Natural, Synthetic Vitamins Emphasized in Wartime Diet

In view of the unavoidable limitations of wartime diet, a good deal of attention has been given by nutrition experts and food chemists to the manufacture and supply of vitamin-containing food. Sirups and other materials rich in natural vitamins have been prepared for children in schools and nurseries, and vitamin-rich

foods have also been given as extras to civil defense and war workers engaged on night work or otherwise deprived of a normal amount of sunlight. These additions have in part been given in the form of synthetic preparations. As far as the general public is concerned, vitamins have been added to some such foodstuffs as margarine and cocoa, sometimes in accordance with government instructions and sometimes by the manufacturer himself without such encouragement. Approximately 25 per cent of the white bread and flour consumed in the United Kingdom is being fortified with vitamin B_1; there is only one producer of synthetic vitamin B_1 in the country. A jelly containing vitamin C extracted from the hips of wild roses is also being made by a firm of chemical manufacturers in Eire.

Tinning Oils from Petroleum Developed

Experiments at the Tin Research Institute have resulted in the development of tinning oils, customarily used in a floating layer on top of the molten tin bath in the manufacture of tin plate, which are derived from petroleum. Several suitable mineral oils have been selected which can be used throughout a comparatively wide range of temperatures and show excellent stability and considerable freedom from fuming and fire hazard. Each carrier may be used combined with a choice of active agents. Some of the oils that were tested compare favorably with palm oil and tallow, now in most common use, especially at high temperatures such as are met in hot tinning. Others are useful for covers of lead-tin baths.

Rhodesian Copper Producers Establish Research Laboratory

A joint laboratory for metallurgical and chemical research has been established for the Rhodesian copper industry at Nkana. There is a fully equipped section for flotation research, pyrometallurgy, and smelting reduction processes.

Nonfelting Wool Demands Special Dyestuffs Treatment

Application of nonshrinking and nonfelting wool processes has made great progress in the British textile industry since all materials for the armed forces must be unshrinkable and there is a tendency to extend the process to utility cloths offered to the public at large for wartime wear. Nonshrinking wool materials last about twice as long as untreated fabrics, while the cost is generally very small. The processes in general use employ chlorine, hypochlorites, sulfuryl chloride, nitrosyl chloride, sodium bisulfite, potassium hydroxide, sodium hydroxide, formic acid, and other chemicals. Although the total demand for nonshrinking wool is of little weight in chemical markets as a whole, it is felt distinctly in some smaller markets.

Nonfelting wool, as established by the Wool Industries Research Association, demands special treatment in dyeing, since it takes up dyestuffs at a greater rate than does the untreated material. With prolonged boiling, however, colors of the level-dyeing or crystalloidal type assume an equal shade on ordinary and nonfelting wool, whereas colors of colloidal type maintain a substantial difference in shade after dyeing for the normal time.

Steps Taken for Output of Rubber Substitutes Questioned

In reply to a Parliamentary question whether any steps were being taken to establish factories for the manufacture of synthetic rubber in Great Britain, it was said that the Minister of Supply has fully in mind the necessity of adjusting rubber supplies by the extended use of substitutes.

Fertilizer Obtained from Water-Softening Plant

Waste sludge from locomotive water-softening plants is being sold by the London and North Eastern Railway Co. to market gardeners.

Sulfur Dyestuffs Used for Army Equipment

Sulfur dyestuffs have played an important part in the dyeing of equipment for the armed forces, both for cotton yarn and pieces and for wool and cotton cloth, it was reported by H. Boothroyd to the Scottish Section of the Society of Dyers and Colourists. Special service requirements include a high degree of water resistance and for certain equipment resistance to treatment with hydrogen peroxide and citric acid. Fastness to light and washing is improved by aftertreatment of fibers dyed with sulfur colors by the copper dichromate process. Raw stock dyeing is useful in production of cotton yarns and webbing for purposes where a great deal of abrasion will be experienced.

G. Abrahamson

150 Halfway St.
Sidcup, Kent
December 29, 1941

Inability to obtain phenol, formaldehyde, polyesters, and other chemicals has resulted in the closing of the Colombian concern, Industria Plástico Quifmica, Ltda., American consular officials have been advised.

Chemical Exports and Imports of Iraq Decline

Demand for chemicals and allied products from Iraq has been fairly active during the past two years, but the country is reported to be experiencing difficulty in fully meeting its requirements because of withdrawal of such European sources of supply as Germany and restriction on shipping from other sources, as the United States and Great Britain.

Domestic production is said to be limited to only a few items. Domestic output, which includes oxygen, carbon dioxide, alcohol, some vaccines and serums, perfumery, and laundry soap, continued up to the first half of 1941. In addition a number of dye factories were operating at the time.

Quantities imported in 1940 decreased decidedly compared with 1939, although the values were reversed because import prices rose sharply. Declines in fertilizers, dyes, paints and varnishes, sulfuric acid, tartaric acid, glycerol, and medicinals were reported. Iraq furnishes gum tragacanth, gum arabic, and other gums, henna, and licorice. Except for licorice and gum tragacanth, exports of these commodities declined in 1940.

War Gives Britain Clear Field in Egyptian Market

Elimination of German and interruption of French supplies of chemical products gave British chemical exporters a clear field and undisputed lead in the Egyptian market during 1940, figures for the year indicate. Formerly France was second only to Great Britain in the Egyptian medicinal and pharmaceutical trade.

The Egyptian Government is the most important single purchaser of chemicals and allied products. General sales of chemicals in that country during 1940 were about level with 1939, but imports showed a 10 per cent gain, attributed mainly to a sharp increase of purchases of sodium nitrate from Chile. This in turn is said to reflect the improved position of Egyptian cotton growers, incident to the cotton purchase program of the British and Egyptian Governments. Other chemical and pharmaceutical products showed between 10 and 15 per cent increase.

Guatemalan Broomroot Exported to United States

Small shipments of broomroot, grown near Quetzaltenango, Guatemala, have been made periodically to the United States by one of two firms engaged in production, harvesting, sorting, and preparing it for export. Several Guatemalan firms are also engaged in buying for export, principally to South American countries.

Expansion of Copper Sulfate Production in Italy Planned

COPPER sulfate is a critical material to Italian economy, a recent survey by the Department of Commerce indicates, with word of projected expansion of the chemical industry in that country to provide for greater self-sufficiency in major items.

At the outbreak of war the industry consisted of approximately 4,500 firms employing 150,000 workers. Local plants supplied the nation's agricultural requirements for insecticides, fungicides, herbicides, and similar products.

An annual quantity of 25,000 to 30,000 tons of copper is required to meet the need for copper sulfate, indispensable to the native wine industry. The coming agricultural year finds a supply of 9,000 tons of copper available to the chemical industry. Sales of copper sulfate are under strict governmental control.

Chemical Fertilizer Industry in New Zealand Sets Record

RECORD highs in physical volume and production value are reported for the New Zealand chemical fertilizer industry in the period 1940–41.

Nine factories engaged in the industry during the year produced 501,409 long tons of superphosphates, compared with 417,160 in the preceding year, a gain of 20.2 per cent. Output of other chemical fertilizers declined from 140,723 long tons in 1939–40 to 133,313 the past year.

During 1940–41 1,171 persons were engaged in the industry in that country, compared with the previous year's total of 1,084, with a 10.5 per cent increase in salaries and wages. Materials used increased 17.5 per cent in cost, and value of products 13.1 per cent.

Uses of Netherlands Indies Tingi Bark May Be Expanded

WAR-RIDDEN areas of the Netherlands Indies are sources for various barks and other wood substances used industrially. Among them is tingi bark, used partly as a dyestuff to develop color of other dyes, and in the Far East in particular, as a dye and preservative of fish nets. It is also hoped to develop this bark for use in batik production.

Total exports were 3,176 metric tons in 1938, dropping to 1,811 in 1940, with large quantities normally exported to Hong Kong and China for use by the fishing industry.

ARGENTINE imports of iodine in 1940 came to 56,890 pounds, compared to the average annual imports of 39,958 pounds recorded for 1937–39. During this three-year period United States sources furnished an average of only 249 pounds.

Mexico Replaces Sweden as Argentine Source of Arsenic

MEXICO appears to be supplanting Sweden as a source of Argentine imports of arsenic. It is brought into that country as "arsenic anhydride" white, and used mainly in the manufacture of sheep dip and in smaller quantities for preserving hides and skins.

Imports totaled 1,009 metric tons in 1938, 1,094 in 1939, and 1,195 in 1940. Imports of dry sodium arsenite are relatively small, and not reported separately. Annual imports of sheep dip run to 9,000 metric tons, but a considerable amount is manufactured domestically.

Lack of Raw Materials Hinders Argentine Development of Plastics

DIFFICULTY in obtaining essential raw materials, especially formaldehyde, apparently precludes any extensive development of plastic molding products at this time in Argentina. No Argentine firm now manufactures plastic molding materials on a commercial scale, although several attempts were made in the past. Only a negligible output resulted in each instance, it was said.

Britain to Buy Entire Egyptian Flax Crop

BRITAIN expects to buy the entire Egyptian flax crop of 1941, according to the U. S. Department of Commerce. The closing of certain European sources has been beneficial to the Egyptian industry, it is indicated, and hope was expressed by the country's Ministry of Agriculture that the output could be increased to at least 50,000 acres in the coming season. In 1939 3,900 acres were planted in flax. The fiber is reported to be first-grade, comparable to the product in northern European countries. Increased flax production is linked with plans to supplement Egyptian cotton with new crops.

Pharmaceutical Sales in Egyptian Market Boom

A BOOM in sales of drugs and pharmaceuticals generally is reported in Egyptian markets, where imports of such items are estimated to have gained between 10 and 15 per cent in 1940 over the previous year. Virtually every pharmacy and drugstore in the principal Egyptian cities is doing a larger turnover than in prewar years, owing to increased purchasing power in the country, it is said. Prices have increased to 20 to 25 per cent over those of 1939.

A CHILEAN organization, the Sociedad Chilena Explotadora de Potasa, has projected an output of 30,000 tons annually of potassium salts at its new plant. A new plant for manufacturing ammonium nitrate also is being considered.

India's Organic Acid Production Increases

INCREASED production of some organic acids is reported from India, where a small plant located near Abmedabad is said to be turning out 300 tons of acetic acid per year from calcium acetate. However, the current supply of this substance is said to come largely from Canada.

Similarly the bulk of India's consumption of organic acids such as tartaric, citric, and oxalic still is imported, although a plant in the Punjab has just started production of oxalic acid, and raw materials for tartaric and citric acids are available.

Chilean Nitrate Industry Reports Satisfactory Year

THE Chilean nitrate industry is believed to have had satisfactory production and shipments as of August 1941, the latest date for which any information has been available in the United States from official sources. No statistics were reported, but activity has been maintained, it was said. Any material change in the nitrate situation is not anticipated for some time to come.

Java Lowers Export Taxes on Cananga Oil

APPLICATION of local regulations lowering export taxes on Javanese cananga oil is reported from Java. Owing to small offerings, citronella prices are said to have recovered somewhat from a decline in September, but as a result, production the following month was 50 per cent below normal. The lowering of export rates is an attempt to improve production and trade in cananga oil.

China Increases Alcohol Production

SPURRED by war needs, China has greatly augmented its alcohol-producing facilities, it is reported from Chihol, in that country. Some 36 plants have been added in the past four years with private capital. Total capacity of these plants is estimated at about 4,500,000 gallons annually. Raw material used is molasses from the large sugar-cane production in Szechuan province.

Before hostilities, annual production of alcohol from private plants in China was 2,388,000 gallons. In 1940 Chinese production in the unoccupied portions of the country was 6,050,000 gallons. In addition to private plants, the National Resources Commission operates seven plants producing alcohol from molasses and potatoes.

POTOMAC POSTSCRIPTS

Priorities and Allocations

Aluminum. The Nation's entire supply of aluminum was marshalled for war January 27 by Production Chief Donald M. Nelson with the issuance of Conservation Order M-1-e. The use of aluminum is prohibited in any manufacture except on war contracts and items specifically set out in the order. The only exception is that aluminum authorized by the Director of Priorities after October 31, 1941, and prior to the effective date of this order may be used for the specific purpose set forth. Only 15 uses of aluminum are permitted, most of them restricted to low-grade aluminum which has not been debased. Anhydrous aluminum chloride may be produced only for the manufacture of dyes for war textiles, high-octane gasoline, tear gas, nylon, or pharmaceuticals. The steel industry may use aluminum as a deoxidizer or alloying agent under specific restrictions. Its use in all other alloy operations is also restricted. Commercial aircraft makers cannot use aluminum except on ratings of A-10 or higher. Containers for intravenous solutions and blood, welding rods, and x-ray tube housings may be produced.

Other permitted uses are condensers to replace defective ones in existing radio sets; match plates, patterns, and snap flasks for use on orders with ratings of A-1 or higher; orthopedic equipment, where light weight is vital; pistons for engines of trucks 1.5 tons or over, heavy-duty tractors, Diesel engines, and engines for portable fire-fighting equipment; and replacement of worn-out or defective aluminum parts, provided that the old parts are returned by the consumer.

Chromium. Control over chromium, vital alloy for corrosive and heat-resistant steel, has been tightened by an amendment to Order M-18-a. The amendment prohibits any person from melting more than 2 tons of ferrochrome in any one month without specific authorization. The purpose is to prevent using up inventories of ferrochrome to fill less essential rated orders for chrome steel.

Ethyl Alcohol. Regulations governing receipts and shipments of ethyl alcohol and related compounds, brought under control by General Preference Order M-30 last August, are revised under terms of Amendment No. 3 to the original order, now in effect.

Definition of ethyl alcohol is changed to indicate that alcohol for industrial purposes only is comprehended. Proprietary solvent is included in the definition of this term.

Restrictions on receipts will be by calendar quarterly periods, rather than monthly. Restrictions on producer's deliveries, previously contained in the order, are rescinded.

Certain orders, including those with an A-1-j or higher rating, may be filled without reference to quantity limitations. Quantities delivered under these orders shall be in addition to the restricted quantities permissible.

Deliveries to the Army and Navy, Lend-Lease countries, and persons holding Internal Revenue permits for the acquisition of tax-free alcohol are exempted from quantity and certificate requirements. Also exempted from provisions of the order are monthly deliveries of 54 gallons or less of ethyl or isopropyl alcohol to any one person during one month.

Fats and Oils. The War Production Board has relaxed General Preference Order M-71 on fats and oils by eliminating the three months' inventory restriction and substituting a restriction on processing.

The control powers already possessed by the board over distribution and use of fats and oils will be exercised if and when any shortage should occur. The amendment leaves the processor free to use his fats and oils to fill contracts for finished products unless and until the Chairman of the War Production Board or the Director of Priorities directs otherwise. No processor of fats and oils may produce more of his product than is required to fill his orders and to give him a practicable minimum working inventory.

Latin American Materials. Allocations of materials for Latin American requirements have been announced for the first quarter of 1942:

Acetone, 100,000 pounds; ammonia, anhydrous, 795,000; ammonium sulfate, 10,100,000; aniline, 95,000; carbon tetrachloride, 140,000; caustic soda, 35,000,000; chlorine, 500,000; chromium tanning chemicals, 565,000; citric acid, 620,000; copper sulfate, 17,500,000; formaldehyde, 175,000; glycerol, 350,000; plastics, 150,000; potash salts, 3,500,000; potassium permanganate, 50,000; soda ash, 47,500,000; sulfuric acid, 2,000,000; superphosphate, 17,500,000; tungsten, 2,500; rayon, 3,300,000; nickel, 15,000 pounds; miscellaneous farm equipment, $13,000,000; platinum, 4,500 ounces; methyl alcohol, 55,000 gallons; and phosphorus, 69,000 gallons.

Mercury. The Nation's mercury usage has been curtailed by Conservation Order M-78, which provides that after January 15 no person shall use mercury in the manufacture of any item or process on List A of the order in excess of 50 per cent of his requirements during a given base period and that after March 31 he will stop using mercury for such purposes.

List B contains articles whose manufacture may be continued at 100 per cent, and in one case at 125 per cent, of the rate during the first quarters of 1940 or 1941, at the option of the manufacturer. These items include fluorescent lamps, health supplies, industrial and scientific thermometers, and mercuric fulminate for ammunition and blasting caps.

Persons working on priority ratings lower than A-1-j will be limited to 80 per cent of their consumption during the first quarter of either 1940 or 1941, provided they are not working on government contracts or articles required to comply with Underwriters' or safety regulations.

Repair, Maintenance, and Operating Supplies. Running at full capacity, the war chemical industry is to receive the assistance of high priority ratings in securing necessary repair, maintenance, and operating supplies. Preference rating order P-89, issued January 26, assigns an A-1-a rating to deliveries of materials to repair actual breakdowns, A-1-c to avert immediately threatened stoppages, and A-3 for other repairs, maintenance, and operation. Before applying any of the ratings, a manufacturer must file with the Chemicals Branch, War Production Board, a statement setting forth certain required information, including amounts of material used for repair, maintenance, and operation during the first six months of 1941, inventories of such material on hand on December 31, 1940, and on June 30, 1941, and must be assigned a serial number under the order. Serial numbers will be assigned only to companies whose products are being used for war or essential civilian purposes.

Neither the A-1-a nor the A-1-c rating may be used to replace material withdrawn from inventories, and the A-3 rating cannot be used for that purpose if, at current rates of consumption, further deliveries would increase inventories above the stipulated minimum. Prior authority, which may be obtained telegraphically, is required before application of the breakdown ratings.

A supplier may not use the two high ratings. He may make use of the A-3 to expedite acquisition of materials which will be delivered by him or another supplier to a producer whose purchase order carries one of the authorized ratings; or to restore his inventory to a practicable working minimum only if, after filling a rated order, his inventory is reduced below such a minimum; if he supplies material which he has in whole or in part

manufactured, he may not apply the rating to restore his inventory to the permitted minimum unless he does so before completing the rated delivery which depletes it. A supplier who provides material to fill rated orders, which he has not in whole or in part manufactured, may defer use of the rating to restore his inventory until he can place a purchase for the minimum quantity procurable on his customary terms, provided he does not defer application more than three months after he first became eligible to apply it.

Research Laboratories. An interpretation of Preference Rating Order P-43 granting priority assistance to research laboratories has been issued to emphasize that the preference rating assigned cannot be used for construction or expansion of laboratory buildings. The only material obtainable under the order by a laboratory is that which will itself be used in the conduct of scientific research or which will enter into the production of material to be so used.

Sodium Nitrate. A complete allocations system for sodium nitrate, effective February 1, has been announced under General Preference Order M-62.

Sodium nitrate is used as a fertilizer, for the manufacture of industrial explosives, nitric acid, potassium nitrate, and glass, and in meat curing and preserving. Demand, particularly for agriculture, is expected to exceed for the spring months supplies on hand and in sight, and strict rationing of supply will be necessary.

Approximately 70 per cent of United States sodium nitrate requirements are imported from South America. Lack of shipping space may interfere with imports, thus making allocations necessary.

Sulfite Pulp. All sulfite pulp allocated for special purposes in January under General Preference Order M-52 has been assigned to Rayonier, Inc. Under the original order, issued January 9 and announced in the January 25 issue of CHEMICAL AND ENGINEERING NEWS, page 123, 4,200 tons of sulfite pulp were to have been set aside for the relief of regular customers of three producers whose plants are widely engaged in war work—Rayonier, Eastern Corp., and Brown Co. Eastern Corp. and Brown Co., according to information received by the War Production Board, can take care of their customers at this time without drawing upon other producers for relief tonnage under the allocation plan.

Tin and Lead Foil. The tin and lead foil order, L-25, has been revoked. Limitations on the use of tin and lead foil are contained in Orders M-43-a and M-38-c, making L-25 unnecessary. The order first was issued November 24, 1941, and its effective date later was postponed for 30 days. A subsequent postponement was made pending issuance of the other orders.

Titanium Dioxide. The percentage of titanium dioxide which must be set aside by producers for direct allocation by the Division of Industry Operations, WPB, has been increased from 20 to 25 per cent by Amendment No. 3 to General Preference Order M-44.

Price Regulations

Borax and Boric Acid. Advances in price of $1.00 a ton on borax and $2.00 a ton on boric acid, justified by increased production costs, were permitted in telegrams sent to members of the industry January 28 by Leon Henderson, OPA Administrator. Until March 24 borax and boric acid are not to be sold at prices in excess of the following per ton f. o. b. plant, freight allowed to destination: borax, granular technical in bulk, $41.50; boric acid, granular technical in bulk, $95.50; regular differentials to apply to shipments in containers and to borax and boric acid sold in commercial forms.

Fluorspar. Fluorspar producers are asked by OPA not to publish, quote prices on, or sell this nonmetallic mineral at above their prices in effect January 2. If any producer considers it necessary to increase prices above the January 2 level, he is requested to notify OPA one month in advance of the date on which the intended increase would take effect. Leon Henderson, OPA Administrator, asked that a detailed factual statement of reasons believed by the producer to justify the proposed increase, including financial data, be submitted. Prices as of January 2 are believed adequate to ensure a supply from existing sources sufficient to meet the increased demand. Fluorspar prices have advanced substantially in the past six months.

Formaldehyde. Price Schedule No. 21 for formaldehyde has been amended to avert hardships to certain users. The amendment withdraws exemptions for formaldehyde to be used in embalming fluids from the maximum prices provided in the schedule, and puts all users on the same basis, regardless of the purpose for which it is intended.

Under the amendment, a reasonable charge for containers is allowable when formaldehyde is shipped in carboys or drums. Prices for shipments in barrels and kegs include the cost of containers. This conforms with trade practices.

Maximum prices for solutions of content other than 37 per cent by weight (U. S. P. formula) are calculated on prices set forth in the original price schedule, multiplied by the number of pounds of formaldehyde by weight contained in 100 pounds of the solution for which the price is to be determined and divided by 37. This assures prices accurately computed upon formaldehyde content.

Sulfur. The Freeport Sulfur Co. has voluntarily offered to continue to sell sulfur throughout the current year at the 1941 base price of $16 a ton, f. o. b. mines, Price Administrator Leon Henderson has announced. At the beginning of 1941 the company, which operates mines in Texas and Louisiana, gave Mr. Henderson an unsolicited pledge that it would not increase the $16 base price of an amount of sulfur sufficient to last its customers for one year at the then current rate of sales.

Although, according to Langbourne M. Williams, Jr., Freeport Sulphur president, sales in 1941 considerably exceeded the amount indicated by the rate prevailing at the time the company made this commitment, all demands for sulfur were filled during the full year at no increase above the base price. Mr. Williams said the company is glad to renew this offer for 1942.

Mr. Henderson expressed his sincere appreciation of the attitude displayed by the company and said, "The efforts of my office to hold prices stable in the face of tremendous inflationary pressures have been assisted importantly by the splendid cooperation given by this major producer. Indeed, the example set by Freeport Sulphur is one that many other industries might well use as a pattern in this war emergency."

Regulation for Control of Explosives

REGULATIONS for the control of explosives and their ingredients in time of war or national emergency have been issued by the U. S. Bureau of Mines under authority of Section 18 of the Federal Explosives Act of October 6, 1917, as amended by the act of December 26, 1941. Violations are punishable by a fine of not more than $5,000 or by imprisonment for not more than one year, or both.

The licensing is required of all persons and establishments for operations relating to explosives or ingredients, with certain exceptions. Arsenals, navy yards, depots, or other establishments owned or operated wholly by or on behalf of the United States need not be licensed. Explosives and ingredients in quantities of 1 ounce or less are also exempted.

Five kinds of licenses are issued—manufacturer's, vendor's, purchaser's, foreman's, and analysts-educators-inventors-investigators. Generally one license will fit all needs of any particular applicant. The last-mentioned license authorizes purchase, manufacture, possession, testing, and disposal of explosives and ingredients for scientific, education, and testing purposes only, and is required of schools, laboratories, and other institutions and persons. It is not required of a manufacturer who customarily conducts such operations.

Wheat to Be Sold for Ethyl Alcohol Production

THE Commodity Credit Corporation is prepared to sell wheat, in place of corn, for production of ethyl alcohol, acetone, and butyl alcohol, according to the U. S. Department of Agriculture.

Under this plan CCC will sell wheat at 91 cents a bushel delivered to processors of the above products. A lower sales price will be made to processors with unusually high conversion costs, but no sales of wheat will be made at less than 80 cents per bushel. These prices are comparable, on a pound basis, to the prices previously quoted for corn. A slightly higher yield of alcohol may be obtained from wheat than from corn. Wheat can be substituted for corn with only minor adjustments in the processes for making alcohol from corn. The wheat price is based on the present price for ethyl alcohol of 50 cents per gallon established by OPA. It will be adjusted for any change in the established ethyl alcohol price.

On January 15 the Department of Agriculture announced the plan of selling corn for ethyl alcohol production. Contracts are being executed under the plan for the period ending March 31. At that time it may be necessary to limit sales solely to wheat for ethyl alcohol production.

Bottling Plants Offer Emergency Drinking Water Source

AS EMERGENCY sources of drinking water if local water supplies are damaged by enemy action, use of facilities of more than 6,000 beverage plants in 2,900 cities and towns have been offered to the Nation by the American Bottlers of Carbonated Beverages, national trade association of the bottled soft drink industry.

Use of such facilities was suggested in a statement filed by the organization with the Office of Civilian Defense, stating: "In the event of impairment of the normal water supply through enemy action, such as by breakage of mains and admission of foreign material, beverage plants using such sources and having specialized water-treating equipment may be in a position to produce a potable water supply through chlorination for the population in their locality". Bottle-washing and sterilizing equipment of the plants, it was said, would provide safe containers for the water and for its distribution in larga areas.

OCD has suggested that, as a preliminary step, each proprietor of a bottling plant contact the defense director or coordinator for his community, giving written information concerning availability of the special water-treatment equipment in the plant and independent sources of water which might be used in an emergency.

Nation Moves to Attain 400,000-Ton Synthetic Rubber Output

POOLING patents, resources, experience, and technical skills by the rubber, chemical, and petroleum industries should make possible attainment of the Nation's 400,000-ton synthetic rubber program, according to E. R. Weidlein, chief of the Chemicals Branch. Many technical difficulties have been avoided by the pooling of patents and technical information, Dr. Weidlein said. The best example of this is that the production program now underway will avoid the use of chlorine. Chlorine is widely used in war production, and present demands exceed supply.

Enough raw materials, provided largely by the chemical industry, are in sight for half the proposed program. Basic ingredients for the Buna S type synthetic rubber, adopted as a standard, are butadiene and styrene. Butadiene is produced from petroleum, natural gas, alcohol, or acetylene. Styrene is a by-product of the coke industry, coming from benzene. Some 20 other chemicals are needed for synthetic rubber production, but the quantities used are small and present no large production problems.

If high priority ratings are assigned for the necessary quantities of noncorrosive steel for equipment, the first 200,000 tons of synthetic rubber will be in production by January 1, 1943, Dr. Weidlein asserted. The problem of raw materials for the next 200,000 tons has been discussed with the petroleum industry, which is studying the matter. The necessary butadiene can be produced as a by-product in the 100-octane gasoline plants now being constructed to provide aviation gasoline. The butadiene can be extracted, Dr. Weidlein pointed out, without reducing the amount of aviation gasoline produced or restricting the output of other petroleum products. If this production is in sight by July of this year, the second 200,000 tons of synthetic rubber can be ready to go into production by mid-1943, he said.

Experimentation will continue during production and it is expected improvements in synthetic rubber will be made. Present outlook is for a product that is 95 per cent as efficient as crude rubber for automobile tires and superior to crude for some other uses. Some variations in formula will be made in various plants, Dr. Weidlein explained, as experiments go forward. Certain types apparently are superior for inner tubes, for instance, and these variations will be made.

The entire program is expected to result in the construction of about 20 new plants for both raw materials and finished products. Four synthetic rubber plants are under construction and two more will be started soon. Three or possibly four more will be necessary for the entire 400,000 tons of synthetic rubber.

Rules on Hydrochloric Acid Transportation Revised

AS A STEP in the Government's all-out war effort, Wayne Chatfield Taylor, Under Secretary of Commerce, has issued an order authorizing the transportation of hydrochloric acid in bulk in tanks on board vessels. This action was taken to ensure adequate supplies of this acid to the vitally important new tin plants created by the Defense Plant Corporation.

Under the order, which amends regulations governing the handling, storage, and stowage of explosives and other dangerous articles on vessels, hydrochloric acid can be shipped in rubber-lined tanks of 18,000 gallons capacity. Barges with a total capacity of 110,000 gallons in six tanks are under construction for use in this service.

Wholesale Price Indexes

INDEX numbers of wholesale prices for chemicals and allied products in September and October 1941 have been released by the United States Department of Labor. With the year 1926 at 100, the indexes were:

PRODUCT	OCT. 1941	SEPT. 1941	OCT. 1940
Chemicals and allied products	89.7	87.4	76 9
Chemicals	88.4	88.2	85 0
Drugs and pharmaceuticals	124.1	104 4	95.8
Fertilizer materials	77.3	76 6	68.1
Mixed fertilizers	77.5	77 1	74.2
Oils and fats	93 4	91.3	39.8

Lead Consumption for 1941 Exceeds Industry's Peak

IN 1941 the apparent consumption of lead in the United States increased 25 per cent over 1940 to reach proportions higher than any of the earlier boom years, 1925–29, according to the U. S. Bureau of Mines. Of the quantity used in 1941 a higher proportion was probably from foreign sources than since establishment of the domestic industry. An increase of nearly 60 per cent in imports of refined lead is indicated for 1941 over the previous record year of 1940. Smelter output from domestic ores and base bullion was 9 per cent higher than in 1940 and the largest since 1930, but production from foreign ores and bullion decreased 3 per cent. Exports of refined lead fell 63 per cent from the 1940 rate. The average quoted price for lead of 5.79 cents was nearly 12 per cent above 1940.

Producers' stocks of refined lead increased from 40,926 tons on January 1 to 47,248 tons at the end of the month. For subsequent months shipments, although fluctuating, remained greater than production, and stocks showed a continual

decline to a record low of 10,735 tons on October 31. November production increased and, as this gain was in excess of a similar rise in shipments, stocks increased to 13,671 tons by the end of November and refinery inventories were only 33 per cent of those at the end of 1940.

Bauxite Production, Imports, Consumption Reach Peak

PRODUCTION of bauxite in the United States in 1941 exceeded the previous peak reached in 1918 by nearly 50 per cent and surpassed the output of 1940 by 105 per cent, according to preliminary figures compiled by the U. S. Bureau of Mines. Output in 1941 totaled an estimated 899,500 long tons, compared with only 438,913 tons in 1940.

Imports of bauxite during the first nine months of 1941 totaled 749,264 tons, considerably greater than ever received during any previous full 12-month period. Domestic production and importations in 1942 are expected to greatly surpass those of 1941. Consumption of bauxite in the United States also broke all records and is estimated at approximately 1,700,000 tons compared with 1,072,000 in 1940. The aluminum industry is said to have consumed about 70 per cent of this bauxite and the chemical, abrasive (including American-owned plants in Canada), and other industries about 16, 12, and 2 per cent, respectively. No reliable figures are available at this time on the value of bauxite shipped. Probably the value on all grades of domestic ore shipped in 1941 more than doubled the $2,578,968 of 1940.

Regulation of Dangerous Drug Products Increased

ELIMINATION of filthy food from the market, prosecution of the responsible manufacturers and shippers, and educational work in improved sanitary factory practices featured enforcement of the Federal Food, Drug, and Cosmetic Act during 1941, reports W. G. Campbell, commissioner of food and drugs. The fiscal year 1941 was the first complete year in which all provisions of the act of 1938 were in effect.

In enforcement of the act there were examined 944 samples of cosmetics, 9,823 of drugs and devices, and 36,380 of foods. Prosecutions to the number of 1,155 were instituted and 2,016 seizures were effected, while 2,605 consignments from foreign countries were denied entry. An increased number of court actions involving shipment of misbranded proprietary medicines were brought. False and misleading therapeutic claims for a variety of diseases and inadequate warning statements were responsible for most of the actions.

Chemical Manufacturers' Shipments and Inventories

THE November index of the value of chemical manufacturers' shipments was 175, compared with 182 in October and 130 in November 1940, taking January 1939 at 100, according to the monthly industry survey of the U. S. Department of Commerce.

The November index of the value of chemical manufacturers' inventories was 131.7, compared with 128.2 in October and 113.3 in November 1940, taking 1939 at 100.

Record Use of Copper in 1941

DEMAND for copper was unprecedented in 1941, reports the U. S. Bureau of Mines. The record-breaking use was to fill armament requirements of the United States and to aid in supplying war needs of foreign countries entitled to help under the Lend-Lease Act.

The enormous use of the metal during the year was accompanied by an unchanged price and by increase in smelter production from domestic sources of only 8 per cent. Imports of crude and refined metal established a new annual record, while exports of refined copper and primary fabricated shapes apparently were the smallest since 1901.

Refinery production of new copper from domestic sources gained 4 per cent in 1941 and that from foreign sources was 10 per cent higher, accounting for a rise in total new copper of 6 per cent. Production of refined copper from foreign sources reached a new annual peak in the past year.

Chlorine to Be Available for Water Purification

NECESSARY amounts of chlorine for water purification will be provided throughout the Nation despite the general chlorine shortage, the Chemicals and Allied Products Branch, War Production Board, has announced. Chlorine in all forms for potable water and sewage treatment is given a high preference over civilian and some war uses to permit water and sewage plants to obtain necessary chlorine and sodium hypochlorite supplies.

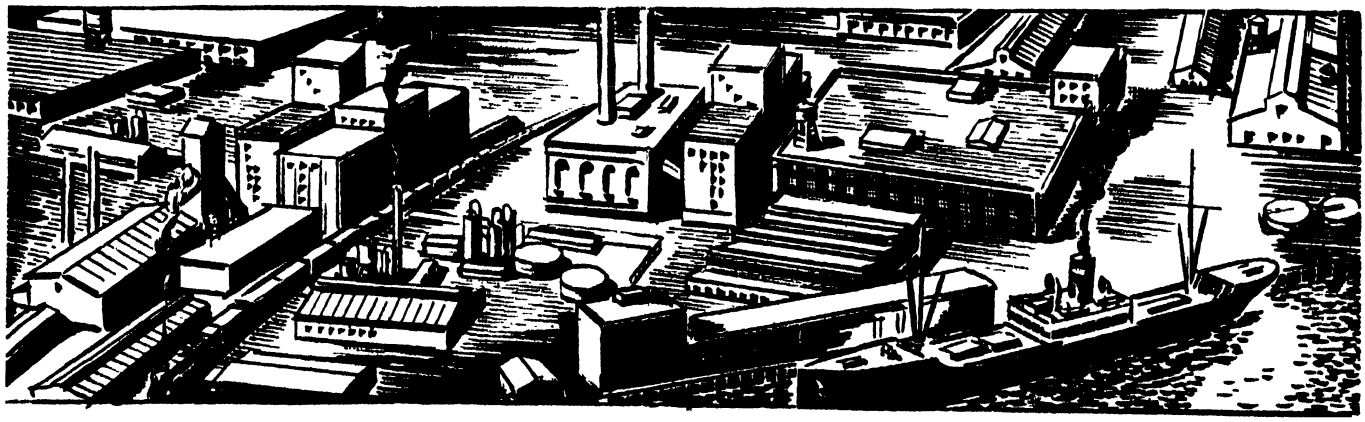
High-test calcium hypochlorite and calcium chloride are at present more scarce than chlorine and sodium hypochlorite. For that reason, the Chemicals and Allied Products Branch says, plants which use these materials may be forced to change to one of the latter. This will not impair sterilization efficiency.

Lead and Zinc Production

IN 1941 the total mine production of recoverable lead and zinc in the United States and Alaska, including that made into pigments and chemicals direct from ore, was 459,756 short tons of lead and 735,865 of zinc, the U. S. Bureau of Mines reports. These figures compare with a production of 457,392 tons of lead and 665,068 tons of zinc in 1940 and show that there were increases in 1941 of less than 1 per cent in output of lead and of 11 per cent in zinc. Total value of the metals in 1941, calculated at the average weighted prices used by the bureau of $0.056 per pound for lead and $0.076 per pound for zinc, was $51,492,672 for lead and $111,851,480 for zinc.

Mine Production of Copper

COPPER production from domestic mines, including Alaska, was 78,001 short tons in November, a decrease of 5.53 per cent from that of October, according to the U. S. Bureau of Mines. Total copper output for 11 months in 1941 was 880,138 tons. Adding preliminary figures for December of 79,368 tons, the total production for 1941 will be about 959,506 tons, an increase over 1940 of 9.3 per cent.



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American Chemical Society Award in Pure Chemistry (established 1931). Canvassing Committee for Award Nom-

inations: *Chairman, Term Expires April 30, 1942:* Everett S. Wallis. *Term expires April 30, 1943:* George Scatchard. *Term expires April 30, 1944:* Ralph L. Shriner.

Borden Co. Award in Chemistry of Milk (established 1938). Canvassing Committee for Award Nominations: *Chairman, Term expires April 30, 1942:* Leroy S. Palmer. *Term expires April 30, 1943:* R. C. Newton. *Term expires April 30, 1944:* R. Adams Dutcher.

Eli Lilly and Company Award in Biological Chemistry (established 1934). Canvassing Committee for Award Nominations: *Chairman, Term expires April 30, 1942:* Ben H. Nicolet. *Term expires April 30, 1943:* M. L. Crossley. *Term expires April 30, 1944:* Lyndon F. Small.

Chemical Service to Medicine (established 1939). (Committee reports to the Directors.) *Chairman,* Vincent du Vigneaud, Cornell University Medical School, 1300 York Ave., New York, N. Y.; H. T. Clarke, W. G. Karr, V. C. Myers, A. E. Osterberg, D. D. Van Slyke.

Cooperation with Chemical Warfare Service (established 1920). *Chairman,* H. E. Howe, 1155 16th St., N. W., Washington, D. C. *Research:* Roger Adams, Per K. Frolich, C. A. Kraus, A. B. Lamb, E. R. Weidlein, F. C. Whitmore. *Development:* Bradley Dewey, W. K. Lewis, G. A. Richter, C. M. A. Stine, L. T. Sutherland. *Production:* G. O. Curme, Jr., W. H. Dow, L. C. Jones, M. C. Whitaker. *Physiological:* Wm. Mansfield Clark, Paul D. Lamson, E. K. Marshall, Jr., D. D. Van Slyke, Vincent du Vigneaud.

Cooperation with National Defense Research Committee (established 1940). (Committee reports to the Directors.) *Chairman,* Roger Adams, Chemistry Laboratory, University of Illinois, Urbana, Ill.; Harry N. Holmes, Thomas Midgley, Jr., *Ex Officio;* J. B. Conant, W. K. Lewis, Charles L. Parsons, E. R. Weidlein, R. E. Wilson.

Council Policy (established 1923). *Ex Officio: Chairman,* Harry N. Holmes, Severance Chemical Laboratory, Oberlin College, Oberlin, Ohio; Robert T. Baldwin, E. J. Crane, Wm. Lloyd Evans, Per K. Frolich, H. E. Howe, A. B. Lamb, Thomas Midgley, Jr., Charles L. Parsons. *Term expires December 1942:* Erle M. Billings. *Term expires December 1943:* G. J. Esselen. *Term expires December 1944:* Walter A. Schmidt.

Economic Status (established 1941). *Chairman,* Lawrence W. Bass, Mellon Institute, Pittsburgh, Penna.; George Calingaert, Walter A. Schmidt, Walter G. Whitman, F. C. Whitmore.

Exchange (established 1907). *Chairman,* E. J. Crane, *Chemical Abstracts,* Ohio State University, Columbus, Ohio; H. E. Howe, A. B. Lamb.

Hazardous Chemicals and Explosives, to Cooperate with National Fire Protection Association Committee on the same subject (established 1923). *Chairman,* George W. Jones, U. S. Bureau of Mines, Pittsburgh, Penna.; F. F. Chapman, A. H. Nuckolls.

Industrial Alcohol (established 1921). *Chairman,* Martin H. Ittner, Colgate-Palmolive-Peet Co., Jersey City, N. J.; R. F. Bacon, J. H. Beal, J. G. Davidson, W. H. Dow, E. H. Killheffer, R. H. McKee, H. W. Rhodehamel.

Licensing Inquiry (established 1939). *Chairman,* Frederic W. Willard, 12 Hawthorn Place, Summit, N. J.; Arthur Guillaudeu, H. S. Lukens, Foster D. Snell.

Membership (established 1876). *Chairman,* W. D. Collins, U. S. Geological Survey, Washington, D. C.; H. E. Howe, Charles L. Parsons.

National Research Council Representatives from A. C. S. on Division of Chemistry and Chemical Technology. *Terms expire July 1, 1942:* Per K. Frolich, John R. Johnson. *Terms expire July 1, 1943:* G. J. Esselen, Paul M. Gross. *Terms expire July 1, 1944:* L. W. Bass, H. M. Chadwell.

Nomenclature, Spelling, and Pronunciation (established 1894). *Chairman,* E. J. Crane, *Chemical Abstracts,* Ohio State University, Columbus, Ohio; Board of Editors of the *Journal of the American Chemical Society;* Editor of *Industrial and Engineering Chemistry;* L. T. Capell, A. M. Patterson, Janet D. Scott.

Paper (established 1908). *Chairman,* Byron L.Wehmhoff, 6506 Brennon Lane, Chevy Chase, Md.; B. W. Scribner, H. J. Skinner.

Patent and Related Legislation (established 1899). *Chairman,* Walter A. Schmidt, 1016 West Ninth St., Los Angeles, Calif.; Robert T. Baldwin, F. E. Barrows, F. G. Breyer, Bruce K. Brown, Henry Howard, Nelson Littell, J. C. Morrell, O. W. Storey, H. T. Stowell, E. H. Volwiler.

Professional Status (established 1935). *Chairman,* Thomas Midgley, Jr., Worthington, Ohio; Webster N. Jones, Donald B. Keyes, Charles D. Lowry, Jr., William McPherson, H. L. Trumbull.

Professional Training of Chemists (established 1936). *Chairman,* W. Albert Noyes, Jr., Department of Chemistry, University of Rochester. River Campus, Rochester, N. Y. *Secretary* (member ex officio), Erle M. Billings, 343 State St., Rochester, N. Y. *Term expires April 30, 1942:* A. W. Hixson. *Term expires April 30, 1943:* W. G. Young. *Term expires April 30, 1944:* Harry B. Weiser. *Term expires April 30, 1945:* W. Albert Noyes, Jr. *Term expires April 30, 1946:* S. C. Lind.

Soap and Soap Products(established 1935). *Chairman,* F. W. Smither, National Bureau of Standards, Washington, D. C.; R. E. Divine, J. E. Doherty, C. P. Long, E. B. Millard, M. L. Sheely, H. P. Trevithick.

Standard Apparatus (established 1917). *Chairman,* W. D. Collins, U. S. Geological Survey, Washington, D. C.; J. V. Freeman, R. A. Osborn, Lyon Southworth, Edward Wichers, H. H. Willard.

Standard Methods for the Examination of Water and Sewage, to Cooperate with the Committee of the American Public Health Association (established 1920). *Chairman,* Arthur M. Buswell, University of Illinois, Urbana, Ill.; W. D. Collins, C. R. Hoover, F. W. Mohlman, F. G. Straub.

Standardization of Biological Stains (established 1924). *A. C. S. Representative on the Commission:* John T. Scanlan, Eastern Regional Research Laboratory, U. S. Department of Agriculture, Chestnut Hill, Philadelphia, Penna.

Standardized Methods for Vitamin Research (established 1921). *Chairman,* H. C. Sherman, Department of Chemistry, Columbia University, New York, N. Y.; E. A. Doisy, A. D. Emmett, E. V. McCollum, E. M. Nelson.

Study Problem of the Teaching of Chemistry in High Schools (established 1941). *Chairman,* B. S. Hopkins, Chemistry Laboratory, University of Illinois, Urbana, Ill.; H. N. Alyea, H. A. Carpenter, M. V. McGill, A. W. Scott.

Supervision of Chemical Engineering Catalog (established 1915). W. R. Veasey, Dow Chemical Co., Midland, Mich.

Supervisory on Standard Methods of Analysis (established 1910). *Chairman,* H. H. Willard, 208 Chemistry Bldg., University of Michigan, Ann Arbor, Mich.; B. L. Clarke, I. M. Kolthoff, G. E. F. Lundell, W. W. Skinner.

Women's Service (established 1927). *Chairman,* May L. Whitsitt, Department of Chemistry, Southern Methodist University, Dallas, Tex.; Mildred Adams, H. Marjorie Crawford, Rachel H. Edgar, Mildred W. Grafflin, Gertrude Vermillion.

Chapters of Student Affiliates

Agricultural and Mechanical College of Texas, College Station, Tex.
Alabama Polytechnic Institute, Auburn, Ala.
Albright College, Reading, Penna.
Birmingham–Southern College, Birmingham, Ala.
Brooklyn College, Brooklyn, N. Y.
Butler University, Indianapolis, Ind.
California Institute of Technology, Pasadena, Calif.
Central College, Fayette, Mo.
College of Puget Sound, Tacoma, Wash.
College of St. Thomas, St. Paul, Minn.
College of Wooster, Wooster, Ohio
Colorado State College of Agricultural and Mechanical Arts, Fort Collins, Colo.
Fordham University, New York, N. Y.
Franklin and Marshall College, Lancaster, Penna.
Grove City College, Grove City, Penna.
Hamline University, St. Paul, Minn.
Hofstra College, Hempstead, N. Y.
Howard College, Birmingham, Ala.
Indiana University, Bloomington, Ind.
Iowa State College, Ames, Iowa
Jamestown College, Jamestown, N. Dak.
Lafayette College, Easton, Penna.
Lawrence Institute of Technology, Highland Park, Mich.
Loyola University, Los Angeles, Calif.
Manhattan College, New York, N. Y.
Marietta College, Marietta, Ohio.
Massachusetts Institute of Technology, Cambridge, Mass.
Newark College of Engineering, Newark, N. J.
Niagara University, Niagara University, N. Y.
Northeastern University, Watertown, Mass.
Ohio Northern University, Ada, Ohio
Ohio University, Athens, Ohio
Oregon State College, Corvallis, Ore.
Polytechnic Institute of Brooklyn, Brooklyn, N. Y.
Rensselaer Polytechnic Institute, Troy, N. Y.
Rhode Island State College, Kingston, R. I.
Rice Institute, Houston, Texas
St. John's University, Brooklyn, N. Y.
St. Louis University, St. Louis, Mo.
St. Norbert College, West DePere, Wis.
San Jose State College, San Jose, Calif.
South Dakato State College, Brookings, S. Dak.
Texas Christian University, Fort Worth, Tex.
Texas Technological College, Lubbock, Tex.
Union College, Schenectady, N. Y.
University of Alabama, University, Ala.
University of California, Berkeley, Calif.
University of Connecticut, Storrs, Conn.
University of Delaware, Newark, Del.
University of Denver, Denver, Colo.
University of Detroit, Detroit, Mich.
University of Florida, Gainesville, Fla.
University of Houston, Houston, Tex.
University of Kentucky, Lexington, Ky.
University of Minnesota, Minneapolis, Minn.
University of Montana, Missoula, Mont.
University of Nevada, Reno, Nev.

University of Pennsylvania, Philadelphia, Penna.
University of Pittsburgh, Pittsburgh, Penna.
University of South Dakota, Vermillion, S. Dak.
Virginia Military Institute, Lexington, Va.
Virginia Polytechnic Institute, Blacksburg, Va.
Washington and Lee University, Lexington, Va.
Western State College, Gunnison, Colo.
Westminster College, Fulton, Mo.

A. C. S. Presidential Data

THE selection of Per K. Frolich as President-Elect of the AMERICAN CHEMICAL SOCIETY for 1943 is significant from three viewpoints.

Dr. Frolich was born in Norway and his election again emphasizes how much of value chemistry in America has obtained from those who have become Americans by choice rather than by birth. Of the 55 men who have been chosen as President of the AMERICAN CHEMICAL SOCIETY 10 were born outside Continental United States. Those who have preceded Dr. Frolich are: John William Draper, 1876, England; Frederick Augustus Genth, 1880, Germany; John William Mallet, 1882, Ireland; Charles Anthony Goessmann, 1887, Germany; William Francis Hillebrand, 1906, Hawaii; Alexander Smith, 1911, Scotland; Leo Hendrik Baekeland, 1924, Belgium; Moses Gomberg, 1931, Russia; Lawrence V. Redman, 1932, Canada. Including these men, at least 35 of our Presidents have had part of their education outside the United States.

Dr. Frolich, born in 1899, will be the youngest President of any in office for more than 30 years. Five others were younger than he when they held the same office: Edgar F. Smith in 1895, 41; Arthur A. Noyes in 1904, 38; Marston T. Bogert in 1907, 39; Willis R. Whitney in 1909, 41; and Wilder D. Bancroft in 1910, 43. The average age of all Presidents while in office is 55.

The five Presidents who immediately preceded Dr. Frolich were all connected with educational institutions when they were in office. It is well that chemists from industry should also be represented, though fortunately there has never been in our SOCIETY any sharp distinction between industry and education. Dr. Frolich has been a teacher. Since 39 of the 55 Presidents have been educators, the selection of Dr. Frolich's successor from the ranks of industry would not be out of order.

HARRISON HALE

UNIVERSITY OF ARKANSAS
FAYETTEVILLE, ARK.

American Solidarity

IN THESE times it has been particularly encouraging to receive from American chemists outside of the United States letters expressing sympathy and solidarity in defense. Two letters have been brought to our especial attention—one from Brazil, assuring us that all chemists in the Americas will cooperate with their government for the defense of democratic principles; and another from Mexico, offering services in investigation and laboratory work entirely without remuneration, with the assurance that the writer and his associates are ready to make any sacrifice to help in the task of preserving the everlasting liberties of the New World.

A. C. S. Student Membership Awards for 1941

DONOR	RECIPIENT
Alembroic Society of Mount Union College. Annual award of one-year's membership in the AMERICAN CHEMICAL SOCIETY to that junior or sophomore chemistry major, who, in the opinion of the faculty and seniors of the Alembroic Society, has accomplished the most outstanding piece of work in chemistry during the previous year.	**William R. Werner**
Brown University. Annual award to the highest standing junior chemist at Brown University. Award consists of one-year's membership dues and a subscription to one of the SOCIETY's journals and was given to Mr. Tamarkin as a result of his standing on June 1, 1941.	**Paul Tamarkin**
Delaware Section, AMERICAN CHEMICAL SOCIETY. This award, consisting of membership and subscriptions to the *Journal of the American Chemical Society* and *Industrial and Engineering Chemistry*, was won by Mr. Rommel as the outstanding senior in chemical engineering at the University of Delaware for the academic year ending in June 1941.	**Richard H. Rommel**
Howard University, Department of Chemistry. This prize, consisting of membership in the AMERICAN CHEMICAL SOCIETY and a subscription to one of the SOCIETY's journals, is given to the senior student majoring in chemistry who has the highest rank in his major requirements.	**Harold Delaney**
Indiana Section, AMERICAN CHEMICAL SOCIETY. This award is made to undergraduate students who have completed three years of study majoring in chemistry or chemical engineering and who have been chosen from among applications for the award made to the heads of chemistry departments of colleges in Indiana as the most worthy for the award. The names submitted by them (one by each head), with supporting data covering the student's scholastic attainments, are sent to the Secretary of the Indiana Section for the selection of two recipients by the Executive Committee of that section.	**Warren J. Close** De Pauw University **Otto Zajicek** Indiana University
Louisiana Section, AMERICAN CHEMICAL SOCIETY. This award, consisting of junior membership in the AMERICAN CHEMICAL SOCIETY and a subscription to one of the SOCIETY's journals, is made each year by the Louisiana Section to the outstanding student in chemistry or chemical engineering at Tulane University.	**Edmund M. Buras, Jr.**
Mu Chapter of Alpha Chi Sigma Fraternity, University of New Hampshire. This is the senior award granted annually to the member of Mu Chapter who exhibits the greatest promise of success in his professional life.	**Peter J. Grabowski**

Silver Aircraft Engine Bearings

SILVER-LINED bearings are being used effectively in aircraft engines of the radial air-cooled type and also in engines designed for liquid cooling, according to information released by the American Silver Producers' Research Project. Some of the bearings are complete rings coated inside and outside with silver and some are split and coated on the inside surface only. Silver is understood to be capable of carrying a higher load than babbitt, to be a better conductor of heat, and to retain its hardness at temperatures above those feasible with babbitt.

Mustard Oil Explosion

THERE are two possibilities which might account for the violent mustard oil explosion reported in the NEWS EDITION for December 10, 1941, page 1408. Alkylrhodanides can under certain conditions hydrolyze into fulminates and hydrosulfides:

$$MCSN + H_2O = CNOH + MHS$$

The catalyst for this reaction is not known.

The second possibility is the production of cyanur chloride by hydrochloric acid (Bergman, "Lehrbuch der organischen Chemie", Vol. 1), which can decompose to nitrogen trichloride and "carbonic nitride" (Franklin, "Nitrogen System of Compounds"):

$$(CClN)_3 = NCl_3 + C_3N_3$$

OSKAR HOROWITZ

235 LEFFERTS AVE.
BROOKLYN, N. Y.
January 19, 1942

NEWS-MAKERS

Robert J. Bibbero, who has been connected with the Pacific Manifolding Book Co., Emeryville, Calif., as research engineer, has recently accepted a commission as ensign in the Bureau of Ordnance, U. S. Naval Reserve, Fort Schuyler, the Bronx, New York, N. Y.

Claude F. Davis has been made chief chemist of the Schwarz Laboratories, Inc., 202 East 44th St., New York, N. Y. Mr. Davis was formerly with the Michigan Bakeries, Grand Rapids, Mich.

Martin Eliason has been appointed representative of the Jessop Steel Co. in the Milwaukee territory, with offices at 419 Colby Abbott Bldg., Milwaukee, Wis.

Alan G. Hamilton, until recently manager of solvent sales development for the R. & H. Chemicals Department, E. I. du Pont de Nemours & Co., Inc., Niagara Falls, is now at the El Monte, Calif., plant of the Pacific Division, doing work of a special nature.

Lewis P. Harris, chemist in charge of the Sherwin-Williams Co.'s Insecticides Laboratory at Yakima, Wash., has been transferred to the company's plant at 1450 Sherwin Ave., Oakland, Calif., as production research chemist.

O. H. Huntley is now plant manager of H. McKenna, Inc., a subsidiary of Joseph E. Seagram and Sons, Inc., Fairfield, Nelson County, Ky.

Richard G. Kadesch completed the requirements for the degree of Ph.D. in organic chemistry at the University of Chicago in August 1941 and is now employed as research chemist in organic chemistry at the Columbia Chemical Division of the Pittsburgh Plate Glass Co., Barberton, Ohio.

Norman F. Kruse, for six years technical director of the soybean expeller and extraction plants of the Central Soya Co., Inc., Fort Wayne, Ind., has been appointed general superintendent of all soybean processing and feed-mixing operations of the company and its affiliate, McMillen Feed Mills.



Norman F. Kruse

Pat Macaluso, Edgar W. Goth, Peter A. Pfeiffer, and **Herbert H. Watjen** have been added to the staff of Foster D. Snell, Inc., Brooklyn, N. Y.

Donal F. McCarthy has become a member of the firm of Pennie, Davis, Marvin and Edmonds, 247 Park Ave., New York, N. Y.



James F. McNamara

James F. McNamara, mill products sales manager of the International Nickel Co., was elected a member of the board of directors of the Lukens Steel Co. at its recent meeting of stockholders.

M. G. Mastin, formerly director of process control at Westvaco Chlorine Products, Inc., South Charleston, W. Va., has been transferred to the Market Development Division in New York City. **R. F. Moran,** formerly assistant chief chemist at South Charleston, succeeds Mr. Mastin.

Harold M. Moore, St. Louis representative of Manning, Maxwell & Moore, Inc., has been called for active duty with the commission of a captain, and is located at Camp San Luis, Obispo, Calif., with the 40th Infantry Division, Field Artillery.

David H. Osgood, formerly with the C. W. Hess Co., Detroit, Mich., and active in the Detroit Section of the AMERICAN CHEMICAL SOCIETY, is now serving with the Prices Division, Protective Coating Unit, Office of Price Administration, Washington, D. C.

George P. Passmore has been appointed works manager in charge of manufacturing of the Wellsville Works of the Worthington Pump and Machinery Corp., Harrison, N. J.

C. F. Rassweiler, who joined Johns-Manville Corp., New York, last June as director of research, has been appointed a vice president of the company. Dr. Rassweiler will continue in charge of the company's research and development activities, now largely devoted to converting the full production capacity of Johns-Manville to war uses.

E. L. Reed has been added to the staff of the Foote Mineral Co., Philadelphia, Penna., as project engineer to do research and development work on milling and concentration problems.

G. M. Ridenour, formerly associate professor in sanitary engineering at Pennsylvania State College, has become associate resident lecturer in public health engineering at the School of Public Health, University of Michigan, Ann Arbor, Mich.

H. H. Rowley has been appointed associate professor of physical and analytical chemistry at Lawrence College, Appleton, Wis. For the past five years he has served as associate in physical chemistry at the State University of Iowa, where he was Chairman and Secretary-Treasurer of the Iowa Section of the AMERICAN CHEMICAL SOCIETY.



H. H. Rowley

Julio Cabello Ruz, a Chilean, has received a commission for chemical research from the Comisión Nacional de Cultura, de Buenos Aires, Argentina. He will work at the University of Buenos Aires.

Henry A. Saller has been named research engineer on the technical staff of the Battelle Memorial Institute, Columbus, Ohio, and has been assigned to research in metallurgy. He was formerly with the Carnegie-Illinois Steel Corp.

Rex R. Shively, chief technologist and vice president of B. F. Drakenfeld and Co., Inc., was honored by his alma mater, the Oklahoma Agricultural and Mechanical College, by being made a member of the Hall of Fame on December 15.

Charles H. Stone, whose chemical business and plant at Charlotte, N. C., were acquired in 1937 by American Cyanamid & Chemical Corp., New York, has completed the period of personal services contemplated at the time of acquisition. Mr. Stone will continue his connection with the corporation in an advisory capacity. He will be located in the Commercial Bank Building, Charlotte.

Chaplin Tyler, who was assigned for a year as public relations director of the Remington Arms Co., Bridgeport, Conn., has returned to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., to join the staff of the Development Department.

Edmund D. Wingfield has been appointed administrative superintendent of the Freeport Sulphur Co., and will be stationed at the company's offices in New Orleans.

W. A. Wirene has been appointed assistant sales manager of the petroleum, chemical, mining, and steel mill section of the General Electric Industrial Department, Schenectady, N. Y.

Appointments to National Panel of Arbitrators

THREE men in the chemical field, all members of the AMERICAN CHEMICAL SOCIETY, have been appointed to serve as impartial arbitrators in connection with any industrial or commercial disputes involving vital war material production: Benjamin H. McGar, chief chemist and assistant research director, Chase Brass & Copper Co., Waterbury, Conn.; Kenneth B. Lacy, president, Lighting Products, Inc., Highland Park, Ill.; and Edward Thomas, patent attorney of New York and Washington, D. C.

The new appointees join a Nation-wide panel of more than 8,000 qualified and carefully selected professional, educational, and business leaders in approximately 1,600 cities in every state in the Nation. A substantial number are men of the chemical profession.

The Arbitration Association, a non-profit organization, which completed its 50th year of successful operation last month, has announced that its 31 regional offices, with hearing rooms and personnel facilities, are available for the duration of the war for any type of commercial or labor-management dispute which might directly or indirectly retard all-out war effort in all industries and professions.

Teaching Fellowships at Northeastern University

SEVERAL teaching fellowships in chemistry for 1942–43 are available for well-qualified graduate students interested in pursuing work in chemistry for the degree of master of science at Northeastern University.

Candidates must have majored in chemistry or chemical engineering in their undergraduate work and must have an academic record and personal qualifications which indicate their ability to profit from graduate study.

The program for the master of science degree will normally be spread over a two-year period, since each teaching fellow will be expected to devote approximately half of his time each year to instructional work. This will consist of the correction of papers, assistance in the laboratories, section work, and similar duties.

Teaching fellows will receive a stipend of $700 during their first year of service and $800 for their second year. They will be expected to pay the regular matriculation fee of $5 and a graduation fee of $10, but will be exempted from all tuition charges and laboratory fees. The college year at Northeastern begins on Tuesday following Labor Day and ends about the middle of June.

Applications must be accompanied by a transcript of undergraduate record, letters of recommendation from four persons familiar with the qualifications of the candidate, and a small snapshot or photograph. All applications should be received not later than March 1. Appointments will be made early in April, and all candidates will be notified promptly of the status of their application.

For application forms and further information address the Director of Graduate Study, Northeastern University, Boston, Mass.

Cenco Fellowships Announced

SENIOR college students majoring in physics with minors in chemistry or mathematics are invited to apply for the Cenco industrial fellowships. Two, and possibly three, fellows will be appointed in April. Tenure will be July 1, 1942, to June 30, 1943. The stipend is to be $1,200. Fellows, although under supervision of the director of research and development, will be given experience in other departments of the company. Application blanks may be secured from M. N. States, Central Scientific Co., 1700 Irving Park Road, Chicago, Ill.

Elmer Peter Kohler Memorial Fellowship

AS A MEMORIAL to E. P. Kohler, professor of chemistry at Bryn Mawr College until 1912 and Sheldon Emery Professor of Organic Chemistry at Harvard University at the time of his death in May 1938, a fellowship for graduate study in chemistry has been endowed through contributions of his students and friends. Since the special purpose of the fellowship is to perpetuate the memory of a man distinguished by his eminence as a scientist and beloved as a teacher of rare qualities who exerted a profound and wide-spread influence on the progress of instruction in chemistry throughout the country, recipients of the fellowship will be chosen in such a way as to provide for an exchange of outstanding students between the institutions where Kohler taught and those in which the Kohler tradition is particularly cherished.

Although the income from the fund now at hand would permit the awarding of the fellowship for the coming academic year, it has seemed unwise to make the initial award in the present unsettled period. At some future date, when there is greater prospect of utilizing the award in a fully effective way and of promoting the work of the very best type of student, announcement will be made of detailed plans for the award.

J. T. Baker Chemical Co. Analytical Research Fellowships

ANNOUNCEMENTS of the J. T. Baker Chemical Co. Research Fellowships in Analytical Chemistry for the academic year 1942–43 have recently been made through brochures widely distributed to colleges and universities. Two of these fellowships are to be granted and each carries a stipend of $1,000. One is awarded to a graduate student in analytical chemistry attending an eastern university and the other to a graduate student at a midwestern university. Applications should be made before February 15, 1942, to John H. Yoe, University of Virginia, University, Va., for the eastern fellowship, and to H. H. Willard, University of Michigan, Ann Arbor, for the midwestern fellowship.



THE CHEMICAL NEWS PARADE



Above. Heat test furnaces, operated at temperatures up to 3,150° F.



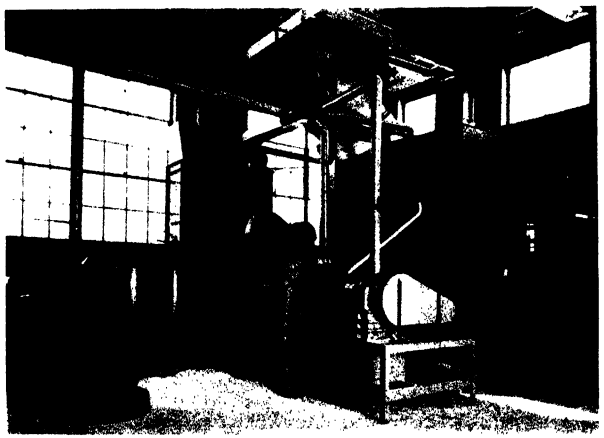
Above. View in the chemical laboratory.



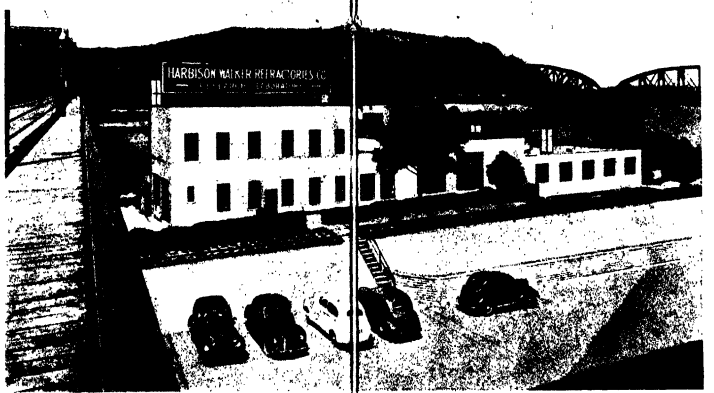
Above. View in the chemical laboratory.



Above. Ball mill and mixing pan.



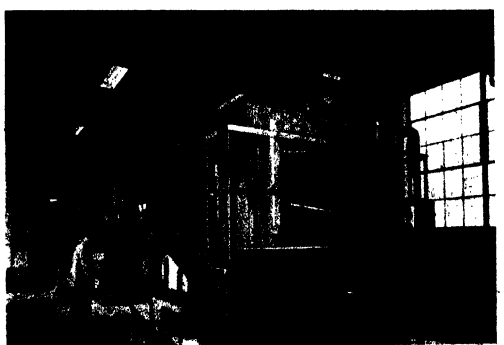
Above. Mixing pan, dry pan, dust collector, and multiple screen. *Below.* Multiple screen. Four sizes produced simultaneously. *Below right.* P. C. E. test furnace.



Highly important to the user of refractories is the kind of research which leads to the improvement of existing types of refractory products, no less than to development of new ones to meet the ever-increasing severity of the demands that metallurgical progress entails. Latest extension to Harbison-Walker's research laboratory at Pittsburgh, Penna., includes installation of a complete pilot plant covering manufacture of brick by any one of the various processes now in use. It is one of the most modern and fully equipped laboratories for advanced refractories research.

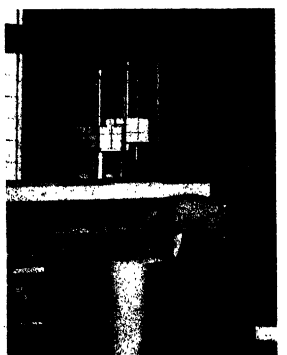


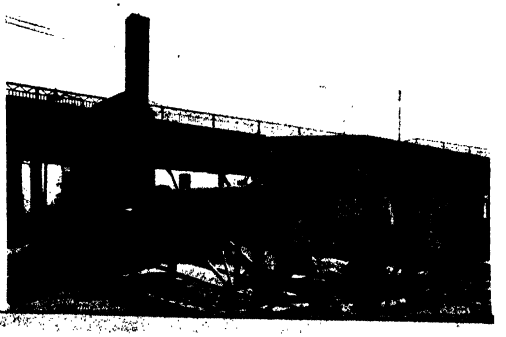
Above. Auger machine with vacuum chamber. *Below.* Rotary kiln, 30-foot. *Left below.* Load test furnace. *Center across bottom* Hydraulic press, 150-ton capacity.













American Chemical Society

103RD MEETING. Memphis, Tenn., April 20 to 24, 1942.

104TH MEETING. Buffalo, N. Y., September 7 to 11, 1942.

105TH MEETING. Indianapolis, Ind., spring of 1943.

106TH MEETING. Minneapolis, Minn., fall of 1943.

NINETEENTH NATIONAL COLLOID SYMPOSIUM, Division of Colloid Chemistry. University of Colorado, Boulder, Colo., June 18 to 20, 1942.

Other Scientific Societies

AMERICAN ASSOCIATION OF CEREAL CHEMISTS. Edgewater Beach Hotel, Chicago, Ill., May 18 to 22. Annual meeting.

AMERICAN CERAMIC SOCIETY. Hotel Netherland Plaza, Cincinnati, Ohio, week of April 19. Annual meeting.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Boston, Mass., May 11 to 13. Semiannual meeting.

AMERICAN INSTITUTE OF NUTRITION. Boston, Mass., April 1 and 2.

AMERICAN PHYSICAL SOCIETY. Detroit, Mich., February 20 and 21.

AMERICAN SOCIETY FOR TESTING MATERIALS. Atlantic City, N. J., June 22 to 26.

AMERICAN SOCIETY OF BIOLOGICAL CHEMISTS. Copley-Plaza, Boston, Mass., March 31 to April 4.

ELECTROCHEMICAL SOCIETY. The Hermitage Hotel, Nashville, Tenn., April 15 to 18.

INSTITUTE OF FOOD TECHNOLOGISTS. Minneapolis, Minn., June 15 to 17.

NATIONAL CHEMICAL EXPOSITION. Stevens Hotel, Chicago, Ill., November 17 to 22.

NATIONAL PETROLEUM ASSOCIATION. Hotel Cleveland, Cleveland, Ohio, April 16 and 17. 39th semiannual meeting.

SCIENTIFIC APPARATUS MAKERS OF AMERICA. Hotel Hershey, Hershey, Penna., June 1 to 3.

SIXTH PHARMACEUTICAL INSTITUTE. Center for Continuation Study, University of Minnesota, Minneapolis, Minn., February 16 to 18.

TECHNICAL ASSOCIATION OF PULP AND PAPER INDUSTRY. Commodore Hotel, New York, N. Y., February 16 to 19.

Local Sections

SECTION AND PLACE	FEB.	SPEAKER	SUBJECT
Akron, Women's City Club	19	**Karl A. Folkers**	Erythrina Alkaloids
Alabama, Molton Hotel, Birmingham	25	**G. Frederick Smith**	
Baton Rouge, Room 104, Nicholson Hall, Louisiana State University	16	**S. D. Kirkpatrick**	Chemical Industry under Arms
Binghamton, N. Y., Carlton Hotel	18	**Victor K. La Mer**	Kinetics of Carbinol Formation in Dyestuffs
Central Pennsylvania, Room 119, New Physics Building, State College	18	**George H. Young**	The Resinous State
Chicago, Stevens Hotel	20	**Russell Wiles**	Patents and Chemistry
Cleveland, Engineering Society	18	**Karl A. Folkers**	Erythrina Alkaloids
Colorado, Oxford Hotel, Denver	27	**Harry N. Holmes**	A Chemist in Medicine
Columbus, Room 100, Chemistry Building, Ohio State University	17	**Karl A. Folkers**	Erythrina Alkaloids
Connecticut Valley, St. Joseph College, West Hartford	21	**H. Mark**	Mechanical Properties of High Polymers
Cornell, Baker Laboratory, Ithaca, N. Y.	20	**Victor K. La Mer**	Kinetics of Carbinol Formation in Dyestuffs
Dallas-Fort Worth, Science Building, North Texas Agricultural College, Arlington	19	**S. D. Kirkpatrick**	Chemical Industry under Arms
Delaware, Y. M. C. A., Wilmington	18	**H. T. Herrick**	
Florida, Chemistry Auditorium, University of Florida, Gainesville	28	**G. Frederick Smith**	
Georgia, Dining Hall, Georgia School of Technology, Atlanta	27	**G. Frederick Smith**	
Kansas City (Mo.), University of Kansas City	26	**Harry N. Holmes**	A Chemist's Adventures in Medicine
Lehigh Valley, Lehigh University, Bethlehem, Penna.	20	**Raymond L. Garman**	Electron Tubes in Measurement and Control
Louisiana, Richardson Chemistry Laboratory, Tulane University, New Orleans	27	**O. E. Kurt**	Making the Most of Your Data
Memphis, Chemistry Lecture Room, University of Tennessee	27	**R. L. Copson**	Electric Furnace for Production of Phosphorus
Michigan State College, Kedzie Chemical Laboratory, East Lansing	25	**E. A. Doisy**	Vitamin K
Milwaukee, City Club	20	**L. F. Audrieth**	Nitrogen Compounds of Phosphorus and Sulfur
Nashville, Auditorium, Chemistry Building, Vanderbilt University	23	**G. Frederick Smith**	
Panhandle Plains, Capitol Hotel, Amarillo, Tex.	20	**S. D. Kirkpatrick**	Chemical Industry under Arms
Pennsylvania-New York Western Border, Bradford, Penna.	21	**A. E. Jennings**	Chemicals Derived from Salt
Philadelphia, Engineers' Club	28		Annual Dinner and Dance
Pittsburgh, Mellon Institute	19		Pittsburgh Award
Rochester, Lower Strong Auditorium, River Campus, University of Rochester	16	**Victor K. La Mer**	The Fading of Dyes
St. Louis, Room 100, Brown Hall, Washington University	24	**Harry N. Holmes**	Vitamins and Public Health
South Jersey, Du Pont-Penns Grove Country Club, Penns Grove	17	**C. C. Furnas**	The Storehouse of Civilization
Southeast Tennessee, Chemistry Lecture Room, University of Chattanooga	26	**G. Frederick Smith**	Manufacture of Perchlorates and Their Industrial Applications
Southeastern Pennsylvania, West York Inn, York	19	**Raymond L. Garman**	Electron Tubes in Measurement and Control
Southeastern Texas, Goodhue Hotel, Port Arthur	17	**S. D. Kirkpatrick**	Chemical Industry under Arms
Syracuse, Bowne Hall, Syracuse University	19	**Victor K. La Mer**	Kinetics of Carbinol Formation in Dyestuffs
Texas A. & M., Chemistry Building, College Station	18	**S. D. Kirkpatrick**	Chemical Industry under Arms
Toledo, Room 1, University of Toledo	19	**Ralph C. Corley**	Chemistry of Immunity Reactions
University of Illinois, Chemistry Annex, Urbana	20	**Karl A. Folkers**	Erythrina Alkaloids
University of Michigan, Chemistry Building, Ann Arbor	25	**A. L. Henne**	Aliphatic Fluorides
University of Missouri, Room 103, Schlundt Hall, Columbia	25	**Harry N. Holmes**	Strategic Raw Materials and National Defense
Western New York, University of Buffalo	17	**Victor K. La Mer**	Kinetics of Carbinol Formation in Dyestuffs
Wilson Dam, State Teachers College, Florence, Ala.	24	**G. Frederick Smith**	Perchlorate Chemical Uses
Wisconsin, Auditorium, Chemistry Building, University of Wisconsin, Madison	18	**C. A. Elvehjem**	The Biochemistry of the Vitamin B Complex
Wooster (Ohio), Recreation Room, Faultless Rubber Co., Ashland	16		

National Symposium on Spectrographic Analysis Dallas Meeting, A. A. A. S.

On Tuesday, December 30, 1941, at the Christmas meeting of the American Association for the Advancement of Science, a National Symposium on Spectrographic Analysis was featured—the first ever held west of the Mississippi. The program was arranged by invitation by William M. Craig, of Texas Technological College. Included on the program were the outstanding authorities of the Nation in many different branches of spectrography. The keynote of the symposium was problems of control of the metallic content of materials vitally needed in carrying out the national defense program.

Dr. Craig opened the symposium with a discussion of applications of spectrography to problems of defense and everyday life, including detection of adulteration in foods, textiles, various metallic alloys, and other products. He also demonstrated a new method which he proposed for correlation of strata in oil wells by a spectrographic analysis of oil-well cuttings.

Ralph A. Sawyer, University of Michigan, gave a rather detailed description of the recent spectrographic installations at the Ford River Rouge plant and the Bethlehem Steel Co. He showed how an analysis of steel may be made within a period of three minutes, whereas hours were required previously. Because of the cheapness, accuracy, and speed of the new method, many more analyses are made than formerly, and much closer control is attained.

O. S. Duffendack, also of the University of Michigan, a well-known authority on the analysis of alkalies and heavy chemicals, gave an account of recent research on electrical sources of arcs and sparks used in making spectrographic determinations. He showed how greater accuracy and speed of quantitative analyses were thus possible.

Methods used in the adequate control of the purity of magnesium and its alloys were described by J. L. Saunderson, chief spectrographer of the Dow Chemical Co., the largest manufacturer of magnesium in the world. Magnesium is of immense value in making light-weight alloys for aircraft and has many other war applications, including incendiary bombs. This company has recently installed two large magnesium plants on the Texas coast.

Recent advances in research on the spectrographic analysis of nonmetallic substances were cited by Maurice F. Hasler, of the Applied Research Laboratories, Los Angeles. He described a new and vastly improved grating spectrograph, which uses a short length of motion picture film instead of the usual fragile glass plates. Phase rule studies of spectrographic analyses made with such materials as glasses, clays, and other insoluble and refractory materials were discussed. These promise to have great value in the ceramic, food, and textile industries.

John A. Hipple, Jr., Westinghouse Research Laboratories, Pittsburgh, described the latest developments in research with the mass spectrometer. His work has brought out a new design, much less bulky and more rapid and accurate than the instruments formerly used. He has recently perfected its application in the quantitative analysis of gas mixtures.

Henry R. Kreider, American Medical Association of Chicago, in a paper on infrared absorption, discussed recent advances in this field. This part of the spectrum has been utilized lately for the identification of hydrocarbons in petroleum products and in oil prospecting. Applications to prevent cancer growth were also discussed. Infrared rays are the very long, invisible heat rays used for baking enamel on automobiles.

Two of the leading young astronomers of the country, C. T. Elvey, assistant director of the MacDonald Observatory, Fort Davis, Tex., and Franklin E. Roach, Steward Observatory, Tucson, Ariz., gave interesting papers on "The Spectrum of the Night Sky" and "The Chemical Analysis of the Stars", respectively. The operation of the world's most rapid lenses was explained by Dr. Elvey.

Although astronomy may seem a far cry from defense problems, such is not the case. The carefully perfected methods developed in spectrographic research by astronomers may be used equally well in the determination of metallic impurities in common alloys used in making war material. To Dr. Roach goes credit for laying the foundation for the method which is so effective in the rapid present-day quantitative analysis of steel.

Marshall N. States, director of research and development for Central Scientific Co., Chicago, explained the important characteristics of the photoelectric spectrophotometer. He also cited its many important uses in the chemical analyses which would otherwise prove very difficult, as well as its application in the quantitative determination of the vitamin content of foods—a factor so important in our national health, for both our soldier and civilian population.

The symposium was well received, as evidenced by capacity crowds, and standing room was frequently at a premium. F. R. Moulton has arranged through the A. A. A. S. to underwrite the printing of a monograph from the papers presented at the symposium. J. L. Saunderson, Dow Chemical Co., was chosen by the authors to receive the manuscripts and prepare the material for early publication.

Pay-Roll Allotment for Defense Bonds in Chemical Industry

The chemical industry is being organized for the pay-roll allotment plan of the defense savings bond campaign. The general campaign for Greater New York is under the chairmanship of Lewis E. Douglas, Mutual Life Insurance Co.; the Industry Committee is under the chairmanship of J. E. Crane, Standard Oil Co. of New Jersey; and the chemical industry is under the chairmanship of P. M. Dinkins, American Cyanamid & Chemical Corp. The chemical industry's committee consists of: J. J. Butler, West Virginia Pulp & Paper Co.; Earl Demmon, Stauffer Chemical Co.; Fred Koch, Dow Chemical Co.; C. L. Gabriel, Commercial Solvents Corp.; W. I. Calliher, Pittsburgh Plate Glass Co.; Lester Gordon, Solvay Sales Co.; George Handel, Cincinnati Chemical Works; Glenn Haskell, U. S. Industrial Chemicals, Inc.; J. H. Karrh, Victor Chemical Works; R. J. Quinn, Mathieson Alkali Works; J. P. Remensnyder, Heyden Chemical Co.; Ira Vandewater, R. W. Greeff & Co., Inc.; W. J. Weed, Niagara Alkali Co.; and V. E. Williams, Monsanto Chemical Co.

Graver Prize Contest

Visitors to the exhibit of the Graver Tank & Mfg. Co., Inc., at the Exposition of Chemical Industries in New York, were given an opportunity to test their skill in a novel contest.

On display in the Graver booth was a cylindrical glass container, divided into six compartments, each containing a chemical used in water conditioning. A prize of $50 was offered to the first person to come closest to estimating the individual weights of the chemicals and their combined weight.

L. R. Moffatt, chemist for Canada Dry Ginger Ale, Inc., of New York City, won the prize, estimating the total weight correctly—and coming close in his estimate of the individual weights.

Terms for Expressing Low Concentrations

The term "milligrams per cent", used in the sense of "milligrams per 100 grams", has found its way into the chemical literature, particularly in biochemical determinations. It is believed that its use should not be encouraged For most purposes the well-known expression "parts per million" is probably adequate for expressing these low concentrations.



A. A. A. S.—Gibson Island Conferences

NEIL E. GORDON, Director; JOHN C. KRANTZ, JR., Assistant Director

THIS is the fifth summer that special research conferences on chemistry and its allied fields have been held at Gibson Island under auspices of the American Association for the Advancement of Science. During this five-year period they have grown from two weeks in the summer of 1938 to ten weeks in 1942. Because of this growth the association has purchased a property, and the conferences are now placed on a permanent basis.

These Gibson Island conferences owe their excellence and popularity to careful planning of the programs by experts, choice of the invited contributors, freedom with which contributors make excursions along and sometimes beyond the frontiers of the known, opportunities for abundant discussion, limitation of participants to 60, mingling of chemists from industrial and university laboratories, and delightful surroundings. At its business meeting each conference determines the subject of the corresponding conference for the following year and nominates its chairman and vice chairman, who are formally appointed by the association.

Conferences for this summer are scheduled for the weeks of June 15 through August 24, excluding the week of August 10.

A. Frontiers in Petroleum Chemistry

C. R. WAGNER, *Chairman*
ROBERT E. BURK, *Vice Chairman*

June 15
- W. J. SWEENEY. New Tools in Hydrocarbon Research.
- HENRY EYRING. Intramolecular Forces; Structure of Hydrocarbon Molecules.

June 16
- S. S. KURTZ, JR. Relation of Physical Properties to Chemical Constitution.
- F. O. RICE. Role of Free Radicals in Hydrocarbon Reactions.

June 17
- R. E. BURK. Fundamental Principles of Catalysis.
- B. J. MAIR. Methods of Purifying Hydrocarbons.

June 18
- A. L. LYMAN. Oxidation of High Molecular Weight Hydrocarbons.

June 19
- L. C. CASE. Role of Chemistry in the Discovery and Production of Petroleum.

B. Catalysis

E. C. WILLIAMS, *Chairman*
HUGH S. TAYLOR, *Vice Chairman*

June 22
- W. G. FRANKENBURG. Adsorption of Hydrogen on Tungsten Powder and Its Meaning for the General Theory of Adsorption and Catalysis.

June 23
- OTTO BEECK. Contributions in the Field of Adsorption as Related to Catalysis.

June 24
- STEPHEN BRUNAUER. Adsorption-Desorption Processes in Catalysis.

June 25
- C. V. SMYTHE. Biological Oxidations, Fermentations, and Phosphorglations.

June 26
- K. C. BLANCHARD. Heterogeneous Catalysis—the Basis of Life.

C. Relation of Structure to Physiological Action

D. L. TABERN, *Chairman*
W. H. HARTUNG, *Vice Chairman*

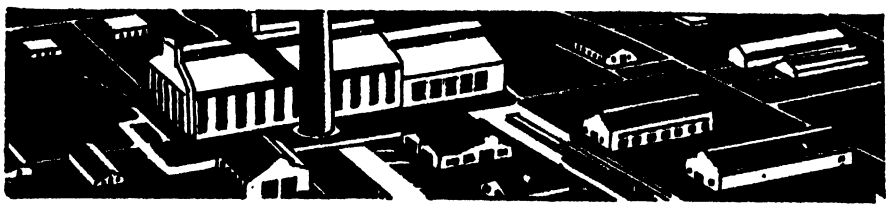
June 29
- H. E. CARTER. Recent Advances in the Synthesis and Physiological Chemistry of the Amino Acids.
- WENDELL W. MOYER. Amino Acids from Natural Proteins.

June 30
- G. O. DOAK. Chemistry of the Aromatic Arsine Oxides.
- HARRY EAGLE. Correlation between Structure and Biological Activity of the Aromatic Arsine Oxides.

July 1
- S. E. FORMAN AND DOROTHY KIBLER. Synthesis of Cyclopropyl Ethers.
- J. C. KRANTZ, JR., W. E. EVANS, AND C. J. CARR. Pharmacology of Cyclopropyl Ethers.
- M. KILBORNE. Clinical Applications of Certain Cyclopropyl Ethers in Anesthesia.
- M. CARMACK. The Monocrotaline and Related Alkaloids.

July 2
- M. HEIDELBERGER. Recent Progress in the Knowledge of Complement and Its Function in Immunity.
- E. W. FLOSDORF. Preparation of Blood Substitutes and Other Biological Materials by Desiccation from the Frozen State.

July 3
- TRACY PUTMAN AND HOUSTON MERRITT. Physiology of Anticonvulsant Drugs.
- W. G. BYWATER AND OLIVER KAMM. Chemistry of Anticonvulsant Drugs.
- F. L. KOZELKA. Metabolism and Excretion of Hydantoins.



D. Organic High Molecular Weight Compounds

S. S. KISTLER, *Chairman*
H. MARK, *Vice Chairman*

July 6
- J. C. SLATER. Nature, Direction, and Magnitude of Forces between Molecules.
- IRVING LANGMUIR. Interfacial Force Phenomena.

July 7
- G. H. YOUNG. Experimental Aspects of Adhesion to Metals.
- OTTO BEECK. Structural Aspects of Adhesion and Cohesion.

July 8
- H. MARK. Structural Aspects of Adhesion and Cohesion.
- J. G. MCNALLY. Distribution of Molecular Sizes in Organic Polymers.

July 9
- P. J. FLORY. Condensation Polymerization.

July 10
- F. K. SCHOENFELD. Theory of Vinyl Type Polymerization.

E. Structure and Chemistry of Textile Fibers

MILTON HARRIS, *Chairman*
H. SPURLIN, *Vice Chairman*

July 13
- HERBERT LEADERMAN. Crepe Phenomena in Fibers and Other High Polymeric Substances.
- LYMAN E. FOURT. Molecular Interpretations of Some Mechanical Properties of Fibers.

July 14
- W. F. BUSSE. Fatigue of Fabrics.
- C. S. FULLER. Relations between Structure and Properties of Linear Polyamides.

July 15
- ROY H. KIENLE. Observations on the Mechanism of Dyeing.

July 16
- DONALD H. POWERS. Application of Resins and Resinous Products to Textile Fibers.
- HARVEY A. NEVILLE. Role of Anionic and Cationic Agents in Textile Processing.

July 17
- HENRY A. RUTHERFORD. Nature of the Degradation of Cellulose by Oxidative Processes.

F. Vitamins

WALTER C. RUSSELL, *Chairman*
R. ADAMS DUTCHER, *Vice Chairman*

July 20
- NORRIS EMBREE. Multiple Nature of Vitamin A.
- ..... Physiological Role of Vitamin A.
- JAMES WADDELL. Present Status of the Vitamin D Problem.

July 21
- ..... Choline in Nutrition.
- ..... Newer Members of the Vitamin B Complex.

..... Water-Soluble Vitamins in Cell Metabolism.

July 22

..... Chemistry and Functions of Biotin.

E. W. McHENRY. Fatty Acids and Their Relation to Members of the Vitamin B Group.

W. H. SEBRELL. National Nutrition Program.

July 23

J. S. ANDREWS. Riboflavin Assay Methods.

ROY L. SWANK. Pathophysiology of Vitamin Deficiencies.

L. B. YOUMANS. Methods Used in Detection of Malnutrition.

July 24

..... Therapeutic Measures in Vitamin Deficiencies.

M. M. WINTROBE. Experimental Vitamin B Group Deficiencies in Swine.

G. X-Ray and Electron Diffraction

B. E. WARREN, *Chairman*
A. L. PATTERSON, *Vice Chairman*

July 27

I. FANKUCHEN. X-Ray Patterns of Imperfect Crystals.

J. T. NORTON. X-Ray Diffraction Methods for Measuring Stresses in Metals.

July 28

J. C. M. BRENTANO. Intensities in X-Ray Diffraction.

K. LARK-HOROVITZ. Intensity Problem in Electron Diffraction Patterns.

July 29

S. B. HENDRICKS. Types and Extent of Isomorphous Replacements in Silicate Structures.

P. DEBYE. Temperature Diffuse Scattering.

July 30

L. K. FREVEL. Chemical Analysis by Diffraction Methods.

W. O. MILLIGAN. X-Ray and Electron Diffraction Examination of Inorganic Colloidal Materials.

July 31

Not yet arranged.

H. Corrosion

R. M. BURNS, *Chairman*
R. B. MEARS, *Vice Chairman*

August 3

J. C. WARNER. Thermodynamical Considerations.

E. A. GULBRANSEN. Passivity.

August 4

C. W. BORGMANN. Techniques of Measurement of Corrosion Rates.

W. A. WESLEY. Methods of Corrosion Testing.

August 5

H. H. PODGURSKI. Use of Volumetric Methods of Evaluating Corrosion.

CARL HEUSSNER. Testing and Evaluation of Metallic Coatings.

August 6

H. A. NELSON. Testing and Evaluation of Organic Coatings.

August 7

R. W. BRIGHTON. Contamination of Foods as a Result of Metallic Corrosion.

F. C. BLANCK. Toxicity of Metals and Public Health Aspects of Corrosion.

I. Chemical Growth Promoters

E. S. COOK, *Chairman*
DEAN BURK, *Vice Chairman*

August 17

C. N. FREY. Effect of Bios on Growth and Metabolism of Yeast.

FELIX SAUNDERS. Nicotinic Acid in Bacterial Metabolism.

August 18

V. G. LILLY. Growth Factors for Fungi.

K. V. THIMANN. Growth Factors for Plants.

August 19

H. W. CHALKLEY. Studies on Fission in Amoeba.

F. S. HAMMETT. Amino Acids in Developmental Growth of Obelia.

August 20

E. S. COOK. Injury and Production of Growth Promoters: Wound Hormones.

JAMES ENGLISH, JR. Chemistry of Plant Wound Hormones.

A. D. HOLMES. Factors Influencing Wound Healing.

August 21

DEAN BURK. Biotin in Metabolism, Growth, and Cancer.

ALBERT CLAUDE. Endogenous Factors in Tumor Development.

J. Instrumentation

JOHN J. GREBE, *Chairman*
RICHARD RIMBACH, *Vice Chairman*

August 24

M. F. BEHAR. General Discussion—Terminology, Symbols, Dimensional Analysis.

H. S. WINMIKI AND J. J. GREBE. Designing Process Equipment to Obtain Self-Regulation, Advance Notice Devices, Time Control, and Ratio Control.

August 25

BRADFORD NOYES, M. J. ZUCROW, AND W. G. BROMBACHER. Requirements of Measuring and Detecting Elements, Sensitivity, Instrument Lags, and Location.

RALPH H. MÜLLER. Detecting and Measuring Elements for Chemical Conditions or Composition, Sampling, and Electrode Design.

August 26

CHARLES S. DRAPER AND K. J. DE-JUHASZ. Indicating and Recording Devices—Their Sensitivity, Lags, Types and Methods; Metering, Weighing, Integrating.

C. O. FAIRCHILD AND R. W. GILBERT. Electronic Devices as a Class of Measuring and Control Equipment.

August 27

C. E. MASON. Stability of Processes and Instruments Using Floating and Proportional Position Responses.

J. C. PETERS. Application of Second Derivative and Special Function Response.

August 28

H. ZIEBOLZ AND R. D. WEBB. Characteristics of Primary Relays, Power Units, Servo Mechanisms, Control Valves, Pipes, and Pumps.

GORDON BROWN. Mathematical Analysis; Methods of Obtaining Highest Speeds and Accuracy.

Gibson Island is situated in Chesapeake Bay about 20 miles south of Baltimore. It is approximately 1,000 acres in area and is connected with the mainland by a causeway. Admission to this privately controlled island is by card only from the Gibson Island Club sent by the director at the time of registration. In addition to the club and property purchased by the association, there are about 80 private residences on the island, leaving most of it quite uninhabited and covered by forests. The island offers opportunity for golf, tennis, both salt and fresh water bathing, fishing, and sailing.

The conference property consists of a large residence and auxiliary buildings on a wooded 3.6-acre lot situated on the highest hill on the island. The property provides accommodations for about 50 men in addition to a conference room. Others attending the conferences, including those who are accompanied by their wives or families, live at the club or in special cottages. All meals are taken at the club.

Substantial gifts by industrial companies whose laboratories have been represented at the Gibson Island conferences have enabled the association to purchase the property. Each contributing company has the right to have a representative at each conference. This is a substantial right because there have been many more applicants for admission to the conferences than can be accommodated unless the limit of 60 that has been set is exceeded. The participants have felt that to enlarge the conferences would take from them something of the informality and intimate contacts that make them most valuable. Companies that have made the purchase of this property possible are:

Atlantic Coast Fisheries Co., New York
The Barrett Co., New York
The Bell Telephone Laboratories, New York
Davison Chemical Corp., Baltimore, Md.
Distillation Products, Inc., Rochester, N. Y.
Ethyl Gasoline Corp., New York
Gelatin Products Co., Detroit, Mich.
General Electric Co., Schenectady, N. Y.
B. F. Goodrich Co., Akron, Ohio
Hercules Powder Co., Inc., Wilmington, Del.
Leeds & Northrup, Philadelphia, Penna.
Merck & Co., Inc., Rahway, N. J.
Monsanto Chemical Co., St. Louis, Mo.
Norton Co., Worcester, Mass.
Pittsburgh Plate Glass Co., Barberton, Ohio
Research Corp., New York
Standard Brands, Inc., New York
Standard Oil Co. of California, San Francisco
Standard Oil Development Co., Elizabeth, N. J.
The Texas Co., New York

Since the conferences have now been provided a permanent home, a Policy Committee has been set up so that the whole project may be guided with the maximum wisdom. This committee consists of the director of the conferences and the chairman and vice chairman of each conference representing the association and a representative appointed by each of the contributing companies.

The first meeting of the Policy Committee was held September 9 at Atlantic City during the meeting of the AMERICAN CHEMICAL SOCIETY. The committee expressed considerable dissatisfaction of one custom in use, i. e., in having the order of the applications determine the order of selection. This procedure has resulted in having many representatives from a few institutions, and possibly not any from other institutions. To distribute the at-

tendance among a wider number of institutions and bring about a more just representation, it was voted that the programs be published in CHEMICAL AND ENGINEERING NEWS and *Science* and that those interested in attending one or more of the conferences be instructed to send their requests for attendance to the director on or before March 10. Each applicant must state the institution with which he is connected and the type of work in which he is most interested.

The director will submit the names of those making requests to the respective chairmen. The program committee will go over the names in an effort to distribute the requests as fairly as possible among the various institutions from which they have been made. Names selected by the committees will be returned by the chairmen to the director who will notify the selectees, and at that time each who is to attend will be requested to register by mail. On receipt of the registration fee of $3.00, made payable to Section C, A. A. A. S., a registration card will be sent covering admission to the island and use of all guest privileges, including a room reservation. Rooms are $2.00 per day per person and board is à la carte (approximate prices—$0.50, breakfast; $0.75, lunch; $1.25, dinner). War conditions make everything uncertain, so it is ruled that all registration fees will be returned and reservations cancelled provided notice of inability to attend is received at least 10 days before the conference.

Accommodations are available at the club for a limited number of women who wish to accompany their husbands. Also, plans are being worked out by a committee for any man wishing to bring his family. All these requests should be made at the time of the request for attendance, for these particular limited accommodations will be assigned in the order received.

All requests for attendance or any additional information should be addressed on or before March 10 to the director of the conferences, Neil E. Gordon, Central College, Fayette, Mo.

Blackout Costume

WORKERS in factories and pedestrians in traffic can be made visible during blackouts by fluorescent-dyed clothing and ultraviolet lighting, a safety measure demonstrated recently at the Calco Chemical Division of American Cyanamid Co., Bound Brook, N. J. Clothing dyed with fluorescent colors glows in invisible ultraviolet light—permissible in blackouts—with a subdued radiance bright enough to be seen nearby but too weak to be visible at a distance, even in a blackout otherwise complete.

In blacked-out plants equipped with ultraviolet lamps, workers wearing garments made fluorescent by dyeing are readily visible to their associates.

Traffic control during blackouts can be effected by using ultraviolet lamps in traffic lights and in the headlights of vehicles. In the invisible radiance from these lamps, clothing dyed with fluorescent colors glows brightly enough to make persons wearing it visible to drivers or other pedestrians but not to aviators at a distance.



Blackout costume with dress, shoes, and stockings treated with fluorescent dye.

Dyes of many shades, possessing fluorescent properties, are available for application to various textile fibers and fabrics. In ultraviolet light, they give fluorescent colors varying from violet through blues, greens, yellows, oranges, and browns to rich reds.

The technique now suggested to give visibility during blackouts is successfully applied to luminous carpets to guide patrons down the aisles of darkened theaters. Fluorescent garments on players have also been used to produce weird effects in theatrical productions. In England direction markers to air raid shelters and many other things that must be seen even during blackouts are similarly treated.

BRITISH plants engaged in recovering benzene have been instructed to maintain production capacity at a maximum, it is reported from that country, based on a directive dated October 24, 1941.

NORWAY will continue as a source of nitrogenous fertilizers, sulfur, and pyrites for Sweden during 1942, a trade agreement between the two countries indicates.

Uses of Sintered Silver Increasing

ACCORDING to information supplied by Handy & Harman, now directing the American Silver Producers' Research Project, the use of silver in powdered metallurgy is increasing. It is employed for making mechanical mixtures containing metals, such as nickel, which do not alloy with silver except in small proportions. Graphite, tantalum, molybdenum, and tungsten are among the materials mixed in finely powdered form with silver powder, compressed, and sintered at a temperature slightly below the melting point of silver.

Some resulting products can be rolled into sheets or drawn into rods which are used, at present, chiefly for making electrical contacts and welding electrodes, though other applications are contemplated. Even wire suitable for heading operations is produced, since silver itself is ductile and helps to form ductile mixtures. It is possible to make mixtures almost as dense as might be expected if complete alloying were possible. On the other hand, if an ingredient is added which can be volatilized after pressing has been done, a uniformly porous product can be produced.

Camphor May Be Obtained from Kenya, Seychelles, Russia

PARALLEL research into possibilities of obtaining camphor at a reasonable price from ocimum plants in Kenya the Seychelles, and in Soviet Russia is reported in trade studies received in this country from its observers abroad.

The investigation in Kenya reveals that the plant *Ocimum kilimandscharicum* is worth consideration. It is further indicated that the product could find a ready market in the United Kingdom, if economically produced.

Work in the Soviet has revolved around the kindred *Ocimum canum* which grows readily in the Ukraine, Crimea, and Caucasus, and can be acclimated even further north. This plant is said to give an average camphor yield of 20 kg. per hectare.

Construction of Soda Ash Plant in China Delayed

DELAY in receipt of imported machinery has held up construction of a large soda ash plant in China, official sources report, with the information that caustic soda and bleaching powder are being produced by electrolysis.

Figures from American sources in the country show production by private plants in the unoccupied sections of the country amounted to 518 tons for the first half of 1940 and 954 tons in the same period of 1941. Production the second half of 1940 was 765 tons. Production of bleaching powder for 1940 was 137 tons.

NECROLOGY

Clifford Dyer Holley

CLIFFORD DYER HOLLEY, head of the Sherwin-Williams research laboratories, died January 16 after being in poor health for a year.



Dr. Holley was born at Farmington, Maine, September 2, 1878, was graduated from the University of Maine, and the Industrial Chemical Institute of Milwaukee, and received his Ph.D. degree at the Univeristy of Michigan. He was chemist for the Dr. Hand Condensed Milk Co., the Provinsic Chemical Co., and the Maine Experimental Station. Later he served as professor of industrial chemistry at the North Dakota Agricultural College, as superintendent of Lead Products Co., and chemical engineer at the Gould Storage Battery Co. In 1907 he became chief chemist of the Acme White Lead and Color Works, as well as professor of chemical engineering at the University of Michigan. In 1935 he was appointed director of research of the Sherwin-Williams Co.

Dr. Holley was the author of "Analysis of Paint and Varnish Products" and "Paint Vehicles, Japans, and Varnishes", as well as a considerable number of scientific articles. He was a member of the AMERICAN CHEMICAL SOCIETY, the American Society for Testing Materials, the Federation of Paint and Varnish Production Clubs, and Alpha Chi Sigma. He was an outstanding contributor to the progress of research on paints and a steadfast advocate of continuous testing of paint by coordinating accelerated testing with weather exposure on test fences.

William Preston Fitzgerald

WILLIAM PRESTON FITZGERALD, vice president of the J. T. Baker Chemical Co., died January 20 at his home in Easton, Penna. He was 63 years old.

A graduate of Lafayette College in the class of 1902, he had been interested in chemistry all his life. His connection with the Baker Chemical Co. dates back to its organization in 1904.

Mr. Fitzgerald's understanding and tireless efforts contributed largely to the status of Baker analyzed C. P. chemicals, and many of his methods of purification on a production basis are still in use.

Mr. Fitzgerald possessed the ability to serve, not only in a technical capacity, but also as an executive. He made rapid steps forward in the affairs of the company, assuming the post of chief chemist in 1905, becoming a member of the board of directors in 1907, secretary in 1923, and in 1926 vice president.

He was for several years a member of the AMERICAN CHEMICAL SOCIETY.

Harry W. Foote

HARRY W. FOOTE, a member of the faculty of Yale University for 42 years, died January 14 after a brief illness. He was 66 years old.

Dr. Foote was born in Guilford, Conn., received the Ph.B and Ph.D. degrees from Yale University, and subsequently studied at Leipzig and Munich. He became an instructor in chemistry in the Sheffield Scientific School of Yale University in 1898, was made assistant professor in 1904 and professor of physical chemistry in 1912.

He specialized in inorganic and physical chemistry and mineralogy and had been associate editor of the *American Journal of Science*. He had been a member of the AMERICAN CHEMICAL SOCIETY since 1908, and had served as local section chairman. He was a fellow of the Royal Geographical Society, and a member of the Connecticut Academy of Science. His hobby was bee-keeping.

Raymond Freas

RAYMOND FREAS, associate professor of organic chemistry, Tulane University, died January 10 at the age of 56.

Dr. Freas was born at York, Penna., January 23, 1886, and received the B.A. degree from Wittenberg College in 1906. He took graduate work at the University of Pennsylvania in 1907–08 and in 1917 received the Ph.D. degree from Johns Hopkins University.

In 1907–08 he was instructor in chemistry at the Pennsylvania State College, and from 1910 to 1916 was chemist and bacteriologist for the Baltimore City Health Department. He was adjunct professor of chemistry at the University of Virginia in 1917–18, assistant professor of chemistry at Tulane University in 1919–20, associate professor of organic chemisty at the Louisiana State University from 1922 to 1930, and associate professor of organic chemistry at Tulane from 1930 until the time of his death.

Dr. Freas served as Chairman of the Louisiana Section of the AMERICAN CHEMICAL SOCIETY for two terms in 1938 and 1939, and for some years had been a member of the Executive Committee. His specialty was organic chemistry, and he had devoted considerable time to research on electrolytic reduction of organic compounds, preparation of sulfonphthalein dyes, influence of ultraviolet radiation on organic reactions, use of ultra-short radio radiations on organic reactions, and chlorine in water purification.

Library Dedicated to American Scientists

DEDICATION of the Hooker Scientific Library to American scientists was announced by the Friends of the Hooker Scientific Library in the January issue of their official organ, *Record of Chemical Progress*. The dedication is in fulfillment of Dr. Hooker's desire, but was not publicly announced until the library was able to establish a comprehensive plan of technical literature services.

As another step toward making these services universally available, a revised schedule of corporation and institutional membership fees was also announced.

Full information about the library as a nonprofit service institution may be obtained from the Hooker Scientific Library, Central College, Fayette, Mo.

Missouri Offers Research and Graduate Fellowships

THE Missouri School of Mines and Metallurgy and the State Mining Experiment Station, in cooperation with the U. S. Bureau of Mines, offer several graduate fellowships in mining, metallurgy, or chemistry. The remuneration for each fellowship is $800 per year for 11 months' work, beginning August 1, 1942. Fellows pay fees amounting to $72 per school year.

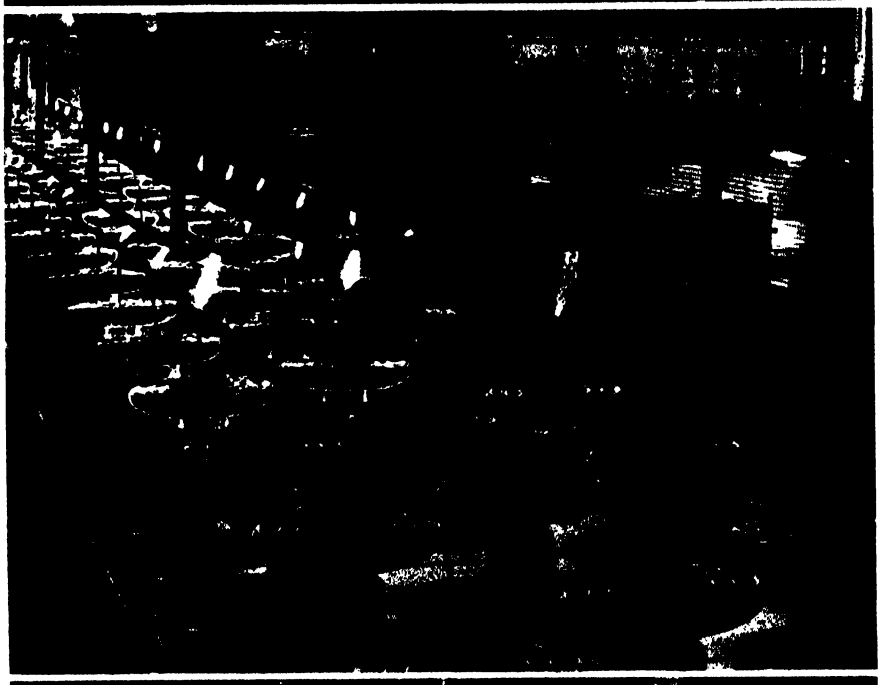
Fellows who have master of science degrees may become candidates for the doctor of philosophy degree. Those who have bachelors' degrees register for the masters' and, until it is earned, are not considered candidates for the Ph.D. Work in the Bureau of Mines constitutes the basis for the thesis. Fellows observe bureau rather than college vacation periods.

Some graduate assistantships in geology, ceramic engineering, chemical engineering, and physics also are open. They carry a stipend of $600 for the school year and require about half-time teaching duties.

Applications, with a certified transcript of college record, a statement of professional experience, photograph, and three letters of recommendation, will be received up to March 15, and should be addressed to Dean Curtis L. Wilson, Missouri School of Mines and Metallurgy, Rolla, Mo.

New Ceramic Saves Defense Materials







PROBABLY the very best indication of the adaptability of porcelain to the changing needs of industry is the introduction, during a hectic year, of a wholly new process and plastic product. This material, "Prestite", was developed by Westinghouse Electric & Manufacturing Co. as an answer in the race to release badly needed defense materials. In this case the substitute in a number of instances out-performs the materials it displaces. Two months after announcement, the new development was being produced in volume and a few months later temporarily outstripped available manufacturing capacity. Although Prestite is properly termed a new plastic because it is formed accurately to intricate shapes, it is actually a porcelain since it is made from exactly the same ingredients and is fired in the same kiln with it. Mechanically the plastic is as strong in compressions as wet-process porcelain. It retains its mechanical strength without deformation or warpage at temperatures that would completely destroy phenolic plastics. Electrically the material is the equivalent of wet process porcelain. It has the same dielectric strength, is completely impervious to moisture, may be subjected to repetitive flashover without surface charring, and otherwise behaves like the highest grade electrical porcelain.

Recently the newly created Prestite has substituted for aluminum in the storage reservoir of water coolers. In that application, ease of forming, dimensional fidelity, and high mechanical strength were essential characteristics. Because porcelain is completely inert chemically, it has proved to be even more suitable than the previous metal reservoir.

Distribution transformer tap changer plates have always been made of wet-process porcelain because of the requirement for high dielectric strength. The economic and mechanical limitations in the production of these plates have always made a design compromise necessary. Normally, long leakage distance and close dimensional tolerances were prime requisites. Cast or pressed plastic bodies would not permit either, so designs were accommodated to the deficiencies in the manufacturing processes. Leakage distances were as long as possible but seldom adequate. Warpage caused a high

Top. **Template turning of a 10-inch porcelain insulator ensures accuracy of assembly. With a steel gage, workman checks dimensions of the unit he has trimmed.** ***Center.*** **Insulators undergoing high-frequency, high-voltage test far in excess of the normal requirements.** ***Bottom.*** **Extruding blanks for largest one-piece wet-process porcelain part ever made. The blanks eventually will become a cylindrical coil form 17.25 inches in diameter by 46.25 inches long.**



India Studies Utilization of Surplus Molasses

RESEARCH activities are reported in India on recovering useful chemicals from the surplus molasses accumulated by the local sugar industry, according to the U. S. Department of Commerce.

This surplus is estimated at approximately 500,000 tons annually. Research schemes under the auspices of the Board of Scientific and Industrial Research relate to extraction of potassium salts from molasses and recovery of certain organic acids and alcohols. Arising from these investigations, a collection of national type cultures for various fermentation products has been organized at Bangalore.

Dried Blood Shipments from Argentina Gain

ARGENTINE exporters are increasing their shipments of dried blood, 1940 exports of 10,713 metric tons having increased to 13,522 metric tons in the first 10 months of 1941, according to official export figures of the country.

Since exports approximate production, the figures indicate output of this commodity. Shipments are made by both packing houses and independent exporters.

Above. **Testing insulators at full A. I. E. E. 60-cycle flashover.** ***Below.*** **Prestite can be pressed accurately to intricate shapes.**

percentage of rejections and a distressing waste of time in assembly. The newly developed Prestite plates, on the other hand, provide adequate leakage paths and are free from warpage. Dimensional tolerances less than half those required for wet-process porcelain are every day saving valuable hours on transformer assembly lines.

Certain vital parts of ignition systems can be completely freed from the exasperating deterioration caused by repetitive flashover or warpage brought about by high operating temperatures through the use of the new plastic. No other known plastic can hope to accomplish both of those results.

Enclosed fused cutout housings are notoriously susceptible to warpage and dimensional inaccuracies at the time they are formed. They have always been cast and such inaccuracies are inherent in that process. In order to minimize those defects and because of dielectric strength requirements, thick sections have been tolerated. Such Prestite accessories on distribution systems are marvels of dimensional accuracy. Doors fit, weight is down, and appearance improved.

Pump valve seats have been a source of trouble. Prestite has displaced all other materials in some instances and improved the life as well as the serviceability of the valves in which it is being used.





Fats, Oils, and Oil-Bearing Materials in the United States. 51 pages. U. S. Tariff Commission, Washington, D. C., 1941. Free of charge, limited supply.

WAR between the United States and the Axis powers, general dislocation of world trade, and increased need for certain fats and oils both to meet the country's own requirements and to supply aid under its Lend-Lease commitments have caused the U. S. Tariff Commission to issue a report giving statistical data on the consumption, uses, and foreign trade in fats, oils, and oil-bearing materials commercially important in the United States.

In 1940 total consumption of fats and oils amounted to 9,800,000,000 pounds, of which 67 per cent entered into food products, 20 per cent into soap, 8 per cent into paints, varnishes, etc., and 5 per cent into miscellaneous products. Domestic fats and oils accounted for about 85 per cent of the total consumption.

The United States has long been on a net import basis with respect to fats and oils entering each of the four broad classes of consumption mentioned above, except edible products. Principal imports have always been vegetable oils and the nuts and seeds from which these are obtained. In 1940, 12 vegetable oils of foreign derivation accounted for about 95 per cent of the total quantity of United States imports of fats, oils, and oil-bearing materials. Six of these oils—coconut, palm, olive, babassu nut, palm kernel, and cottonseed—are used principally in the manufacture of edible products or soap. Of this group much the greater part came from the Philippines and the Netherlands Indies, trade which is now disrupted. The other six imported oils are used in paints, varnishes, and for other technical purposes. Western Hemisphere countries have been the dominant suppliers, Latin America furnishing the bulk of the two most important oils in the group, linseed and castor, and also supplying all of the oiticica oil. Tung oil, however, came almost exclusively from China, and perilla and rapeseed oils from Japan and Japanese-dominated areas of China.

Stocks of fats and oils at the end of September 1941 amounted to less than 2,700,000,000 pounds, compared with 3,300,000,000 at the end of 1940.

Prices of fats and oils rose sharply during 1941. By the middle of the year the average prices of many, including butter, reached levels higher than in any preceding year in a decade.

Industrial Instruments for Measurement and Control. *Thomas J. Rhodes.* 1st ed., 573 pages. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York, N. Y., 1941. Price, $6.00.

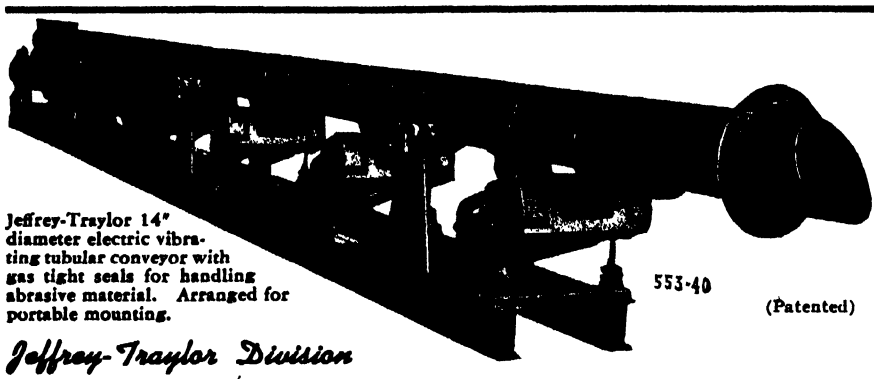
IN THE preface Mr. Rhodes states that his intention was to create a textbook for the study of instruments and automatic control in engineering schools and a reference book for those concerned with instrument and control problems in industry.

Rhodes has done a good job in following his original intention and the present offering fulfills, capably, a long-felt need of the instrumentation engineer.

No attempt was made to describe all available commercial types of controls and instruments. This was a wise decision in view of their number. Each major control device, however, has a chapter on its chief type, construction, use, and theory. Where possible, Rhodes has backed up verbal discussions of theory with the best available mathematical explanations. One severe criticism must be made of the mathematical treatment especially in the chapter on Automatic Control Theory. This has been made unnecessarily difficult by the lack of standardization of symbols, for the author uses the original nomenclature as found in the reference articles. The net result is most confusing to anyone comparing the investigations. Obviously the symbols should have been standardized for the whole text or at least for each individual chapter. It is disconcerting to find, in the same chapter, many different symbols for the same variable, or many variables having the same symbol. This shortcoming will not encourage interest in this comparatively new mathematical approach to control problems, which is doubly mourned as it is one of the outstanding untouched fields of mathematical-engineering investigation.

There are eleven chapters covering standards: Pressure and Vacuum Gauges; Indicating and Recording Thermometers; High-Temperature Pyrometry; Theory of Differential-Pressure Flowmeter Primary Measuring Instruments; Differential-Pressure Flowmeter Secondary Measuring, Recording, and Integrating Elements; Liquid-Level Measurement; Telemetering; Automatic-Control Theory; Automatic-Control Mechanisms; Miscellaneous Industrial Instruments.

CONTINUED ON PAGE 206



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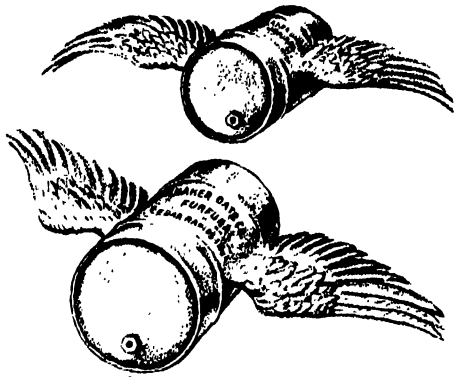
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Beyond the Flyleaf

CONTINUED FROM PAGE 204

Principles and Practice of Chromatography. *L. Zechmeister* and *L. Cholnoky.* (Translated from the second and enlarged German edition by A. L. Bacharach and F. A. Robinson with a foreword by I. M. Heilbron.) xviii + 362 pp., 74 fig. John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y., 1941. Price, $5.00.

ENGLISH-SPEAKING chemists will welcome this authoritative translation of a volume which has become a chemical classic. The authors have made so many notable investigations in the field of chromatography that they can write with authority and conviction on the techniques involved and the type of problems which can be attacked by chromatographic techniques. The translators have retained the enthusiasm of the authors and have added occasional footnotes which either expand or clarify the text.

Chromatography was discovered by Tswett in 1906 and is a specialized type of selective adsorption from a solution flowing through an adsorbent in columnar form. Those components with high adsorption affinity are adsorbed close to the top of the column, and other compounds with lower adsorption affinities are adsorbed in bands in the lower portion of the column. Compounds with no adsorption affinities appear in the filtrate. When pigmented compounds are adsorbed, the Tswett bands appear as colored areas.

For many years the Tswett technique was used primarily as a qualitative method to determine whether pigment systems were homogeneous or heterogeneous. About 1931, however, it began to be used as a preparative technique. The adsorption bands were removed separately from the adsorption column, the adsorbed constituent was elutriated by some appropriate solvent or technique, and it was thus possible to secure readily many compounds in a pure state from mixtures which could not be separated easily by other means. Our present knowledge of many important biochemical compounds depends upon such separation and preparative techniques, and more and more laboratories are adopting such techniques for either routine analyses or as research methods.

The present volume discusses the general principles underlying chromatography, the general methods which may be used including types of apparatus, adsorption media, solvents, and elution techniques. Following this general section special attention is given to the application of chromatography to naturally occurring pigments, chlorophyll, hemin, the porphyrins, bile pigments, carotenoids, naphthoquinone and anthraquinone pigments, flavins, pterins, anthocyanins, etc. This is followed by a discussion of the behavior of synthetic dyestuffs and this, in turn, by a consideration of the technique with relation to colorless compounds of a great variety of types—*e. g.*, sterols, alkaloids, vitamins, hormones, enzymes, etc. The last two chapters deal with technological applications and inorganic chromatography, purification of inorganic compounds, and separation of mixtures of anions or cations. An excellent condensed bibliography and author and subject indexes conclude the volume. Unfortunately, some of the more recent literature is not included, references and text being only for material appearing prior to the summer of 1938. In spite of this limitation, the book is recommended as probably the most authoritative single source of information in this important and rapidly expanding field.

ROSS AIKEN GORTNER



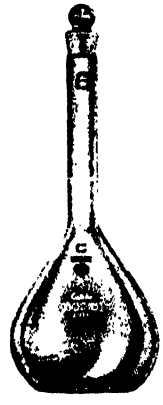
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Technical Report Writing. *Fred H. Rhodes.* 1st ed. 125 pages. McGraw-Hill Book Co., 330 West 42nd St., New York, N. Y., 1941. Price, $1.25.

THE need of a proper text on technical report writing, such as that by Fred H. Rhodes, of Cornell, and offered by McGraw-Hill's Chemical Engineering Series, has been generally apparent, frequently rather painfully so. As the author is a chemical engineer, it is possible that his introductory stress on the importance of effective report writing may obtain recognition from the technically minded student not always granted English departments. Too few young technical men are aware of the professional importance of being effectively articulate.

It is probably impossible to prepare such a book primarily for the undergraduate without including much that seems platitudinous. Experience with reports prepared by students who have completed undergraduate English continually shows the need of re-emphasis of much that is elementary. Presumably Professor Rhodes prepared his material as a text for a course in this subject, the more mathematical chapters being amplified in class work and supplemented by reference material. For others than students of such a course, it is possible that a more general treatment, indicating rather specifically where the various mathematical methods should be applied, would be more

CONTINUED ON PAGE 208



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Beyond the Flyleaf

CONTINUED FROM PAGE 206

constructive, especially if rather detailed reference could be given to more adequate treatments of these several subjects. As they now stand, these chapters are not fully satisfying to the laboratory worker who must use these methods, nor necessarily fully effective as a warning and guide to workers who need them only infrequently.

One great merit of the book is that it recognizes and calls to the reader's attention the fundamental importance of determining the statistical adequacy of the data on which the report is based. To its general discussion of this subject, little exception need be taken. It is unfortunate, however, that the author did not confine himself to a more extended general statement of the problem, and then refer the reader to appropriate statistical works for further detail. In its necessary brevity, the detailed instruction provided has the dangers of a little learning; it is inadequate for the judicious consideration of statistical problems.

Inclusion in a text of this type, of a chapter on The Method of Dimensional Analysis is also questionable as it offers only one of the several checks possible on equations used. Again, a more generalized discussion in an undergraduate course might be constructive and less hazardous for readers not supplementing the text through oral instruction or guidance.

It is hoped that this book will receive the wide distribution it deserves, not only among undergraduates where its general discussion and specific suggestions will be found valuable. It should serve to reduce the burden on many a research director who must read and revise report material for action or for presentation to lay executives.

RAYMOND STEVENS

Journal of Chemical Education for February

THE *Journal of Chemical Education* for February contains, among others, the following articles:

CLARA DE MILT. Christopher Glaser.
THOMAS H. HAZLEHURST. The Measurement of Surface Tension. A Laboratory Experiment.
C. D. WEST. Polarizing Accessories for Microscopes.
JAMES B. SUMNER. The Demonstration of an Induced, or Coupled, Reaction.
R. H. WRIGHT. Some Useful Expedients in Laboratory Glass Working.
C. F. H. ALLEN AND J. H. CLARK. Sodium Perborate as a Replacement for Sodium Peroxide in the Chemical Laboratory.
HUBERT BRADFORD VICKERY. Liebig and Proteins.
CHESTER B. KREMER. The Ethanolamines.
R. D. BILLINGER. Seventy-Five Years of Chemistry at Lehigh University.
THEODORE A. ASHFORD AND WILLIAM M. SHANNER. Objective Test Items of the Recognition Type That Test Reasoning and Minimise Guessing. Ten Questions That Students of Chemistry Will Be Asking—and Their Answers.
G. O. CARTER AND H. F. REINHARD. Modern Uses of Oxygen.

January Journal of Physical Chemistry

PAPERS presented at the Wilder D. Bancroft Colloid Symposium, which was held at Cornell University, Ithaca, N. Y., June 19 to 21, 1941, and reviews of new books appeared in the January issue of the *Journal of Physical Chemistry:*

WILDER D. BANCROFT. Thirty Years of Colloid Chemistry.
R. C. MERRILL, JR., AND J. W. MCBAIN. Studies on Solubilization.
S. S. KISTLER. The Calculation of the Surface Area of Microporous Solids from Measurements of Heat Conductivity.
L. H. REYERSON AND CYRUS BEMMELS. The van der Waals Sorption of Chlorine by Silica Gel at Low Temperatures.
L. H. REYERSON AND CYRUS BEMMELS. The van der Waals Sorption of Gaseous Hydrogen Chloride, Hydrogen Bromide, and Hydrogen Iodide by Silica Gel.
CHARLES W. PROUDFIT AND WESLEY G. FRANCE. The Effect of Surface-Active Agents on Electroörganic Reductions.
C. E. MARSHALL AND W. E. BERGMAN. The Electrochemical Properties of Mineral Membranes. II. Measurement of Potassium-Ion Activities in Colloidal Clays.
FRANK E. E. GERMANN AND HERBERT W AYRES. The Origin of Underground Carbon Dioxide.
C. E. BARNETT. Some Applications of Wave-Length Turbidimetry in the Infrared.
COLIN G. FINK. The Intermediate Colloid State in the Formation of Gold and Platinum Ions.
C. R. HOOVER, FRANK W. PUTNAM, AND EARL G. WITTENBERG. The Depolarization of the Tyndall-Scattered Light of Bentonite and Ferric Oxide Sols.
E. M. BEAVERS AND F. K. CAMERON. Properties of the Floc in Water Purifications with Bentonite.
HARRY B. WEISER, W. O. MILLIGAN, AND J. B. BATES. X-Ray Diffraction Studies on Heavy-Metal Iron Cyanides.
T. ALFREY AND H. MARK. A Statistical Treatment of Crystallization Phenomena in High Polymers.
E. A. HAUSER AND M. C. SZE. Chemical Reactions during Vulcanization. III.
PAUL J. FLORY. Constitution of Three-Dimensional Polymers and the Theory of Gelation.
JOHN M. SWANSON. A Contribution to the Physical Chemistry of the Asphalts.
MAURICE L. HUGGINS. Some Properties of Solutions of Long-Chain Compounds.
S. E. SHEPPARD, R. C. HOUCK, AND C. DITTMAR. The Sorption of Soluble Dyes by Gelatin.
ELMER O. KRAEMER. The State of Aggregation of Gelatin in Nongelating Systems.
MARY L. PETERMANN. Ultracentrifugal Analysis of Pepsin-Treated Serum Globulins.

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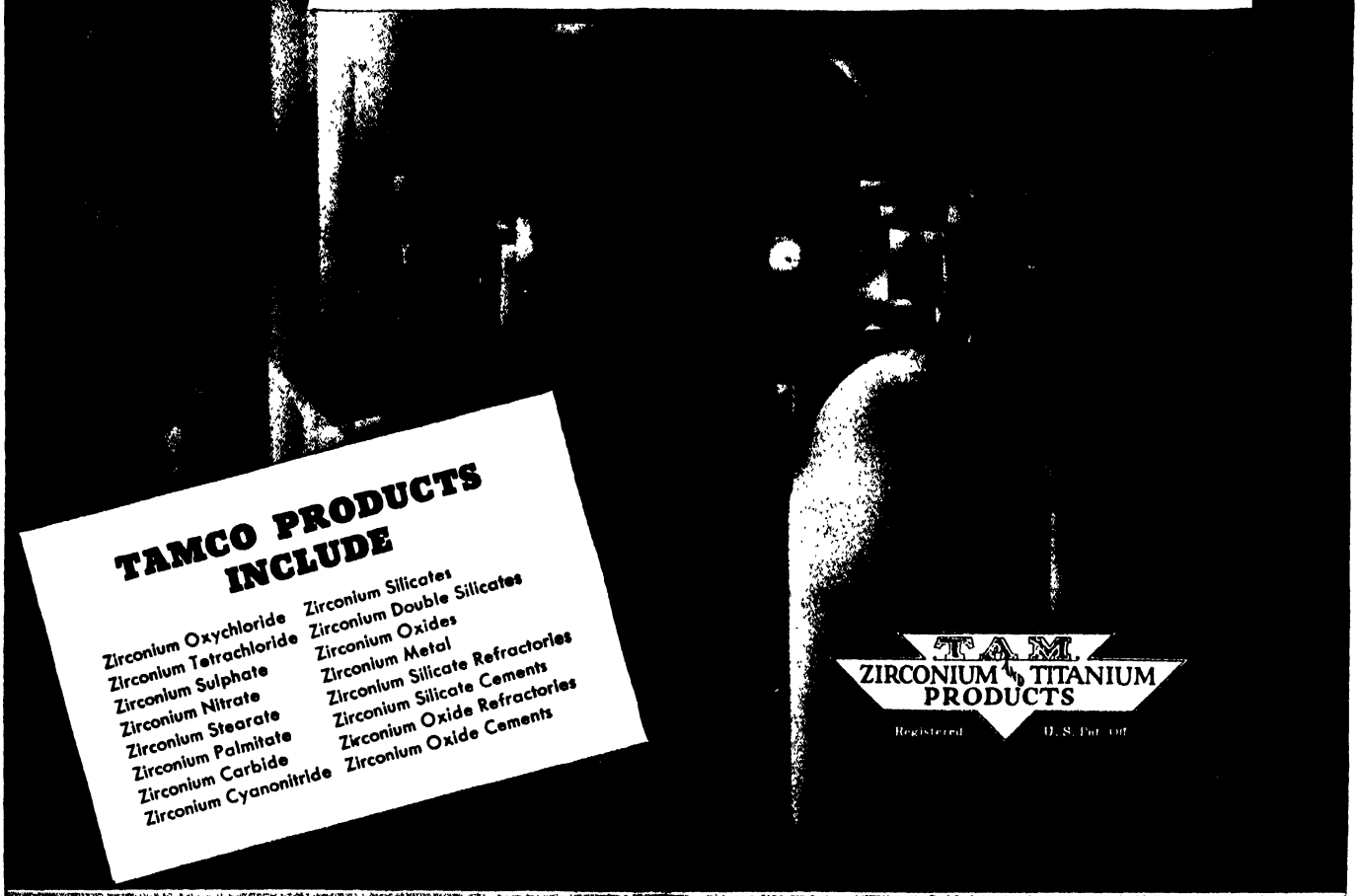
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Beyond the Flyleaf

CONTINUED FROM PAGE 208

H. A. Abramson, D. H. Moore, and H. H. Gettner. Electrophoretic and Ultracentrifugal Analysis of Hay-Fever-Producing Component of Ragweed Pollen Extract.

Hans Neurath, Gerald R. Cooper, and John O. Erickson. The Denaturation of Proteins and Its Apparent Reversal. III.

E. A. Hauser and Davis R. Dewey, II. Visual Studies of Flow Patterns.

Salvage in the Milk Industry

In "Treatment and Disposal of Waste Waters from Dairies and Milk Products Factories", Water Pollution Research Technical Paper No. 8 issued by the Department of Scientific and Industrial Research (England), information is given on the amounts of materials, such as milk, whey, and buttermilk, carried away in waste waters from the milk industry. Reduction of these losses by simple modifications in operations and by careful control of draining and washing equipment is discussed. The paper indicates that at least 3,000,000 gallons a year could be saved on the milk handled at all factories in Great Britain. On the problem of disposal of milk waste waters, purification by the activated sludge process and by filtration in percolating filters is suggested. Details are given on design and size of plant required. The paper is available from H. M. Stationery Office, London, at 4s. plus postage.

Explosives Treated with Fire-Retardant Chemicals

Liquid-oxygen explosives, highly flammable and subject to accidental ignition, have been rendered safer by treatment with fire-retardant chemicals developed by the U. S. Bureau of Mines. Liquid-oxygen explosives are commonly made from a carbonaceous absorbent and liquid oxygen of high purity. The treatment consists of spraying the absorbent with watery solutions of phosphoric acid before it is charged into the cartridge. For additional protection the canvas wrappers in which packed cartridges are stored are soaked or sprayed with solutions of ammonium phosphate, ammonium chloride, or phosphoric acid.

Although treated explosives will withstand most of the ordinary conditions of handling, certain inherent hazards remain, especially when large charges are exposed to extremely violent igniting agents. For this reason it is recommended that the usual safety precautions be exercised.

A report of the study may be obtained by requesting Report of Investigations 3605, "Practical Fire-Sensitivity of Liquid-Oxygen Explosives Treated with Fire-Retardants", by A. R. T. Donues, from the Bureau of Mines, U. S. Department of the Interior, Washington, D. C.

Foote-Prints

The December 1941 issue of *Foote-Prints*, published by the Foote Mineral Co., 1609 Summer St., Philadelphia, contains an article by F. B. Shay on the "Fine Grinding of Minerals", of particular interest with reference to the grinding and processing of chemicals and ores. Norbert J. Kreidl of Pennsylvania State is the author of "The Possibilities of Strontia in Ceramics". The publication also contains analyses and information on inorganic chemicals, metals, alloys, and minerals.

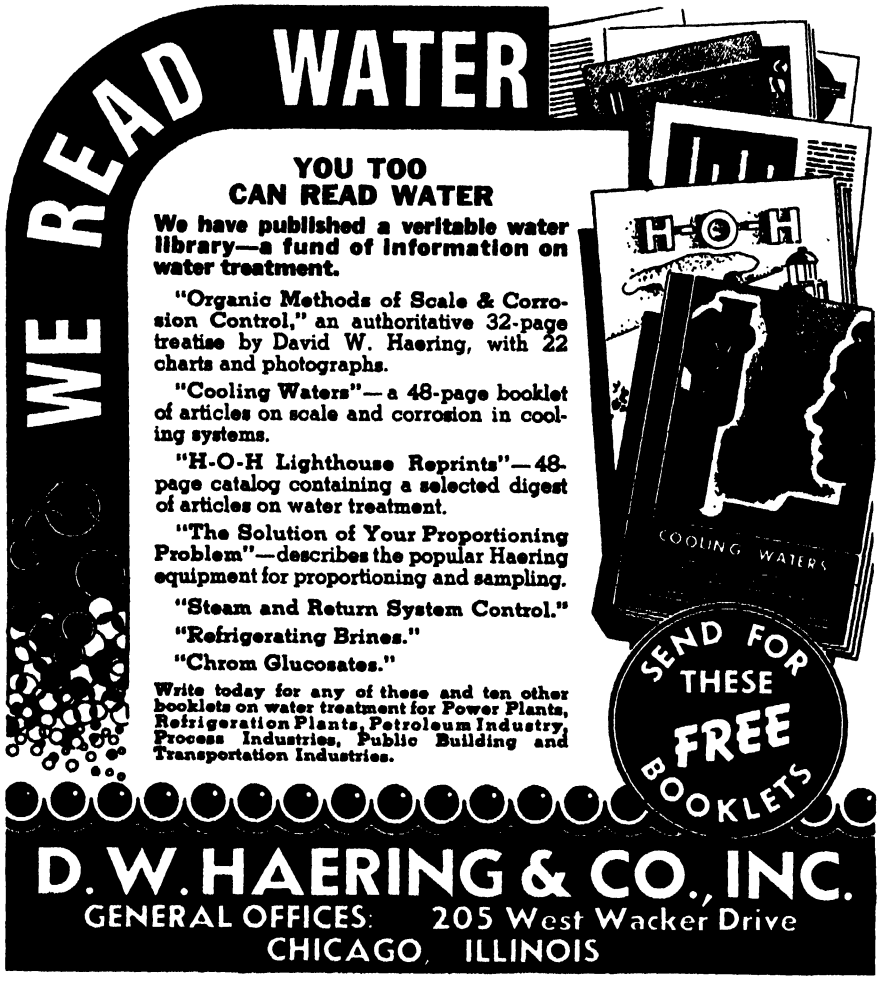
FSA Designates Habit-Forming Drugs

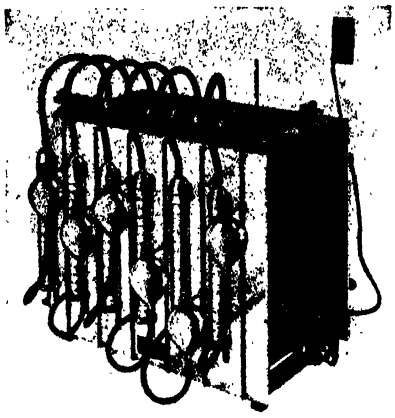
A regulation designating habit-forming chemical derivatives of substances named in section 502 (d) of the Federal Food, Drug, and Cosmetic Act has been issued. The order will become effective April 23, and is based on evidence presented at the public hearing in March 1941. Copies of the *Federal Register* of January 23, in which the regulation is published, may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 10 cents each.

Rubber Products

The December 1941 edition of A. S. T. M. Standards on Rubber Products, an annual publication sponsored by the American Society for Testing Materials' Committee D-11 on Rubber Products, contains the 39 specifications and methods of test in their latest approved forms. The 10-page bibliography gives recent sources of information on mechanical testing of rubber. Copies in heavy paper binding may be obtained from A. S. T. M. Headquarters, 260 South Broad St., Philadelphia, Penna., at $1.75 each.

Index to A. S. T. M. Standards, Including Tentative Standards. 196 pages. American Society for Testing Materials, 260 South Broad St., Philadelphia, Penna., December 1941. Free of charge on request.





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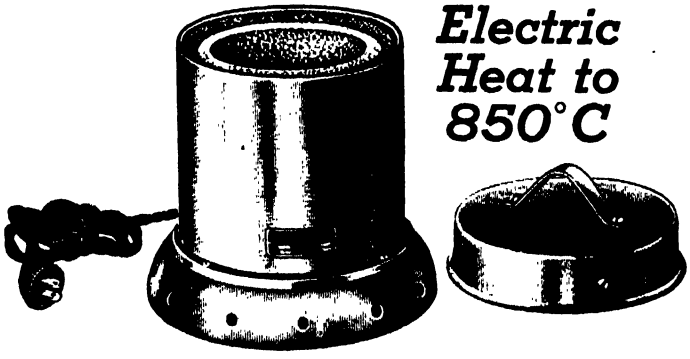
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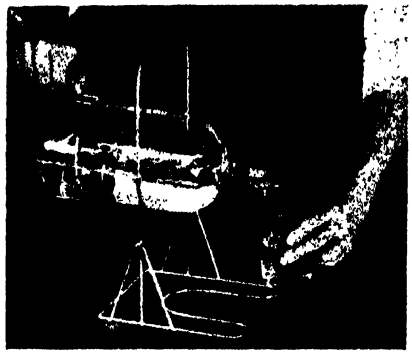
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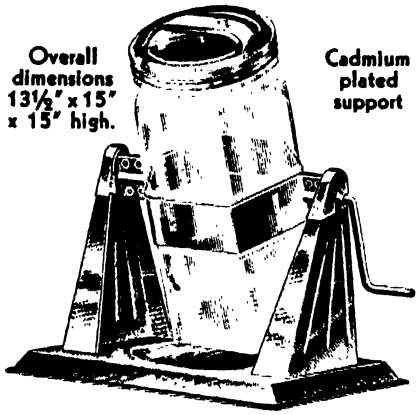
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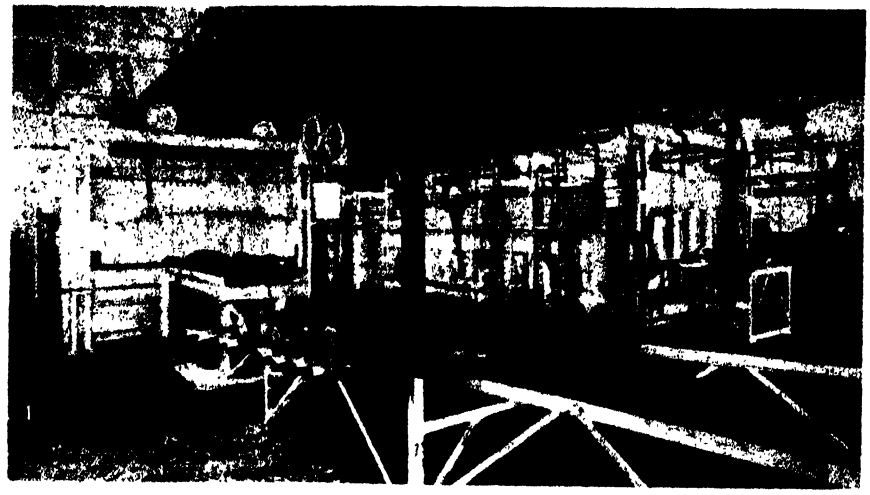
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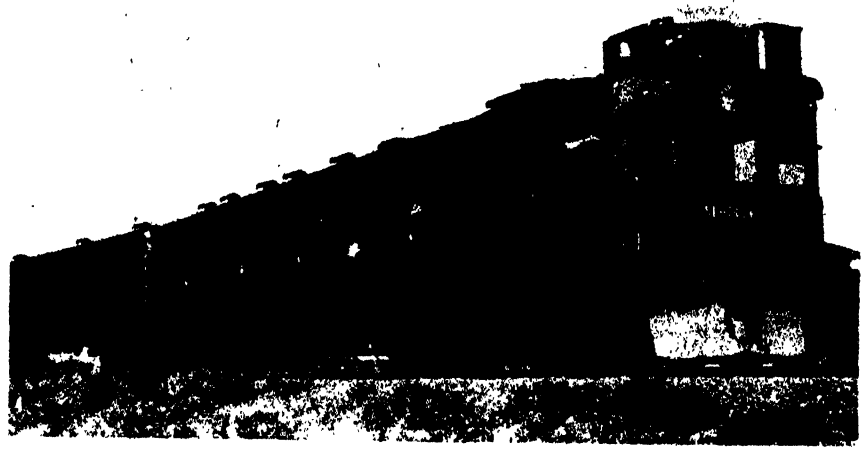
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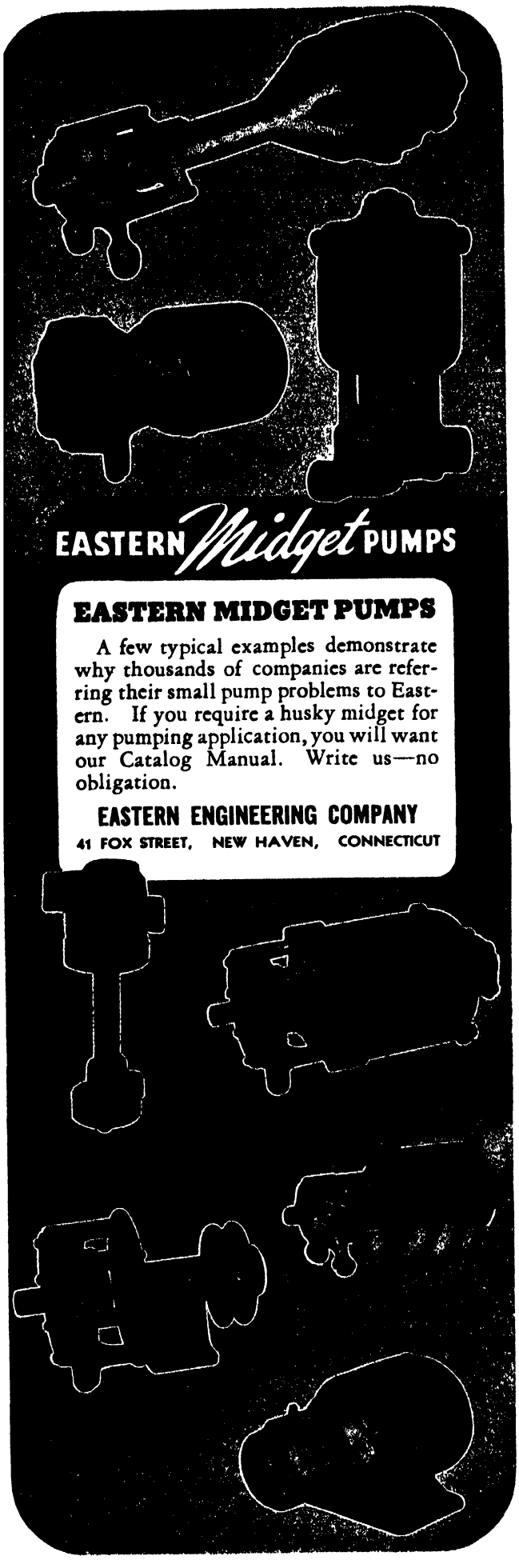








(1) Heat treating furnaces fired with liquefied gas. (2) Dredge powered by liquefied gas fueled engines. (3) Strip mining coal with dump truck powered by liquefied gas fueled motor. (4) Rail car operated by liquefied gas powered engine. Story on page 214.



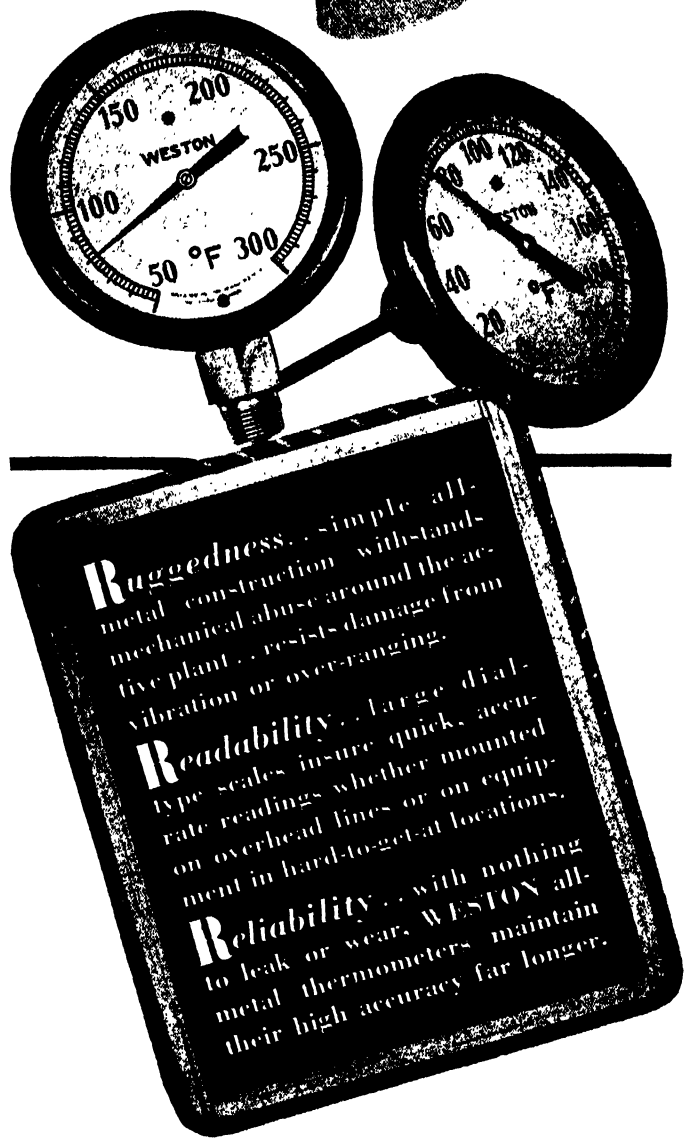
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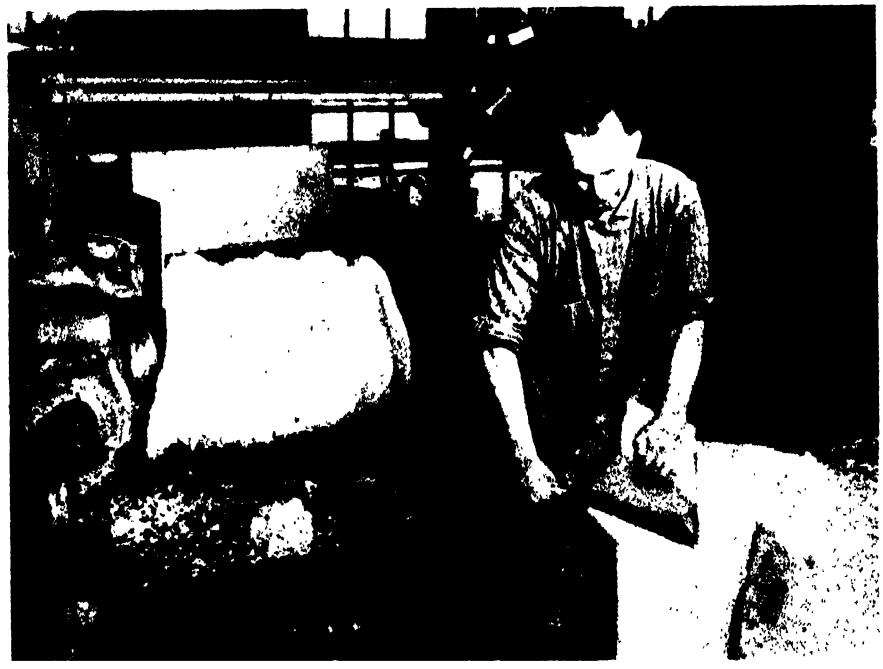
Liquefied Petroleum Gas in 1941

THE year 1941 in the liquefied petroleum gas industry made new highs in marketed production for all types of uses in spite of the difficulty in obtaining materials for new installations, curtailment of sales activities in many quarters because of inability to secure customer equipment and appliances, and restrictions on appliance financing. It saw a great increase in the industrial uses of liquefied gases in defense work and an increase in the amounts of certain associated hydrocarbons used in the manufacture of synthetic rubber and plastics.

The estimated marketed production of liquefied petroleum gas during 1941 was 445,000,000 gallons, compared with 313,456,000 gallons for 1940, or an increase of 42 per cent. This includes all liquefied petroleum gas (propane, butane, butane-propane mixtures, and pentane) when sold as such, but not butane when blended with heavier petroleum fractions for motor-fuel purposes nor sales of hydrocarbon gases delivered by pipe line in the gaseous state to certain large chemical concerns located adjacent to the points of production of the hydrocarbon gases.

The estimated domestic use of liquefied petroleum gas in 1941 amounts to 221,880,000 gallons, an increase of 65.5 per cent over 1940, when 134,018,000 gallons (42.7 per cent) were so consumed. The number of new domestic users of liquefied petroleum gas increased approximately 520,000 during the year. It is now estimated that there are a total of 1,645,000 users of liquefied petroleum gas in

CONTINUED ON PAGE 216



Synthetic rubber manufacture

STEAM JET EVACTORS
AIDING NATIONAL DEFENSE

Numerous Croll-Reynolds Evactors are working overtime maintaining high vacuum in plants making explosives, synthetic rubber, airplane lubricants and a long list of other ordnance materials. They are maintaining high vacuum on engines and turbines of dozens of American ships sailing the seven seas.

While the large and special units require up to three months or more for fabrication the smaller ones are sometimes made in two weeks, or less, when the demand is urgent. These include single and multi-stage units for vacuum up to a small fraction of 1 mm. absolute, also small condensers and vacuum chilling equipment.

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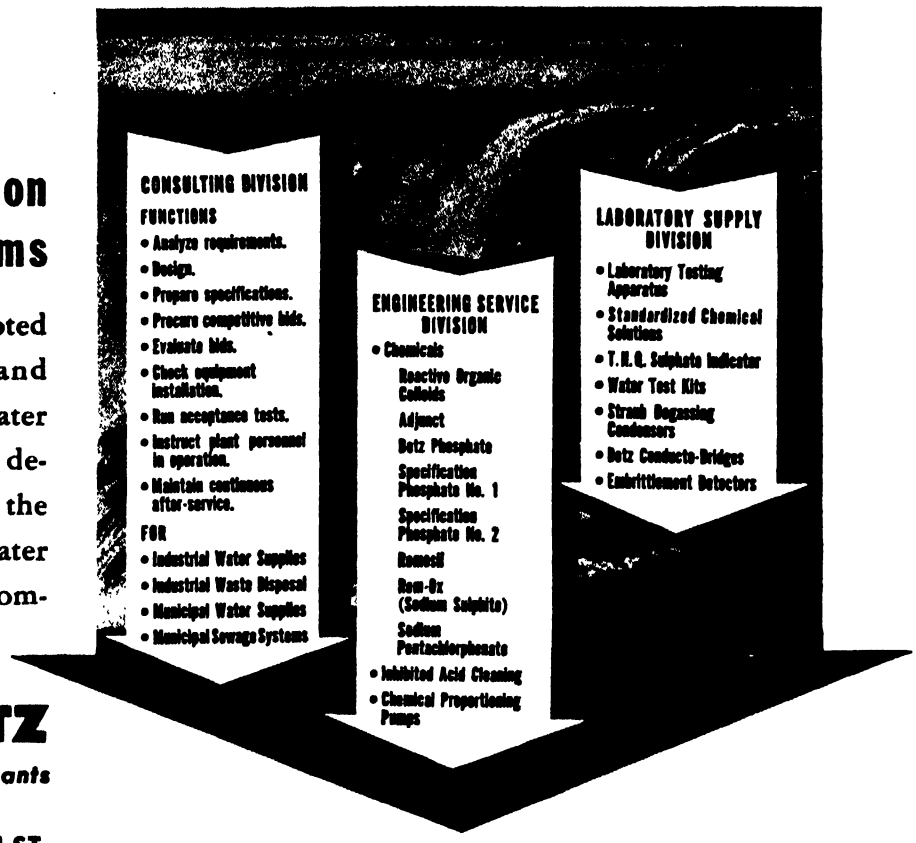
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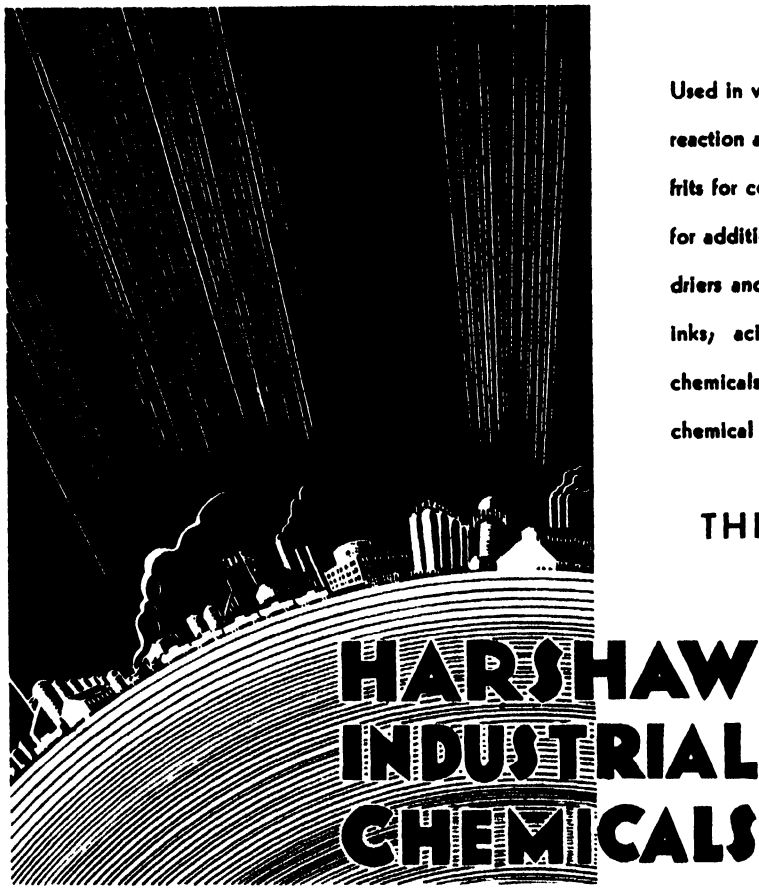


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Liquefied Petroleum Gas in 1941

CONTINUED FROM PAGE 214

the domestic and small commercial classification.

Many new industrial installations were made, principally in the heavy manufacturing areas in the North and East, and a majority use propane, delivered in tank-car quantities. From these installations, liquefied petroleum gas is used in the manufacture of battleships, machine guns, tanks, hydraulic pumps, aluminum shapes, shells, airplane parts, cruisers, destroyers, tankers, and ordnance of all types. Many large industrial concerns have installed liquefied petroleum gas systems as standby to ensure gas service for vital manufacturing operations during periods when the utility system has high peak loads.

Liquefied petroleum gas systems have been installed to furnish piped gas service for several large housing projects in defense areas. Over 200 cities are now employing or arranging to use undiluted butane or propane, propane-air, butane-air, propane, butane, or mixtures for the sole source of gas or for standby, peak load control, or enrichment. Increasing quantities of liquefied petroleum gas were transported direct from gasoline plants or refineries to consumers, or from pipe line terminals to consumers in 1941.

In the chemical field, liquefied petroleum gases became an increasingly important source of raw material. Volume shipments of special grades of propane, *n*-butane, isobutane, and butadiene were made for use in the manufacture of nitroparaffins, plastics, and synthetic rubber. For experimental and pilot plant operations such special hydrocarbons as propylene, butylene, isobutylene, and others are now available in pure and technical grades.

Competition for the domestic markets continues keen from both within and without the industry, electricity being the principal competitor from without the industry. Prices within the industry have, in general, strengthened, particularly in the Southwest. New uses began to require appreciable volumes of hydrocarbons in the liquefied gas range. Among these were butadiene and isoheptene for manufacturing synthetic rubber, diolefins for plastics, propane for nitroparaffins, and *n*-butane for conversion into isobutane in the manufacture of aviation gasoline by the isomerization and alkylation processes.

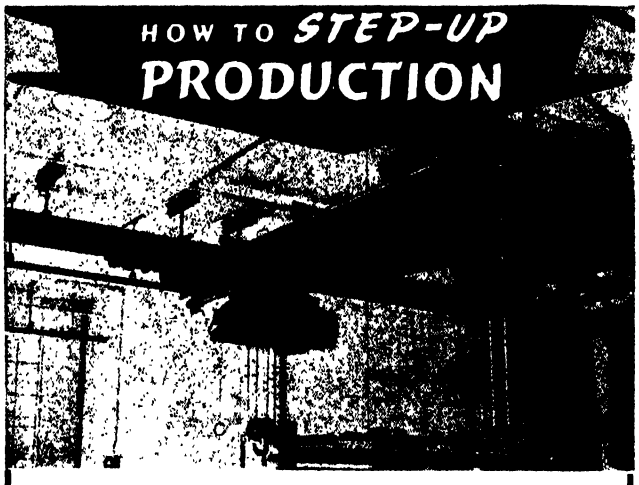
The year 1941 saw the first large-scale installation of propane-fired heaters for removing accumulations of ice and snow on switches in railroad yards.

Additional special high-pressure tank cars and transport trucks were required to deliver the increased volumes in 1941. It is estimated that orders for more than 200 new tank cars were placed with car builders in 1941.

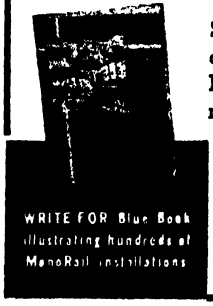
Twenty-seven states have enacted laws requiring payment of motor fuel taxes on only those quantities of liquefied petroleum gas sold or used to propel motor vehicles upon the public highway.

In 1941 additional states adopted rules and regulations governing the safe storage, handling, transportation, and utilization of liquefied petroleum gas. A large percentage of these regulations were in substantial conformity with the National Board of Fire Underwriters' standards. Seventeen states now have liquefied petroleum gas rules and regulations.

As the year 1941 ended, the liquefied petroleum gas industry found itself in a most difficult position from the standpoint of obtaining equipment with which to make new customer installations in 1942. With war underway, new sales probably will come close to a halt as soon as the available warehouse stocks are used. Equipment companies catering largely to the liquefied petroleum gas industry already have or are rapidly switching over a portion of plant facilities from the manu-



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facture of liquefied petroleum gas industry articles to war items. However, marketers and equipment manufacturers have spent considerable time on research work connected with development and use of substitute or alternate materials and equipment with noteworthy success. These efforts are being continued.

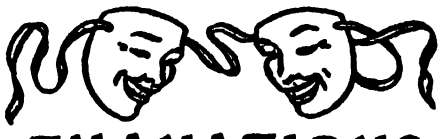
Eighteen states now have liquefied petroleum gas production.

One trend in refining technology relating to the manufacture of aviation gasoline, which will have a pronounced effect on the available supply of butanes to the liquefied petroleum gas industry, is the process of isomerization of normal butane into isobutane, with the isobutane then being converted into aviation gasoline by either the thermal or catalytic alkylation processes. The demands for tremendous quantities of aviation gasoline under the war program have greatly stimulated the installation of new large capacity isomerization and alkylation plants, and plans for further expansion along these lines throughout the petroleum industry are well under way.

Cuba Imports Glue from U. S.

UNITED STATES exports of glues of animal derivation, shipped to Cuba, amounted to 88,600 pounds valued at $15,900 in 1940, compared with 121,100 pounds at $21,600 in 1939. Glues and gelatins are sold in Cuba through the large wholesale drug, chemical, and hardware concerns, while some larger furniture manufacturers import glue for their own account.

TOTAL mine production of recoverable gold in the United States, territories included, was 5,858,871 fine ounces in 1941, a decrease of 2 per cent from 5,984,163 ounces in 1940, according to preliminary figures of the U. S. Bureau of Mines. The value of the gold, calculated at $35 per fine ounce, was $205,060,485 in 1941 and $209,445,705 in 1940.



EMANATIONS

IN A chemistry test the teacher wrote on the blackboard, "Explain the following terms, and give examples", ending the list with "complex ions". Mr. X—— struggled with this for some minutes, and finally wrote, "I don't think complexions can be explained, but I know my girl's is just swell."

CONTRIBUTED

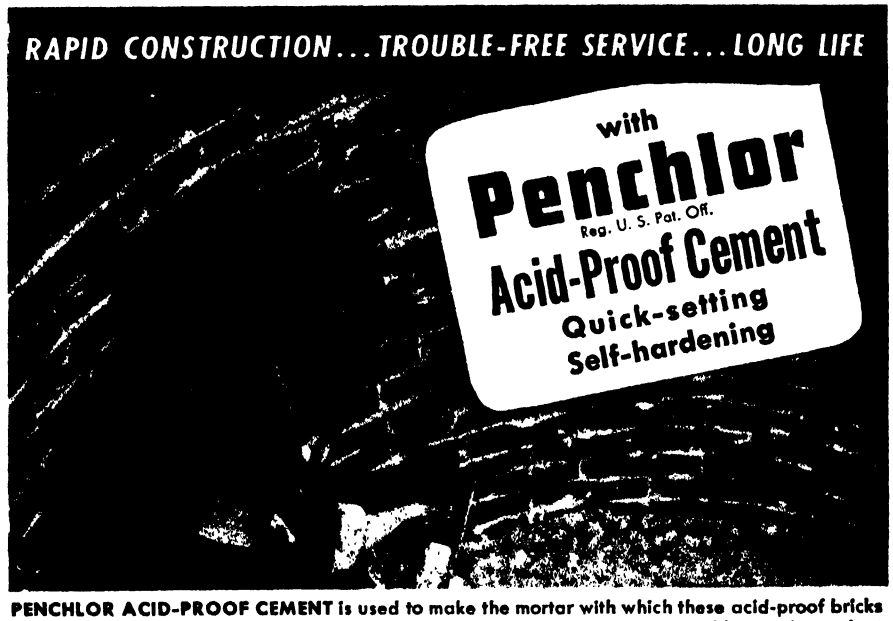
Egyptian Chemical Trade Reported Good

CONTINUED news is being received of favorable conditions in the Egyptian chemical trade. Because of disturbed business conditions brought about by the war, a recent report stated, it is almost impossible to forecast accurately with regard to any phase of economic activity in Egypt. Conditions in the Egyptian chemical trade at the end of the summer, however, indicated a satisfactory turnover for the entire year 1941.

Fertilizer imports, which represented more than half of the total chemical and allied products trade, were expected to be maintained at a satisfactory level.

ITALY is sharply restricting exports of both lemons and raw materials required for preparation of tartaric acid. Lemons are being curtailed to offset a shortage of citric acid while, in the case of pharmaceutical citric acid, efforts are being made to hurry expanded production plans.

VALERIAN root is under extensive cultivation in Chile, with a view to its exportation.



PENCHLOR ACID-PROOF CEMENT is used to make the mortar with which these acid-proof bricks are being laid in lining a tank to store hot dilute sulphuric acid at the chemical by-products plant of the Chesapeake-Camp Corp., Franklin, Va. Construction Contractors: A. Lynn Thomas Co., Inc., Richmond, Va.

Here is another installation where *Penchlor Acid-Proof Cement* will prove its worth in years of dependable service. This quick-setting sodium silicate cement was chosen because of its proven record of highly satisfactory service under severe acid conditions . . . a record that includes successful application in most of the important chemical plants throughout the United States, in steel mills, in paper and pulp mills, oil refineries and smelting plants.

With time a vital factor in new construction, the quick-setting and self-hardening qualities of Penchlor Acid-Proof Cement are a greater advantage than ever. There need be no delays in putting brick-lined equipment into service.

If your conditions require a corrosion-proof cement with unusual strength and exceptional resistance to abrasion, use one of our resin cements, such as *Asplit* for conditions which are always acid—or *Causplit* for conditions alternately acid and alkaline. You will find these easy to handle and capable of withstanding a wide range of corrosive conditions at temperatures up to 350 degrees F.

Long experience in our own chemical plants in handling acids and alkalis makes it possible for us to put seasoned engineering service at your disposal—without obligation, of course. Write us fully. Or if you prefer, use the coupon below.

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Uruguay Consumption of Arsenic Is 1,000 Tons

URUGUAY is reported to have an annual consumption of approximately 1,000 tons of arsenic, used principally in preparation of cattle and sheep dips, insecticides, and weed killers. Although a private concern imports this substance, arsenical preparations are distributed locally by two government agencies, the Institute of Industrial Chemistry and Department of Agriculture.

Italy's Agricultural Chemical Industry May Be Expanded

ITALY'S chemical industry is contemplating large plans for increasing self-sufficiency, despite war difficulties, according to discussions published abroad.

The industry comprises 4,500 concerns, with capital investment totaling 38,000,000,000 lire. Most of the discussion centers about expansion of the agricultural chemical industry, important to the national economy. The chemical industry supplied the country's agriculture with insecticides, fungicides, herbicides, and similar products.

As recently reported, owing to cessation of copper imports, with annual requirements of 25,000 to 30,000 tons for preparation of copper sulfate alone, sale of copper sulfate is coming under strict control.

Monsanto Turns Plant Over to the Army

THE Chemical Warfare Service's St. Louis Plant No. 1, located at Monsanto, Ill., an industrial community on the banks of the Mississippi River across from St. Louis, has been turned over to the Army by Monsanto Chemical Co., the engineering and supervising constructing contractor, on time and at a cost less than estimates and for a supervising fee less than the Government's agreement specified.

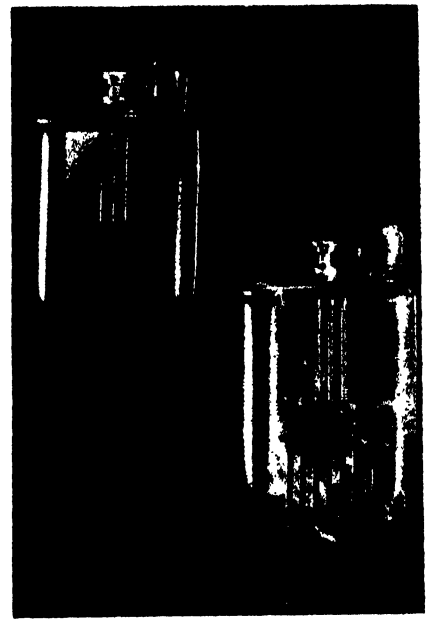
The chemicals to be produced in the plant, according to the Chemical Warfare Service's original announcement, are to be used by the service in the manufacture of gas protective equipment for troops.

Navy E and Bureau of Ordnance Awards

THE Navy E and the Navy Bureau of Ordnance flag have been awarded to the Bethlehem Foundry & Machine Co., the Monsanto Chemical Co. generally and the Anniston, Ala., and Monsanto, Tenn., plants of Monsanto specifically for outstanding performance in the production of naval ordnance materiel vital to national defense. Employees of these plants will be accorded the privilege of wearing the Navy E and the Bureau of Ordnance seal. The Monsanto ceremonies of award occurred on January 21 and 22.

John D. Schwartz, formerly at Westminster College, has joined the staff of the Ampule Department, Winthrop Chemical Co., Inc., Rensselaer, N. Y.

Plastic Hearing Aid



Shatterproof Tenite microphone housings give a neat appearance to the new Vactuphone hearing aid device. The housings are molded of the Tennessee Eastman plastic by the Columbus Plastic Products, Inc., Columbus, Ohio, for Allen-Howe Mfg. Co.

MODERN PULP AND PAPER MAKING

by George S. Witham, Sr.

SECOND EDITION — Revised and Greatly Enlarged

The second completely revised and greatly enlarged edition of this standard American treatise on the pulp and paper industry demonstrates the fact that it was written by a man who was not only a master paper-maker but thoroughly in touch with all the latest developments in paper technology. This book is not only invaluable to the technologist but also a real practical help to machine tenders, beater men, digester cooks, and other practical workers in the pulp and paper industry. The outstanding feature of the first edition of Mr. Witham's treatise was its practicality and this has been extended and accentuated in the second edition.

Special features of the revised edition include: new methods of wood preparation peculiar to the Pacific Coast and the South; new cooking processes, modifications of the sulphite process, forced circulation, etc.; new developments in recovery processes; improvements in paper machine design, and criticism of these developments based on the author's own experience; recent improvements in ground-wood manufacture; automatic control; new types of equipment — refiners, screens, thickeners, special bleaching equipment, continuous rotary filters and other things new to the industry since the publication of his first book; thorough checking and modernization of all figures as to power consumption, capacity, etc.; and great attention to new acid-resisting materials such as Monel metal, stainless steel, chromium-plate, rubber linings, etc.

An entire chapter has been added on converting and coating; the chapter on the finishing room has been greatly amplified based on the author's activities in his later years. There is much added material on tissues, glassine, boards and other specialties. The chapter on bleaching has been greatly enlarged and amply covers modern practice. At the same time all the notable features of the original book have been conserved and strengthened.

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2037	Acrolein (Stabilized with Hydroquinone) BP 51-53°	100 g.	$3.50 C
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Write for *Eastman Organic Chemicals, List No. 32*

EASTMAN KODAK COMPANY, CHEMICAL SALES DIVISION, ROCHESTER, N. Y.

Industrial Uses of Silver

SILVER, abundantly available in world markets, has been suggested as a substitute for defense-scarce copper, brass, stainless steel, and other metals by the American Silver Producers' Research Project under direction of Handy & Harman. During the past decade, quite independent of silverware, the industry has increased its consumption to several million ounces annually. Although silver is replacing some metals not available for nondefense applications, especially where material costs are low in relation to total cost, its primary industrial uses are based on its merits. This easily worked metal is obtainable in sheets, strips, rod, tube, and wire, a variety of alloys with diverse properties, and certain metals clad with silver. Its resistance to corrosion and electrical and heat conductivity are high.

Information on silver and its uses, collected by the project, 82 Fulton St., New York, is available without cost to manufacturers. Under the project the metal in a variety of forms can be consigned without charge to responsible manufacturers prepared to apply it in solution of new research and development problems.

To conserve tin, the project announces two types of lead-silver solders containing no tin. One of these is the eutectic alloy which contains 2.5 per cent silver and 97.5 per cent lead. It flows at about 580° F. The other is a proprietary alloy composed of 2.5 per cent silver, 0.25 per cent copper, and 97.25 per cent lead. It starts to melt at about 580° F. and flows at about 661° F. These relatively soft solders should not be confused with the silver brazing alloys and hard silver solders having melting points of 1175° to 1600° F. A lead-silver solder containing 2.5 per cent silver costs less than lead-tin solders in which the tin content is above 25 per cent, according to the project's report.

Silver for Bus Bars

Now that copper production can barely keep pace with defense needs, the use of silver in bus bars has been suggested. If power plants replaced copper bus bars with those made of silver, thousands of tons of high-purity copper could be released for defense applications. The silver presumably would come from reserves now idle in government vaults or from newly mined silver. It might be lent and returned later when needs for copper are less pressing.

Silver is the best electrical conductor known and has other excellent physical properties suiting it for use in bus bars. It is easily fabricated and can be silver soldered or brazed with silver alloys in the same way that copper bus bars are brazed.

Loosening Glass Stopcocks and Glass Fittings

IT IS common experience in all laboratories where glass equipment is used intermittently by various chemists that a certain percentage of equipment having glass stopcocks become valueless because of frozen stopcocks. Heretofore, a flame or, in the case of ordinary flint glass stopcocks, hot water has been used to loosen the plug. In most cases, the result is either a broken stem or cracked valve seat.

An extremely simple method of loosening these stopcocks or any frozen glass fitting is to immerse the equipment in a dilute solution of Aerosol OT (du Pont), made by adding 1 ounce of 10 per cent Aerosol OT to 1 liter of water. The frozen glass stopcock is allowed to stand immersed in the solution until it can be turned freely. This usually takes from 2 to 24 hours, depending on the condition of the equipment.

CLINTON L. TAYLOR

HILTON-DAVIS CHEMICAL CO.
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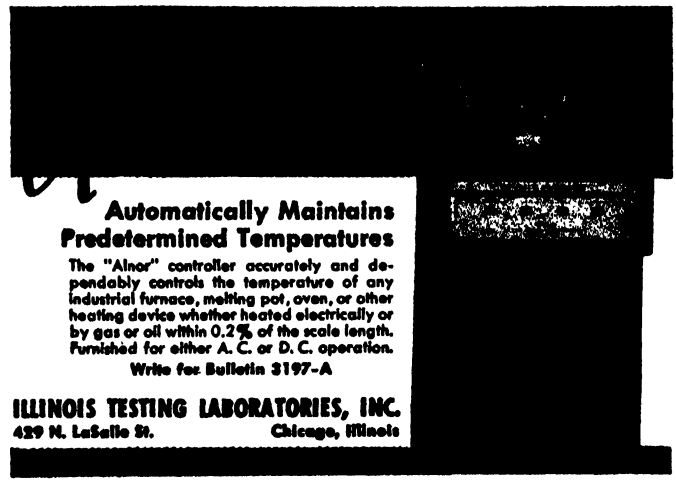
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- what type of protecting tube to use for your application? See Page 14.*
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* The above page numbers are from the New Wheelco Thermocouple Data Book and Catalog. Temperature conversion tables, pipe and wire sizes, wire resistances, millivolt tables, decimal equivalents, etc., are also included in this valuable book. Write for your copy TODAY!

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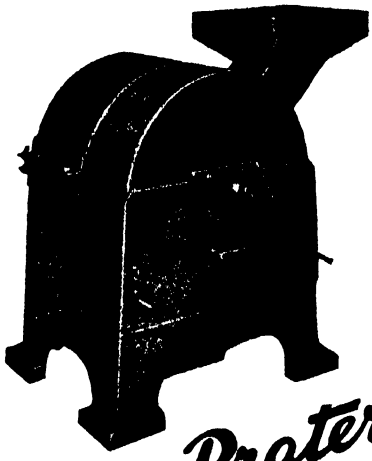
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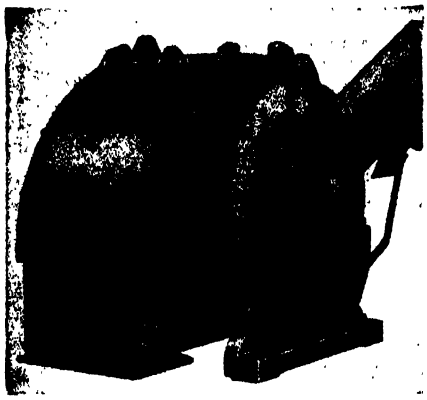
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The process industries are facing terrific demand. Not only must they take on the burden for goods of war—they must also supply materials to replace those ordinarily used for goods of peace. Dependable high production equipment is a necessity.

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Every Prater Mill is sold on a basis of guaranteed output per horsepower hour and control of quality of grind, and grain size, after analysis of your problem.

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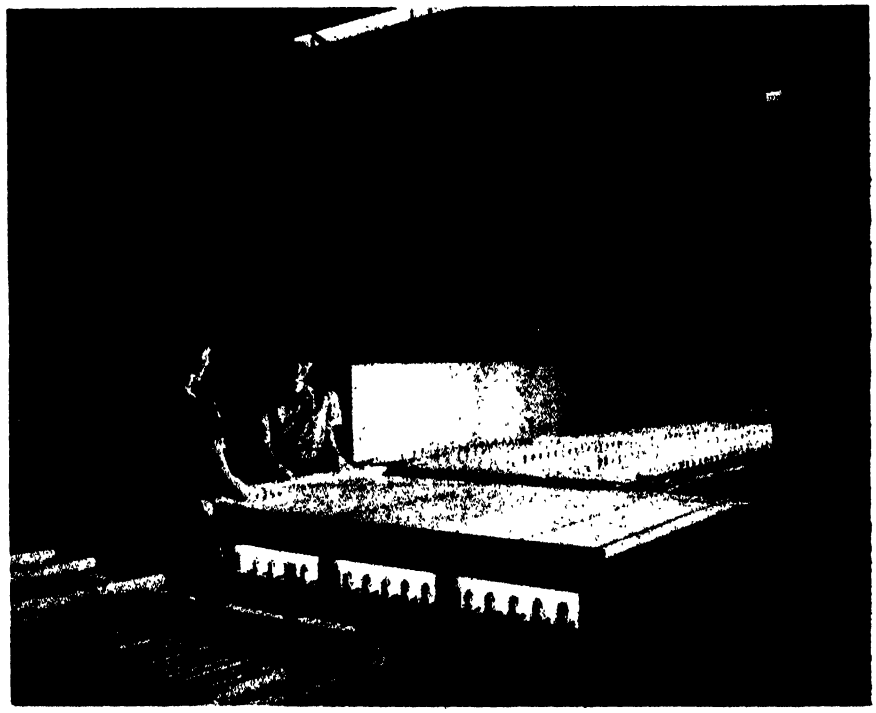
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1825 South 55th Avenue, Chicago, Illinois

THE WALL STREET OF CHEMISTRY

	Annual Earnings		Per Common Share	
	1940	*1941*	*1940*	*1941*
American-Marietta Co.	$105,145	$244,311	$0.88	$2.44
General Tire & Rubber Co.	595,017	1,218,569	0.85	2.05
Hercules Powder Co.	5,807,769	6,098,712	4.01	4.23
Hooker Electrochemical Co.	1,089,027	1,182,511	3.71	4.12
Rustless Iron & Steel Corp.	1,275,993	2,332,298	1.28	2.42
	Six Months' Earnings			
American Agricultural Chemical Co.	240,300 (loss)	336,189	..	0.53
Lehn & Fink Products Corp.	312,873	348,387	0.78	0.87

The **Hercules Powder Co.** reports that net sales of goods and services for 1941 were $85,612,161, an increase of 63.3 per cent over the previous year, in addition to which the company was engaged on large projects for the construction and operation of munitions plants for the Government. Approximately $4,887,000 was spent during the year in the improvement and expansion of plant facilities, consisting largely of reconstruction of the Kenvil, N. J., plant damaged by explosion and additions to capacities of plants for the production of cellulose acetate, ethyl cellulose, chlorinated rubber, nitric acid, purified cotton linters, and synthetic resins. On December 31, 1941, the board of directors declared a regular quarterly dividend of 1.5 per cent on preferred, payable February 13 to stockholders of record February 2. A year-end dividend of $1.20 a share on common was declared payable December 19 to stockholders of record on December 8.

The **General Refractories Co.** has completed the sale to insurance companies of $3,000,000 principal amount 3.25 per cent promissory notes, due January 1, 1957. Out of the proceeds the company has paid its outstanding 3.75 per cent first mortgage sinking fund bonds, due January 1, 1949, and the balance is to be used for modernization and expansion of present plants, purchase and conversion of a face brick plant at Malakoff, Tex., into a fire brick plant, advances to the company's Cuban subsidiary for purchase and development of chrome ore leases in Cuba, advances to the Northwest Magnesite Co. for increasing facilities, and additional working capital.



Fluorescent Lamp Production

Drying fluorescent coating inside glass tubes at the new Westinghouse Fairmont, W. Va., works. All the lacquer, which is used to deposit evenly the fluorescent coating, is removed by the high temperature of the oven. The plant was designed to make 100 lamps per minute.

Refiners Spend $20,000,000 Yearly for Research

A PETROLEUM-CHEMICAL industry whose "limits of further expansion would be hazardous to predict", in the opinion of two U. S. Bureau of Mines experts, has been developing through the past decade. Continuing research programs on which the refining industry is spending about $20,000,000 annually foretell rapid expansion in the future.

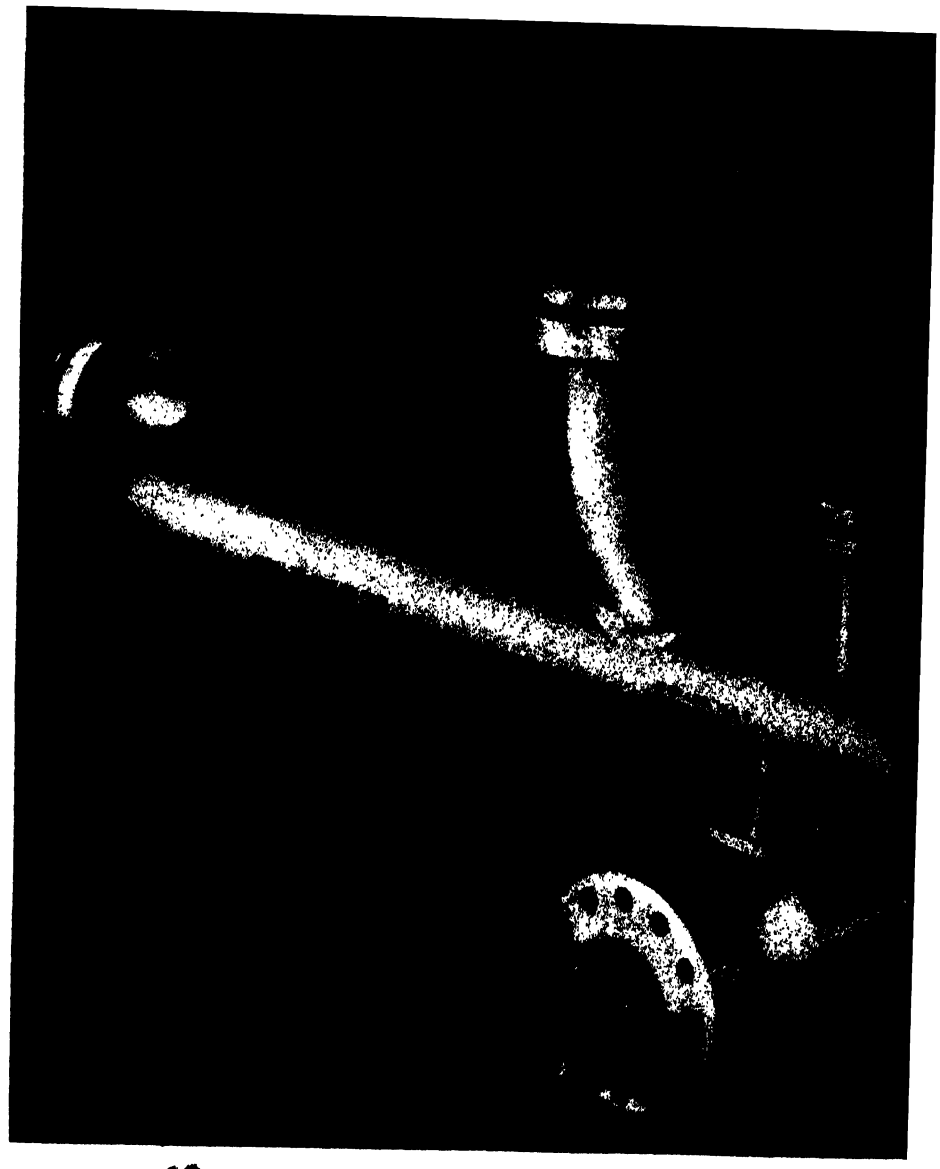
Among major industries that maintain research laboratories, H. C. Miller and G. B. Shea of the bureau's technical staff report, the growth of petroleum research has been the most rapid in the past decade. Next to the chemical industry, more workers are engaged in petroleum research than in any other industry. According to available information, less than 1,000 employees were engaged in petroleum research in 1927, compared with more than 5,000 in 1938, representing one eighth of all the research workers employed by all industries in the United States during that year.

Technologists trace development of petroleum refining from simple distillation through thermal cracking to the many catalytic-synthetic processes introduced since 1930, the third period in the advance of refining. The industry can obtain virtually what it desires from petroleum and its gaseous hydrocarbons by an increasing variety of catalytic and synthetic processes, which give the flexibility so desirable and necessary for profitable operations, they report.



Plastic Vacuum Sweeper

Tenite replaces aluminum in the Premier Pic-Up hand vacuum sweeper. This change in material not only saves metal vital to war industries but, due to the nonabrasive surface of the plastic, it also minimizes danger of scratching furniture. It is molded of the Tennessee Eastman product by Zenith Plastics, Inc., Cleveland, Ohio, for the Electric Vacuum Cleaner Co.



WHEN defense orders necessitate added power piping in your plant, take this short-cut through the special engineering and prefabrication problems that precede installation. "Give the plans to Grinnell", and you'll "sub-contract" all the troubles of interpreting super-pressure steam requirements into super-power piping.

Grinnell engineers are power specialists, qualified by long experience to interpret even the most complex power problems into speedily-erected, underwriter-approved piping systems. Grinnell plants, strategically located to serve defense industries, are equipped with every last facility to prefabricate these systems.

Grinnell is helping leading manufacturers, utilities and process plants to meet defense needs for added power. Write for Data Book, "Grinnell Prefabricated Piping". Grinnell Company, Inc., Executive Offices, Providence, Rhode Island. Branch Offices in principal cities of the United States and Canada.

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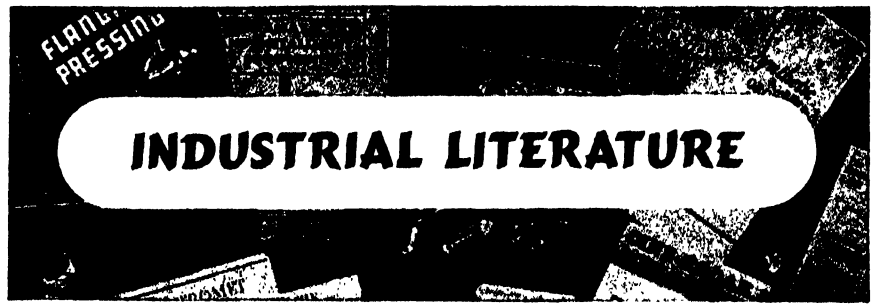
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Here is Chemical Equipment whose corrosion resistance does not depend on merely a surface lining... HAVEG is corrosion resistant throughout its entire mass. HAVEG is a strong, tough and durable molded plastic... impervious to rapid temperature changes... unaffected by temperatures up to 265° F. It is being successfully used in acetic acid service... hydrochloric... hydrofluoric... sulphuric up to 50% concentration.

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INDUSTRIAL LITERATURE

Listed publications should be requested directly from the company concerned. Use business stationery, mention bulletin numbers, and refer to this journal. Publications will be sent free unless otherwise noted.

High-Pressure Condensate Return. A 4-page bulletin lists 50 industries in which increases in production rates and fuel savings are made by use of this system, and describes a typical installation with diagram. *Publication 3025 IE.* COCHRANE CORP., 17th and Allegheny Ave., Philadelphia, Penna.

Laboratory Rheostats. Jagabi Lubritact laboratory rheostats are described in a 4-page illustrated bulletin. *Bulletin 1705-IE.* JAMES G. BIDDLE CO., 1211 Arch St., Philadelphia, Penna.

Light Reflection. A bulletin entitled "Better Light Reflection—More Production" points out with graphs and figures the importance of proper lighting. *Bulletin 533-IE.* THE TRUSCON LABORATORIES, Caniff & G. T. R. R., Detroit, Mich.

Pipet Aspirator. This pamphlet describes a handy device which fits any size pipet. It will draw up a desired quantity of solution and discharge with accuracy greater than 0.01 cc. *Once Again... Progress Speaks Pamphlet IE.* THE CAMPBELL CO., Hammonton, N. J.

Plexiglas. A manual of 47 pages details storage, handling, forming, cementing, and repairing of this plastic material. Prepared specifically for the Army, Navy, and industrial firms using Plexiglas in defense manufacture, the publication is available to other users of thermoplastics. *Plexiglas Fabricating Manual IE.* RÖHM & HAAS CO., 222 West Washington Square, Philadelphia, Penna.

Porcelain Enamel. This 24-page booklet discusses the different types of porcelain enamels and describes the drying trays, cascade pans, small tanks, and screens to which they are applied. *Vitreo for Process Industries Booklet IE.* VITREOUS STEEL PRODUCTS CO., Cleveland, Ohio.

Power Recording Instruments. A 28-page catalog covers the use of continuous-recording load meters. Equipment is listed which can telemeter over practically any distance, and totalize the load of almost any number and combination of generators, stations, and tie lines. *Catalog N-58-161 IE.* LEEDS & NORTHRUP CO., 4934 Stenton Ave., Philadelphia, Penna.

Pressure Filter. A pamphlet describes a continuous rotary leaf pressure filter. Other products, including filters, evaporators, and process equipment, are listed. *McCaskell Continuous Rotary Leaf Pressure Filter Pamphlet IE.* GOSLIN-BIRMINGHAM MFG. CO., INC., Birmingham, Ala.

Pumps. This attractive 24-page catalog on vertical pumps gives a series of comparisons between detailed installation drawings and the case histories of such installations in use. Seven types of operations are shown. *Bulletin 29-A107 IE.* POMONA PUMP CO., 206 East Commercial St., Pomona, Calif.

Resin and Lacquer Emulsions. A 3-page mimeographed paper discusses the behavior of emulsions and dispersions of resins and lacquers. *Theory, Practice, and Uses of Resin and Lacquer Emulsions Pamphlet IE.* AMERICAN RESINOUS PRODUCTS CORP., Peabody, Mass.

Rotamatic Controller. This publication is a new addition to the rotameter series, capable of controlling flow automatically. The unit, consisting of a rotameter with attached induction transmitter, remote recorder, and air-controlled diaphragm motor valve, is supplied for either liquids or gases. *Catalog Section 51-B IE.* FISHER & PORTER CO., Hatboro, Penna.

Rotary Kilns. A well-illustrated 16-page bulletin shows rotary kilns in various stages of manufacture and installation and describes auxiliary equipment. Some of the latest contributions to rotary kiln design are given. *Bulletin 770 IE.* KENNEDY-VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York, N. Y.

Rotary Pumps. An 8-page bulletin is devoted to helical-gear, spur-gear, and plunger pumps capable of handling viscous or nonviscous, hot or cold, or even abrasive liquids. Also shown are high-vacuum units. A convenient index, based on liquids to be pumped, is included. *Bulletin 19 IE.* KINNEY MFG. CO., Boston, Mass.

Sludge and Sewage Pumps. A 4-page bulletin describes a line of pumps designed to handle liquids containing various solid and fibrous materials in suspension. *Bulletin 206-2 IE.* LAWRENCE MACHINE AND PUMP CORP., 371 Market St., Lawrence, Mass.

Stainless Steel Casting Alloys. A 4-

page bulletin lists the designations, analyses, and physical properties of these corrosion- and heat-resistant casting alloys. *Stainless Steel Castings Reference Chart IE.* LEBANON STEEL FOUNDRY, Lebanon, Penna.

Traps. A recently revised 16-page bulletin gives complete information on construction features, operating principles, installation, and operation of Yarway impulse steam traps. *Bulletin T-1736 IE.* YARNALL-WARING CO., Chestnut Hill, Philadelphia, Penna.

Tube Stills and Heaters. This 4-page bulletin discusses uses and advantages of portable and sectional tube stills and heaters. These units provide a new low-cost method of heating crude, fuel oil, asphalt, water, and other liquids. *Bulletin 41 IE.* INDUSTRIAL ENGINEERS, INC., 819-A East 59th St., Los Angeles, Calif.

Vibrating Screens. A 4-page illustrated bulletin describes the Style M Robins-Vibrex vibrating screen. *Bulletin 118-IE.* ROBINS CONVEYING BELT CO., Passaic, N. J.

Water Purification. An 8-page illustrated bulletin describes the Model A Sterozone unit for water purification, including a flowsheet and analysis of Sterozone-treated water. *Bulletin IE.* TECHNICRAFT ENGINEERING CO., DIVISION OF LANE-WELLS CO., 5610 South Soto St., Los Angeles, Calif.

Wet Dust Collectors. A 16-page illustrated bulletin covers the theory and operation of a series of wet-type dust collectors, said to be free from maintenance requirements. A method of recovering water for re-use is shown. *Bulletin 110 IE.* CLAUDE B. SCHNEIBLE CO., 3951 Lawrence Ave., Chicago, Ill.

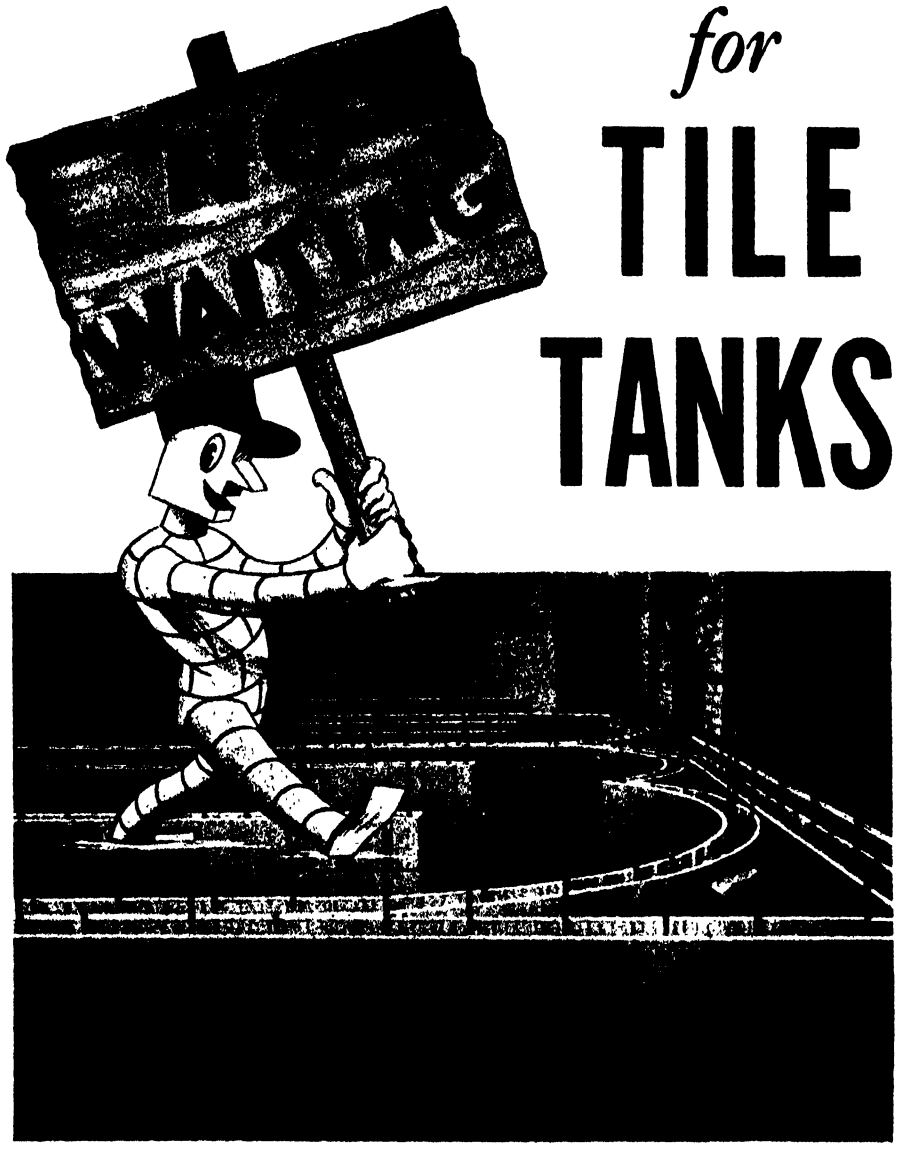
Worm Gear Drives. This 8-page pictorial booklet is devoted to the service performance of Cleveland drives, based on experience in a variety of industries. *Form 160 IE.* CLEVELAND WORM & GEAR CO., 3277 East 80th St., Cleveland.

Zeolite Softeners. A 12-page bulletin discusses the theory and operation of Zeolite softeners. Six methods for softening water are shown on a flow chart. *Form 307 IE.* GRAVER TANK & MFG. CO., INC., East Chicago, Ind.

Zeolite Water Purifier. This bulletin describes a Zeolite purifier unit said to produce water comparable to that which has been single-distilled. Other products mentioned in the bulletin are feed-water treatment plants, Zeolite softeners, and filters. *Distilled Water Without Heat Bulletin IE.* ILLINOIS WATER TREATMENT CO., 840 Cedar St., Rockford, Ill.

Direct Radiant Gas-Fired Kilns

DIRECT firing of ceramic kilns with radiant refractory-cup gas burners, pioneered 14 months ago in the 125-foot circular bisque kiln at Lenox, Inc., Trenton, N. J., has now been applied by at least seven producers to 13 kilns. The latest contracts announced by the Selas Co., Philadelphia, Penna., cover kilns for Globe Union, Inc., Milwaukee, Isolantite, Inc., Belleville, N. J., and Henry L. Crowley & Co., West Orange, N. J.



Firms wishing to store sludges, brines, bleaching solutions, process water, pulps, dust, salts, granular products, etc., need not be inconvenienced. We can provide a tile tank or silo for these purposes which has these significant advantages:

(1) The durability of reinforced concrete
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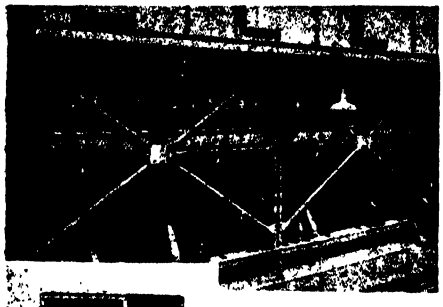
The call today is for speed and more speed. There is no time to try this or try that; materials and men are too precious to waste on experiments.

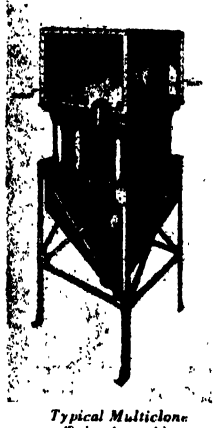
That's why plant owners turn instinctively to Western Precipitation when they have a dust problem to solve.

Dust out of control leads to litigation, impairs health, lowers employee efficiency, and destroys buildings and machinery.

Multiclones eliminate these dangers. They combine the advantages of low first cost, low operating cost, compactness and high efficiency. Multiclones are fireproof. They have no cloth parts to clog, to be cleaned or replaced.

In addition to the collection of fly ash and all kinds of nuisance dusts, Multiclones are widely used in the process industries for the final collection of the output from spray dryers, crushers, pulverizers and other manufacturing equipment.





180-tube Multiclone Capacity 72,500 c.f.m.

●

Write today for complete information on Multiclone Dust Collectors



Typical Multiclone Tube Assembly

WESTERN PRECIPITATION CORPORATION
1014 West Ninth St., Los Angeles, California
PRECIPITATION CO. OF CANADA, LTD.
Dominion Square Building, Montreal
BRANCH OFFICES IN PRINCIPAL CITIES

MULTICLONE

Business Statistics

WE ARE indebted to the Manufacturing Chemists' Association, 608 Woodward Bldg., Washington, D. C., for the following figures showing business conditions.

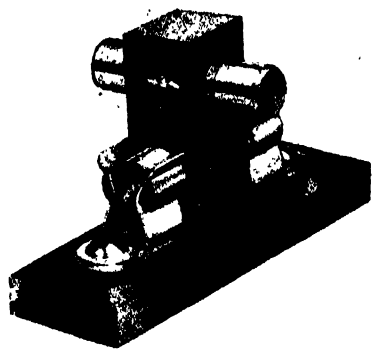
Monthly Statistical Report on Business Conditions

	Seasonally Adjusted			Without Adjustment		
	December 1941	November 1941	December 1940	December 1941	November 1941	December 1940
(Base 1935–39 = 100)						
Industrial production[a]	168[b]	166	139	165[b]	167	136
Chemical production	153[b]	149	121	154[b]	151	122
Steel production	212	207	181	212	207	181
Pig iron production	190	184	173	190	184	173
Freight car loadings	137	135	119	128	141	112
(Base 1923–25 = 100)						
Construction contracts, residential	68[b]	74	90	58[b]	71	77
All other	186[b]	189	136	145[b]	163	106
Department store sales, value	110[b]	116	101	195[b]	132	179

	December 1941	November 1941	December 1940
Index of factory employment[c]:			
All manufacturing	134.0[b]	134.7	116.2
Chemicals	186.5[b]	184.9	149.9
Drugs	149.4[b]	148.2	115.8
Fertilizers	105.8[b]	101.2	95.0
Compressed gases	143.6[b]	140.8	122.8
Index of factory pay rolls[c]:			
All manufacturing	169.8[b]	165.2	122.4
Chemicals	271.0[b]	264.6	187.9
Drugs	183.5[b]	189.2	130.7
Fertilizers	104.4[b]	99.1	80.5
Compressed gases	169.1[b]	165.6	132.1
(Base 1926 = 100)			
Wholesale price indexes:			
All products (except farm products and foods)	93.7	93.5	84.1
Chemicals	88.6	88.3	85.4
Drugs and pharmaceuticals	123.0	123.2	96.2
Fertilizer materials	77.8	77.3	70.0
Purchasing power of the dollar:			
All products (except farm products and foods)	$1.068	$1.070	$1.189
Chemicals	1.129	1.132	1.171
Drugs and pharmaceuticals	0.813	0.811	1.040
Fertilizer materials	1.287	1.292	1.429
Automobile retail sales:			
Passenger	185,821	198,271	317,379
Truck	78,999	64,536	60,728
Total	264,820	262,807	378,107

[a] Source of statistics in first seven items: Federal Reserve Board.
[b] Preliminary figures.
[c] U. S. Department of Labor.

New Fuse Unit



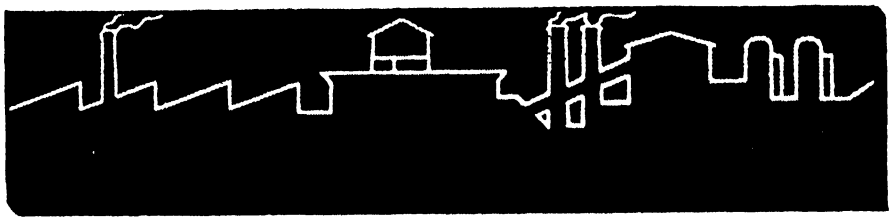
A NEW convenience for changing fuses in close quarters and giving notice on inspection that another spare is required is embodied in a spare fuse holder and puller combined, announced by Littlefuse, Inc., 4797 Ravenswood Ave., Chicago, Ill.

Shellac Substitute

J. EHRLICH, Beverly Hills, Calif., has developed a new phenolic resin that shows promise as a shellac substitute. The resin is of the fusible type but is a glassy solid at room temperature. It yields clear, very concentrated solutions in either alcohol or aqueous caustic soda.

THE Irvington Varnish & Insulator Co., Irvington, N. J., announces its new Fibronized Koroseal Tubing designed for use as electrical insulation by manufacturers in the electronic, instruments, and power industries.

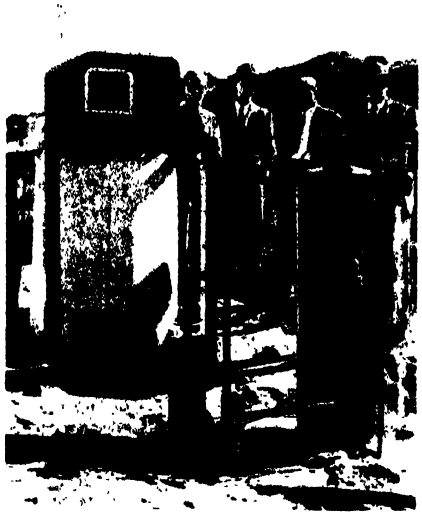
This insulation was developed by Irvington's Fibron Division from B. F. Goodrich Co.'s product, Koroseal.



Synthetic p-Cymene

PRODUCTION of synthetic *p*-cymene (structurally *p*-methylisopropyl benzene) from liquid terpenes is announced by the Hercules Powder Co., Wilmington, Del. A new unit for the production of the material is nearing completion at the Brunswick, Ga., naval stores plant of the company. An important use of *p*-cymene has been as an intermediate in the manufacture of phenols, carvacrol, thymol, and the cyclic alcohol, menthol. The essential oil industry consumes substantial quantities of carvacrol in the manufacture of odorants used in soaps.

Portable Water Purifier



A PORTABLE, automatic unit that produces pure, clear, colorless, tasteless, odorless water without the use of chlorine or other chemicals has been developed by the Technicraft Engineering Co., 5610 South Soto St., Los Angeles, Calif. The unit, known as the Sterozone Model B, has a capacity in excess of 1,200 gallons per hour and can be installed on any tank or water storage container. For field use a 250-gallon canvas bag is used. Power is supplied from 110-volt, 50- to 60-cycle outlet or by a portable gasoline-electric generator. Operation is entirely electrical. No chlorine or other chemicals now restricted for military requirements are needed.

Strip Welder

A LOW-COST installation for welding together ends of strips has recently been developed by the Progressive Welder Co., East Outer Drive, Detroit, Mich. It consists of two air-operated series connected guns for spot welding, a notched bar to locate welds, and a control handle to move the gun along, the entire assembly being supported from an I-beam section above which the welding transformer is located.

Deep-Well Turbine Pumps

PROVIDING the main source of water supply for the $63,000,000 Basic Magnesium reduction plant near Boulder City, Nev., the Peerless Pump Division of the Food Machinery Corp., San Jose, Calif., reports the novel design of 6 high-capacity deep-well turbine pumps.

Each of these pumps, mounted on steel piers extending 200 feet out into Lake Mead, is capable of delivering 3,800 gallons of water per minute, or a combined potential capacity of 32,000,000 gallons daily.

Basic Magnesium, Inc., plans to have the Boulder Dam reduction plant deliver 112,000,000 pounds of metallic magnesium a year. The plan is to mine the ore at Gabbs and Mead, Nev., and truck it about 200 miles to the reduction plant. The plant needs 196,000 kilowatts of cheap power and 9,000,000 gallons of water daily. The power is available only at the Boulder Dam Power House and the only water source in the whole dry area is Lake Mead, formed by the trapped waters of the Colorado River.

The selection of these pumps follows the installation of 30 giant Peerless Hydro-Foil propeller-type pumps by the Dow Chemical Co. in the magnesium plant at Houston, Tex. These huge pumps individually deliver up to 100,000 gallons per minute against heads of up to 60 feet and are being used in extracting magnesium from sea water. This was the process that earned Dow the 1941 Chemical Award for the outstanding achievement of the year.

Vibrex Vibrating Screens

THE Style M Robins-Vibrex, a high-speed, unbalanced pulley type vibrating screen that will stand up to overloads, is announced by the Robins Conveying Belt Co., Passaic, N. J.



The new screen has a number of features designed to save power, lubricant, screen cloth, and general maintenance costs. Oil-lubricated bearings are supersealed by means of double-action flingers and completely welded splash and dust guards. Inclination of screen, amplitude of vibration, and operating speed may all be varied in order to obtain maximum flexibility of application.

Low-Visibility Paint

A NEW type of low visibility paint, possessing exceptional heat-deflecting qualities, has been developed by The Arco Co., Cleveland, Ohio, for use in the protective concealment of vital defense structures



WATER
FOR A NATION AT WAR!

To the East and to the West, we are looking straight into the cannons of war. From within we face the inevitable saboteur. It is time to become grim, cautious and determined in our war aims and actions. We must win this war and do a good job of it. We will fight with men, metals, fuel, power, food, water and materials of all kinds.

Never before has water been a more vital necessity. Beyond its task of serving men, materials and machines, water now also must guard against fire . . . protect factories, equipment, supplies, homes . . . and lives.

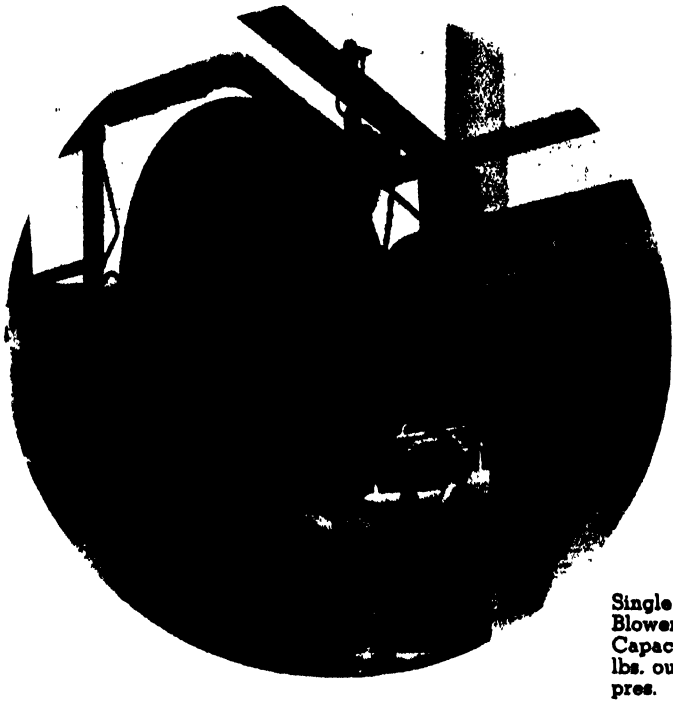
As in the strenuous days of defense preparation, Layne now is ready, fully equipped and speedily engaged in an even greater task . . . that of providing water for a Nation at war. This activity includes service to the Military and Naval forces, essential industries and necessary repair work.

Check your water supply and install necessary wells and pumps. See that all present wells and mechanical equipment are placed in good order and kept ready for any emergency. Repairs to existing equipment will conserve material needed for war purposes.

LAYNE & BOWLER, INC.
Memphis, Tenn.

LAYNE
PUMPS & WELL WATER SYSTEMS
Affiliated Companies

Layne-Arkansas Company.....Stuttgart, Ark.
Layne-Atlantic Company.....Norfolk, Va.
Layne-Central Co.....Memphis, Tenn.
Layne-Northern Company.....Michawaka, Ind.
Layne-Louisiana Company.....Lake Charles, La.
Layne-New York Co.....New York City.
Layne-Northwest Company.....Milwaukee, Wis.
Layne-Ohio Company.....Columbus, Ohio
Layne-Texas Company.....Houston, Texas.
Layne-Western Company.....Kansas City, Mo.
Layne-Western Co. of Minn.....Minneapolis, Minn.
Layne-Bowler New England Corp.....Boston, Mass.
International Water Supply, Ltd.....London, Ont.



Single stage Centrifugal Blower in Eastern refinery. Capacity, 11,750 CFM, 3 lbs. outlet pres., 14.3 inlet pres.

BLOWER DESIGN *TO MEET YOUR REQUIREMENTS*

If your air or gas handling problem is constant pressure with variable volumes, a Roots-Connersville Centrifugal Blower, with motor drive, may be the answer.

But what about specific service conditions? They may be corrosive gases, high temperatures, space limitations, adaptations to other equipment, etc. These factors call for specialized knowledge and experience to build a blower to suit your requirements.

That's where Roots-Connersville can step in and assume the burden. Hundreds of successful installations are proof of our ability to help you. Write us about your needs.

ALL OUT for VICTORY

Roots CONNERSVILLE SINCE 1854 Centrifugal

BLOWERS · EXHAUSTERS

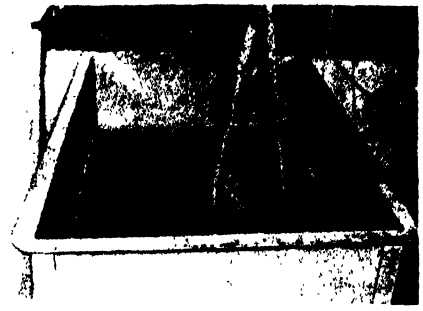
Single stage "R-C" units handle pressures up to 3 lbs. Multi-stage units up to 30 lbs. Capacities from 100 to 50,000 CFM.

ROOTS-CONNERSVILLE BLOWER CORPORATION

202 Georgia Avenue — Connersville, Indiana

and equipment. Already in use on certain government properties, the new paint meets tentative Navy specifications for infrared reflecting paints for use on fuel storage tanks, buildings, and certain types of equipment where dark colors as well as heat-reflecting qualities are required. It is offered commercially under the trade name "Infray" and is being manufactured in green, tan, black, and four intermediate shades.

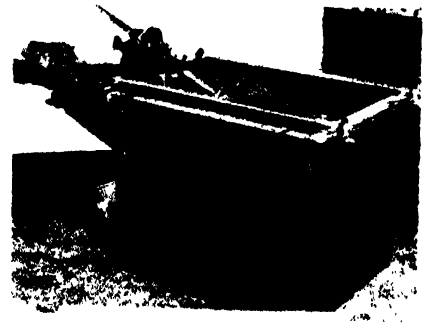
Substitute for Trichloroethylene Degreasing



ANNOUNCEMENT is made of a new mineral grease and dirt digestive solvent, called Gunk X-11, available from the Curran Corp., Malden, Mass. This is available in the form of a concentrate which may be diluted with a grease solvent before use to charge large open cleaning tanks or vats. The newly developed digestive solvent tank is a substitute for trichloroethylene vapor-phase metal-cleaning tanks, particularly in heavy-duty automotive or similar applications where there is much insoluble dirt or smut to be removed.

The cleaning is carried out by cold immersion of greasy or dirty parts. The new solvent not only takes the cling out of hard mineral dirt and grease accretion, but emulsifies them so that they may be instantly and completely rinsed away by sluicing with a water hose.

Motor-Driven Oblique Plating Barrel



AN IMPROVED oblique plating barrel drive has been developed by the Hanson-Van Winkle-Munning Co., Matawan, N. J. This Type 34 oblique barrel is available in a new model, directly driven by a 1/6 hp. motorized worm-gear reducer which is suitably mounted on the tank, ready for connection to power lines. The arrangement readily permits the removal of the cylinder for rinsing, loading, and unloading of the work.

CHEMICAL MARKET PRICES

January 30, 1942

Compiled from weekly current price listings in the *Oil, Paint and Drug Reporter*, with permission of the publisher under its copyright. These prices, unless otherwise specified, are those prevailing in the New York market for technical grades in usual large commercial quantities.

Acetaldehyde, drums, c/l., wks.	lb.	.11
Acetamide, tech., kegs, 500-lb. lots, works	lb.	.30
Acetanilide, tech., powd., bbls.	lb.	.27
Acetic anhydride, drums, c/l., frt. allowed	lb.	.11½
Acetone, C. P., drums, c/l., dlvd.	lb.	.08½
Acetophenetidin, bbls., 1000 lbs.	lb.	1.00
Acetophenone, drums, 100 lbs.	lb.	1.55
Acid, abietic, drums, c/l.	lb.	.08¼
Acetic, 28%, bbls., c/l.	100 lbs.	3.28
56%, bbls., c/l.	100 lbs.	5.58
Glacial, synth., drums, c/l.	100 lbs	9.40
Glacial, U. S. P., drums, c/l.	100 lbs.	11.20
Acetylsalicylic, U. S. P., bbls.	lb.	.40
Anthranilic, tech., bbls.	lb.	.75
Battery, cbys., c/l., E. wks.	100 lbs.	1.60
Benzoic, tech., bbls.	lb.	.43
Boric, tech., gran., bags	ton	99.00
Butyric (99%), drums, c/l., wks.	lb.	.22
Chloroacetic, mono-, tech., bbls. wks.	lb.	.17
Chlorosulfonic, drums, c/l., wks.	lb.	.03
Chromic, 99%, drums	lb.	.16¼
Cinnamic, bottles	lb.	3.50*
Citric, cryst., bbls., c/l.	lb.	.20
Cresylic, H. B., 210–215°, drums, c/l, wks., frt. equal	gal.	.81
Formic, 90%, cbys., f. o. b. works, c/l.	lb.	.10½
Gallic, tech., bbls.	lb.	1.10
Hydriodic, 57%, 5-lb. bot.	lb.	2.90
Hydrobromic, 34%, cbys.	lb.	.35
Hydrochloric, 20°, tanks, wks.	100 lbs.	1.15
Hydrofluoric, 30%, bbls., wks.	lb.	.06
60%, lead cbys.	lb.	.14
Hydrofluosilicic, 30%, bbls., wks.	lb.	.09
Hypophosphorus, U. S. P., 30%, 5-gal. demis.	lb.	.75
Lactic, dark, 22%, bbls.	100 lbs.	2.90
Light, 22%, bbls., wks.	100 lbs.	3.90
Maleic, powd., drums	lb	.30
Mixed, tanks, wks. N unit.	lb.	.05
S unit.	lb.	.0085
Naphthenic, 220–230, drums	lb.	.10
Nitric, C. P., cbys.	lb.	.13
36° cbys., c/l., wks.	100 lbs.	5.00
Oxalic, bbls., wks.	lb.	.11¼
Phosphoric, U. S. P., 50%	lb.	.10½
Picramic, kegs	lb.	.65
Picric, bbls.	lb.	.35
Pyrogallic, tech., bbls.	lb.	1.45
Salicylic, tech., bbls.	lb.	.33
Stearic, distilled, d. p., bags, dlvd.	lb.	.15
Sulfanilic, tech., 250-lb. bbls.	lb.	.17
Sulfuric, 66°, cbys., c/l., E. wks.	100 lbs.	1.50
66°, tanks, E. wks.	ton	16.50
60°, tanks, E. wks.	ton	13.00
Oleum, 20%, tanks, E. wks.	ton	18.50
Tannic, tech., bbls.	lb.	.71
Tartaric, U. S. P., cryst., bbls.	lb.	.70½
Tungstic, pure, 100-lb. pkg.	lb.	2.86
Alcohol, ethyl, 190 proof, from molasses, drums, c/l.	gal.	3.19
Amyl, from pentane, tanks	lb.	.131
Butyl, normal, tanks, frt. allowed	lb.	.12½
Cinnamic, bottles	lb.	3.00
Denatured, C. D. 14, drums, c/l., wks., E.	gal	.65
Diacetone, tech., drums, c/l.	lb.	.11
Furfuryl, tech., drums, c/l., wks.	lb.	.30
Isobutyl, ref., drums, works	lb.	.0860
Alcohol, isopropyl, ref., 91%, drums, c/l., f. o. b. dest.	gal.	.40½
Wood, *see* Methanol		
Aldol, 95%, drums, c/l., wks.	lb.	.12
Alpha-naphthol, bbls.	lb.	.52
Alpha-naphthylamine, bbls.	lb.	.32
Alum, ammonia, lump, bbls., wks.	100 lbs.	4.25
Chrome, bbls.		.12½
Potash, lump, bbls., wks.	100 lbs.	4.50
Soda, bbls., wks.	100 lbs.	3.25
Aluminum, metal, 98–99%, drums, c/l.	lb.	.15
Chloride, anhyd., commercial, drums extra, c/l., wks.	lb.	.08
Stearate, bbls., c/l.	lb.	.23
Sulfate, comm'l, bags, c/l., wks., frt. equal	100 lbs.	1.15
Iron-free, bags, wks.	100 lbs.	1.75
Ammonia, anhydrous, fertilizer, f. o. b. wks., frt. equalized	ton	90.00
Pure, cyls.	lb.	.16
Ammonia, aqua, 26°, tanks (on NH_3 content), f. o. b. wks.	lb.	.04
Ammonium bicarbonate, drums	lb.	.0564
Bifluoride, bbls.	lb.	.15½
Bromide, bbls.	lb.	.31
Carbonate, tech., bbls.	lb.	.08¼
Chloride, gray, bbls.	100 lbs.	5.50
U. S. P., gran., bbls.	lb.	.12
Iodide, 25-lb. jars	lb.	3.65
Linoleate, 80%, anhyd., bbls.	lb.	.12
Nitrate, tech., bags, c/l., wks.	100 lbs.	4.35
Oleate, bbls.	lb.	.14
Oxalate, kegs	lb.	.23
Persulfate, cases	lb.	.21
Phosphate, dibasic, tech., bbls.	lb.	.07¼
Sulfate, bulk, c/l., f. o. b. cars, ports contract	ton	29.00
Sulfide, liq. 40–45%, basis 100%, tanks, dlvd.	lb.	.07½
Amyl acetate, from pentane, tanks, frt. allowed	lb.	.14½
Chloride, mixed, tanks, wks.	lb.	.06
Mercaptan, drums, l. c. l., wks.	lb.	1.10
Oleate, drums, l. c. l., wks.	lb.	.31
Stearate, drums, l. c. l., wks.	lb.	.32½
Amylene, tanks, wks.	lb.	.09
Anilin oil, drums	lb.	.15
Anthraquinone, subl., bbls.	lb.	.70
Antimony, chloride, soln., cbys.	lb	.17
Needle, Bolivian, 67%	lb.	.18½
Oxide, bags, c/l.	lb.	.15
Salts, 65%, bbls.	lb.	.34
Argols, test 75–80%, basis 100%, f. o. b. Spanish ports	100 kilos	105.00
Arsenic, metal, kegs	lb.	No prices
White, c/l., kegs	lb.	.04
Arsenous chloride, cans	lb.	4.85
Barium carbonate, natural, 99%–200 mesh, bags, c/l., wks.	ton	43.00
Chloride, tech., cryst., bgs., c/l.	ton	77.00
Dioxide, drums, wks.	lb.	.10
Hydroxide, bbls., wks.	lb.	.06
Nitrate, casks	lb.	.10½
Barytes, floated, 350-lb. bbls., wks.	ton	27.65
Benzaldehyde, tech., drums	lb.	.45
Benzidine base, bbls.	lb.	.70
Benzol, tanks, frt. allowed E. of Omaha	gal.	.15
Benzoyl chloride, carboys	lb.	.23
Benzyl acetate, F. F. C., drums	lb.	.55*
Beta-naphthol, tech., bbls.	lb.	.23
Beta-naphthylamine, tech., kegs	lb.	.51
Bismuth, metal, ton lots	lb.	1.25
Bismuth nitrate, cans	lb.	1.30
Oxychloride, kegs	lb.	3.10
Subnitrate, powd., barrels	lb.	1.20
Blanc fixe, dry, bags, c/l.	ton	60.00
Bleaching powder, drums, wks.	100 lbs.	2.25
Bone black, 4, bbls., c/l., frt. allowed E.	lb.	.11
Borax, tech., gran., bulk, c/l., frt. allowed	ton	41.50
Bordeaux mixture, drums	lb.	.11
Bromine, cases	lb.	.25
Bromoform, cbys.	lb.	1.42
Butyl acetate, drums, c/l., frt. allowed	lb.	.14½
Aldehyde, drums, l. c. l.	lb.	.16½
Lactate, drums	lb.	.26½
Stearate, drums	lb.	.31
Cadmium, metal, ingots, cases	lb.	.90
Bromide, 25-lb. jars	lb.	1.65
Sulfide, boxes	lb.	1.35
Caffeine, 100-lb. drums, 10,000 lbs. or more	lb.	2.60
Calcium acetate, bags	100 lbs.	3.00
Arsenate, bgs., c/l.	lb.	.06½
Carbonate, precip., bags, 50 lbs., c/l., wks.	lb.	.02¾
Chloride, bags, flake, c/l., dlvd.	ton	18.50
Gluconate, U. S. P., bbls., 150 lbs.	lb.	.52
Phosphate, dibasic, 38–40% P_2O_5, bags, Atlan. pts.	unit-ton	No prices
Tribas., bbls.	lb.	.0635
Calomel, bbls., kegs, 50 lbs. or more	lb.	2.95
Camphor, synthetic, gran., powd., drums, ton lots	lb.	.42
Carbazole, 95%, drums, ton lots, wks.	lb.	.70
Carbon bisulfide, drums, c/l.	lb.	.05
Black, reg., uncomp., bgs., c/l., works	lb.	.03625
Dioxide, liq., cyl.	lb.	.06
Tetrachloride, drums, c/l., frt. allowed	gal.	.73
Casein, dom., 20–30 mesh, bags, c/l.	lb.	.30
Cerium oxalate, bbls., wks.	lb.	.35
Charcoal, willow, powd., bbls.	lb.	.06
China clay, bulk, c/l., wks.	ton	7.60
Chloral hydrate, drums	lb.	.90
Chlorine, liq., c/l., cyl., dlvd.	lb.	.05¼
Tanks, wks., frt. equal	100 lbs.	1.75
Chlorobensene, mono-, drums	lb.	.07
Chloroform, tech., drums	lb.	.20
Chromium acetate, 24%, powd., bbls.	lb.	.22
Sulphate, pearls, dms.	lb.	.40
Coal tar, crude, bbls., c/l., wks.	bbl.	7.50
Cobalt oxide, black, kegs	lb.	1.84
Copper carbonate, 52–54%, bbls.	lb.	.18
Chloride, bbls.	lb.	.19½
Cyanide tech., bbls.	lb.	.34
Metal, elec.	lb.	12
Oxide, black, bbls., tons, wks.	lb.	.19½
Sulfate, bbls., c/l., wks.	100 lbs.	5.15
Copperas, cryst., bulk, c/l., wks.	ton	14.00
Cream of tartar, bbls.	lb.	.57½
Cresol, U. S. P., drums, c/l., wks.	lb.	.11
Crotonaldehyde, 97%, c/l., wks.	lb.	.15
Cyanamide, 22% N, pulvd., dlvd., contracts	Nitrogen unit	No prices
Diamylamine, drums, c/l., wks.	lb.	.50
Diamylene, tanks, wks.	lb.	.09½
Diamyl phthalate, tanks	lb.	.20
Diatomaceous earth, dom., bags, c/l., Pacific Cst.	ton	22.00

Dibutylamine, drums, l. c. l., wks.	lb.	.53
Dibutyl phthalate, drums, c/l., dlvd.	lb.	.21
Tartrate, drums	lb.	.87
Dichloroethyl ether, drums, c/l., wks.	lb.	.15
Diethanolamine, drums, c/l., wks.	lb.	.23½
Diethylaniline, drums	lb.	.40
Diethylene glycol, drums, c/l., wks.	lb.	.14
Monobutyl ether, drums, wks.	lb.	.22½
Monoethylether, drums, c/l., wks.	lb.	.14½
Diethyl phthalate, drums, c/l.	lb.	.21½
Sulfate, tech., drums, wks.	lb.	.13
Diglycol oleate, light, bbls.	lb.	.17
Dimethylaniline, drums	lb.	.23
Dimethyl phthalate, drums, c/l., dlvd.	lb.	.20
Dinitrobensene, tech., drums	lb.	.18
Dinitrochlorobensene, bbls.	lb.	.14
Dinitronaphthalene, bbls.	lb.	.35
Dinitrophenol, bbls.	lb.	.22
Diphenyl, bbls., c/l., wks.	lb.	.15
Diphenylamine, bbls.	lb.	.25
Diphenylguanidine, bbls.	lb.	.35
Epsom salt, tech., bags	100 lbs.	1.80
Ether, cone., drums	lb.	.11
Nitrous, bots., 100 lbs.	lb.	.73
Ethyl acetate, 85-90%, tanks, frt. allowed	lb.	.11
Acetoacetate, drums, c/l., wks.	lb.	.37½
Bromide, drums	lb.	.50
Chloride, drums	lb.	.18
Formate, drums	lb.	.27½
Methyl ketone, drums	lb.	.09
Ethylene dichloride, drums, c/l., wks., frt. allowed	lb.	.0742
Glycol, drums, c/l.	lb.	.14½
Monobutyl ether, drums, wks.	lb.	.16½
Monoethyl ether, drums, wks.	lb.	.14½
Monoethyl ether acetate, drums, wks.	lb.	.11½
Monomethyl ether, drums, wks,	lb.	.15½
Feldspar, 20 mesh, bulk, wks.	ton	9.75
Film scrap colors, dk., cs., 1000 lbs., E. wks.	lb.	.14
Fluorspar, 95%, bags, f. o. b. mines	ton	32.00
Formaldehyde, bbls., c/l.	lb.	.05½
Fuller's earth, bags, c/l., mines	ton	8.50
Furfural, tech., drums, contract, works	lb.	.10
Glauber's salt, bbls., c/l.	100 lbs.	1.05
Glycol phthalate, drums	lb.	.38
Stearate, drums	lb.	.26
Hexamethylenetetramine tech., drums	lb.	.32
Hydrogen peroxide, 100 vol., cbys., c/l.	lb.	.16
Hydroquinone, kegs	lb.	.90
Indigo, synth., liq., bbls.	lb.	.16½
Iodine, resubl., jars	lb.	2.00
Iodoform, drums, 100 lbs.	lb.	3.95
Iron acetate, N. F. IV, cbys.	lb.	.15
Iron chloride, tech., cryst., bbls., wks., frt. allowed	lb.	.05
Isopropyl acetate, tanks, frt. allowed	lb.	.07½
Lead acetate, white, broken	lb.	.12
Arsenate, bbls.	lb.	.11
Metal, N. Y.	1 lb.	.0585
Oxide, litharge, bbls., 20-ton lots	lb.	.0790
Peroxide, powd., tech	lb.	.23
Red, bbls., 20-ton lots	lb.	.09
Sulfate, bbls.	lb.	.0675
White, basic carb., bbls.	lb.	.0750
Lecithin, edible, grade 1, drums, c/l.	lb.	.45
Tech., Grade 1, dms., c. l.	lb.	.35
Lime, live, chemical, bulk, wks.	ton	7.00
Lime-sulfur, dry, bags, c/l.	lb.	.07½
Lithopone, ordinary, bbls.	lb.	.04½
Magnesite, calcined, dom., bags.	ton	80.00
Magnesium carbonate, tech., bags, c/l.	lb.	.06¼
Chloride, drums	ton	32.00
Fluosilicate, cryst., bbls.	lb.	.20
Oxide, light, bbls.	lb.	.26
Manganese chloride, bbls.	lb.	.14*
Dioxide, 85-90%, bbls., c/l., wks.	ton	74.00
Sulfate, anhyd., bbls., wks.	lb.	.10½
Mannitol, commercial, bbls., wks.	lb.	.35
Menthol, nat., cans	lb.	13.75
Mercury bichloride, cryst., drums, 50 lbs. or more	lb.	2.39
Mercury, flasks, 76 lbs.	flask	203.00
Meta-phenylenediamine, kegs	lb.	.65
Meta-toluylenediamine, kegs	lb.	.70
Methanol, pure, synthetic, drums, frt. allowed, c/l.	gal.	.34½
Tanks, frt. allowed	gal.	.28
Methyl acetate, 97-99%, tanks	gal.	.09½
Chloride, cylinders	lb.	.32
Formate, l. c. l., drums	lb.	.89
Hexylketone, drums, tech., wks.	lb.	.60
Salicylate, drums	lb.	.35
Monoamylamine, drums, c/l., wks.	lb.	.50
Monobutylamine, drums, l. c. l., wks.	lb.	.40
Monoethanolamine, drums, wks.	lb.	.24
Naphthalene, crude, dom., 74 deg., bags, c/l., wks.	100 lbs.	2.50
Nickel salt, single, bbls.	lb.	.13
Niter cake, bulk	ton	16.00
Nitrobensene, drums	lb.	.08
Nitrocellulose, alcohol-sol., bbls., wks.	lb.	.28
Nitrogen solution	unit	1.2158
Octanol, normal, drums	lb.	.85
Oil, castor, No. 3, tanks	lb.	.11½
China wood, dms.	lb.	.40½*
Coconut, crude, tanks	lb.	No prices
Cod, Newf., bbls.	gal.	.85
Corn, crude, tanks, mills	lb.	.12½*
Cottonseed, cooking, bbls.	lb.	.16¼
Linseed, raw, tanks	lb.	.1080
Menhaden, crude, tanks, f. o. b. Baltimore	gal.	.63¼*
Neat's-foot, pure, bbls.	lb.	.17¾
Oiticica, bbls.	lb.	.25¼*
Oleo, No. 1, bbls.	lb.	.13¼
Olive oil, denat., bbls.	gal.	4.40
Edible, Calif., drums	gal.	5.00
Palm, Niger, bbls.	lb.	.09¼*
Sumatra, bulk	lb.	No prices
Peanut, crude, tanks	lb.	.13*
Perilla, drums	lb.	.2460
Rapeseed, tax incl., bbls.	gal.	.15½*
Red, bbls.	lb.	.12¾
Soy bean, crude, tanks	lb.	.12¼*
Sperm, 38°, bbls.	lb.	.1301
Whale, bbls., natural, refined	lb.	.1070*
Ortho-dichlorobensene, drums	lb.	.06
Ortho-nitrochlorobensene, kegs	lb.	.15
Ortho-nitrotoluene, drums	lb.	.09
Ortho-toluidine, bbls.	lb.	.19
Para dichlorobensene, drums, c/l.	lb.	.11
Para-formaldehyde, drums	lb.	.23
Paraldehyde, tech., drums	lb.	.12
Para-nitraniline, drums	lb.	.45
Para-nitrochlorobensene, drums	lb.	.15
Para-nitrotoluene, bbls.	lb.	.30
Para-phenylenediamine, bbls.	lb.	1.25
Para-toluidine, bbls.	lb.	.48
Paris Green, 250-lb. kegs	lb.	.24
Perchlorethylene, drums, c/l., wks.	lb.	.08
Phenol, drums, c/l., wks.	lb.	.12½
Phenolphthalein, yellow, drums, ton lots	lb.	.80
Phenylethyl alcohol, bottles	lb.	2.10
Phloroglucinol, tech., tins, wks.	lb.	15.00
C. P., tins, wks.	lb.	20.00
Phosphorus, red, cases	lb.	.40
Oxychloride, 175-lb. cylinders	lb.	.15
Trichloride, cyl.	lb.	.15
Phthalic anhydride, bbls., c/l.	lb.	.14½
Platinum, metal, solid	oz.	36.00
Potash, caustic, solid, drums	lb.	.06¼
Potassium acetate, tech., bbls.	lb.	.28
Bicarbonate, gran., bbls.	lb.	.14
Bichromate, casks, c/l., wks.	lb.	.09½
Bromide, U. S. P., gran., bbls.	lb.	.27
Carbonate, 80-85%, calc., casks.	lb.	.06½
Chlorate, cryst., kegs	lb.	.11*
Chloride, tech., cryst., bgs.	lb.	.08*
Cyanide, drums	lb.	.55
Meta-bisulfite, bbls.	lb.	.18
Muriate, fert., bulk K_2O unit		.53½
Permanganate, tech., drums	lb.	.19¾
Prussiate, red, casks	lb.	No prices
Yellow, casks	lb.	.17
Pyridine, denat., drums	gal.	1.71
Pyrocatechin, C. P., drums	lb.	2.15
Quinine, 100-oz. cans	oz.	.97½
Resorcinol, tech., kegs	lb.	.68
Rochelle salt, powd., bbls.	lb	.43½
Saccharin, drums	lb.	1.45
Salt cake, bulk, wks.	ton	15.00
Saltpeter, gran., bbls.	100 lbs.	8.20
Silica, amorph., 96%, 325 mesh, bags, c/l., wks.	ton	20.00
Silver nitrate, vials	oz.	.26½
Soda, ash, 58%, light, paper bags, contract, wks.	100 lbs.	1.05
Caustic, 76%, solid, drums, contract, wks.	100 lbs.	2.30
Sodium acetate, flake, 60%, bbls.	lb.	.05
Alginate, drums	lb.	.69
Antimoniate, bbls.	lb.	.15
Benzoate, U. S. P., bbls.	lb.	.46
Bicarbonate, U. S. P., powd., bbls., c/l., wks.	100 lbs.	1.85
Bichromate, c/l., wks.	lb.	.07½
Bisulfite, bbls.	100 lbs.	3.00
Bromide, U. S. P., bbls.	lb.	.27
Chlorate, cryst., bags	lb.	.06¼
Chloride, bags	ton	15.70
Cyanide, 96-98%, dom., drums.	lb.	.14
Fluoride, white, 90%, bbls., c/l., frt. alld.	lb.	.08
Metallic, untrimmed bricks, drums, f. o. b. Niagara Falls	lb.	.15½
Metasilicate, gran., bbls.	100 lbs.	2.50
Naphthionate, bbls.	lb.	.50
Nitrate, crude, bulk	ton	27.00
Nitrite, bbls.	lb.	.06¾
Perborate, bbls.	lb.	.14¾
Phosphate, disodium, cryst., bags, c/l., wks.	100 lbs.	2.55
Phosphate, trisodium, bags, c/l., wks.	100 lbs.	2.70
Picramate, kegs	lb.	.65
Prussiate, yellow, bbls.	lb.	.11
Silicate, drums, c/l., 40°	100 lbs.	.80
Silicofluoride, dom., bbls.	lb.	.12
Stannate, drums	lb.	.33½
Sulfate, anhyd., bags	100 lbs.	1.70
Sulfide, cryst., bbls.	100 lbs.	2.40
Solid, 60%	100 lbs.	3.15
Sulfocyanide, C. P., bbls.	lb.	.55
Thiosulfate, reg., cryst., bgs.	100 lbs.	2.25
Tungstate, tech., kegs	lb.	No prices
Strontium carbonate, tech., bbls.	lb.	.15*
Nitrate, bbls.	lb.	.07¾
Sulfur, bulk, mines	ton	16.00
Chloride, drums	lb.	.03
Dioxide, commercial, cyl., wks.	lb.	.07
Tetrachloroethane, 50-gal. drums.	lb.	.08
Thiocarbanilid, bbls.	lb.	.24
Tin, Straits	lb.	.52
Crystals, bbls.	lb.	.39
Oxide, bbls.	lb	.55
Tetrachloride, anhydrous, drums, bbls.	lb.	No prices
Titanium dioxide, bags	lb.	.14¼
Toluene, tanks	gal.	.28
Triamylamine, l. c. l., wks.	lb.	.90
Triamylborate, drums, l. c. l., wks.	lb.	.33
Tributylamine, drums, l. c. l., wks.	lb.	.70
Trichloroethylene, drums, wks., frt. allowed	lb.	.08
Tricresyl phosphate, tech., drums.	lb.	.25
Triethanolamine, drums, c/l., wks.	lb.	.19
Triphenyl phosphate, drums	lb.	.88
Tungsten, tech., powder	lb.	2.60
Urea, dom., 46 + % N., bags, f. o. b. wks. or seaboard	ton	80.00
Vanillin, 25-lb. tins	lb.	2.35
Whiting, comm., dry-grd., bags, c/l., wks.	ton	18.00
Xylene, 10°, tanks	gal.	.30
Xylidine, drums	lb.	.35
Zinc ammonium chloride, bbls.	lb.	.0565
Chloride, tech., fused, drums	lb.	.05
Dust, bbls., c/l.	lb.	.1035
Metal slabs, at N. Y.	lb.	.0865
Oxide, Amer., bags	lb.	.0725
Stearate, tech., bbls.	lb.	.30
Sulfate, cryst., bgs., c/l., wks.	100 lbs.	3.40

* Nominal.

EMPLOYMENT INFORMATION

RATES to be paid in advance. Standard setting 5c a word, minimum charge $2.00 each; include 8 words for box address. Exceptions see ⟶ Display, $7.50 per column inch. No discounts or allowances.

SEND advertisements with remittance to INDUSTRIAL AND ENGINEERING CHEMISTRY, 332 West 42nd St., New York, N. Y., to reach there not later than 10:00 A.M. on the 10th and 25th, closing dates for NEWS EDITIONS of the 25th and 10th, respectively. Insertions made in order of receipt provided necessary remittances are complete.

Employers are requested to mention in their announcements the section of the country in which the open position is located to ensure replies only from those who are geographically available.

In printing these advertisements the SOCIETY assumes no obligations as to qualifications of prospective employees or responsibility of employers.

Unemployed members of the AMERICAN CHEMICAL SOCIETY seeking employment for themselves are allowed in one calendar year 3 free announcements, one per issue, set in standard style and limited to 50 words each, including 8-word box address. Excess words 5c each. Additional standard announcements 50% of regular rate.

Employed members of the AMERICAN CHEMICAL SOCIETY seeking new positions are permitted 3 standard announcements during the calendar year at 50% of the regular rate—include 8 words for box address.

Employers seeking chemists and chemical engineers are permitted 3 standard announcements, not to exceed 50 words each including box address and not more than one per issue, during the calendar year without charge, provided they agree in writing to acknowledge all replies (excess words 5c each), otherwise full rate applies.

The AMERICAN CHEMICAL SOCIETY is vitally interested in the welfare of its members and in seeing that the chemical industry is manned with competent chemists and chemical engineers. These pages are part of our service in that connection. In addition most of the larger sections of the AMERICAN CHEMICAL SOCIETY and several of the smaller ones have active employment committees. Local section secretaries in your area will inform you as to any employment aids that may be available locally.

An Employment Clearinghouse is operated at each national meeting of the SOCIETY for the purpose of bringing together representatives of industry looking for chemists and members and student affiliates in attendance wishing to make such contacts. For further details, consult the preliminary and final programs as printed in the NEWS EDITION prior to each meeting.

In the New York area, special employment facilities are offered by the Employment Bureau of the Chemists' Club, 52 East 41st St., New York, N. Y., and by the Chemist Advisory Council, Inc., 60 East 42nd St., New York, N. Y. In the Chicago area, the Chicago Section maintains an employment service at 413 Stevens Hotel, Chicago, Ill.

Those replying to announcements should be careful to send copies and not original documents. Advertising circulars will not be forwarded and to that end all letters will be opened at the forwarding office.

SITUATIONS OPEN

Those announcements in which the letter "P" is part of the address key have paid in full and are not committed to acknowledge replies. The Society regards acknowledgment by employers of all applications as an act of common courtesy but can assume no responsibility for their failure to do so.

EXECUTIVES, CHEMICAL ENGINEERS AND CHEMISTS with exceptional backgrounds of experience should use our confidential and individual method of contacting responsible employers. No limit to territory. We negotiate all overtures. Established 1915. The National Business Bourse, 20 W. Jackson Blvd., Chicago, Ill.

ORGANIC RESEARCH chemist, Ph.D., under 30, with wide experience in synthetic organic chemistry for development of research department in large mid-west industry. Submit full details of education, experience and complete personal data. Include salary expected and recent photo.
Box 14-N-1, Ind. & Eng. Chem., Easton, Pa.

WANTED BY large Eastern concern for immediate employment; Chemists or chemical engineers for research and development work in petroleum and polymer chemistry. Our own employees have been advised of this advertisement. Replies will be treated in strictest confidence. Submit photograph with details of experience and qualification.
Box 22-N-1, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST wanted with actual working knowledge of formulation and production of synthetic resins, particularly of the phenolic type, to develop new thermo-setting resins from certain natural raw materials.
Box 28-T-1, Ind. & Eng. Chem., Easton, Pa.

GOOD OPPORTUNITY for Chemist experienced in production or research on manufacture X-ray intensifying screens. Give complete details including education, personal history, experience, salary desired, references. Include small recent photograph. Location New York City.
Box 35-T-1, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Bachelor or Master, must have outstanding scholastic record and good foundation in physical and organic chemistry. Applicants should give educational history, experience, age and other personal data, and recent photo. Excellent opportunity for qualified person in research laboratory of prominent food organization.
Box 10-NP-2, Ind. & Eng. Chem., Easton, Pa.

GRADUATE ASSISTANTSHIPS at the University of Maine. Applicants may work half time toward the master's degree in chemistry or chemical engineering. Remuneration $500 plus tuition for twelve hours' laboratory instruction per week for the school year. Applicants should be in the upper quarter of graduating class. All applications must be received before March 15 and should include complete personal data, photograph, official transcript, preferred research field and three reference letters.
Box 11-N-2, Ind. & Eng. Chem., Easton, Pa.

WANTED for RESEARCH and development department of large chemical manufacturer in Western New York area two (2) Junior Chemical Engineers. Must have thorough training in chemistry and chemical engineering. Two or three years' experience an advantage but not required. Give full details of education, experience, personal data, and salary required.
Box 14-N-2, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST with broad training in the food industry. Good foundation in physical and organic chemistry necessary. Applicants should give educational history, scholastic grades, experience, age and other personal data, and recent photo. Excellent opportunity for qualified person.
Box 15-NP-2, Ind. & Eng. Chem., Easton, Pa.

CEREAL CHEMIST. Experience in cereal laboratory for research and product development. Location East. Submit full details of education, experience, salary desired and photograph.
Box 16-N-2, Ind. & Eng. Chem., Easton, Pa.

CHEMISTS and CHEMICAL engineers for research allied to and control of a new ammonia plant and other defense projects. Although positions are classified as temporary, they offer definite probability of permanent employment.
Box 17-N-2, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST of Bachelor, Master, or Ph.D. grades. Good record in the fundamental branches of chemistry required. Applicants should give educational history, experience, age, and recent photo. Opportunity for qualified person in research laboratory of prominent food organisation.
Box 23-NP-2, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, recent graduate, wanted by mid-west manufacturer to assist in abstracting and bibliographic work. Typing ability helpful. Reply giving full details on education, personal data and references.
Box 25-N-2, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST. With advanced degree and 3 years' experience in biochemical field. Experience with tobacco analysis highly desirable but not essential. Give personal data, qualifications, salary expected and enclose photograph in first letter.
Box 30-N-2, Ind. & Eng. Chem., Easton, Pa.

CEREAL CHEMIST Preferably with two or three years' experience. Applicants should give educational history, scholastic grades, experience, age, and recent photo. Excellent opportunity for qualified person in research laboratory of prominent food organization.
Box 31-NP-2, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER for operating and engineering duties, with ability to handle drafting, design layout, pilot plant development and plant operations. Permanent position with lignin products division of reliable firm located Central Wisconsin. Married man with some industrial experience preferred. Reply giving personal data, training, experience, salary expected, draft status, and enclosing photograph.
Box 32-NP-2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST for control laboratory. Must be graduate and under 30 years of age. Preference given to married man with some chemical engineering or bacteriological training. Will consider recent graduate. Ohio location. Please send full personal information and recent snapshot.
Box 33-NP-2, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 230)

WANTED

BY DESIGNERS AND BUILDERS OF PROCESS INDUSTRY PLANTS FOR HIGHLY IMPORTANT DEFENSE WORK

PIPING DESIGNERS AND DRAFTSMEN

Experienced in the layout and detailing of piping for oil refinery units, processing plants, or chemical plants.

STRUCTURAL DESIGNERS AND DRAFTSMEN

Experienced in design and detailing of steel structures, foundation and concrete work, and industrial buildings.

PROCESS EQUIPMENT DESIGNERS AND DRAFTSMEN

Experienced in design of pressure vessels, fractionating columns, heat transfer equipment, and the like.

ELECTRICAL ENGINEERS

Experienced in electrical layout for process plants. Must know explosion proof work.

INSTRUMENT ENGINEERS

Experienced in instrumentation and control of process plants.

SPECIFICATION WRITERS

Experienced in preparation of specifications for purchase and preparation of bills of material for process plant construction work. Excellent opportunities for the right men.

Write outlining qualifications and experience. Personal interviews will be arranged when desirable.

BLAW-KNOX COMPANY
PROCESS INDUSTRIES DEPT.
PITTSBURGH, PA.

Address communications to the box number indicated and Mail to Easton, Penna.

The American Chemical Society has no information concerning the position advertised—or in regard to those seeking employment.

(Situations Open Continued)

ANALYTICAL CHEMIST for a food research laboratory. Sound training in the fundamentals of chemistry required. Details of educational history and experience, age, and other personal data, and recent photo should be submitted.
Box 34-NP-2, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. or equivalent, thoroughly trained in organic synthesis. Must be excellent technician. Should have a working knowledge of physical chemistry. In replying give personal data and history. Location Western Connecticut.
Box 44-N-2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST WANTED: To conduct research in the field of Organic Synthesis for progressive mid-west concern. State training, experience, personal qualifications and salary expected. Give references.
Box 46-N-2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST with experience in manufacturing of medicinal and C.P. chemicals. Position with future. State age, experience and salary desired.
Box 47-N-2, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER. Applicants should give educational history, scholastic grades, experience, age and other personal data, and recent photo. Excellent opportunity for qualified person in research laboratory of prominent food organization.
Box 48-NP-2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST or CHEMICAL Engineer. Pilot plant and development work in the organic chemical field. Location—metropolitan New York. Only candidates having five to ten years' responsible experience will be considered. Give full particulars including training, experience, personal data, references, salary expected, and enclose small non-returnable photograph.
Box 50-NP-2, Ind. & Eng. Chem., Easton, Pa.

CEREAL CHEMIST for pilot plant development work on prepared breakfast cereal. Midwestern Research Laboratory. Experience not essential. Prefer recent graduate with some mechanical aptitude and ability to organize work of this type.
Box 55-NP-2, Ind. & Eng. Chem., Easton, Pa.

WANTED IMMEDIATELY: Organic research chemist, at home in vegetable oil field, for position under excellent conditions in well known Eastern research laboratory. Persistence, drive, initiative, ability to plan and cooperate essential. Advanced degree preferred. Opportunity of life-time for properly qualified person.
Box 62-NP-2, Ind. & Eng. Chem , Easton, Pa.

PLASTICS CHEMIST for development work on by-products. Must be free to travel for prolonged periods. Send full data regarding education, experience, salary desired and small photo.
Box 67-NP-2, Ind. & Eng. Chem., Easton, Pa.

LIBRARY ASSISTANT (Female) B.S. or M.S. Experienced in classifying and cataloging technical publications, abstracting, and literature searching. Must have outstanding scholastic record, literary ability and good foundation in chemistry or biology. Applicants should give educational history, experience, age, and other personal data and recent photograph. Excellent opportunity for qualified person in library of a prominent food organization. Location near New York City.
Box 71-NP-2, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST in FOOD Research Laboratory. Broad training in the fundamental branches of chemistry necessary and demonstrated ability to apply training. Please provide details of education, scholastic attainments, experience, age and a photograph.
Box 72-NP-2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST or CHEMICAL engineer wanted by Eastern concern. Relatively new graduate preferred. One or two years' experience in paint and varnish formulation and testing desired but not essential. Give educational training, experience, salary desired and recent photograph.
Box 73-N-2, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER for sales promotion of industrial instrumentation in process industries. Sound technical training and several years process experience essential. Send photo and complete record with first letter. The Foxboro Company, Foxboro, Mass.

CHEMIST or ENGINEER for research and development work on insulation board and kindred products. Applicant should have 3 to 5 years' experience with research problems of this or similar nature and should be familiar with stock preparation and manufacture of high and low density boards. Location middle west. Give full details of background, training, experience and salary desired in first letter and include photograph. Our staff has been advised of this advertisement.
Box 82-N-2, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST, woman, Northeastern State. Some previous experience required. State age, experience, religion, salary required, give references and include snapshot.
Box 84-NP-2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST or CHEMICAL engineer wanted by rayon manufacturer for research work. Thorough training in organic chemistry preferable, plant experience not necessary. Woman, or man with deferred draft classification. Not over thirty five years. Give summary of education, experience, personal data, salary required. References and recent photograph. Location Southeast.
Box 87-NP-2, Ind. & Eng. Chem., Easton, Pa.

DIRECTOR, DEVELOPMENT and research program, pharmaceutical field, thoroughly trained organic chemist with working knowledge biochemistry and bacteriology, to $10,000: Perfume chemist, to $300: Chief control chemist to $400: Control chemists (4) to $300: Pharmacy science bachelor for manufacturing, $40. All positions in East. Everett Brown Agency, 17 John Street, New York.

SITUATIONS WANTED
(A.C.S. MEMBERS)

MODERN WAR NEEDS
Chemists and Chemical Engineers
In Production of Materiel
In Defense Research
In Production of Chemists

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A. C. S. EMPLOYMENT CLEARING HOUSE
Memphis, Tennessee
April 19–24, 1942

Open only to members and paid student affiliates of the American Chemical Society registered at the meeting

Request forms now from the
AMERICAN CHEMICAL SOCIETY
1155–16th Street, N. W.,
Washington, D. C.

See
CHEMICAL and ENGINEERING NEWS
January 10, page 36

CHEMIST, BIOCHEMIST, bacteriologist. A.B., 16 years' experience in foods, biological and bacteriological products, plant management including production, maintenance, personnel, and accounting. Successful research and sales records. Patent experience. Age 39, married, Protestant. Continental U. S. preferred.
Box 66-T-10, Ind. & Eng. Chem., Easton, Pa.

FOOD CHEMIST with over twenty years wide experience in the food industry, in direction, research, process development, quality control, and factory problems. Desires a responsible position.
Box 48-T-11, Ind. & Eng. Chem., Easton, Pa.

PROFESSORSHIP Ph.D., Phi Beta Kappa, listed in Who's Who, Protestant. Experienced in teaching General, Organic, and Industrial Chemistry, also as industrial research laboratory director. Now employed, but interested in return to teaching because of opportunity for essential constructive work.
Box 31-N-1, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, ORGANIC, Ph.D. in 1942 from Eastern University. Available immediately. Research in ensyme chemistry and analytical organic. Publications. Broad background in major field including synthetic organic. Minor in physical and biochemistry. 4 years' experience in teaching organic and inorganic. Eastern location preferred but not essential.
Box 36-N-1, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST Chemical Engineer: A.B., M.A., 3½ years' towards Ph.D. (evenings). 5 years' experience industrial research, principally in organic chemical lines, cosmetics, and pharmaceuticals. Wants position in production or research with good chance for advancement. Draft deferred. Available immediately.
Box 37-N-1, Ind. & Eng. Chem., Easton, Pa.

COLLEGE TEACHING or research, Ph.D., 1940. Organic major. Two years' college teaching, general, organic, analytical; two years' graduate assistant. Phi Beta Kappa, Sigma Xi, fellowships, publications. Available June, 1942. Woman, single.
Box 21-T-1, Ind. & Eng. Chem., Easton, Pa.

ORGANIC BIOCHEMIST, Ph.D., 1942 Available March 1. Experience in vitamin D and sterol research, including spectrophotometric and chromatographic technique. Interested in vitamin, ensyme, or drug research. East preferred. Age 26, single, draft deferred. Protestant. Member of Phi Lambda Upsilon, Sigma Xi. Publication.
Box 24-T-1, Ind. & Eng. Chem., Easton, Pa.

SYNTHETIC ORGANIC Chemist. M.S. leading university. Additional graduate research. Young, responsible, good personality. Draft deferred. Excellent organic training. Industrial experience. Desires organic research position in a metropolitan area. Presently employed.
Box 12-N-2, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Sc.D., married; 12 years' experience in research and research direction, specializing in vitamins; 20 publications. Broad biological background. Desires responsible position in research or research and development.
Box 13-N-2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, excellent background. 8 years' varied chemical experience. Age 27. Research publications in physical, organic, and biochemistry. M.S. physical and organic. Phi Lambda Upsilon. Year chemistry teaching. Industrial testing and control experience. Employed. Out of town offers invited.
Box 18-N-2, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL and INORGANIC Chemist, Ph.D., 1939. Single, 28, dependents, draft deferred. 6 years' college teaching, directing research, publications in x-ray crystal analysis, honor societies, thorough training in major fields. Desires research in metallurgy, spectroscopy, college teaching. Prefers Middle West, East. Available June, 1942.
Box 20-N-2, Ind. & Eng. Chem , Easton, Pa.

BIOCHEMIST, M.S., 1938 desires research position. Thoroughly experienced in small animal experimentation and vitamin assays of pharmaceuticals and food preparations. Development work on pharmaceuticals and control assay methods. Director of biological laboratory with three years research on vitamin preparations and pharmaceuticals. Married, 3A draft deferred.
Box 22-N-2, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, age 39, Ph.D. 1928, with 14 years' research experience in carbohydrates, pharmaceuticals, hydrocarbons. Fluent in German, French, Russian; abstractor for Chem. Abstr. Research position in pharmaceutical or synthetic rubber industry desired.
Box 24-N-2, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, M.S. '38. Organic and colloid chemistry. Desires position in development or research department. Over 2 years' experience in research and non-routine analysis on industrial organic materials. Location mid-west. Member Sigma Xi.
Box 27-N-2, Ind. & Eng. Chem., Easton, Pa.

RUBBER CHEMIST, Chemical Engineer. B.S. in Chemical Engineering 1938. Dean's list man. 40 months rubber experience as production and laboratory supervisor. Position wanted in synthetic rubber development. Single, age 28, immediately available for eastern location.
Box 28-N-2, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 231)

(Situations Wanted Continued)

PHYSICAL CHEMIST, Ph.D., specializing in Surface Chemistry (Adsorption, Catalysts, Corrosion). Desires research and development or teaching position.
Box 29-N-2, Ind. & Eng. Chem., Easton, Pa.

POST GRADUATE Chemist, 43, 17 years' petroleum refining experience mostly as Chief Chemist of major oil company. Desires position with reliable company as chemist, superintendent or any position of real responsibility.
Box 35-N-2, Ind. & Eng. Chem., Easton, Pa.

EXPLOSIVES CHEMIST 1½ years' dynamite plant; analysis, testing of powder, mixed acid, and nitroglycerin. Explosives laboratory; some plant operation. Now employed, but desire ordnance plant with opportunity. Powder control and development. Publication inorganic analysis. Cal Tech. 2-B deferment, 23, single. Anywhere.
Box 37-N-2, Ind. & Eng. Chem., Easton, Pa.

COLLEGE TEACHING or Research, Ph.D., 1931, with teaching experience in general, organic, physical chemistry, research work in colloids, publications, Protestant, midwest preferred, age 37, American, draft deferred.
Box 40-N-2, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, Ph.D. large, eastern university. Two years' full-time teaching physical chemistry in small ACS accredited college. Desires teaching position with better research facilities. Interest—kinetics of organic reactions. Publications, honor societies. Protestant, married, age 27. Available in May.
Box 41-N-2, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, D. Eng., 13 years' experience in plant research, development and control including construction, installation, maintenance, operation in the oil refining industry, age 38, married. Desires new connection where his abilities can be utilised fully.
Box 49-N-2, Ind. & Eng. Chem., Easton, Pa.

ORGANIC Ph.D. June 1942, desires patent service or chemical sales position. Location immaterial. Age 25, single, aggressive, personable, ambitious. Some industrial experience in petroleum products, tin derivatives; part-time sales, teaching; carbohydrate research. Enjoys traveling, contacting people.
Box 51-N-2, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST Ph.D. 1941 with 3 years' experience in fermentation work. Also 1 year of experience in industrial research on vitamins. Member of Phi Kappa Phi, Sigma Xi, Phi Lambda Upsilon. Age 28, married, Protestant. Desires research position in fermentation work. Location immaterial.
Box 54-N-2, Ind. & Eng. Chem., Easton, Pa.

Ph.D. June '42. Available for employment June. Excellent training in Organic and Physical Chemistry. Married, draft classification 3A. Interested in firms engaged in petroleum, rubber, or plastics.
Box 56-N-2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST and CHEMICAL engineer with exceptional training, experience and executive ability; highly successful record of accomplishment in responsible positions; sound judgment; resourcefulness; good personality. Seeks outstanding position in chemical research, development or management.
Box 58-N-2, Ind. & Eng. Chem., Easton, Pa.

HIGHLY SUCCESSFUL, capable and experienced university teacher; chemist of wide experience and accomplishment in executive positions; Ph.D., best of training here and abroad; numerous publications. Interested in university professorship in general, physical, industrial chemistry or chemical engineering.
Box 59-N-2, Ind. & Eng. Chem., Easton, Pa.

BLACKOUT CHEMIST: phosphorescent products for emergency lighting, indicators, directions, signals. Background of physical chemistry and industrial experience. Interested and experienced in manufacture and development of these materials. Married, children.
Box 60-N-2, Ind. & Eng. Chem., Easton, Pa.

SPECTROGRAPHER CHEMIST, M.S. accredited college. Two years' industrial experience in spectrographic, radiographic, and X-ray diffraction analysis. Desires research analytical position employing these techniques. Preferably in East or Middle East. Married, 26.
Box 63-N-2, Ind. & Eng. Chem., Easton, Pa.

DEVELOPMENT and RESEARCH chemist, Ph.D., chemical engineer, 14 years' successful direction in fermentations, cereal chemistry, biochemistry, yeast, foods. Careful worker, adaptable, invention minded, publications, patents, office experience, four languages, excellent credentials. Interested in responsible position or good opportunity for advancement.
Box 65-N-2, Ind. & Eng. Chem., Easton, Pa.

SYNTHETIC RESIN Chemist. Five years' experience in technical research on synthetic coatings and adhesives. Also experienced in photochemistry. I have shown originality; and I have obtained practical results. Married. Age, 28. Harvard training. Now employed, seeking better opportunity.
Box 68-N-2, Ind. & Eng. Chem., Easton, Pa.

RUBBER CHEMIST now employed, 4 years' experience in compounding development, and processing of mechanical goods and sponge, reclaimed and synthetic rubbers, also latex, water dispersions and adhesives.
Box 69-N-2, Ind. & Eng. Chem., Easton, Pa.

PRODUCTION CHEMIST. Graduate chemical engineer with twenty years' experience in heavy chemicals, acids, purified cellulose fibre, nitrocellulose, viscose-cellulose film, paper coatings, lacquer formulation. Positions held: chief chemist, development engineer, production department head, plant superintendent. Primary interest: production supervision.
Box 74-N-2, Ind. & Eng. Chem., Easton, Pa.

POSITION TEACHING general or physical chemistry desired by Ph.D. from large midwestern university having one year post-doctoral research experience, three years' experience teaching general chemistry. Age 27, married, selective service classification 3A. Sigma Xi, Phi Kappa Phi, Phi Lambda Upsilon. Opportunity for research is essential. Available June 1942.
Box 78-N-2, Ind. & Eng. Chem., Easton, Pa.

WANTED: work that contributes to "all out" emergency effort. 1940 Ph.D. Physical Chemistry major, Organic and Physics minors. Almost thirty months industrial experience in applied inorganic research and process development. Teaching experience. Selling experience in unrelated field. Cooperative and adaptable. Member of several honor societies. Married. Age 34. Protestant. Class 3 draft. Now employed. Available on reasonable notice.
Box 79-N-2, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, 13 years' experience in pigment manufacturing and wet metallurgical processes. Research and manufacture of lithopone, zinc pigments, titanium dioxide, barytes reduction, zinc liquor purification. Electrolytic manganese. Pilot plant operation. Available now.
Box 80-N-2, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST M.Sc. 1940 with one year experience in control work desires position in Spectrographic field. Currently completing Defense Training course in Applied Spectroscopy. Also interested in Control position in Defense Industry. Eastern location preferable.
Box 86 N-2, Ind. & Eng Chem., Easton, Pa.

SITUATIONS WANTED
(NONMEMBERS)

YOUNG WOMAN (B.A.) June 1941, majored in Chemistry-Biology-Bacteriology. Excellent typist-stenographer. Knowledge of French and German. Prefers office position.
Box 26-N-2, Ind. & Eng. Chem., Easton, Pa.

B.S. in CHEMISTRY 1940, University of Pittsburgh. Courses included qualitative and quantitative analysis, advanced organic, physical, steel analysis, fuel analysis, biochemistry. Also EDTC, Testing of Explosives. Draft status, 1-B.
Box 38-N-2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST I.Ph. University Vienna, age 37, draft deferred, single, 11 years' practical experience asphalt, tar distillation, bituminous emulsions, paints, varnishes, portland cement, desires position.
Box 39-N-2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, A.B. Degree in June. 42 hours of chemistry. Desire work in plastics or synthetic rubber, Eastern location preferred. Minors: mathematics, physics, German. Age 27, married, Christian. Good character references. Mechanically inclined.
Box 42-N-2, Ind. & Eng. Chem., Easton, Pa.

PHARMACEUTICAL CHEMIST, age 37, married, B.S. Pharm., M.S. Chem. and Ph.D. requirements. 3 years' control, 5 years' diversified research, and 3 years' production. Desires position having future with progressive pharmaceutical manufacturer. Employed now.
Box 45-N-2, Ind. & Eng. Chem., Easton, Pa.

PHYSICIST. Background in electron physics, mathematics, physical chemistry, mechanical engineering. Scholarship recipient seven years. Three years experience in college teaching, industrial inspection and testing, government research and development. Age 25, draft 3A. Now available.
Box 61-N-2, Ind. & Eng. Chem., Easton, Pa.

ASSISTANT PHARMACOLOGIST & Chemist, B.S., graduate courses in chemistry. Male, 33, class 3A. Working for past 6 years in Department of Pharmacology of medical school in N. Y. C. Bio-assays, pharmacological, physiological experimental set-ups, bio-chemistry.
Box 66-N-2, Ind. & Eng. Chem., Easton, Pa.

EXPERIENCED MECHANICAL Engineer, licensed, with creative ability, expert in high temperature heat distribution for presses, evaporators, etc., and all thermodynamic questions including power problems, possesses chemical knowledge, seeks position as production or development engineer for improving processes or designing new equipment in petroleum, plastic, rubber, paper or other industries.
Box 81-N-2, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Mem. Amer. Soc. Biol. Chem., Ph.D., 10 years' research experience, numerous publications, presently at great Eastern university with rank of assistant professor, desires position offering adequate scope and opportunities. Research has dealt with chemistry of enzymes and vitamins, biophysics of proteins and viruses, cellular metabolism. Expert knowledge of ultracentrifugal and electrophoretic techniques. Age 37, married. Best references.
Box 89-N-2, Ind. & Eng. Chem., Easton, Pa.

A. C. S. EMPLOYMENT CLEARING HOUSE MEMPHIS MUNICIPAL AUDITORIUM APRIL 19–24, 1942

Open only to members and paid student affiliates registered at the meeting.

See Page 36, January 10 issue of this publication.

Fork Truck



THE Clark Tructractor Division of the Clark Equipment Co., Battle Creek, Mich., has developed a sturdy, low-priced, compact, fork-type truck that incorporates all desirable features in modern truck design. Christened the "Clipper", these trucks are offered in six models, capacities 1,000, 1,500, 2,000 pounds with standard finger lifting heights of 60 to 108 inches, other special heights optional.

The Clipper has an economical four-cylinder industrial truck engine, front wheel drive, rear wheel steer, hydraulic lift and tilt. Self-starter and hydraulic brakes are standard equipment.

Bakelite Corp. Opens Cincinnati Sales Office

THE Bakelite Corp., unit of Union Carbide and Carbon Corp., has established a new sales office for Bakelite varnish resins at Cincinnati, Ohio. The new office, which will be under the direction of Robert B. Waters, is located at 2506 May St.

MISCELLANEOUS

BUSINESS OPPORTUNITIES • FOR SALE • WANTED • ETC.

Five cents a word, minimum charge $2.00; display available at $7.50 per inch; in advance. No discounts or allowances

MICRO-ELEMENTARY ANALYSES: C, H, N, S, P, Halogens, Methoxyl, Mol. wt., etc., U.S.P. and other official tests, Purity tests, Microinorganic assays, Spot tests, Micro-distillations, Toxicological investigations, and typical micro-chemical research work. Dr. Carl Tiedcke, 366 Fifth Avenue, New York, N. Y.

ASKING for INQUIRIES for manufacturing of fine organic chemicals in limited quantities. Box 85 N 2, Ind. & Eng. Chem., Easton, Pa.

WANTED to BUY: New or used single Vols 2, 3, 5 and 6 of Ullmann Enzyklopaedie der technischen Chemie second edition. Also looking for new or used complete set of Ullmann Enzyklopaedie der technischen Chemie second edition. Box 21 N 2, Ind. & Eng. Chem., Easton, Pa.

WANTED to BUY: a three to ten pound supply of asbestos for Gooch Crucibles. Box 36 N-2, Ind. and Eng. Chem., Easton, Pa.

Wanted: Physikalische zeitschrift Sowjetunion V. 10, 1936, British Chemical Abstracts, 1936; Journal Societi-Chemical industry London, 1936, and Proceedings 1881 meeting. Box 52-N-2, Ind. & Eng. Chem., Easton, Pa.

WANTED to BUY: manufacturing process for Diphenylamine Offers: Box 70 N 2, Ind. & Eng. Chem., Easton, Pa.

WANTED: "Chemical Abstracts" vol. 1 (1907) nos 12, 15, paying $4 each (nos. 2, 3, 18, 20, Index, $3 each); vol. 2, (1908) nos 1, 2 paying $3 each (nos 7, 10, 21, $2 each). Dr. G. H. Franzius, 201 East 82nd St., New York, N. Y.

MATERIALS WANTED

Regular and steady supply sources wanted for all fine and rare organic chemicals and pharmaceutical specialties. Interested in permanent connections.

Box 77-N-2, Ind. & Eng. Chem., Easton, Pa.

FOR SALE

Semicarbazide Sulfate Purity: Ninety seven per cent minimum Hydrazine Sulfate: Less than 0.6%. Available in 10, 25 and 50 lb. lots.

Box 43-N-2, Ind. & Eng. Chem., Easton, Pa.

WANTED to HELP the Defense Program. Yes, we want to buy your surplus laboratory equipment, instruments and apparatus. Chemists, Metallurgists, Biologists, Physicists and other Scientific workers doing Government work need them badly and in a hurry to use in the months before new equipment deliveries can be made. Look into every corner, closet and storeroom and bring out the hundreds of idle instruments which can be useful to someone else. We are prepared to pay the highest possible price in proportion to value and need. Do not hesitate to offer us your surplus. It will be of great service to the entire chemical field. Cash with all purchases. Write or wire complete listings for immediate attention. Exchanges can be arranged. The Laboratory Exchange, 24 E. 21st St., New York, N. Y.

FOR SALE: Journal American Chemical Society and Chemical Abstracts, 1910–1937 inclusive, excepting 1912, 1913 and 1914 and April and May 1921, including first Abstracts Index. Clean, fresh copies. $200. Box 19 N-2, Ind. & Eng. Chem., Easton, Pa.

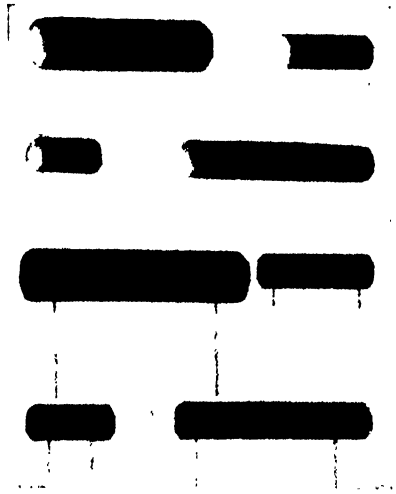
FOR SALE: Soc. Chem. Ind. 1904–1911 incl. Ind. & Eng. Chem. Jour. Vols. 1-13 incl. Jour. Amer. Chem. Soc. 1904–1908 incl. Review of Amer. Chem. Researches Vols. 10, 11, 12. The Chemical Engineer Vols. 5, 6, 7, 8 all bound. Box 53 N-2, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Abderhalden Biochemisches Handlexikon vols. 1 to 9. Abegg Auerbach Handbuch anorganische Chemie vols. 1 to 5. Archiv der Pharmazie 1926 to 1939. Dyer 1933 to 1940. Berichte Deutsche Chemische Gesellschaft 1899 to 1902, 1924, 1935. American Journal tropical Medicine vols. 1 to 17. Box 57-N-2, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Kilo Histidine Monohydrochloride, Allantoin, Glucuronic Acid, Lobeline, Digitonin, Tryptophane, Leucine, Fucose. Luminous pigments, 1500 lbs. each. Barium and Copper Fluosilicates, 50 lbs. Calcium boride, 300 lbs. Paracresol, 2 tons Antimony metal powder 99%. All salts Caesium and Rubidium in quantity. Box 83 N 2, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: We have available for immediate delivery. Subject to prior sale. International Centrifuges; Horizontal Sterilizing Autoclaves; Barnstead Water Stills; 10 very fine Analytical balances; Becker, Voland and Troemner; 4 Research microscopes; Gaertner Spectrophotometer Assembly; Travis Colloid Mill; Hydraulic Laboratory; Freas and other drying ovens, Incubators, Dubosq Colorimeters, 3 objective Microscopes; Hanovia Ultra Violet Lamp; Gaertner Cathetometer; etc. Write or wire for immediate quotation. The Laboratory Exchange, 24 E. 21st St., New York, N. Y.

Negative Temperature Coefficient Resistors



THE Keystone Carbon Co., 1935 State St., Saint Marys, Penna., announces that its line of negative temperature coefficient resistors are available with metal-coated ends for making electrical connection. Hitherto, they were supplied only with molded-in wires. The addition of resistors with metal-coated ends has increased the range of application and has simplified design problems by permitting the use of a cartridge or clip method of mounting.

Foam Mixing Chamber

A NEW mixing chamber, the Evertite, has been designed by the American-LaFrance-Foamite Corp., Elmira, N. Y., for easy installation on modern oil-storage tanks of the pressure type. Its purpose is to provide a simple yet effective method of applying a blanket of fire-smothering foam to burning oil surfaces.

THE McKenna Metals Co., Latrobe, Penna., announces a price reduction in Kennametal tools and tool blanks, effective January 5, 1942.

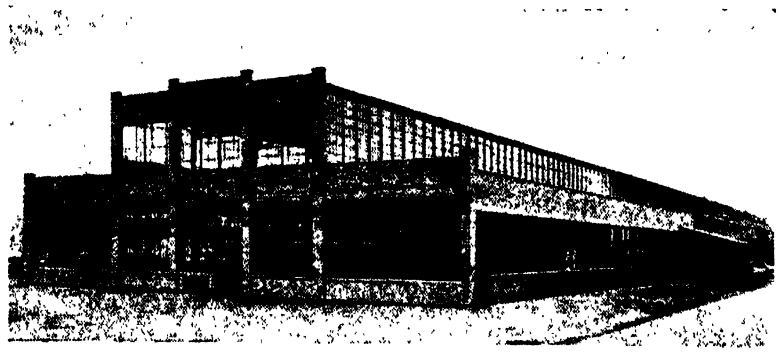
Service for Seamless-Tube Buyers

THE Seamless Steel Tube Institute, Gulf Building, Pittsburgh, Penna., announces the establishment of a new service whereby purchasers may obtain information on the availability of various grades and sizes of seamless steel tubing for new or special wartime requirements.

This step was taken for the benefit of those who have bought tubing for use in peacetime products but who may be unfamiliar with sources of supply for other or special grades of tubing required for war equipment, and for manufacturers who never before needed seamless steel tubing.

Extension to Clark Plant

A 200-FOOT extension to the Clark Bros. Co. plant at Olean, N. Y., has recently been completed to house the manufacture of large triple-expansion marine steam engines, in connection with the Government's defense program.



CHEMICAL AND ENGINEERING NEWS
HARRISON E. HOWE, Editor
PUBLISHED BY THE AMERICAN CHEMICAL SOCIETY
VOLUME 20 FEBRUARY 25, 1942 NUMBER 4

Educational Institutions of the Memphis Section

THE Memphis Section of the AMERICAN CHEMICAL SOCIETY is fortunate in the number and quality of educational institutions for higher learning in its area.

Situated in the heart of Memphis on a beautiful campus opposite Overton Park is Southwestern, a liberal arts college for men and women. In the eastern end of the city is Memphis State College, primarily a training college for teachers. Near the Tri-State Fairgrounds is the Christian Brothers College, a junior college, and near Crosstown, the central part of the city, is the William R. Moore School of Technology. Close to the principal business section is the University of Tennessee Medical College, adjacent to two large hospitals. Scattered about the city are several smaller colleges of a more specialized nature. In the southern section is Siena College for women. Memphis also has a college for Negroes, LeMoyne College. Situated about two hours' drive from Memphis at Oxford, Miss., is the University of Mississippi.

Southwestern

In 1849 an institution known as Montgomery Masonic College was started by the Masonic Grand Lodge of Tennessee in Clarkesville. But financial difficulties were soon encountered, and the trustees were obliged to find another organization to support it. The Presbyterian Church took it over in 1855 and named it Stewart College after the new president.

The Civil War caused college exercises to be suspended, and occupation by federal troops left the college in ruins, everything being destroyed except the brick walls. The Nashville, Alabama, Memphis, and Mississippi synods which supported separate colleges and suffered similar losses faced a bleak picture after the war. They decided to unite to build one university for the whole Presbyterian territory. These synods pooled their interests and in 1875 selected the remnant of Stewart College to become the nucleus of the newly named Southwestern Presbyterian University. A School of Divinity was added to the university in 1885 but was discontinued in 1917 when the institution became a college.

Soon after Charles E. Diehl became president in 1917, the Board of Directors relocated the college in Memphis. Supplied with stone from their own quarry at Bald Knob, Ark., the new Gothic buildings on the beautiful 124-acre campus were ready for occupancy by 1925. The name was abbreviated to Southwestern. After undergoing many financial difficulties, the college finally emerged in 1930 free from all mortgaged indebtedness with assets of a little over $2,000,000. It is on the approved list of the Southern Association of Colleges and Secondary Schools, American Association of Colleges, and Association



Chemistry and Pharmacy Building, University of Mississippi

of American Universities. Present enrollment is about 500 students.

Chemistry, physics, biology, and related subjects are grouped in the Science Building with their well-equipped laboratories and a branch of the library which has more than 48,000 volumes. In the Chemistry Department research on the compounds of sulfur and organometallic compounds is being pursued by the staff. The biology staff is working on the composition of water as related to fish welfare, doing most of the field work at the Reelfoot Lake Biological Station. In the biology laboratory at Southwestern is one of the largest collections of ocean coral in the South.

All academic tests and examinations at Southwestern are conducted under the honor system, and the students have the privilege of the tutorial system from their second year if desired. This system, which was adopted at Southwestern in 1931, offers the student the advantage of personal guidance in weekly conferences with his professor-tutor and increased freedom in the selection of fields of study.

Recently a music department has been added to the college, and a magnificent collection of recordings has been obtained to acquaint students with the classics of music. A studio for radio broadcasting has been equipped in the campus, and regular programs are broadcast over a local station.

Memphis State College

Memphis State College, located in the eastern part of Memphis, was established in 1909 as West Tennessee State Normal School on a site donated by the City of Memphis and Shelby County. Originally offering a two-year college training for teachers, it inaugurated the standard four-year college curriculum in 1925 and now offers premedical and other types of preprofessional courses. The college was recently renamed Memphis State College. It belongs to the Southern Association of Colleges and Secondary Schools, Teachers College Extension Association, and the American Association of Teachers Colleges.

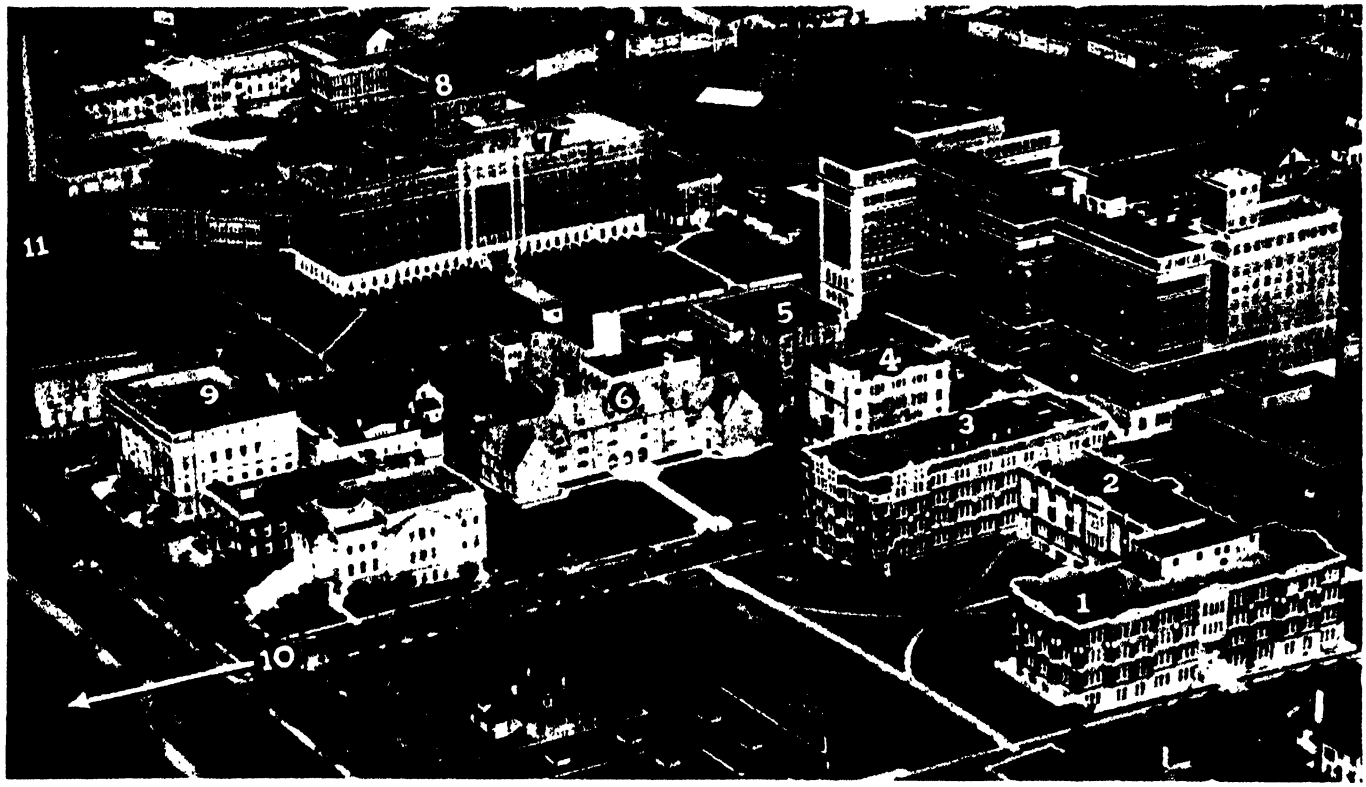
There are 11 principal buildings on the campus of 85 acres. Among them are the Brister Library containing about 25,000 volumes, the Training School—a regular primary school of the Memphis Board of Education operated by the college for practice teaching, and Manning Hall, planned by the staff now using it and erected in 1930, one of the best appointed science buildings in Tennessee. An arboretum and bird sanctuary have been started on a section of the campus.

Memphis State College has an enrollment of over 1,000 students.

The Christian Brothers College

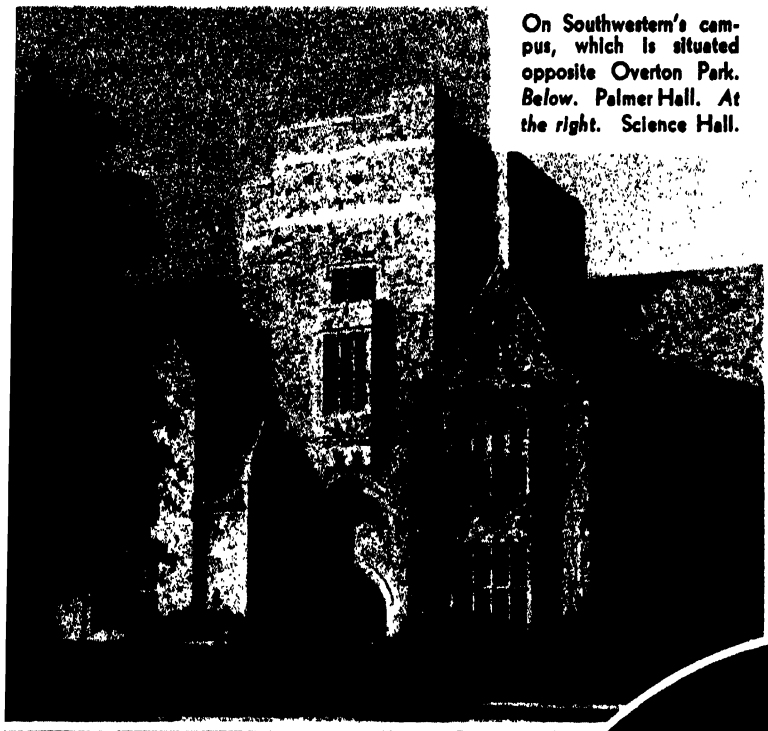
The Christian Brothers College was founded in 1871 and for nearly half a century functioned as a degree-granting institution. During World War I the entire student body of the college department entered the Officers' Training Corps of the U. S. Army, and from then until 1940 the institution operated as a high school only although its charted name was retained.

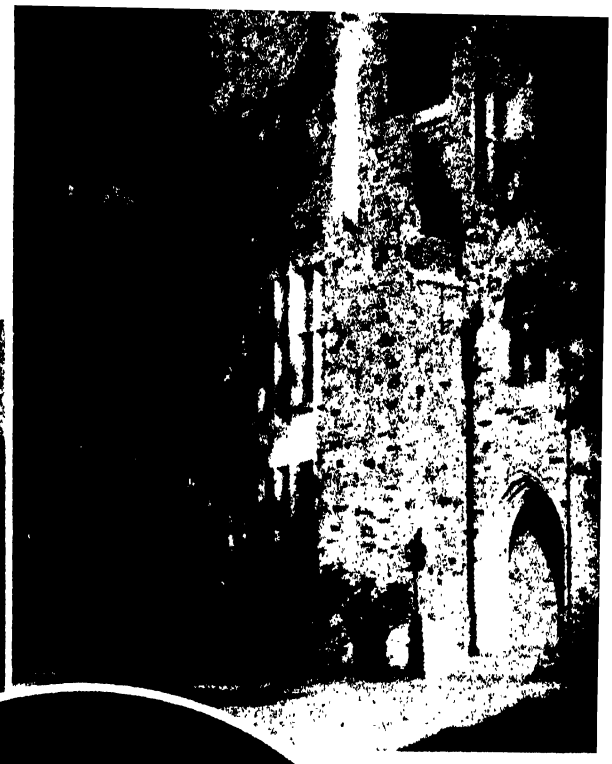
Collegiate work was resumed in the fall of 1940 when the institution moved to its new campus at Central Avenue and East Parkway on a 33-acre tract in the park area. A junior college department was started to supplement the work of the high school department and to bring within reach of a greater number of young men an opportunity for higher education. The new school building contains well-



University of Tennessee Campus in Memphis. *(1)* Pharmacy. *(2)* Library and Administration. *(3)* Biological Sciences. *(4,5)* Out-Patient Clinics. *(6)* Men's Dormitory. *(7)* John Gaston Hospital. *(8)* The Nurses' Home. *(9)* University Center. *(10)* To Rogers Hall, dental school. *(11)* New Clinics and Psychiatric Hospital, under construction. In right background is the Baptist Memorial Hospital.

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On Southwestern's campus, which is situated opposite Overton Park. *Below.* Palmer Hall. *At the right.* Science Hall.





Above. William R. Moore School of Technology. *Below.* School of Biological Sciences, University of Tennessee.





(1) Research on organometallic compounds at Southwestern. (2) Preparation of gaseous mixtures in work on malaria research, Metabolism Laboratory, University of Tennessee Medical Center.





(3) A corner of the microanalytical research laboratory at the University of Mississippi. (4) Microscopic examination of blood films in malaria research at the University of Tennessee Medical Center. (5) G. H. Woollett, head of the Chemistry Department at the University of Mississippi, directs investigation of halogenated phenols.





furnished laboratories and classrooms with modern arrangements. An interesting feature of its chemistry department is the use of semimicro laboratory procedures exclusively for qualitative analysis.

The college is conducted by the Brothers of the Christian Schools who also operate Manhattan College in New York, La-Salle College in Philadelphia, Saint Mary's College in Minnesota, and Saint Mary's College in California.

William R. Moore School of Technology

The William R. Moore School of Technology was founded as a result of a long-cherished desire of the late William R. Moore, wholesale dry goods merchant. It is an endowed technical trades school with an endowment of over $1,000,000 and a $250,000 plant.

The school plant is housed in two new buildings, an outstanding feature of which is the design and equipment of its shops. These are all on the ground floor and contain modern and up-to-date machinery. Working conditions found in shops of modern industrial plants are reproduced as much as possible.

The program is especially designed for high school graduates who desire intensive training in the mechanical trades that will enable them to fit directly into some specific work in an industrial plant.

Both day and night classes are given, a full course being two years of 11 months each. Under the able direction of J. Lister Skinner, two classes have already graduated from the institute.

University of Tennessee Health Service Division

The University of Tennessee has located in Memphis as the Health Service Division, the School of Biological Sciences, the Colleges of Medicine and Dentistry, and the Schools of Pharmacy and Nursing. Closely integrated into the program of the university are the John Gaston Hospital (the municipal hospital of Memphis), the Baptist Memorial Hospital, the Willis C. Campbell Orthopedic Clinic, and the Public Health Departments of Memphis and of Shelby County. The new Psychiatric Hospital of the State of Tennessee is nearing completion and it will be incorporated into the same program of education and health service. The total enrollment of students is about 1,000 annually, of which about 450 are in the College of Medicine. Most of the buildings housing these activities are relatively new and are well-equipped for their purposes. About them in a radius of several blocks are numerous private special clinics and offices of physicians and dentists and other services associated with the practice of medicine. The whole constitutes a large and compact medical service center.

The oldest of this group, the College of Medicine, was founded in Nashville in 1876. It absorbed the Medical Department of the University of Nashville about 1910 and in 1911 was moved by the Board of Trustees of the University of Tennessee to Memphis. It acquired buildings from the College of Physicians and Surgeons to start with and later absorbed the Memphis Hospital Medical College.

The college operates four quarters annually—a summer quarter in addition to the usual three quarters. Each course of the curriculum is offered each quarter so that students may enter at the beginning of any quarter and proceed to graduation in three years and one quarter if they wish. (One quarter is devoted to preparation for and completion of a comprehensive examination.) This system of medical education not only enables the student to complete the standard course in much less time, but it also achieves better pedagogic results by admitting the students in such small groups that they can all be taught at the same time in both laboratory and clinic. Incidentally but of importance, an expensive plant is kept almost continuously in operation and equipment is maintained for groups of 30 instead of over 100.

The Department of Preventive Medicine is especially active in undergraduate teaching and in research. In cooperation with the Tennessee Valley Authority and with the help of the National Research Council, a broad program of research into the fundamental problems of malaria is in active progress. The problem is under investigation simultaneously at the hands of anatomists, chemists, physiologists, pharmacologists, bacteriologists, and pathologists as well as specialists in malariology and public health. The work is coordinated and stimulated by weekly progress reports and conferences of the entire group.

The School of Biological Sciences receives students who have begun their basic scientific training in Liberal Arts Colleges and extends and specializes this basic foundation as the students pass on to the applied courses in their professional schools. It comprises the Departments of Anatomy, Chemistry and Pharmacology, Physiology and Pathology and Bacteriology. These departments, in addition to the training given undergraduate professional students, offer training for the master's degree and the doctorate of philosophy.

Siena College

Founded as a women's college by the Sisters of Saint Dominic in 1852, Siena College was a pioneer in this section in promoting night collegiate education for adults. Starting in 1935, the night classes are coeducational and now have an enrollment of about 175. The science subjects have been very popular. The college is affiliated with the Catholic University of America and is a member of the Catholic Education Association. It is approved by the Department of Education of the State of Tennessee as a teacher training school.

Besides its Administration Building, Siena College consists of a music branch, the Memphis Conservatory of Music, and the Goldsmith Memorial Library containing 12,000 volumes.

Specialized Institutes

There are several National Defense Schools in Memphis and vicinity. The University of Tennessee defense courses section offers courses in the college level, including engineering of any kind, to students working in defense industries.

The National Defense School trains workers in aviation mechanics and related trades. The Shelby County School of Aeronautics in Whitehaven on U. S. Highway 51 is approved by the Civil Aeronautics Administration to train men in aircraft and aircraft engine mechanics. Related trades courses are also offered. The school runs 24 hours a day and has about 600 students.

Two night schools offer three-year courses in law; the Southern University College of Law with an extension school at Jackson, Tenn., has an average enrollment of 125, and the Memphis University Law School has about 50 students.

The Memphis College of Music, organized in 1933, is affiliated with Southwestern for the exchange of music and academic credits leading to degrees in either school. It is an associate member of the National Association of Schools in Music.

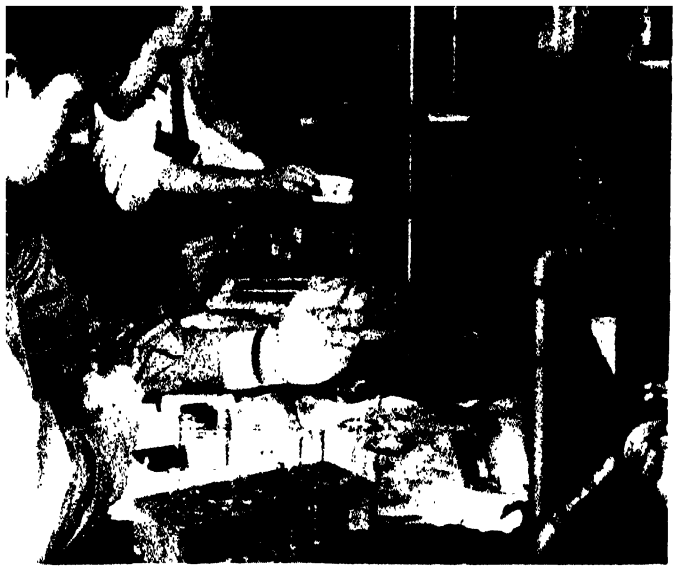
The Memphis Academy of Arts was incorporated in 1936 and gives instruction in all types of art work. Many of the commercial artists of Memphis were trained here.

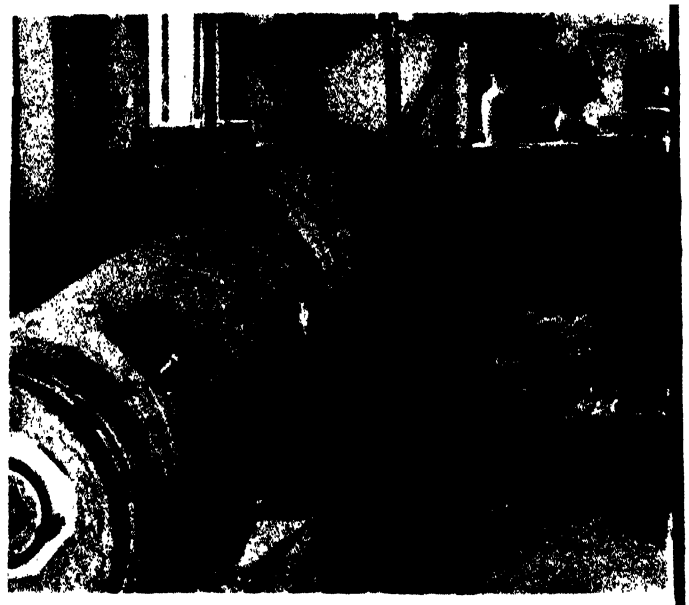
LeMoyne College

LeMoyne College is an outgrowth of LeMoyne Institute which was started after the Civil War for Freedman Negroes as a grade school, later becoming a high school. The college was started about 12 years ago and is largely supported by the American Missionary Association. It has a separate science building and a library housing about 16,000 volumes, all obtained in the past 10 years. Present enrollment is about 400.

The University of Mississippi

The University of Mississippi, the leader of educational ideals in the State of Mississippi, was opened in 1848 with a faculty of four and a student body of 50. This was the beginning of the present College of Liberal Arts and was actually the university until the Law Department was founded in 1854. The university was





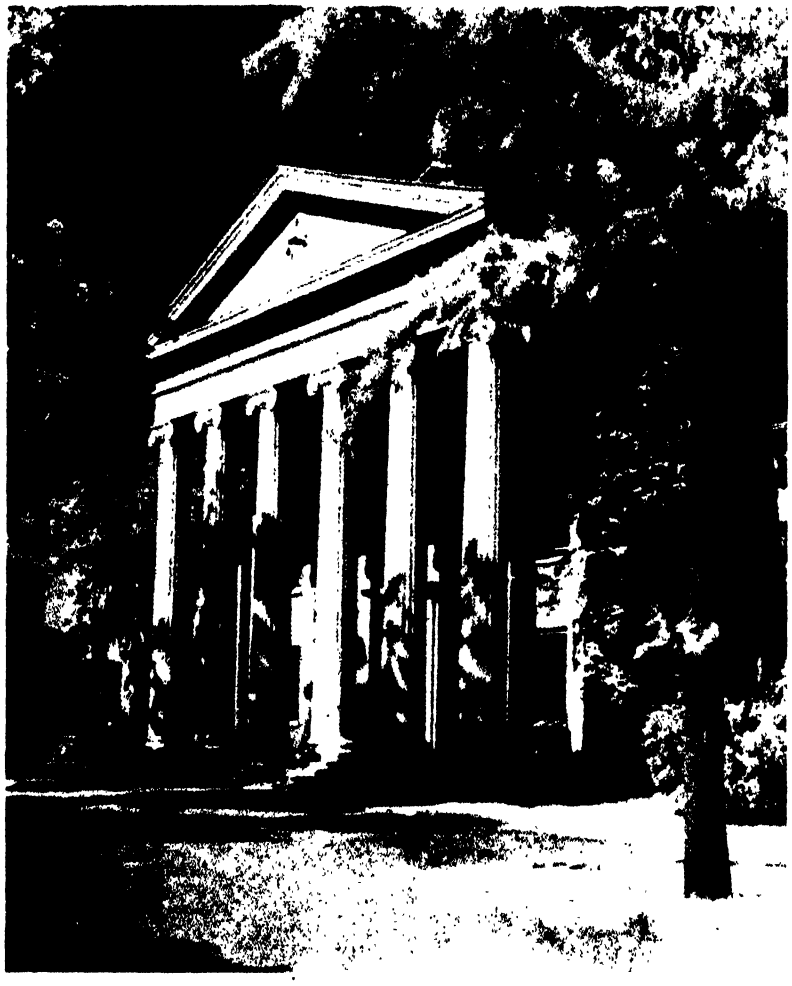
Above. Semimicromethods for qualitative analysis, Christian Brothers College. *Right above.* Rotary kiln dryer at University of Mississippi Clays Laboratory. *Right.* Bottling student kits for general chemistry at Memphis State College.











The Lyceum, oldest building on the University of Mississippi campus

established upon its present site, a square mile of rolling land at an altitude of 500 feet with much natural beauty situated just west of the town of Oxford.

In 1861, on account of the existing Civil War and the enlistment of most of the students in the Confederate Army, exercises were suspended, not to be resumed until 1865. In 1882 the university was made coeducational. The attendance of women has increased until at present there are about 450 women in a total of 1,500 students.

Since 1893 the university has had regular summer school sessions. The Schools of Engineering, Education, Medicine, Pharmacy, Commerce and Business Education, and the Graduate School have since been added along with the Extension Department, the Department of Music, and the Department of Military Science and Tactics.

The university offers a high order of instruction in the major fields of human knowledge. It has land, buildings, and equipment valued at more than $4,600,000; it has well-equipped laboratories and a general library containing about 80,000 volumes along with the chemistry library containing about 20,000 volumes, most of which are journals.

The University of Mississippi has had many exceptionally able men serving it from its beginning and is in very able hands now. One of the members of the first faculty in 1849 was John Millington who had worked in the Royal Institution of London under Michael Faraday and Sir Humphry Davy. A. P. Barnard during his stay until 1861 equipped an excellent physics laboratory and had built for it one of the largest telescopes in the country at that time. L. Q. C. Lamar, who later became a member of President Cleveland's cabinet and then an Associate Justice of the U. S. Supreme Court, was a professor at "Ole Miss" in its early history.

Each of the foregoing institutions extends a cordial invitation to chemists attending the AMERICAN CHEMICAL SOCIETY'S 103rd meeting in Memphis, April 20 to 24, to visit its campus and inspect its facilities and laboratories.

Charles L. Wiswall, since 1933 director of sales of the R. & H. Chemicals Department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has been appointed assistant general manager of the newly created Photo Products Department. **Samuel C. Harris** has succeeded Mr. Wiswall as director of sales.

Safety Program of Alpha Chi Sigma

ALPHA CHI SIGMA, professional chemical fraternity, has initiated a safety program for its chapters located in 46 American colleges and universities. The objectives of the safety program point toward making chemical and chemical engineering students safety conscious in their academic work, giving them the proper attitude and training for their later industrial life, and by their example, inculcating among their associates the principles of safety.

The program originated through the work of H. B. Stevenson, East Central District counselor of the fraternity, of Cincinnati, Ohio, who became aware of the need for such activity by his contact with accident prevention work with his employers, the Procter & Gamble Co. Last year he instituted a program at two chapters located at the University of Cincinnati and at Case School of Applied Science in Cleveland. The success of this work led to the decision to sponsor a safety program for all collegiate chapters.

It was recognized that a successful program must be initiated through the heads of the departments of chemistry and chemical engineering at the schools involved. In every case the extent and development of the program have been made the responsibility of the individual chapter and the university. A broad program, prepared with the aid of the National Safety Council, was to serve as a basis for each college or university. The Grand Chapter of Alpha Chi Sigma has taken an association membership in the National Safety Council, and each chapter has been urged to apply for membership in the university and college classification of the council.

The response has included 20 acceptances of the program. Five chapters have tabled the program, generally because of well-established safety programs already in existence.

Research Fellowship in Colloid Chemistry

THROUGH the generosity of the Colgate-Palmolive-Peet Co., a research fellowship in colloid chemistry has been established at the University of Southern California, Los Angeles, Calif., for work under the supervision of Robert D. Vold. The fellowship allows full time for study and research leading to the Ph.D. and is awarded annually, carrying a stipend of $1,000.

Wendell Markham, who received his A.B. from Colorado State College and his M.S. from Oklahoma A. and M., has been appointed to the fellowship for the current year. He will undertake research in the field of emulsions.

Seven Months of Defense Training in Chemistry

Austin M. Patterson, U. S. Office of Education, ESMDT, Washington, D. C.

During the first seven months of the Engineering, Science, and Management Defense Training program—July 1, 1941, to February 1, 1942—112 courses for training chemists were approved, with an authorized enrollment of 4,213 (this figure will shrink a few per cent when the final reports arrive). These courses represent only about one third of the total chemical training, the rest being classed under "engineering". "Chemical engineering" shows an enrollment for the seven months of 7,329, and "basic chemistry for engineers" an enrollment of 1,159, making a total authorized enrollment of 12,701 in 336 chemical courses.

Up to July 1, 1941, all the courses of college-grade defense training sponsored by the U. S. Office of Education were for engineers, and the program was called Engineering Defense Training (EDT). The program for the present fiscal year is for chemists, physicists, and production supervisors as well as engineers and is called Engineering, Science, and Management Defense Training (ESMDT). N. W. Rakestraw is the chemistry representative on the National Advisory Committee. The work consists of short, practical courses designed to train for particular jobs in defense industries and in government defense agencies. Most of them are given in the evening to persons already employed and very often they serve for "upgrading" on a defense job. Various universities and colleges offer their facilities, investigate the needs, and give these courses, while the Government pays the extra expense entailed.

The most numerous class of chemical trainees (if we include here "basic chemistry for engineers") are employees in industry, either in the laboratory or in the plant, who have had no previous chemistry or at best a high school course but who need chemistry in their jobs. They are given elementary college-grade chemical training. Next in point of numbers come those who have had a general chemistry course and who are trained for work as laboratory technicians. They usually take a course in qualitative and quantitative analysis with a strong industrial slant, but a few courses in general laboratory technique have also been given. A smaller number of applicants, who have had two years of college chemistry or engineering, find an elementary course in organic chemistry valuable; this is given only as an in-service course or as preliminary to an applied course to follow, as on explosives or plastics. A still smaller number are ready for an in-service course in physical chemistry. There are also courses on various special topics, such as organic analysis and chemical microscopy. In the chemical engineering field a course in fundamentals, usually emphasizing unit operations, is the most common type. Then come courses (in order of frequency) on explosives, plastics, inspection and testing, and individual industries such as petroleum refining.

The figures for chemistry and physics are not so impressive as for engineering and management, but there is great need in all four fields. The shortage of professionals in these lines is serious and the supply must be supplemented by emergency training such as ESMDT can do. Results are of course not perfect. There is a certain amount of waste. Some trainees do not finish; some take jobs in which their training is of no help; a very small proportion do not secure employment. But by and large, results are encouraging; the courses do help war production. Out of more than 1,000 replies from industry to an inquiry as to the value of the ESMDT program all but four were favorable and many were enthusiastic.

The number of institutions approved to February 1 to offer courses is 183 and all but 18 of these are approved for chemistry. The number of courses is increasing and a steady expansion in all fields is expected for some time. Estimates center around a doubled demand for trained persons next year as compared with this.

Apologies

We apologize to American Cyanamid & Chemical Corp. for indicating in Chemical and Engineering News for February 10 (page 219, "Loosening Glass Stopcocks and Glass Fittings") that Aerosol OT is a du Pont product. Aerosol OT is made and sold exclusively by American Cyanamid & Chemical Corp. under U. S. Patent 2,028,091.

Swift & Co. Grants Fellowship to University of Minnesota

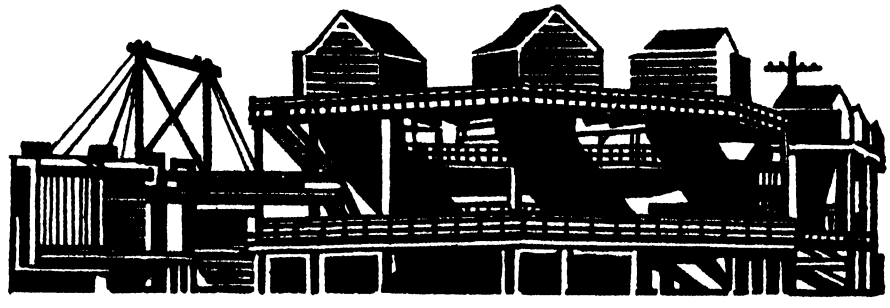
The University of Minnesota has received from Swift & Co., Chicago, a grant to be used under the direction of Ancel Keys in his studies on the relation of fatigue to diet. This work was originally sponsored by the National Research Council and is now operating under the Office of Scientific Research and Development in direct cooperation with the United States Army Quartermaster Corps. Although much of this work is being directly applied to military and industrial needs during the present emergency, it will be possible to extend the findings to civilian nutrition. Dr. Keys received his Ph.D. from the University of California in 1930. Since 1937 he has been associated with the Department of Physiological Hygiene at the University of Minnesota, where he has the rank of full professor and is in charge of the department.

Montana Research Fellowships

The Montana School of Mines, in cooperation with the State Bureau of Mines and Geology, offers several research fellowships and graduate assistantships in geology, metallurgy, mining, and mineral dressing, open to college graduates. Fellowships are for nine months and carry a stipend of $540, while assistantships are for two nine-month periods, with a stipend of $675. Applications must be filed before April 15 with Eugene S. Perry, Chairman, Graduate Committee, Montana School of Mines, Butte, Mont.

Utah Fellowships Offered

The Utah Engineering Experiment Station is offering several research fellowships for the school year 1942–43. Each carries a stipend of $600. Fellows are exempted from the nonresidence fee but are required to pay other university fees, which average about $100 for the school year. Fellowships are open to college graduates who have had the proper training in mining, metallurgy, chemistry, or geology. Applications should be submitted before April 1. Blanks and further information may be obtained by addressing S. F. Ravitz, Director, Utah Engineering Experiment Station, University of Utah, Salt Lake City, Utah



Advances in Entomology[1]

C. H. RICHARDSON

Iowa Agricultural Experiment Station, Ames, Iowa

Inorganic Stomach Poisons

NOTWITHSTANDING the introduction of new stomach poisons, acid lead arsenate ($PbHAsO_4$) continues to hold an important place among agricultural insecticides. Criticism of its use on fruits and vegetables has arisen from the belief that the residues might lead to human poisoning. Investigations of the past several years have allayed this fear; those of 1941 seem to remove altogether the danger from residues on agricultural products that have been properly sprayed or dusted with lead arsenate.

The U. S. Public Health Service has announced, in a series of bulletins and reports, the results of a comprehensive study of the health of persons exposed to acid lead arsenate. A large group of men, women, and children, including consumers of sprayed fruit, orchardists exposed to arsenical mist and dust and to actual contact through the handling of spray materials, and individuals exposed in other ways, were examined in this study. Among 1,231 such individuals, Neal *et al.* (*176*) found only 7 persons with clinical and other evidences that might be interpreted as minimal lead arsenate poisoning. None of these cases, however, met the established criteria of lead intoxication, incipient plumbism, or lead poisoning. The general health of populations in regions where spraying with lead arsenate has been practiced for years was found to be as good as that of populations in regions where spraying is not widely practiced. The only recommendation made is that spray operators be protected from adsorption of excessive amounts of lead and arsenic. Various phases of the investigation are treated in separate papers by Fairhall and Miller (*70, 71*) and by Webster (*252-55*).

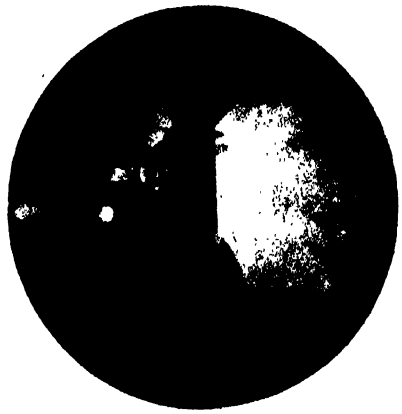
New light is shed by several papers on the ratio of lead (as Pb) to arsenic (as As_2O_3) in residues on fruit trees sprayed with lead arsenate. In attempting to confirm the results of an earlier study (*186*), Pearce and Avens (*187*), New York Experiment Station, observed that this ratio is not changed (*68*) even after long weathering of the residue, if lead arsenate alone is present in the original spray. The addition of lime tends to increase the ratio, while Bordeaux mixture, aluminum sulfate, and petroleum oil mixtures act in the opposite direction. As the number of cover sprays is increased, the ratio approaches the theoretical value for $PbHAsO_4$, and later spray deposits tend to check and mask the decomposition of earlier deposits. Frear and Worthley (*78*), Pennsylvania Experiment Station, found no consistent differences in either fresh or weathered residues from different spray mixtures. Differences in the ratio were noted, however, between seasons and between apple varieties in the same season. The latter observation pertains even to residues on fruit sprayed with lead arsenate mixtures from the same spray tank.

In Germany, Speyer (*220*) observed that spraying regularly with lead arsenate over a period of years led neither to an increase nor a decrease in the resistance of populations of the geometrid moth, *Cheimatobia brumata*. This result is considered remarkable in view of the known readiness of this insect to form local races.

A number of methods for the quantitative determination of lead and arsenic in biological materials have appeared recently. Several methods for lead determination relating to the use of dithizone are described by Kozelka and Kluchesky (*137, 138*), University of Wisconsin, and by Bambach and Cholak (*12, 34*), University of Cincinnati. A modification of the method of Cholak and Bambach permits electrolytic or dithizone isolation of the lead and its estimation by a polarographic method. Fairhall and Keenan (*69*), U. S. Public Health Service, offer a rapid micromethod for lead in urine based on separation with dithizone. Letonoff (*148*), Philadelphia General Hospital, determines lead in human blood by a colorimetric method which involves the use of diphenylcarbazide.

Noteworthy advances in the use of calcium arsenate for the control of cotton insects are recorded. Attention has been given particularly to the effect on toxicity of certain physical and chemical properties of calcium arsenates. R. C. Gaines *et al.* (*85*), Bureau of Entomology and Plant Quarantine, confirm earlier work in field experiments with calcium arsenates of high, medium, and low content of water-soluble As_2O_3 that demonstrated equal effectiveness for these compounds when they were applied as dusts against the boll weevil, *Anthonomus grandis*. In cage tests, however, calcium arsenates of high water-soluble arsenic content and relatively large particle size were more toxic to the boll weevil than calcium arsenates of lower water-soluble content of arsenic and smaller particle size (*215*). In the field, likewise, the arsenates of higher water-soluble As_2O_3 were more effective in reducing infestations of tarnished plant bugs, *Lygus pratensis oblineatus*, and rapid plant bugs, *Adelphocoris rapidus*, than the arsenates of lower arsenic content (*85*). Similar results are reported from the Texas Experiment Station, by J. C. Gaines (*81*). Other contributions to this subject are made by J. C. Gaines (*82*), R. C. Gaines (*84*), Moreland *et al.* (*173*), and Rainwater and Bondy (*197*). According to Ewing (*65*), Bureau of Entomology and Plant Quarantine, dusting with calcium arsenate is more effective than spraying with either calcium or lead arsenates for controlling heavy infestations of boll weevils, whereas for light infestations spraying with lead arsenate is more effective.

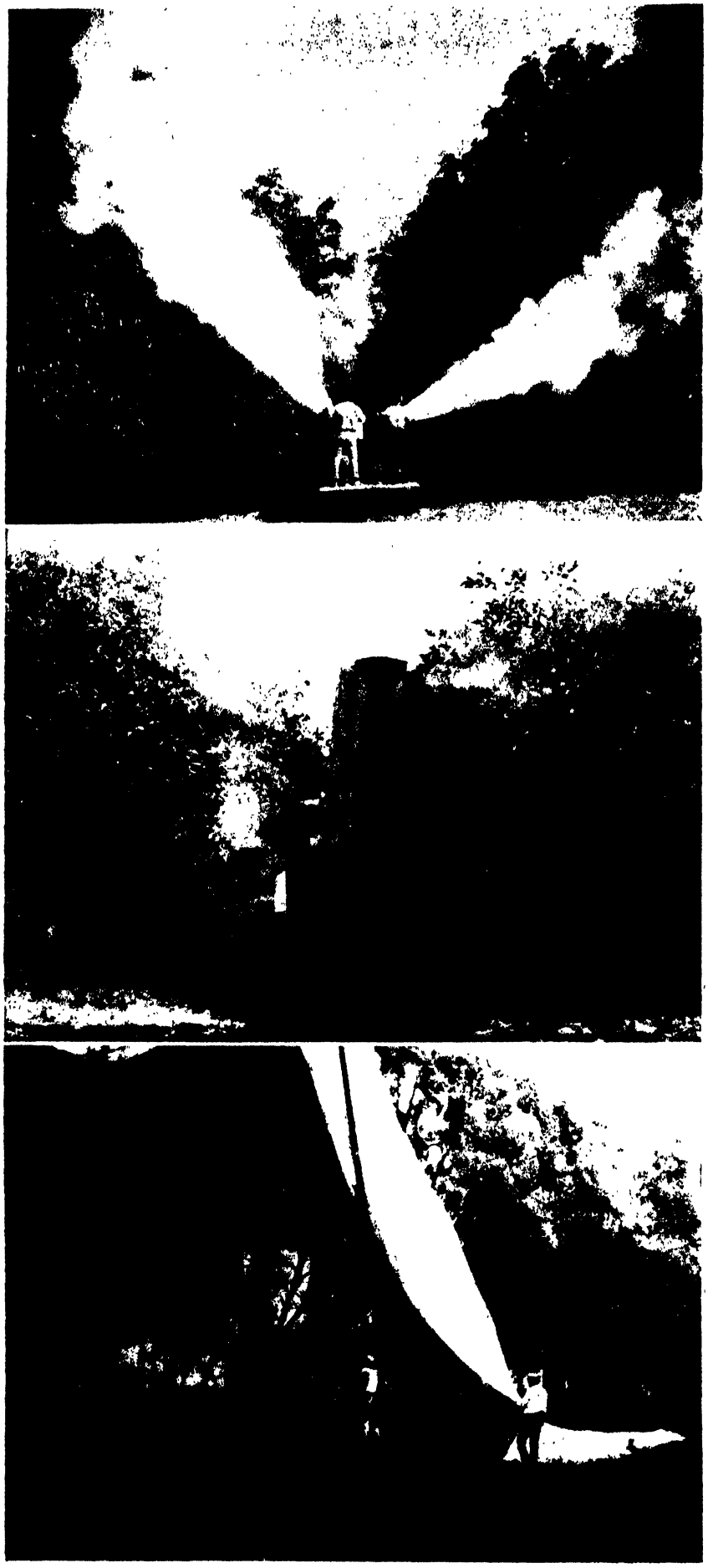
Dusting cotton plants with calcium arsenate is often followed by marked increases in the number of cotton aphids, *Aphis gossypii*. Folsom and Bondy (*76*) thought the arsenate destroyed the parasitic insects that held the aphids in check. Dunnam (*57*), Bureau of Entomology and Plant Quarantine, noticed that the leaves of the more pilose varieties of cotton retained greater quantities of arsenical dust than plants with smoother foliage but, in spite of an increase of the aphid population proportionally to the number of hairs on the lower surfaces of the leaves, the ratio of increase for dusted cotton was greater on the glabrous plants (*58*). Furthermore, the aphids increased on all types of plants to which calcium arsenate was applied, while the rate of parasitization remained nearly constant. Working from the hypothesis that calcium or arsenic might be absorbed by the cotton plant and that one or both of these elements might stimulate the reproduction rate of the aphids, Dunnam and Clark (*59*) found that some calcium arsenate is taken up by the leaves and roots of the cotton plant. The pH of the soil is also increased by the arsenical,



CITRUS EXPERIMENT STATION, RIVERSIDE, CALIF.

Spray duster in operation at night

[1] Journal paper No. J-975 of the Iowa Agricultural Experiment Station, Ames, Iowa. Project No. 137.



CITRUS EXPERIMENT STATION, RIVERSIDE, CALIF.

Top. Citrus duster adapted to walnut trees, often 50 to 60 feet tall. *Center.* Spray duster operating in a lemon grove. *Bottom.* Covering walnut trees for HCN fumigation.

and calcium probably increases the pH of the leaf cell sap and certainly enhances its value as food for the aphids. Under these conditions, reproduction of the aphids is increased. To offset this favorable action of calcium arsenate on the aphids, substances were added to the sprays and dusts that would decrease alkalinity and reduce the content of water-soluble arsenic. Plants dusted with zinc arsenate (pH 6.40) held fewest aphids and appeared in best condition. Probably zinc salts are best suited for neutralizing and "buffering" calcium arsenates.

Basic copper arsenate is one of the newer stomach poisons. In cage tests made by Moreland *et al.* (*173*), Bureau of Entomology and Plant Quarantine, this compound proved more toxic than calcium arsenate to the boll weevil, the bollworm, *Heliothis armigera*, and the cotton leaf worm *Alabama argillacea;* but the experiments of Smith *et al.* (*215*) indicate that it is less effective for boll weevils than dicalcium arsenate. The studies of Watts (*250*), South Carolina Experiment Station, show that basic copper arsenate has poor dusting properties and requires dilution with a mixture of cottonseed meal and kaolin for effective use against *Heliothis armigera* on tomatoes. Boyce and Bartlett (*21*), Citrus Experiment Station, tested basic copper arsenate in sprays against the walnut husk fly, *Rhagoletis completa*, obtaining results that compared favorably with those from natural cryolite. Basic zinc arsenate and basic lead arsenate were less effective.

Analyses of samples of commercial Paris green by Carter and Smith (*29*), Bureau of Entomology and Plant Quarantine, reveal wide departures from the accepted formula, $Cu(C_2H_3O_2)_2.3Cu(AsO_2)_2$. Several of these samples contained appreciable quantities of arsenic in pentavalent form, while others appeared to contain no Paris green and to consist of copper metarsenite or indefinite mixtures of copper arsenite and arsenate. Henderson and Howard (*113*), Georgia Department of Public Health, compared Paris green with pyrethrum-petroleum oil emulsion as larvicides for anophiline mosquitoes, obtaining results that favored Paris green. Middlekauff and Hansberry (*170*), Cornell University, detected no significant difference in toxicity between trisodium arsenite and trisodium arsenate when administered to three species of fruitflies, *Rhagoletis pomonella, R. fausta*, and *R. cingulata*.

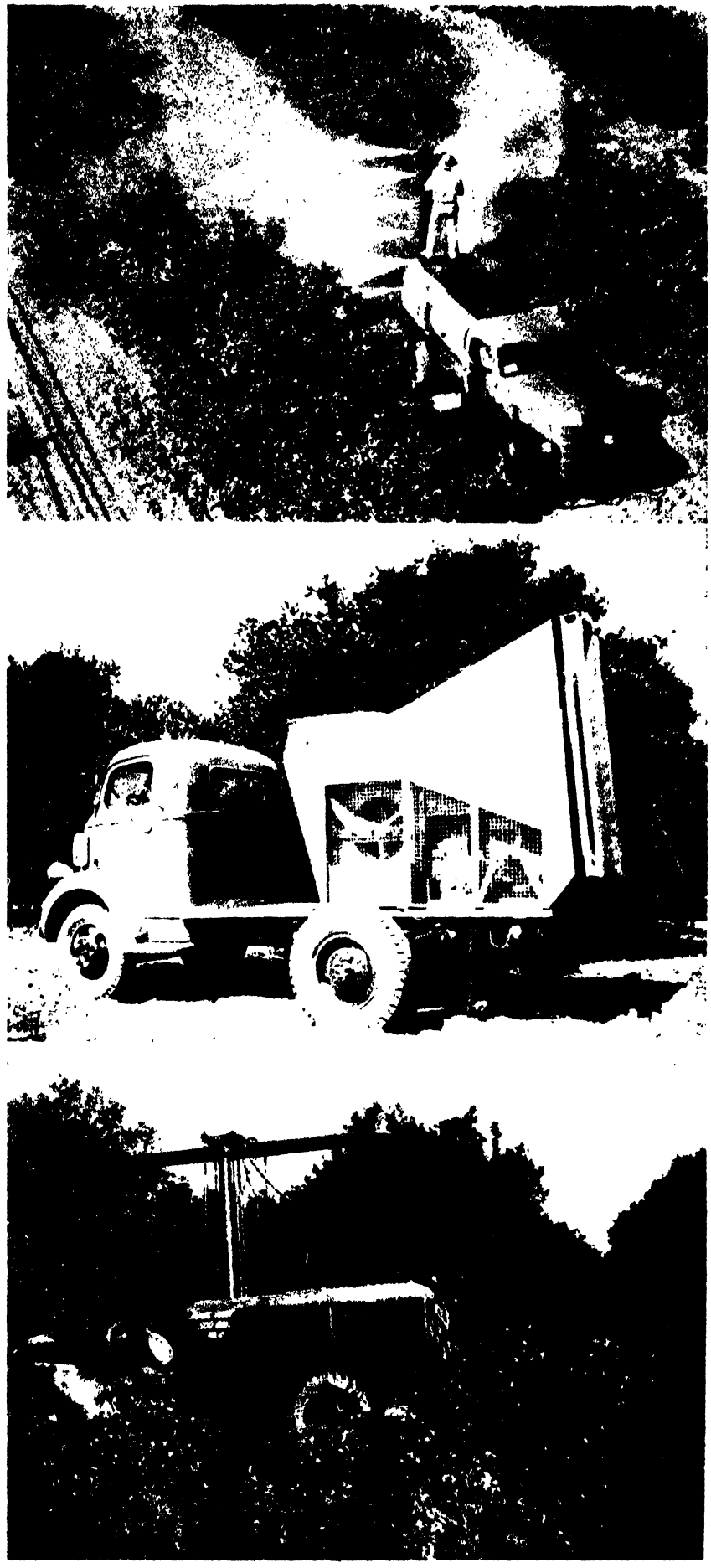
Lennox and Webber (*146*), Australian Council for Scientific and Industrial Research, tested a group of arsenical compounds on larvae of the blowfly, *Lucilia cuprina*. The highly toxic compounds, arranged in decreasing order of effectiveness, were barium arsenite, calcium arsenite, arsenic acid, Paris green, and arsenic trioxide. Less effective in order were zinc arsenate, aluminum arsenate, lead arsenate, and calcium arsenate. Toxicity, in general, was a function of the

stability of the compound as measured by its soluble arsenic content, but the cation also seemed to play some part. Hobson (*115*), University College of North Wales, reports encouraging results with calcium arsenite and lead arsenite as larvicides for the sheep maggot, *Lucilia sericata*.

Several important articles on the penetration, disposition, and effects produced by arsenical compounds in the bodies of insects are noted in the recent literature. Using the stomach of the honeybee, *Apis mellifera*, as a semipermeable membrane, Zänkert (*267*), Biological Institute, Berlin-Dahlem, failed to demonstrate the passage of arsenic from a solution of sodium arsenite through the wall of the stomach. Neither did iron from a solution of ferric ammonium sulfate penetrate these membranes. Norton and Hansberry (*183*), Cornell University, fed radioactive arsenic to silkworms, *Bombyx mori*, and analyzed for arsenic the feces, regurgitated material, blood, intestine, and other tissues of the insects by means of a Geiger-Müller counter. The initial elimination of arsenic was more rapid and complete for the insoluble than for the soluble arsenates, and the arsenates that were eliminated most completely tended to be least toxic. After absorption, elimination proceeded slowly and was greatest for the arsenates that were most completely absorbed. Most of the absorbed arsenic was found in the midgut wall, and the authors suggest that absorption takes place as complex ions containing some of the metallic element in addition to arsenic rather than as simple arsenic ions. Woke (*262*), Bureau of Entomology and Plant Quarantine, studied histologically some of the effects produced by arsenic on insects. He finds that ingestion of lead arsenate, Paris green, calcium arsenate, calcium arsenite, and arsenic trioxide by the southern armyworm, *Prodenia eridania*, results in the disintegration of the cells of the midgut epithelium and damage to its muscle fibers.

Woke also fed sodium fluoride, cryolite (Na_3AlF_6), and barium fluosilicate to southern armyworms. Histological preparations of the larvae revealed disintegration of the cytoplasm and nuclei of the midgut epithelium following ingestion of sodium fluoride, whereas cryolite caused disintegration of the walls of the midgut and injury to its musculature. On the other hand, barium fluosilicate produced no detectable changes in the histological picture of the midgut epithelium, and even the peritrophic membrane of poisoned larvae remained intact.

At the Texas Experiment Station, J. C. Gaines (*81*) tested a cryolite-sulfur dust against the boll weevil, which proved inferior to calcium arsenate for controlling this insect. Similar results were reported by McGarr (*155*), Bureau of Entomology and Plant Quarantine. However, a natural cryolite-sulfur dust was more effec-



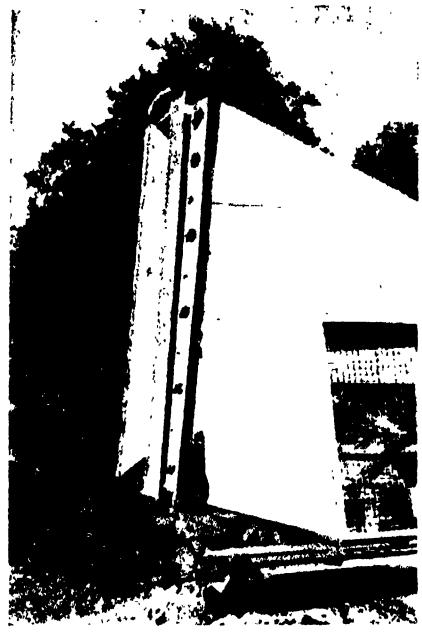
CITRUS EXPERIMENT STATION, RIVERSIDE, CALIF.

Top. Boom sprayer in operation applying zinc sulfate–lime on citrus. *Center.* Latest type citrus duster. *Bottom.* Tower lowered and arranged for travel on the highway.

tive against the cotton bollworm, than calcium arsenate (*82*), although it was less toxic to the rapid plant bug. Natural cryolite was more effective than synthetic cryolite in sulfur dusts for cotton bollworm control (*83*) and in sprays and dusts for the walnut husk fly (*21*). Watts (*250*) finds cryolite generally less economical to use than calcium arsenate for controlling *Heliothis armigera* on tomatoes. Excellent dusts for this insect are made by incorporating cryolite in cottonseed meal. Cryolite-cornmeal baits also offer promise for the control of *Heliothis* on tomatoes. Cryolite dusts and sprays have given the best and most consistent results for the pink bollworm, *Pectinophora gossypiella* (*30*). Steiner and Worthley (*223*), Pennsylvania Experiment Station, find cryolite and barium fluosilicate sprays more effective than arsenical spray for the plum curculio, *Conotrachelus nenuphar*, on peaches, but practical use of the compounds is restricted at present by their tendency to injure the foliage. Karr (*133*), Pennsylvania Salt Manufacturing Co., found that soap bark extract and several proprietary wetting agents lowered or did not improve the effectiveness of sodium silicate or hydrochloric acid solutions for removal of residues from apples sprayed with natural cryolite.

A recent development in control of the Mormon cricket, *Anabrus simplex*, is discussed by Cowan and Shipman (*38*), Bureau of Entomology and Plant Quarantine. Until 1935 dusting with sodium arsenite was relied upon chiefly to suppress this insect. Since then extensive experimentation with poisoned baits has led to the use of a bran-sawdust mixture with sodium fluosilicate as the poisonous ingredient.

The value of sulfur as a contact insecticide and fumigant is established, but almost nothing is known concerning its value as a stomach poison. A recent paper on this subject by Dickinson *et al.* (*51*), Ohio State University, is timely. In the laboratory sulfur was lethal to the southern armyworm, variegated cutworm, *Lycophotia margaritosa saucia*, and fall armyworm, *Laphygma frugiperda*. It was not toxic to larvae of several species of lepidopterous insects, or to larvae of the Mexican bean beetle, *Epilachna vaerivestis*, or Colorado potato beetle *Leptinotarsa decemlineata*. Tests with purified crystalline sulfur, sulfur containing known impurities, and sulfur residue insoluble in carbon disulfide suggest that the toxicity of sulfur as a stomach poison may be related to particel size, to allotropic form, or to the presence of unidentified impurities. Gooden (*94*), Bureau of Entomology and Plant Quarantine, has determined the particle diameters of 54 commercial insecticidal sulfurs by an air permeation method (*95, 96*). The average diameter ranged from 5 to 25 microns. Plain ground sulfurs and sulfur flowers had the largest particles (13 to 25 microns in diameter), special process sulfurs the smallest (5 to 8 microns), with ground, conditioned and ground, wettable sulfurs occupying an intermediate position with respect to diameter.



CITRUS EXPERIMENT STATION, RIVERSIDE, CALIF.

Showing the nozzle arrangement in one of the discharges of the spray duster

DeLong (*48*), in collaboration with the Bureau of Entomology and Plant Quarantine, presents evidence for a stomach poison action of copper compounds on the potato leafhopper, *Empoasca fabae*. Apparently the insects do not receive directly the copper compounds from the sprayed plants, but rather from the plant liquids into which the compounds have passed by absorption from the spray residue. There is also the possibility that the leafhoppers are affected by some product elaborated by the plant through the physiological action of the copper spray. Kennedy (*134*) has tested copper sulfate as a mosquito larvicide under conditions that may indicate action as a stomach poison. In natural waters, which precipitate the copper as copper carbonate, the particles of the latter are ingested by and kill the mosquito larvae.

Elm trees can be killed without becoming liable to the attack of bark beetles by the introduction of certain inorganic compounds into the sap stream according to Whitten (*257*), Bureau of Entomology and Plant Quarantine. Copper sulfate, sodium arsenite, and zinc chloride are the compounds most widely used for this purpose.

Boric acid seems to have a place in the treatment of maggot-infested wounds of sheep (*145*). In Australia, Lennox (*146*) proposes as a wound dressing a mixture of boric acid, tar oil, bentonite, a wetting agent, and water. Knipling (*135*), Bureau of Entomology and Plant Quarantine, reports boric acid rather toxic to dipterous fleece worms of sheep in the United States.

Tests made at the Iowa Experiment Station with baits containing barium compounds for control of the firebrat, *Thermobia domestica*, revealed five compounds of definite toxicity (*202*): barium fluosilicate, barium carbonate, barium oxalate, barium peroxide, and barium triphosphate. Of these, barium carbonate proved the most practical for use in baits, being as effective as sodium fluoride and less repellent. Lennox (*148*) finds barium chloride and cadmium chloride highly toxic to larvae of *Lucilia cuprina*.

The influence of electrostatic charges on the insecticidal effectiveness of dust particles is the subject of an important paper by Wilson *et al.* (*260*), University of Wisconsin. Frictional electrostatic charges are induced on the particles during the process of applying the dusts. Diluents that produce comparatively high charges (pyrophyllite, flaky talcs, calcium carbonate, gypsum) give higher mortalities than diluents (clays and some talcs) that produce lower charges. Galloway and Burgess (*86*), Bureau of Entomology and Plant Quarantine, describe a method of applying insecticidal or fungicidal dusts with liquid adhesives, emulsions, and water. The dust particles are coated with the liquid as they leave the apparatus. Flanders (*74*), Citrus Experiment Station, reviews the literature on the effects of inert and toxic dusts on insects.

Organic Stomach Poisons

Phthalonitrile, a new insecticide, appears to have either a stomach poison or contact action on insects. Trials on nine species of leaf-eating insects by Swingle *et al.* (*233*), Bureau of Entomology and Plant Quarantine, show that phthalonitrile is generally superior to lead arsenate and derris. Garman's tests (*88*) with the adult apple maggot fly also indicate promise for phthalonitrile.

Middlekauff and Hansberry (*170*), Cornell University, found Reineke salt $[NH_4(NH_3)_2Cr(SCN)_4 . H_2O]$ more toxic than several arsenic compounds and nicotine to the adult apple maggot fly and two other species of fruit flies.

A series of organic compounds containing nitrogen, sulfur, or both were tested on larvae of the fleshfly, *Lucilia sericata*, by Hoskins *et al.* (*119*), University of California. The compounds were administered in a synthetic food mixture. Outstanding in toxicity were compounds possessing the group, —C(=S)N=, illustrated strikingly by thiourea, some thiourea derivatives, and certain thioamides. Thiourea and some of its derivatives were as toxic to this larva as rotenone and 2,4-dinitro-6-cyclohexylphenol, and more toxic than nicotine and a preparation containing 50 per cent of β-butoxy-β-thiocyanodiethyl ether. Thiourea is also definitely toxic to larvae of the clothes moth, *Tineola biselliella*, but leaf-eating insects are not highly susceptible

to it. The toxic action of thiourea seems to be related, in some manner, to the behavior of the enzymes concerned with the metabolism of a high protein diet. Metcalf and Kearns (*169*), University of Illinois, have studied a series of picramic acid and toluene sulfonyl chloride derivatives as stomach poisons for the greenhouse leaf tier, *Phlyctaenia rubigalis*. *N,N*-dimethylpicramic acid was most toxic and eight other compounds—*N*-methylpicramic acid, 3,4-dichlorobenzene-*N*-methylsulfonamide, 2,4-dinitro-1-naphthol, picramic acid, *N*-caproylpicramic acid, 2,6-dinitro-*p*-toluenesulfonyl chloride, *p*-toluenesulfonamide, and phenothioxin—were more toxic than acid lead arsenate. A free OH group is apparently necessary in picramic acid derivatives for high toxicity. Replacement of one or both hydrogen atoms of the NH_2 group by aliphatic groups in these derivatives increased toxicity to the insect and decreased toxicity to plants, while tertiary picramic acid amines were more toxic to the insect and less toxic to plants than the secondary amines.

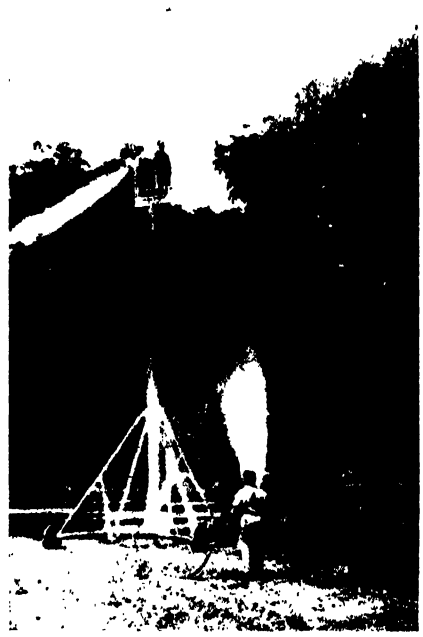
Xanthone, $CO:(C_6H_4)_2:O$, a recent development among organic stomach poisons, has received experimental attention during 1941. Webster *et al.* (*251*), Washington Experiment Station, report favorable results in codling moth control with a proprietary insecticide containing xanthone used in either an aqueous or a petroleum-oil spray.

Cutright and Vogel (*41*), Ohio Experiment Station, obtained less favorable results with this preparation against the same insect, and Steiner and Worthley (*223*) report negative results against the pistol case-bearer. In laboratory and orchard experiments on the oriental fruit moth, *Grapholitha molesta*, Garman (*87*) found the xanthone-containing preparation superior to lead arsenate. Boyce and Bartlett (*21*) failed to control the walnut husk fly with xanthone, and noticed that it caused moderate to severe injury of walnut foliage.

New developments are reported in the use of antimony compounds for control of the citrus thrips, *Scirtothrips citri*, in California. Persing, Bartlett, and Beier (*189*), Citrus Experiment Station, believe potassium antimonyl citrate is a valuable substitute for tartar emetic (potassium antimonyl tartrate) now becoming unavailable as a result of war conditions (*190*).

In ordinary spray waters, the citrate is not so effective as tartar emetic, but when the reaction of the citrate solutions is changed from pH 4.4 to pH 6.0 to 7.0, toxicityto the greenhouse thrips, *Heliothrips haemorrhoidalis*, closely approaches that of tartar emetic solutions. Adjustment of the pH of citrate solutions with sodium hydroxide, sodium bicarbonate, or potassium hydroxide has not increased significantly the effectiveness of the sprays for citrus thrips on lemons, but on oranges the citrate solutions are reasonably effective (*190*). A discussion of the conditions which affect the use of tartar emetic for citrus thrips control is given by Persing and Boyce (*191*).

The large-scale application of insecticides in agricultural practices always raises the question of the effect of the poisons on honeybees. The growing use of antimony compounds for insect control induced Eckert (*65*), University of California, to study the effect of tartar emetic on bees. The minimum lethal dose was established as between 3 and 6 micrograms per bee. Under field conditions, however, bees do not feed sufficiently upon the sweetened tartar emetic spray to cause death. Bertholf and Pilson (*14*), Western Maryland College, found that phenothiazine, which under laboratory conditions is highly toxic to codling moth larvae, was almost nonpoisonous to the honeybee. In comparison, calcium arsenate, arsenic pentoxide, cryolite, and lead arsenate were toxic in about the order given. Some samples of lead arsenate, in which the particles were relatively large, met the requirements of codling moth control yet were nearly nontoxic to bees. Sturtevant *et al.* (*226*), Bureau of Entomology and Plant Quarantine, have studied possible causes of the serious losses of bees in Utah. Orchard spraying seems to furnish the most probable source of bee poisoning, and spraying of sugar beets with Paris green contributes another source. Phenothiazine proved highly toxic to blowfly larvae, *Lucilia cuprina* (*143*), and substituting methyl, ethyl, acetyl, or benzo radicals into the parent compound reduced toxicity. Believing that the variable results obtained with phenothiazine for codling moth control might arise from the form of the sulfur used in its preparation, Siegler and Smith (*210*), Bureau of Entomology and Plant Quarantine, prepared the compound from amorphous sulfur, crystalline sulfur, and a mixture of equal parts of these two forms. The three phenothiazine preparations were equally toxic to codling moth larvae, indicating that the variations in toxic action must lie elsewhere than in the form of the sulfur used. Woke (*262*) was unable to find histological changes in the midgut of a southern armyworm which had been poisoned with phenothiazine.



CITRUS EXPERIMENT STATION, RIVERSIDE, CALIF.

The spraying of Persian walnut trees with basic lead arsenate for control of codling moth. This tower is 30 feet tall, but some are as high as 40 feet.

Experiments completed in South Africa suggest a possible use of calcium chloroacetate in grasshopper baits. In the laboratory Lea and Nolte (*142*), Department of Agriculture and Forestry, Union of South Africa, demonstrated that calcium chloroacetate was an effective poison for the brown locust, *Locustana pardalina*, and the red locust, *Nomadacris septemfasciata*, though it was somewhat less toxic than sodium arsenite. In field experiments less encouraging results were obtained. Barium chloroacetate and bromoacetate were less toxic than the calcium compound in the order given. Dimethylglyoxime was also toxic in baits for these insects. Other information on baits for these insects is given by du Plassis and Nolte (*60*). Against larvae of *Lucilia cuprina* Lennox (*143*) found that calcium chloroacetate, chloroacetamide, and the dye compounds, methylene blue, crystal violet, malachite green, brilliant green, and eosin, were markedly effective. When added to a food medium, methylene blue prevented entirely growth of the larvae. Pentachlorodioxytriphenylmethane, sulfonic acid, and a chlorinated phenyl benzyl phosphonium compound possess mothproofing properties according to Herrmann (*114*). A review of mothproofing agents is contained in an article by Van Antwerpen (*245*).

Waterhouse (*248*), Council for Scientific and Industrial Research, Australia, has determined by an indicator method the hydrogen-ion concentration of the digestive tracts of nine species of flies, two of which are abundant in North America. Most portions of the tracts of the larvae were predominantly neutral or alkaline, the range in pH being generally from 7.4 to 8.0. The one exception, the middle portion of the midgut, was definitely acid—pH 3.2 to 3.9. In contrast the tracts of the adult flies were usually acid with a range of pH from 3.5 to 5.3, except for the posterior portion of the midgut which was alkaline—pH 7.8 to 8.0. Staudenmayer (*222*), Horticultural Research Station, Germany, has published perhaps the most comprehensive review of the literature on the hydrogen-ion concentration of the digestive tract and blood of insects. Values are given for 120 species in nine orders of insects. The data are discussed with respect to the toxicity of stomach poisons.

Contact Poisons

Important fundamental studies of the permeability of insect cuticle to toxic and other substances have been published by Hurst (*121*, *122*), Biological Field Station, Imperial College of Science and Technology, England. In the later article Hurst points out that the cuticle of insects possesses a high degree of asymmetry which depends on the association between the external, water-repelling "lipoid layer" and the internal, hydrophile, protein-chitin complex (*240*). This asymmetry affects the permeability of the whole cuticle, and is modified in different insects by the relative distribution and physical properties of the soluble and insoluble substances in the cuticle. An asymmetrical membrane may be more permeable to a particular substance than is a single component of the membrane. The permeability of asymmetrical colloid associations, such as the insect cuticle, is not deducible necessarily from the summation of the permeabilities of the component phases of the associations. Hurst believes the fundamental assumptions concerning the permeability of membranes should be reconsidered. Wigglesworth (*258*), London School of Hygiene and Tropical Medicine, confirms Hurst's earlier work with nontoxic hydrocarbons, and stresses particularly the importance of the partition coefficient of a substance between oil and water in determining the rate at which it leaves the oily component of a contact insecticide to enter the tissues of an insect.

According to a recent paper by Moore *et al.* (*172*), McLaughlin Gormley King Co., a selenium compound, a proprietary material made by dissolving selenium in potassium ammonium sulfide solution, was tested in sprays on the Pacific mite, *Tetranychus pacificus*, and the European red mite, *Paratetranychus pilosus*. Both the mites and their eggs on apple trees were killed, and the trees were not injured by these sprays. Yothers (*266*), Bureau of Entomology and Plant Quarantine, observed that female San Jose scales, *Aspidiotus perniciosus*, were rendered unproductive by lime-sulfur spray from the action of the spray on the reproductive organs of the females or to the death of the males, and more likely to the latter because the males are more susceptible than the females to lime-sulfur spray.

In work on organic contact insecticides, Melvin *et al.* (*167*), Bureau of Entomology and Plant Quarantine, offer a new remedy for treatment of wounds on cattle infested with screwworms, *Cochliomyia americana*, and for protecting wounds from re-infestation. In 1939 (*166*) the discovery was made that diphenylamine repelled the flies and killed the young larvae before they could injure the tissues. The new preparation, superior in its action to diphenylamine alone, is a mixture of diphenylamine, benzene, Turkey red oil, and lampblack. It is applied to the wounds with a brush. A group of amines derived from the fatty acids has been studied for insecticidal action by Ralston *et al.* (*199*), Armour & Co. Of the primary amines, the octyl and decyl compounds gave highest kills of houseflies in a Peet-Grady



TEXAS EXPERIMENT STATION

Adult cotton flea hopper

chamber, but they are too irritating for general use. Dioctylamine was the most active secondary amine, showing marked paralyzing and lethal potency to houseflies. It is not irritating to man or toxic to domestic animals. Trioctylamine, the only tertiary amine tested, possessed weak insecticidal action. Dahm and Kearns (*42*), University of Illinois, tested 22 alkyl secondary amines for toxicity to the housefly. *N*-η-hexyl-η-heptylamine was equal in effectiveness to any compound in the series and superior to any lower member. Straight-chain alkyl secondary amines having identical alkyl groups, or differing by only one CH_2 group, were more toxic than secondary amines in which the alkyl groups differ by a greater number of CH_2 groups. However, the substitution of branched-chain alkyl groups leads to reduced insecticidal effectiveness. Thomssen and Doner (*236*), J. R. Watkins Co., discuss the insecticidal properties of the fatty acids.

Organic dinitro compounds continue to occupy the attention of investigators of insecticides. Stellwaag and Staudenmayer (*224*), Horticultural Research Station, Germany, have studied the mechanism of toxic action of 3,5-dinitro-*o*-cresol (2,4-dinitro-6-methylphenol) on insects. This compound seems to penetrate the lipoidlike surface layer of the cuticle, destroying the underlying cells by precipitation of the proteins. Toxic action on insects and plants is increased in the presence of wetting and adhesive agents. But when used with an oil, the compound will kill the pupae of certain insects in their cocoons without injury to tree buds. Decker and Drake (*47*), Iowa Experiment Station, examined the action of a number of organic nitro compounds in dusts on two-striped grasshoppers, *Melanoplus bivittatus*, Mormon crickets, *Anabrus simplex*, and chinch bugs, *Blissus leucopterus*. Most toxic to the grasshoppers was 3,5-dinitro-*o*-cresol, which also killed chinch bugs but proved less effective on Mormon crickets. 2,4-Dinitro-6-cyclohexylphenol and 2,4-dinitrophenol were less active though still markedly toxic to the grasshoppers.

A recent addition to the nitrophenol insecticides is the dicyclohexylamine salt of 2,4-dinitro-6-cyclohexylphenol. Kagy and McCall (*132*), Citrus Experiment Station, and Boyce and Kagy (*25*) have found this compound to be very toxic to the citrus red mite, *Paratetranychus citri*, the citrus thrips, and some other mites and insects. The salt is nearly as effective as the parent phenol and, because it has a lower vapor pressure, its effectiveness persists for a longer period. It can be used in dusts without injury to citrus foliage. Isely (*125*), University of Arkansas, controlled the red spider, *Tetranychus telarius*, on cotton with a dust which contained 0.05 per cent of 2,4-dinitro-6-cyclohexylphenol in sulfur. In a later paper, Kagy (*131*) reviews the pertinent literature and presents new information on the 2,4-dinitro-6-*R*-phenols as insecticides. 2,4-Dinitrophenol, the derivative in which *R* is hydrogen, is considerably less toxic to insects than 2,4-dinitro-6-methylphenol, in which *R* is a methyl group. When administered as stomach poisons to silkworms, *Bombyx mori*, the toxicity of the derivatives increases with increasing length of the substituted normal alkyl chain up to 6 or 7 carbon atoms. Beyond that point, the substituted compounds decrease in toxicity. All of the 2,4-dinitro-6-*R*-phenols are more toxic to silkworms than acid lead arsenate and less toxic than rotenone, and 2,4-dinitro-6-cyclohexylphenol is more toxic than 2,4-dinitro-6-methylphenol. Because the latter compound is essentially the first member of this series, it can be expected to behave peculiarly in toxic properties. There are indications that the toxicity of these compounds to man stands in reverse order to their toxicity to insects.

A comprehensive study of the action of contact insecticides on *Lucilia cuprina* larvae has been made by Lennox (*144*). Pure liquid aliphatic, halogenated, and aromatic hydrocarbons were markedly toxic. The toxicity of normal aliphatic alcohols and acids increased, within homologous series, with the length of the carbon chain. Isomers of alcohols and acids were less toxic than the corresponding normal compounds. The toxicity of coal-tar fractions increased with the volatility of

the tar acid content. Lipoid solvents were highly toxic, probably owing to a solvent action on the external cuticular layer which facilitates penetration of the solvent through the cuticle.

Three species of fleece worms, larvae of the flies, *Phormia regina*, *Cochliomyia macellaria* and *Lucilia sericata*, are responsible for cutaneous myiasis of sheep in the United States. Knipling (*135*), Bureau of Entomology and Plant Quarantine, tested 30 organic compounds against the larvae of these flies. The 11 most toxic compounds were diphenylsulfoxide, *p*-nitroanisole, azobenzene, diazoaminobenzene, *p*-nitrophenetole, phenothioxin, *m*-dinitrobenzene, *p*-dichlorodiphenyl, hydrazobenzene, *p*-nitrotoluene, and benzeneazodiphenylamine. The first four of these compounds approached sodium arsenite in toxicity to the larvae.

Pierpont (*193*), University of Delaware, uses a terpene ether, ethylene glycol ether of pinene, as an activating agent in pyrethrin–petroleum oil fly sprays. Ark and Tompkins (*9*), University of California, killed red spiders and their eggs with a 2 per cent aqueous solution of phthalic glyceryl alkyd resin. The compound has spreading properties, and at this concentration did not injure the foliage of the sprayed plants.

Trichlorobenzene and *o*-dichlorobenzene were used by Fellton (*73*), Department of Health, New York, to control larvae of aquatic midges, *Procladius* spp., *Chironomus* spp., in lakes on the New York World's Fair grounds. The compounds were sprayed on the surface of the water at 16 to 25 gallons per acre. Trichlorobenzene was the more rapid in toxic effect. Collins (*36*), Bureau of Entomology and Plant Quarantine, finds *o*-dichlorobenzene emulsion with or without petroleum oil useful as an ovicide and repellent spray for the bark beetles, *Scolytus multistriatus* and *Hylurgopinus rufipes*.

Ebeling (*62*), Citrus Experiment Station, proposes a method of determining residues from petroleum-oil sprays on citrus trees which involves absorption with filter paper of the spray from the upper surfaces of sprayed foliage and extraction of the oil from the filter paper. Oil concentration in a petroleum-oil spray bears a linear relation to oil deposit on the foliage. Blood albumin as a spreader tends to decrease oil deposit, while certain electrolytes (calcium chloride, aluminum sulfate) increase the deposit of certain types of oils. McCall and Kagy (*154*) stain the oil spray with Sudan III, extract the oil deposit from the sprayed foliage with light petroleum ether, and determine the deposited oil by comparison with a set of standards made from the same oil. The accuracy of the method is not affected by extracted plant waxes or essential oils. Cole and Smith (*35*), California Experiment Station, use Nile blue sulfate for differentiating the oil droplets from the dispersing medium of an oil-in-water emulsion. Pearce *et al.* (*188*) determine the deposition of oil by dormant sprays on the bark of apple trees by extracting with petroleum ether carefully sampled lots of sprayed twigs which have been cut into convenient lengths. Net weight of the extracted oil residue is obtained by correcting for the amount of residue extracted from unsprayed twigs. This method is used by the same authors (*31*) in a study of the factors that influence the deposition of petroleum oil on apple trees in dormant spraying. The primary factors are concentration of oil in the spray mixture, kind and amount of emulsifier–wetting agent, and the quantity of spray applied per tree. Oil concentration and oil deposition are correlated when the same emulsifier is used, but there may be little relation between concentration and deposition when the emulsifiers are different. If the first spray is allowed to dry before a second spray is applied, the oil deposit from the later spray shows nearly a twofold increase. Oil deposit and toxicity to eggs of the fruit tree leaf roller, *Cacoecia argyrospila*, are definitely correlated (*32*).

The effect of petroleum-oil sprays on the chemical composition of the juice of citrus fruits is the subject of an extensive investigation in California reported this year by Sinclair *et al.* (*212*), Citrus Experiment Station. Washington navel and Valencia oranges were obtained from orchards located in widely separated areas of the citrus-growing regions involving many different soil types and climatic conditions. The trees from which the fruit was taken were sprayed with light-medium oils of 70° viscosity, 92 per cent of unsulfonatable residue, and distillation range of 50 to 65 per cent at 636° F. The oil concentrations of the sprays ranged from 0.25 to 1.75 per cent. Within these limits of concentration, all sprays reduced the total soluble solids, the reducing sugars, and the total sugars of the juice, but the changes were slight after spraying with oil concentrations that ranged from 0.75 to 1.75 per cent. Titrable acidity was changed slightly, and the pH but little because the juice is highly buffered.



TEXAS EXPERIMENT STATION

Cotton bollworm feeding on boll

Worthley (*263*), Pennsylvania State College, investigated the relation of the physical properties of lubricating type oil to toxicity, using as the experimental insect, the larger milkweed bug, *Oncopeltus fasciatus*. The oils were applied directly to the insects, dosage being proportional to unit area of body surface rather than to body weight or to the single insect. Toxicity of the lubricating oil fractions decreased with increase in viscosity, it was not correlated with the density or the index of refraction of the oils, and there was no significant difference in toxicity with respect to sex of the insects.

According to Watson (*249*), Cambridge University, petroleum oils affect mosquito larvae in several ways. They may adhere to the body hairs and so interfere with the balance of the larvae; the movements of the feeding brushes may be obstructed by the oil, resulting in starvation of the larvae; certain oils are directly poisonous, acting on the muscle tissue and causing paralysis. All of the oils examined were able to penetrate the outer cuticle of the larvae, and they also entered the tracheae, interfering with moulting and affecting the heart. The potency of an oil is related to its ability to spread upon a water surface, but if the oil layer is of unimolecular thinness, the oil may fail to enter the respiratory siphon. Richards (*201*), University of Pennsylvania, finds that toxic (volatile) petroleum oils cause extensive degeneration of the nervous tissue of mosquito larvae, *Culex pipiens*, and all oils, whether of the toxic or nontoxic type, produce the histological effects of suffocation, *i. e.*, a clumping of the chromatin especially in the cells of the central nervous system. The same histological effects were observed in larvae asphyxiated in water of low oxygen tension.

Hansberry (*105*) compared rapeseed oil with petroleum oil, both supplemented with nicotine compounds, in sprays for controlling the codling moth. The rapeseed oil proved inferior for this purpose.

Specifications and methods of analysis for tar-oil dormant (winter) sprays are presented by Gimingham *et al.* (*90*), British Ministry of Agriculture and Fisheries. The specifications refer to single-phase or polyphase products compounded from distillates from retort or coke-oven tars. Miscible tar-oil sprays shall contain not less than 80 per cent total oil, not less than 52 per cent tar oil soluble in dimethyl sulfate, and not more than 10 per cent of phenols. At least 40 per cent of

the neutral oil from dimethyl sulfate shall distill above 230° C., 22 per cent above 290° C., and 10 per cent above 335° C. Specifications are also given for stock emulsion tar-oil sprays, and the methods of analysis for both types of sprays are detailed.

Control of Termites and Other Wood-Infesting Insects

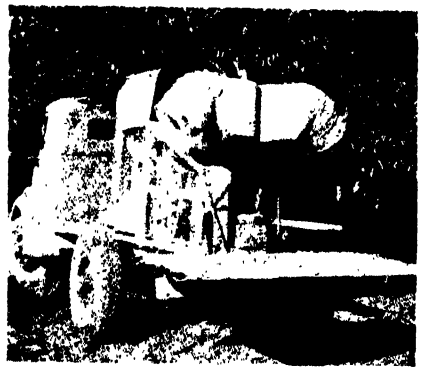
A new soil insecticide for termites, phthalonitrile, is announced by Swingle *et al.* (*233*). Concentrations down to 1 to 3,000 parts of soil, killed *Reticulotermes* sp. in 24 to 48 hours. Concentrations of 1:4,000 and 1:5,000 killed 93 per cent of the insects in three days.

Some years ago, the Bureau of Entomology and Plant Quarantine built a test house on Barro Colorado Island, Canal Zone, to determine the resistance of building materials to termites and decay organisms under severe tropical conditions. A report on the condition of this house as of August 1940 has been published by Snyder and Zetek (*217*). Timbers impregnated with standard wood preservatives (coal-tar creosote, zinc chloride) withstood the attack of termites from 1926 until 1940. However, the termites succeeded in constructing shelter tubes over the treated timbers and so reached and damaged untreated materials inside the house. Incorporation of phenol formaldehyde resins in plywood (*4*), produced a material with promising termite-resistant properties. Turner (*242*), Connecticut Experiment Station, discusses the control of termites. Cann (*28*) reviews the recent work in Great Britain, Australia and the United States on preventing *Lyctus* beetle attack on wood by chemical agents

Plant Insecticides

Pyrethrum. LaForge and Acree (*139*), Bureau of Entomology and Plant Quarantine, offer a new method for the quantitative determination of pyrethrins I and II. The pyrethrins are hydrogenated with palladium as catalyst, yielding hexahydropyrethrone and the corresponding acids of pyrethrins I and II. The monocarboxylic acid of I is steam distilled from the acidulated, fatty acid-free filtrate and titrated with weak sodium hydroxide solution. The dicarboxylic acid of II is removed from the residual filtrate by ether, extracted with a slight excess of sodium hydroxide, and back titrated with weak acid. The method is said to be rapid and accurate. Yip (*265*), University of California, describes a simple and inexpensive apparatus for extracting pyrethrin I from pyrethrum flowers with petroleum ether which reduces loss of solvent by evaporation. Martin (*164*), Rothamstead Experimental Station, England, obtains colorless concentrates of the pyrethrins by extracting with petroleum ether ground pyrethrum which has been mixed with fresh decolorizing carbon. Pyrethrin II seems to be held more tenaciously by the carbon than pyrethrin I. Harts *et al.* (*109*), John Powell and Co., in a comparative study of the Seil and mercury reduction methods for pyrethrin determination, obtained consistently lower results with the mercury reduction method for both ground pyrethrum flowers and pyrethrum extracts. Nagase (*174, 175*), Taihoku Imperial University, Taiwan, has studied the products of combustion and of destructive distillation of pyrethrum, reporting among the former neutral, phenolic, acidic, and basic substances. The neutral substances predominate and show greatest toxicity to the pomace fly, *Drosophila ampelophila*. Destructive distillation yielded butyric acid, isovaleric acid, an unknown acid, acetaldehyde, propionic aldehyde, and butyric aldehyde. Covello (*37*) finds that sulfur dioxide inhibits the activity of the oxidase responsible for the loss of pyrethrins during the drying of pyrethrum flowers.

The relative toxicity of pyrethrins I and II to insects is still a matter of interest. The toxic action of the pyrethrins in kerosene on the American cockroach is the subject of a paper by McGovran *et al.* (*157*), Bureau of Entomology and Plant Quarantine. Solutions rich in pyrethrin II caused more rapid paralysis affecting a greater proportion of the insects than solutions rich in pyrethrin I. Yet mortality within levels of 17 to 77 per cent was greater from solutions of high pyrethrin I content, though more concentrated solutions produced higher and almost identical mortalities. Female cockroaches were about twice as resistant as the males to the action of the pyrethrins. The effect of pyrethrum on the spiracular mechanism of insects has been studied by Wigglesworth (*259*) who confirms the destructive action of pyrethrins on the central nervous system. Wigglesworth's experiments also show that desiccation of insects poisoned by pyrethrins is not the main cause of their death. Newly emerged blowflies, *Phormia regina*, with thin, soft cuticles proved more resistant to pyrethrins, contrary to expectation, than older insects with hardened and thickened cuticles (*1*).



CITRUS EXPERIMENT STATION, RIVERSIDE, CALIF.

Rear view of walnut duster

There are a number of references to pyrethrum–petroleum oil larvicides for mosquito control in the 1941 literature. Mentzer *et al.* (*168*), University of Delaware, modified the New Jersey mosquito larvicide (*91*) by substituting a fuel oil for kerosene and adding pine oil, ethylene glycol ether of pinene, or fenchyl thiocyanoacetate. These substances increased the toxicity of the standard larvicide, but a mixture which contained 50 per cent of the standard proportion of pyrethrum and 5 per cent of ethylene glycol ether of pinene, diluted 1:10, proved most satisfactory. Yates and Stage (*264*), Bureau of Entomology and Plant Quarantine, have attempted to improve the New Jersey larvicide. Trials were made with a group of emulsifiers, oils, and activators. Several organic wetting agents produced pyrethrum-oil emulsions that compared favorably with the standard New Jersey preparation. Diesel and stove oil performed no better than kerosene in this preparation and, while 5 per cent of sesame oil or of amyl acetate increased moderately the toxicity of the preparation, these additions do not seem justified economically. Effects of storage, of debris, and of temperature on the effectiveness of these emulsions are considered. The same authors (*221*) have dealt with the resistance to larvicides of several species of mosquitoes. Petroleum oils, pyrethrum-oil emulsions, Paris green, and phenothiazine were included in this study. Some marked differences were revealed. Ginsburg (*92*) brings up to date existing knowledge of mosquito oils and larvicides, and mosquito control is treated in a paper by Bishopp and Webb (*15*), Bureau of Entomology and Plant Quarantine.

A pyrethrum-oil preparation was more effective than petroleum oil alone for controlling the cornsilk fly, *Euxesta stigmatias*, a pest of sweet corn in Puerto Rico, according to Bailey (*11*), Puerto Rico Experiment Station.

According to Skaptason and Blodgett (*213*), Cornell University, pyrethrum insecticides reduce the effectiveness of cuprous oxide for the fungus organism of potato, *Phytophthora infestans*.

An important medical use of pyrethrum for controlling lice on man is indicated by the work of Angevine (*2*), Board of Public Welfare, District of Columbia. Martin and Hester (*165*), Rothamsted Experimental Station, England, find that the causal agent of human dermatitis in pyrethrum is located in the lower part of the flower head. It is soluble in petroleum ether and is present in the volatile oil obtained by steam distillation of the flowers. Apparently the pyrethrins are not concerned in pyrethrum dermatitis.

Cultivation and harvesting of pyrethrum is treated in a bulletin by Sievers *et al.* (*211*), U. S. Department of Agriculture, who believe a modified cotton stripper offers the mechanical principles of a successful machine for harvesting pyreth-

rum flowers. A machine-harvested crop met adequate standards with respect to insecticidal properties.

Rotenone and Rotenoids. The quality of rotenone-bearing plants is based on the content of rotenone and total extractive material. The rotenone content has definite insecticidal significance, but the toxic action of the extractive substances may vary with the source of the plant material. Goodhue and Sullivan (*97*), Bureau of Entomology and Plant Quarantine, have studied the toxicity to the adult housefly of the noncrystalline extractive material from the roots of *Tephrosia virginiana*. Starting with the residue from a chloroform extract of the roots, taken up in ether and freed of rotenone, they obtained by alkali extraction an alkali-soluble fraction and an alkali-insoluble resin. The resin was divided into a neutral resin fraction and an oil. The fraction which contained the neutral resin and comprised about 50 per cent of the total extractives of the roots was toxic to the housefly. The alkali-soluble fraction which made up 9 per cent and the oil 23 per cent of the total extractives were nontoxic. These two nontoxic portions of the total extractives should be considered in evaluating the roots on the basis of total extractive content. Jones and Wood (*130*) and Jones (*128*), Bureau of Entomology and Plant Quarantine, find that soft glass, owing to its alkalinity, lowers markedly the melting points of α-toxicarol and of rotenone. Only glass of low alkalinity is suitable for melting point determinations of these compounds. A study of the photochemical decomposition of rotenone by Ts'ai and Ke (*241*), Yenching University, China, revealed that oxygen does not decompose rotenone in the dark, but in the light a marked decomposition takes place. Strangely, the presence of oxygen does not seem to have an appreciable effect on the decomposition of the rotenone in the light.

Woke (*262*) fed rotenone to larvae of the southern armyworm. The larvae were not killed and on microscopical examination of the epithelial cells and tissues of the midgut appeared normal. Some new or otherwise noteworthy insecticidal uses of rotenone-bearing materials appear in the 1941 literature. Progress in the development of a kerosene-rotenone spray for red scale in California is shown by Quayle (*196*), Citrus Experiment Station, and by McBeth and Allison (*153*), Leffingwell Ranch, Whittier, Calif. Steiner and Worthley (*223*), Pennsylvania Experiment Station, have developed a petroleum-oil emulsion containing cube powder for the control of the pistol casebearer, *Coleophora malivorella*, on apple. McGarr (*156*), Bureau of Entomology and Plant Quarantine, uses derris in calcium arsenate dust for the cotton aphid. Johnson and Friend (*127*), Connecticut Experiment Station, report encouraging results with derris for controlling mound-building ants, *Formica exsectoides*. Eckert (*64*), University of California, Berkeley obtains favorable results for the control of the Argentine ant, *Iridomyrmex humilis*. On the contrary, Hackley (*102*) states that the action of derris on ants is variable. Goetsch (*93*) University of Breslau, Germany, gives information on the control of ant colonies and the composition of ant baits. Fulton and Nelson (*80*), Bureau of Entomology and Plant Quarantine, show that Bordeaux mixture is reasonably compatible with ground cube root and that a mixture of the two is suitable as a spray for the Mexican bean beetle. Spencer (*219*), University of British Columbia, recommends derris powder, dusted and rubbed into underwear and seams of uniforms, in place of older remedies for control of body lice on troops in the field. Roark (*203*), Bureau of Entomology and Plant Quarantine, reviews the more recent literature on rotenone and the rotenoids with special emphasis on work done in the United States.



TEXAS EXPERIMENT STATION

Cotton leafworm

Nicotine. Distribution of nicotine and some of its compounds between water and vegetable oil has received the attention of Norton (*180*), New York Experiment Station. The purpose was to ascertain the stability of nicotine-oil preparations for insecticidal sprays. Most vegetable oils, particularly those with free alcohol groups (pine oil, castor oil), hold more nicotine than petroleum oils. Nicotine compounds are not so favorably distributed between water and oil as free nicotine, but they tend to shift less toward the water phase with increasing concentration. Judged solely on the basis of distribution, the advantage shown by vegetable oils over petroleum oils is too small to be of practical significance. Norton *et al.* (*181*) also determined the partial pressure of nicotine solutions at 25° C. With increasing nicotine concentration, loss of nicotine relative to water at first increases rapidly, then remains nearly constant over a considerable range of concentrations, and finally increases rapidly again. Norton and Billings (*182*) present a study of the residues from sprays containing soluble nicotine, nicotine-oil preparations, and fixed nicotines. The most rapid loss of nicotine occurs during the drying of the spray. The loss is greatest for the soluble nicotines and least for the fixed nicotine preparations. Deposits of nicotine oleate and nicotine pectate are smaller and are lost more rapidly than those of nicotine sulfate because of the greater run off and, probably, lower chemical stability.

An investigation reported by Dawson (*44*), University of Missouri, indicates that nicotine is synthesized largely in the roots of the tobacco plant and moves from the roots to the leaves principally through the xylem.

Babers (*10*), Bureau of Entomology and Plant Quarantine, observed no change in the pH of the blood of southern armyworms which were held in an atmosphere of nicotine vapor, although the larvae absorbed considerable nicotine. Apple (*7*), Iowa State College, studied the effect of sodium and calcium chloride on the toxicity of nicotine to eggs of the housefly. The experiments showed an increased toxic activity of nicotine in the presence of sodium chloride, while calcium chloride exerted an antagonistic influence on the nicotine. The effect is probably the result of changed rate of nicotine permeability in the presence of the salt ions. Hansberry and Norton (*106*) tested a group of nicotine compounds in sprays against the bean aphid, *Aphis rumicis*. Nicotine laurate, oleate, linoleate, stearate, and naphthenate were most toxic, and in effectiveness they equaled approximately free nicotine in sodium oleate solution. Compounds with poor spreading properties (nicotine caseinate), compounds like dodecyl nicotinium iodide, and some nicotine double salts containing copper, tin, and zinc were less toxic, while insoluble nicotine compounds possessed little toxicity. Nicotine combinations with fatty and naphthenic acids owe their insecticidal effectiveness to the combined action of alkaloid and acid, to the improved wetting and spreading properties of their solutions, and to an unknown activating or synergistic action. A dust mixture of nicotine tannate, nicotine bentonite, and an inert carrier was more effective than rotenone dusts for controlling the European corn borer, *Pyrausta nubilalis*, on sweet corn, according to Turner (*243*). Fahey (*67*) studied bentonite clays from various sources with respect to their suitability for preparing tank-mixed nicotine-bentonite sprays. Clays that removed a large percentage of nicotine from solution generally swelled when wet with water and were flocculated from water by addition of nicotine sulfate. One clay sample, from Mississippi, behaved exceptionally

in removing most of the nicotine from solution, yet it did not swell in water and was not flocculated by nicotine sulfate. Clays which were flocculated by nicotine sulfate yielded blotchy spray residues with superior weather-resisting properties. High mortality of the pea aphid, *Illinoia pisi*, was obtained by Ditman *et al.* (*53*), Maryland Experiment Station, by the application of nicotine vapor with a vaporizer. A machine called the vapo-fumer, used to "gas" vegetable crops with nicotine vapor, is described by Nicholson (*179*).

Anabasine, an alkaloid related chemically to nicotine, has been used in mist form for controlling mosquitoes by Pogodina and Sokolov (*194*), and is the subject of an exhaustive review by Roark (*204*) who summarizes the chemistry, occurrence, pharmacology, insecticidal uses, patents, and literature.

Other Plant Insecticides. Recently introduced into the United States from China, where it has long been grown and used to protect vegetables from insect attack, the "Thunder God vine", *Tripterygium wilfordii* (family Celastraceae), has interesting possibilities as a stomach poison. W. T. Swingle *et al.* (*235*), U. S. Department of Agriculture, working with the pulverized fresh root from plants grown in the United States, demonstrated marked toxicity to young larvae of the diamondback moth, *Plutella maculipennis*, and the imported cabbage worm, *Pieris rapae*. To some other insect larvae, the powder gave low to almost no mortality. The chemical nature of the toxic substance in the powder is under investigation. Hwang (*123*) states that the insecticidal compound in this plant is an alkaloid ($C_{28}H_{33}O_{11}N$) to which the name tripterygine has been given. He obtained 2.4 grams of the alkaloid from 3 kg. of the roots.

Stultz and Patterson (*225*), Dominion Entomological Laboratory, Royal, N. S., examined for toxicity the alkaloids, tetrahydropolmatin, protopine, dicentrine, and corydine hydrochlorides, and the hydrochlorides of the total amorphous alkaloids from *Lobelia inflata*, *Menispermum canadense*, and *Delphinium brownii*. The alkaloids of *D. brownii* appeared most promising. They were less toxic than nicotine sulfate as contact poisons for aphids, but as stomach poisons and repellents for some other insects they were more effective. Spray residues of the alkaloids appear to lose their insecticidal potency more rapidly than those of nicotine sulfate. Colchicine, an alkaloid related to morphine and obtained from *Colchicum autumnale*, has been studied by Dooley (*55*), Prairie View State College, Texas, with respect to its influence on the germ cells of Orthoptera. The testes cells of the cricket, *Gryllus assimilis*, and those of the entire insect are more sensitive to injected solutions of colchicine than the corresponding cells of the differential grasshopper, *Melanoplus differentialis*. Colchicine prevents division of the sperm cells of these insects without inhibiting their differentiation.

The fruit of the Amur cork or velvet tree, *Phellodendron* spp., a native plant of Amurland, contains a substance with insecticidal properties. Haller (*103*), Bureau of Entomology and Plant Quarantine, tested the residue after removal of the volatile oil on larvae of the mosquito, housefly, and codling moth, to all of which it was toxic. The action of the toxic substance is rapid, like that of pyrethrum and nicotine. Apple and Howard (*8*), Bureau of Entomology and Plant Quarantine, report dusts made from nuts of the California buckeye, *Aesculus californica*, as rather mildly toxic to the Mexican bean beetle.

A survey of plant products for insecticidal properties has been made by Hartzell and Wilcoxon (*110*), Boyce Thompson Institute for Plant Research. Of 150 species and varieties tested on larvae of the mosquito, *Culex quinquefasciatus*, 36 species produced mortalities of 50 to 100 per cent. Among these, 18 plant products, all sources of botanical drugs, killed from 90 to 100 per cent of the larvae. These products are balm of Gilead buds, caraway seed, echinacea root, elecampane root, hydrangea root, male fern rhizome, black mustard seed, pepo (pumpkin seed), sage root, oils of bay leaves, cubebs, cypress, patchouli, rosemary, santal, sweet basil, sweet majoram, and chenopodium. Several of these products are well-known anthelmintics. A steam distillate of elecampane was distinctly toxic to *Aphis rumicis*. Neither ricin, ricinin, crushed castor-bean seed, nor the foliage of castor-bean plants were toxic to the grasshopper, *Melanoplus differentialis* (*218*).

Wetting, Spreading, and Adhesion of Sprays

Several contributions to the wetting, spreading, and adhesive properties of sprays are noted in the recent literature. McKenna and Hartzell (*160*), Boyce Thompson Institute for Plant Research, used 34 wetting and spreading agents in lead arsenate sprays against the Japanese beetle. Ultroil, a proprietary material consisting of a sulfated castor oil with a relatively large percentage of combined SO_3, was most satisfactory for control of the beetle. It left no visible residue and caused no injury to the 48 species of plants sprayed with it. Garman and Shepard (*89*) propose the following spray mixture as a substitute for the western "dynamite spray" for codling moth control—aluminum acetoborate 1 pound, benzoic acid 0.25 pound, white mineral oil 1 quart, lead arsenate 1.5 pounds, and water 50 gallons. Results of experiments in Iowa (*99*) show that soybean flour adds or detracts nothing from the effectiveness of lead arsenate and calcium arsenate sprays for controlling the codling moth. Knipling (*136*), Bureau of Entomology and Plant Quarantine, recommends beet molasses as a dispersing agent for phenothiazine. Fassig and Pierpont (*72*), University of Delaware, find the potassium soaps of wood resin and resin residue equal to potassium oleate as a spreader for nicotine but less effective for derris, while none of the soaps was an effective spreader for pyrethrum extract. A resin–mineral oil emulsion, useful as a sticker for agricultural insecticides, is described by Chisholm (*33*), Bureau of Entomology and Plant Quarantine. Several commercial wetting agents for arsenical sheep dips decrease the retention of arsenic by the fleece, affording poor protection against sheep maggots, according to Hobson (*116*). Roth and Pyenson (*206*), Atlas Powder Co. and New York State Institute of Applied Agriculture, find in mannitan monolaurate a valuable wetting and spreading agent in rotenone and pyrethrum sprays for aphids and certain other insects and in preparations for control of the corn earworm.

The effect of reducing the surface tension of water on mosquito pupae is described by Manzelli (*165*), Rutgers University. Materials which reduce the surface tension of water may have a deleterious effect on



TOBACCO BY-PRODUCTS AND CHEMICAL CORP.

Vapo-fumer in action—applying nicotine vapor to vegetable crops

all stages of the mosquito. The female, alighting on the water to deposit her eggs, cannot support herself if the surface tension is too low and, even if she succeeds in ovipositing, the eggs will sink and the embryos drown. But if the eggs are laid and they hatch, the young larvae will be killed by the combined effect of reduced surface tension and toxicity because most substances that reduce surface tension are, in some degree, toxic. Finally, and this is the subject of Manzelli's paper, the pupae lose their equilibrium in water of low surface tension. This happens as a consequence of the position of the center of buoyancy of the pupae which lies between the tips of the two breathing trumpets. Normally the tips of the trumpets are maintained at the surface by the tension of the surface film. If the tension becomes too low, the trumpets can no longer hold to the film, and the pupae turn over on their sides and die. Substances that reduce surface tension are suitable for controlling the breeding of mosquitoes in barrels, dye vats, and similar receptacles. In such places a neutral wetting agent will probably serve better than a soap. Cupples (*40*), Bureau of Entomology and Plant Quarantine, sprayed rotating apples with aqueous solutions of various wetting power as measured by their spreading coefficients on mineral oil. Retention of the spray mixtures was determined at the point of run-off from the apples. There was a close relationship between the spreading coefficients of the solutions and relative retention of the spray by the apples. Cupples suggests that the spreading coefficients of aqueous spray solutions on a reference mineral oil may be used to determine the wetting properties of aqueous sprays.

Fumigants

A striking example of change in the characteristics of an insect population brought about by application of insecticides over a period of years is afforded by development of a resistant strain of the California red scale, *Aonidiella aurantii*. This subject is discussed in a penetrating article on racial segregation in insect populations by H. S. Smith (*216*), Citrus Experiment Station. In an endeavor to reduce the scale populations to safe levels, orchardists have created strains of red scale so resistant to hydrogen cyanide that they can no longer be held in check by the older methods of fumigation. Dickson (*52*), working at the same station, shows that this resistance is inherited, that it depends on a single gene or a group or closely linked genes in the X-chromosome of the insects, and is sex-linked. Scale populations which were formerly controlled by hydrogen cyanide fumigation probably contained individuals in which this factor for resistance was present. The use of hydrogen cyanide from year to year in the citrus orchards of California has gradually increased the proportion of resistant individuals, and the proportion will continue to increase until a nearly pure strain of resistant insects is established. Hardman and Craig (*107*), University of California, Berkeley, have established a physiological basis for the resistance of the two strains of red scale. In the presence of hydrogen cyanide, the spiracles of the resistant strain remain closed for at least 30 minutes, while under the same conditions the spiracles of the nonresistant strain are closed for about one minute only after which they open and death of the insects follows, if the cyanide concentration is lethal. Swain and Buckner (*230*), du Pont company, consider hydrogen cyanide the most satisfactory compound for controlling red scale, notwithstanding the difficulties presented by resistant strains. Dosages, however, should be higher than those currently used, and on lemons the higher doses should be applied during the winter months only. In two papers Lindgren (*149*, *150*), Citrus Experiment Station, discusses the relative merits of high peak and low, uniform dosage, time, temperature, and other factors concerned in the use of hydrogen cyanide for citrus fumigation. Lindgren and Dickson (*151*), have also studied the susceptibility to hydrogen cyanide of the purple scale, *Lepidosaphes beckii*. This insect is most susceptible in the immature crawler stage and most resistant in the first half of the egg stage. Studies by Sinclair *et al.* (*212*) of the effect of hydrogen cyanide on the chemical composition of the juice of fumigated oranges revealed no effect from either fall or winter fumigation.

Experiments recently made by Livingstone and Reed (*152*), Bureau of Entomology and Plant Quarantine, show that revival of cigarette beetle larvae, *Lasioderma serricorne*, from hydrogen cyanide fumigation reaches a peak several days after the insects are removed from the gas when a decline sets in. Percentage of mortality should be determined on the day maximum revival occurs.

Winkler (*261*), U. S. Food and Drug Administration, reports on several chemical methods of determining hydrogen cyanide residues in fumigated foods. A thiocyanate method and a phenophthalein method, both colorimetric, are discussed and their advantages and disadvantages are pointed out.

In spite of its combustible nature, carbon disulfide continues to be used as an insect fumigant. The U. S. Public Health Service (*5*) considers the potential dangers of carbon disulfide and its toxicity to human beings. For continued exposure the permissible limit of concentration is reported as 20 parts per million parts of air. Thirty parts per million are likely to produce toxic effects. McKee (*159*), Harvard School of Public Health, describes a quantitative microchemical colorimetric test for carbon disulfide in air, water, and biological fluids. White and Calvert (*256*), American Viscose Corp., describe an automatic recorder for the determination of carbon disulfide in room air.

Hamilton (*104*), New Jersey Experiment Station, contributes an interesting article on the toxicity of methyl bromide to the red spider on greenhouse roses. Percentage mortality and plant tolerance within the temperature range of the experiments were essentially products of concentration and exposure time. The margin of safety between plant tolerance and mortality of the red spider was lower at the lower temperatures, and a concentration of methyl bromide that killed 100 per cent of the red spiders injured the most susceptible of the rose varieties used in the experiments. A discussion of the hazards associated with the use of methyl bromide as a fumigant is presented in *Pests* (*3*), and the danger from methyl bromide residues in foodstuffs is discussed by Dudley *et al.* (*56*), who state that the small quantities of methyl bromide and bromine residues in fumigated products are not likely to be harmful to the consumer.

The Bureau of Entomology and Plant Quarantine presents a number of articles on aerosols for the control of insects. Sullivan *et al.* (*229*) sprayed a solution of naphthalene in *o*-dichlorobenzene on a surface heated to 375° C. The resulting aerosol killed houseflies in 24 hours, but required a longer time to kill adult cockroaches, *Periplaneta americana*. Aerosols volatilized in this manner are relatively nontoxic to man and nonflammable. They have considerable penetrating power and are very irritating to insects, driving them out of cracks and crevices. They can be produced at low cost. Their chief disadvantages are unpleasant odor, injury to plants, and the necessity of limiting their use to enclosed spaces. Sullivan *et al.* (*228*) vaporized naphthalene alone and in the presence of a burning mixture of cornstarch and sodium nitrate. The period of dispersion of the naphthalene was greatly lengthened in the presence of smoke. Apparently the naphthalene is adsorbed on the smoke particles and tends to be deposited uniformly on surfaces. Naphthalene aerosols produced higher mortality of houseflies than naphthalene vapor, and mortality was greater in covered than in uncovered cages. In another paper, Sullivan *et al.* (*227*) describe aerosols produced by spraying mixtures of lauric or oleic acids and *o*-dichlorobenzene on heated surfaces (375° C.). Aerosols from the mixtures were more toxic than those produced by the components of the mixtures. Some other fatty acid derivatives gave similar results. Goodhue and Sullivan (*98*) present a general discussion of insecticidal smokes for controlling insects.

Gunderson (*101*), Iowa Experiment Station, added concentrations of ethyl

ether, which were themselves sublethal to the confused flour beetle, *Tribolium confusum*, to concentrations of carbon disulfide, carbon tetrachloride, and ethyl acetate, known to be lethal for this insect. In mixtures containing carbon disulfide or carbon tetrachloride, ether exerted a synergistic effect on toxicity, while the addition of ether to ethyl acetate resulted in an antagonistic action.

Some new or little used fumigants have lately received the attention of investigators. O'Kane and Smith (*185*), New Hampshire Experiment Station, introduce 1,1-dichloro-1-nitroethane (Ethide), a colorless liquid of specific gravity 1.4153 at 20° C. and boiling point of 124° C., which appears to offer a favorable combination of properties with respect to penetration, flammability, toxicity to insects, and safety for practical use as a fumigant. Peters (*192*) describes the use of trichloroacetonitrile as a fumigant. The compound, a liquid, is nonflammable, noncorrosive, and easily volatilized. Hymas (*124*) discusses the use of β-methallyl chloride ($CH_2{:}C(CH_3)CH_2Cl$) as a fumigant, a use for which it was indicated earlier by Briejèr (*26*). Thorp (*237*) killed adult flour weevils (species not given) by passing air which contained impure ozone (47 per cent oxides of nitrogen, 53 per cent ozone) through flour for 30 minutes.

A new use for mercurous chloride is suggested by Hobson (*117*), who finds this compound toxic to the eggs of the sheep maggot fly, *Lucilia sericata*, when infested sheep are dusted with the solid compound or dipped in dilute solutions of it. The toxic substance is probably mercury vapor, various substances in the wool appearing to "activate" the mercurous chloride. The author believes mercurous chloride will be valuable in protective dusts and maggot dressings for sheep.

Many soil insecticides probably act on insects as respiratory poisons. Some, however, may act as contact or stomach poisons. In most cases their action is unknown or obscure, but for convenience they are included here with the fumigants. Breakey *et al.* (*24*), West Washington Experiment Station, applied calcium cyanamide to the soil for controlling pear thrips, *Taeniothrips inconsequens*, a pest of prunes in Washington State. Applications of 100 pounds of pulverized, oiled calcium cyanamide per acre reduced the thrips populations and controlled brown-rot fungus, *Sclerotinia fructicola*, besides furnishing nitrogen to the soil. Neu (*178*), University of Bonn, Germany, attempted to control larvae of the cockchafer, *Melolontha melolontha*, in the soil through applications of calcium fertilizers. Only very large amounts of such fertilizers as kainit reduced the number of larvae, amounts that were dangerous to plants. Lane (*140*), Bureau of Entomology and Plant Quarantine, discusses the practical use of carbon disulfide and naphthalene for the control of wireworms (Elateridae) on irrigated lands.

The woolly apple aphid, *Eriosoma lanigerum*, is a destructive pest of young apple trees in nurseries, and the root infesting form of the insect is difficult to reach and destroy with insecticides. Underhill and Cox (*244*), Virginia Experiment Station, applied carbon disulfide emulsion, diluted 1:1,600, and bis β-chloroethyl ether in water, diluted 1:800, to control this insect. One gallon of either insecticide applied to the loosened soil about the roots of the trees, gave good results in moist or dry soil. C. F. Smith (*214*), North Carolina Experiment Station, believes a slightly alkaline aqueous solution of sodium cyanide is more effective than carbon disulfide or bis β-chloroethyl ether. The dosage is 0.2 to 1.0 gram of sodium cyanide dissolved in 1 quart of water per tree. Dominic (*54*), Virginia Experiment Station, applied bis β-chloroethyl ether to control the tobacco flea beetle, *Epitrix parvula*, in abandoned tobacco seed beds.

Attractants and Repellents

The factors which determine the attracting and repelling characteristics of plants for insects are discussed in an important contribution by Dethier (*49*), John Carroll University. Dethier has studied the lepidopterous genus *Papilio* (swallowtailed butterflies), and he considers the factors operating in the selection of food by these larvae as primarily repellent and attractant in nature. Repellent factors, he says, are frequently physical, as for example the toughness or pubescense of foliage, but they may be chemical. Attractant factors, on the other hand, are entirely chemical. The larvae of many papilios feed on plants of the parsley family (Umbelliferae) whose characteristic odors are imparted by compounds found in certain essential oils (methyl chavicol, anethole, carvone, coriandrol, sedanolid). Experiments demonstrate that species which feed on the Umbelliferae are attracted by these compounds. Originally these insects fed on plants of the rue family (Rutaceae), and the transition to the Umbelliferae took place owing to the presence of identical attractant compounds in both families of plants. The present distribution of the genus *Papilio* is related, in part, to the distribution of its host plants.

According to Crombie (*39*), Cambridge University, the lesser grain borer, *Rhizopertha dominica*, relies chiefly on the sense of smell in reaching an environment where food is present. But once within an environment permeated with the odor of food, the sense of touch becomes paramount in the selection of a site for egg-laying, *i. e.*, a certain pattern of stimuli, involving both olfactory and tactile sensations, is necessary to induce the actual deposition of eggs. Most important is the discovery by Crombie that *Rhizopertha* can be conditioned to the odor of oil of peppermint, a substance which it normally shuns, so that the insect becomes attracted to the once repugnant odor. The conditioned effect wears off after 10 to 14 days by isolating the insect from the odor-permeated environment. In this fashion, the insect comes to associate the new odor with an environment optimum for its life. Olfactory conditioning of several other species of insects has been accomplished by Thorpe (*238*, *239*).

A similar kind of association has recently been demonstrated in the blowfly, *Cynomyia cadaverina*, by Frings (*79*), University of Minnesota. Adult blowflies were exposed to the odor of coumarin while their tarsal taste organs were held intact with a sugar solution. After a training period, most of the flies gave the feeding response (extension of the mouth parts) when they were exposed to coumarin odor. The conditioned flies continued to associate the odor with food even after various operations on the antennae and labrum and after certain parts of the body were coated with lacquer. These conditioning studies help to explain why insects sometimes change from an accustomed to an entirely new food, and they extend our knowledge of the basis upon which rests the practical use of attractants and repellents for insect control.

Attractive baits are used in apple orchards to ascertain from the number of moths caught in traps the correct time for the application of cover sprays. Eyer and Medler (*66*), New Mexico Experiment Station, have published the results of an important investigation on this subject. Dilute cane sirup fermented by certain bacteria (*Aerobacter*, *Aerobacillus*) proved more attractive to codling moths than sirup which was contaminated with yeast, mold, and bacteria from the air. Tests with a large number of compounds, products of the bacterial fermentation of sucrose, glucose, and fructose, yielded information with respect to the relationship between the structure of the compounds and their attractiveness. The hydroxy, dibasic, and aromatic acids were generally more attractive than the aliphatic acids and simple alcohols. Among the simple alcohols and acids those containing propyl or propionyl groups were consistently attractive. The methyl series of their esters was most attractive when the alcohol radical was concerned while the propionyl series was most attractive when the acid radical was considered. Concerning the hydroxy and dibasic acid esters, those of the malonic, malic, lactic, and oxalic acids were attractive. The more complex alcohols and esters that contained a phenyl radical were attractive in laboratory and field trials. Evidently no single compound determines attractiveness of fermenting cane sirup to the codling moth. Bohorquez (*20*) attracted the

olive fruitfly, *Dacus oleae*, to traps with ammonium phosphate and ammonium fluoride. Females predominated in the catches. Buchanan (*86*), Bureau of Entomology and Plant Quarantine, observed that the injection of ethyl alcohol into living elm trees rendered them attractive to the ambrosia beetle, *Xylosandrus germanus*.

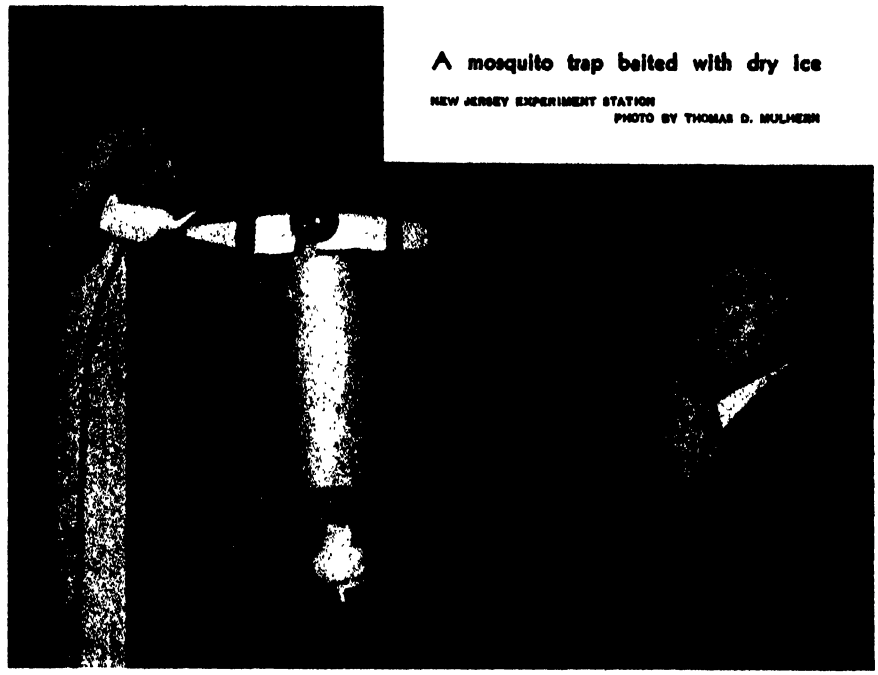
In a paper on traps for the Japanese beetle, Fleming *et al.* (*75*), Bureau of Entomology and Plant Quarantine, give new specifications for eugenol, a compound about as attractive to this insect as geraniol and a more standard product. Eugenol derived from clove oil is more attractive to the Japanese beetle than eugenol from cinnamon oil. It should meet these specifications—specific gravity at 25° C. 1.064–1.070; solubility 1 part in 2 parts of 70 per cent alcohol; boiling range 250–255° C. The oil should be a colorless to pale yellow, thin liquid with a strong odor of cloves and a pungent, spicy taste. Jones and Haller (*129*), Bureau of Entomology and Plant Quarantine, present a detailed study of the chemical composition of a sample of commercial geraniol which contained 34 per cent of geraniol, 17 per cent of citronellol, and smaller proportions of 12 other constituents.

Two papers have appeared this year on the use of protein lures for controlling fruit flies (*161*). Dean (*45*), New York Experiment Station, made preliminary trials with decomposing protein materials as attractants for adult apple maggot flies, *Rhagoletis pomonella*. Most attractive were powdered egg albumin, a peptone preparation, and dried yeast powder containing alkali. About 83 per cent of the captured flies were females, indicating a differential sex attraction for these materials. After several years' study, Boyce and Bartlett (*22*), found a preparation containing 2 per cent glycine (tech.) and 3 per cent commercial sodium hydroxide in water most effective for attracting the adult walnut husk fly, *Rhagoletis completa*.

A new method of baiting mosquito traps with carbon dioxide has recently been announced. The principle rests upon the discovery by Rudolfs (*207*) in 1922 that mosquitoes are attracted to carbon dioxide and ammonia. In 1934 Headlee (*111*), New Jersey Experiment Station, observed that if standard mosquito traps were equipped to volatilize carbon dioxide very large numbers of mosquitoes visited and were captured by the traps. Later studies (*112*) showed that the traps can be baited conveniently with solid carbon dioxide. These traps are now employed as indicators of the presence and abundance of mosquitoes, but there are possibilities of developing traps for the direct control of these insects.

Attractiveness of baits owing to taste, palatability, and perhaps other "agreeable" sensations may be considered under this heading. Mitchener (*171*), University of Manitoba, determined the attractiveness to grasshoppers of sawdust from several kinds of trees. The clear-winged grasshopper, *Camnula pellucida*, two-striped grasshopper, *Melanoplus bivittatus*, and the lesser migratory grasshopper, *Melanoplus mexicanus*, served as test insects. *Camnula* ate readily spruce or poplar sawdust if it was mixed with wheat bran, but Jack pine sawdust made a less attractive mixture. *Melanoplus bivittatus* consumed less readily baits containing poplar sawdust and bran, and all of these sawdusts made unsatisfactory bait mixtures for *Melanoplus mexicanus*. A knowledge of the source of the sawdust as well as the species of grasshopper for which the bait is prepared is shown by this investigation to be very important. Lea and Nolte (*142*) found sodium bicarbonate definitely repellent to several African species of grasshoppers. Attempts to improve the attractiveness of bran baits for Mormon crickets by the addition of amyl acetate, molasses, sodium chloride, and various other materials have been unsuccessful (*38*).

Ralston and Barrett (*198*), Armour & Co., investigated the repellent action of certain fatty acid derivatives on the housefly, *Musca domestica*. The decyl, undecyl, undecenyl, and dodecyl alcohols and the aliphatic nitriles with 10 to 14 carbon atoms were highly repellent. In fact, undecylonitrile, lauronitrile, tridecylonitrile, and dodecyl alchol proved more repellent than citronella oil. Large-scale tests with lauronitrile, which is nontoxic to human beings, are in progress. Searls and Daehnert (*203*) find 3 per cent of phenoxychloroethyl ether in a highly refined mineral seal oil an excellent repellent for flies that attack cattle. Hobson (*115*) found among 17 trial repellents for sheep maggot flies, *Lucilia sericata*, three that gave promise—olive oil, cottonseed oil, and oleic acid. None of these materials protected sheep longer than two weeks from the flies. In another paper Hobson (*118*) discusses attractants, repellents, antiseptics, ovicides, and larvicides in relation to the sheep maggot problem in England.



A mosquito trap baited with dry ice

NEW JERSEY EXPERIMENT STATION
PHOTO BY THOMAS D. MULHERN

According to Huckett (*120*), New York Experiment Station, the Mexican bean beetle, *Epilachna varivestis*, does little feeding on foliage that has been sprayed with derris. Larvae repelled from the derris-sprayed foliage die of desiccation on the surface of the soil. The residue from Bordeaux mixture also reduces the amount of feeding, and Huckett finds that derris powder incorporated in Bordeaux mixture protects the foliage of plants from the attack of this insect.

Johnson (*126*), Connecticut Experiment Station, protected grape foliage for a considerable period from attack by the Japanese beetle with a spray containing phenothiazine. Wallace (*247*), at the same station, reports borax entirely ineffective as a repellent for the bark beetles, *Hylurgopinus rufipes* and *Scolytus multistriatus* in elm logs. Miscible creosote oils reduced infestations, while a complete cover of liquid coal-tar creosote rendered the logs free from attack.

Dethier (*50*) finds that normal larvae of the imported cabbage worm, *Pieris rapae*, show definite signs of avoidance of benzaldehyde-air mixtures that contain 580×10^{-7} gram benzaldehyde. Larvae from which the antennae were removed, however, reacted to a higher threshold value of benzaldehyde (770×10^{-7} gram per liter). Shaw (*209*) discusses repellents for the honeybee and describes, briefly, experiments with creosote, tar oil, phenol compounds, naphthalene, and alpha and beta naphthols. These substances reduced

the number of visits made by the bees to sprayed blossoms. But some of these materials are too injurious to plants for use in horticultural sprays. The subject needs much further study.

Lesser (*147*), consulting chemist, Brooklyn, N. Y., offers 16 formulas for insect repellents which contain oil of citronella, pennyroyal, cedarwood coumarin, camphor, pyrethrum extract, and other active ingredients.

Methods for Testing Insecticides and Evaluating Toxicological Data

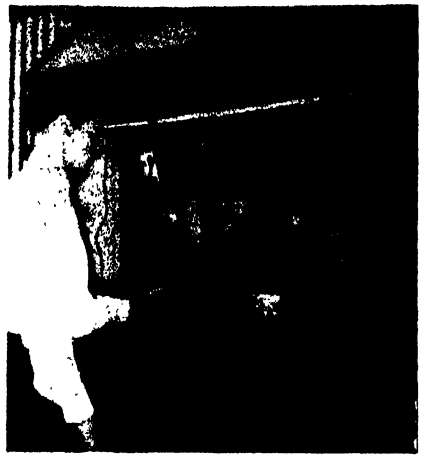
Methods for rearing certain leaf-eating insects in the laboratory and for testing stomach poisons applied as dusts are contained in two articles by Swingle *et al.* (*232*, *234*), Bureau of Entomology and Plant Quarantine. A simple technique is given for differentiating between the stomach poison, contact, and fumigant actions of compounds. Sweetman (*231*), Massachusetts State College, and Laudini and Sweetman (*141*) offer several methods for testing stomach poisons on cockroaches. An air-operated dust gun which applies small weighed quantities of insecticide dusts is offered by Harries (*108*), Bureau of Entomology and Plant Quarantine.

A detailed investigation of small-scale laboratory spraying apparatus has been made by Potter (*195*), Rothamsted Experimental Station, England, and a spraying tower is described in which uniform quantities of spray liquid can be delivered to groups of insects. O'Kane *et al.* (*184*), New Hampshire Experiment Station, have designed an "insect toximeter", which holds individual insects by means of wire clips and subjects them to a thorough coating of a spray liquid.

Standard methods for testing insecticides against certain household insects have been developed by Campbell *et al.* (*87*), Ohio State University. The apparatus and procedures are applicable to the evaluation of household sprays against the German cockroach, *Blatella germanica*, and the bedbug, *Cimex lectularius*, as test insects. Ford (*77*), The Upjohn Co., has studied the variation in Peet-Grady tests by the large group and small group methods (*19*). David and Havrey (*43*), Shell Marketing Co., London, have designed an apparatus for separating housefly pupae from the culture medium to obtain flies for Peet-Grady tests.

The bioassay of flysprays for treating livestock is the subject of a recent paper by Eagleson (*61*), Bureau of Entomology and Plant Quarantine. Hypnotic rather than lethal doses proved advantageous in evaluating the sprays on houseflies in an aerated spray tunnel. Mailen and Fenton (*162*), Oklahoma A. & M. College, test the repellence of livestock sprays by a new "half cow" method. Nelson (*177*), Stanco, Inc., reviews the methods for testing livestock sprays from the standpoint of their possible acceptance as official testing methods. According to the author, none of the existing methods is suitable for this purpose. Lennox (*148*) and Lennox and Webber (*146*) discuss at length methods for applying stomach poisons and contact poisons to blowfly larvae in the laboratory.

McGovran *et al.* (*158*) have devised an ingenious, manually operated micropipet



NEW HAMPSHIRE EXPERIMENT STATION

Insect toximeter

with which measured drops of contact insecticides can be applied to individual insects. Grayson and Swank (*100*), Iowa State College, offer a precise laboratory method for testing fumigants, the novel feature of which is the use of weighed doses of the fumigants in glass ampules broken in the container to release the fumigant.

Advances in the application of statistics to the evaluating of toxicity data from experiments with insecticides are noted. Bliss (*16*), Connecticut Experiment Station, treats mathematically the relation between exposure time, concentration, and toxicity with special reference to fumigants. In another paper (*17*) he discusses the place of biometry in biological assay, and in a third (*18*) methods are given for the statistical estimation of insect populations. Beall (*13*) contributes a paper on the fit and significance of contagious distributions as applied to populations of insect larvae. DeBeer (*46*) Burroughs, Wellcome and Co., describes a method for determining graphically the slopes of dosage-mortality curves.

Reviews

Several important reviews have been issued recently by the U. S. Bureau of Entomology and Plant Quarantine. One of them (*6*) concerns the work of the Division of Insecticide Investigations from 1927 until 1939. The accomplishments of this period are included in 518 papers published and in process, and in 98 patents granted and applied for. The research accomplishments are described briefly and a bibliography concludes the article. Vivian and Acree (*246*) list and discuss the organic sulfur compounds used as insecticides during 1935, 1936, and 1937. The list supplements another published by Roark and Busbey (*205*) in 1935. Each compound is discussed briefly with respect to insecticidal use, references and patents are cited, and there is a list of the insects and other organisms on which the compounds were tested.

Rawlins (*200*), Cornell University, summarizes the recent entomological research on insect pests of the potato. There are 32 references including a number on chemical control of potato insects.

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Zoology in 1941

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Hormones and Neurohumors

For some two decades evidence has been accumulating for the view that certain portions of the nervous system in invertebrates and vertebrates carry on an endocrine activity. Recent studies extend this earlier work and offer a structural basis for the physiological findings. Brown and Cunningham (*9*), Marine Biological Laboratory and Northwestern University, showed that sea-water extracts of portions of the nervous system of the horseshoe crab, *Limulus*, act to concentrate chromatophores when injected into blinded fiddler crabs, *Uca pugnax*. A probable source of this principle has been suggested by Scharrer (*48*), Western Reserve University and Marine Biological Laboratory. She described glandular, colloid-filled cells in horseshoe crab nerve tissue, the distribution of which correlates well with the distribution of the chromatophore-affecting substance found by Brown and Cunningham. Similar neuroglandular cells have been described by the Scharrers in the brain of the killifish *Fundulus* (*50*) and in the cockroach (*49*). In such cells activities suggestive of a secretory cycle can be demonstrated.

Kleinholz and Bourquin (*29*), Cold Spring Harbor and Harvard University, repeated the experiments of earlier workers on eye-stalk removal in the fiddler crab *Uca*, and concluded the evidence is insufficient for believing that molting is inhibited by a hormone produced there.

The culture medium in which ripe females of the polychaete worm *Ophryotrocha puerilis* have been kept causes such females to resorb their eggs after 8 to 10 days, according to Hartmann and Lewinski (*25*), Kaiser Wilhelm Institute. They have extracted from these animals a substance which has the effect of masculinizing females up to 100 per cent, as compared with the control sex ratio of 50 to 50 per cent. The authors think that the active material is liberated from the eggs, and has, they suggest, a female-inhibiting effect. Its action would thus be the opposite of that of vertebrate sex hormones.

Studies on the recently discovered hormonal control (v^+ and cn^+ hormones) of eye color in insects have been extended. Tatum and Haagen-Smit (*60*) found that the v^+ active substance elaborated by bacteria cultured on a tryptophan medium is kynurenin combined with sucrose. The sucrose can be removed by hydrolysis, leaving the activity of the kynurenin unchanged. Beadle and Tatum (*4*), Stanford University, have proposed a scheme to explain *Drosophila* eye colors on the assumption that the vermilion gene controls transformation of tryptophan to kynurenin and that the cinnabar gene controls transformation of the latter into the cn^+ hormone which forms the brown eye pigment. It is supposed that these are competitive reactions, normal eye color depending on the availability of sufficient kynurenin, and vermilion eye color resulting from oxidation of the kynurenin needed for the second step. Kikkawa (*27*), Japan, also showed that the effects of certain genes on eye color in *Drosophila*, silkworm, and *Ephestia* concern the metabolism of kynurenin. Kikkawa, however, regards the kynurenin as a substrate rather than a hormone.

That sex hormones may act directly on susceptible tissues without some intervening systemic mechanism has been confirmed by Chamberlin, Gardner, and Allen (*13*), Yale University, who obtained unilateral sex changes in the sexual skin and mammary glands of monkeys by local application of estrone. A similar nonsystemic action of testosterone was observed by Kirschbaum and Pfeiffer (*28*), Yale University, on sexual pigmentation in the sparrow.



LOOK MAGAZINE, PHOTO BY JACK GODRICH

Dorippe, a crab inhabiting Asiatic waters. According to legend, these animals are the reincarnated spirits of Japanese warriors who have been drowned in battle.

Guyénot and Held (*22*), University of Geneva, have distinguished two principles in pregnancy urine. The first, which survives one hour's heating at 70°, is an auxogenic substance. The other, destroyed by this treatment, has a luteinizing effect. The auxogenic principle apparently acts only in the presence of the hypophysis.

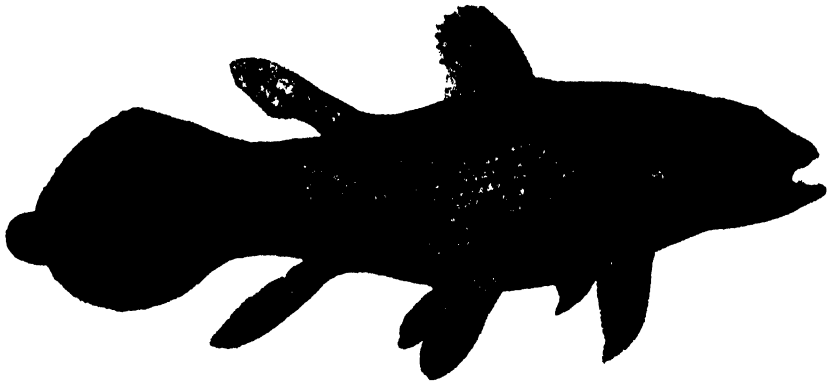
Some of the variance in the results obtained by workers studying the effects of testosterone on sex organs may be explained under a scheme proposed by Shay, Gershon-Cohen, Paschkis, and Fels (*55*), Philadelphia. They have suggested that testosterone not only stimulates the testis, but inhibits the gonadotropic function of the pituitary. Experimental results would thus depend upon a balance between dosage and the variable activity of the pituitary.

Turner (*61*), Northwestern University, analyzed the factors controlling development of the sexually modified anal fin (gonopod) of the killifish *Gambusia affinis*. Production of the sexual modifications was found to depend on genetic determination of differentiation areas and specific structures, which could be expressed only at sufficient concentrations of male hormone and in a sequence governed principally by androgen concentration.

Confirmation of the role of the intermediate lobe of the pituitary in controlling color changes, previously proposed by Parker for the catfish, has come from the work of Rahn (*43*), University of Wyoming. Ablation of the intermediate lobe of the pituitary in the rattlesnake, *Crotalus v. viridis*, is followed by a permanent paling of the skin. Injection of chick intermedin causes a dispersal of the melanophores. Hypophysectomy is followed by reduction or cessation of melanin deposition in the scales, and it is possible that this activity is also controlled by the intermediate lobe.

The infundibulum may act as an inhibitor of the intermediate lobe of the pituitary, according to Etkin (*17*), College of the City of New York. This suggests that injury to the infundibulum may account for results previously interpreted as indicating activity of a "whitening hormone" (*W* substance).

Parker (*39*), Harvard University, has reported that ergotamine, which acts on melanophores, requires the intermediate



Latimeria, a living lobe-finned fish, belonging to a family thought to have become extinct in Cretaceous times.

action of the nerves, whereas the chromatophore controlling neurohumors—acetylcholine, intermedin, and adrenaline—act directly even on denervated cells.

Observing *Fundulus* chromatophores under polarized light, Shanes and Nigrelli (*54*), New York University and New York Aquarium, found a birefringent material which forms strands interconnecting the cells. The strands respond to adrenaline, ether, and potassium chloride like the melanophores themselves, which led the authors to believe that changes in pigment cells ascribed by Parker to lipohumors may be effected through this material.

Embryology

Pease (*40*), Stanford University and Hopkins Marine Station, exposed eggs of the sand-dollar *Dendraster excentricus* to concentration gradients of various chemical inhibitors. Enzyme poisons were found to affect bilateral determination, the regions of greatest inhibition becoming dorsal, those least inhibited becoming ventral. Pease has suggested that at least part of the key enzyme system is the cyanide-sensitive respiratory mechanism.

By treating unfertilized *Dendraster* eggs with thiocyanate and calcium-free sea water, Rulon (*47*), Hopkins Marine Station and Wayne University, obtained ectodermized forms, which he believes were caused by inhibition of the normal axiate pattern followed by recovery. The same treatment after fertilization gave rise to exogastrulae and entodermization.

Adult flour beetles, *Tribolium confusum*, produce a volatile substance which causes abnormalities in the developing offspring, according to Roth and Howland (*45*), New York University. These workers obtained this substance in crystalline form. Application of the crystals to developing beetle larvae results in duplication and triplication of legs, persistence of the larval condition of some parts, and other aberrations.

The development of the eye in an "eyeless" strain of mice was investigated by Chase and Chase (*14*), University of Illinois. The gene for anophthalmia allows an optic vesicle to form, but growth of the vesicle and cup formation are inhibited. When the optic cup is below a certain size, it can no longer induce a lens.

Tyler (*63*), California Institute of Technology, has extended and reviewed recent investigations on the action of fertilizin. Heating fertilizin produces a substance, assumed by Tyler to be a univalent fertilizin, which does not agglutinate sperm, but renders it incapable of subsequent agglutination and impairs its fertilizing powers. Egg water was found to contain a substance with these properties.

R. S. Lillie (*30*), University of Chicago and Marine Biological Laboratory, investigated the relation of water content of eggs to activation. Starfish eggs are sensitized to activation by such agents as butyric acid in a degree directly proportional to concentration and duration of exposure to media of different osmotic strengths. Lillie has suggested that activation depends upon the water content of the egg as reflected in the structural density of the cortical region.

Moore (*32*), Hopkins Marine Station, investigated the mechanics of gastrulation in the sand-dollar *Dendraster excentricus*. By means of osmotic pressure exerted inside the blastocoel, invagination can be prevented. The invagination force, thus measured, has a value of 2.6 to 5.5 mg. pressure, or in terms of work, 1×10^{-3} ergs.

Experimental Morphology

Attempts to elucidate the role of nerves in limb regeneration have not resulted in agreement. Schneider (*51*), Academie der Wissenschaften, Moscow, resected nerves supplying regenerating limb tissue in the axolotl, *Siredon pisciforme*. He concluded that the nerve has merely a trophic function in the regeneration process and that differentiation is an autonomous activity of the regenerant. Schotté and Butler (*52*), Amherst College and Princeton University, on the contrary, regard the nerve as playing a much more fundamental part in regeneration. From experiments on the regenerating forelimb of the urodeles *Amblystoma* and *Triturus* they concluded that the nerve maintains an equilibrium of cellular interactions without which regeneration does not occur, and they have suggested that cases of limb regeneration after nerve resection may be caused by incomplete severance or regeneration of the nerve.

Twitty and Bodenstein (*62*), Stanford University, studied fin formation in newts following substitution of flank ectoderm to prospective fin ectoderm. The capacity of the graft to form fins and that of the host neural crest to elicit fin formation was found to vary not only with age and position but with species. Transplantation experiments with hybrid animals showed that the capacities for induction and for response are modifiable by paternal factors.

Baltzer (*1*), Zoölogischer Institut, Berne, described the development of heteroplastic grafts of neural tube from the tree frog *Hyla* to the urodele *Triton*. The pigment cells thus transferred retain their cellular characteristics, but their arrangement is subjected to the pigment pattern of the *Triton* host. The grafted cells later become reduced, and in subsequent development are absorbed, leaving areas devoid of pigment.

Weber (*66*), University of Geneva, implanted optic vesicles of the chick to the region of the nerve cord. Such implantation, he found, causes an inhibition of the normal histodifferentiation (vacuolization) of the nerve cord so that it has the same structure as the brain in the region of the optic vesicle. Weber has suggested that some inhibitor of neural differentiation diffuses from the region of the lens

The "creeper" factor in chicks is a dominant lethal gene which, in the heterozygous condition, is expressed by shortening and distortion of the limbs. Homozygous "creepers" do not usually survive the fourth day of incubation and never reach the hatching stage. Hamburger (*24*), Washington University, transplanted "creeper" limbs to normal chicks. Heterozygous limbs developing in a normal chick retained their "creeper" characteristics and also their intrinsic growth rates. Homozygous wing and leg transplants were viable but showed the typical "creeper" morphogenesis. These findings indicated to Hamburger that the "creeper" character of limb primordia is determined early and that lethality does not reside in the organ rudiments, but that the "creeper" gene has a universal action, possibly through some general metabolic or respiratory deficiency.

Ectoderm of the gastrula of *Amblystoma punctatum* will form neural tubes in the absence of organizer, according to experiments reported by Barth (*2*), Columbia

University, in which pieces of ectoderm were explanted and allowed to develop. The frequency of occurrence of neural tubes is greater, Barth found, if the anteroposterior polarity of the explant is preserved. The capacity of the tissue for such autonomous neural differentiation shows a gradient passing from the animal pole to the region of the ventral epidermis.

Dalcq (*15*), University of Brussels, studied the development of the amphibian *Discoglossus* in which a rectangle in the central organizer region had been rotated through 180° before gastrulation. Regulative migration of the reversed area resulted in embryos of almost normal external appearance, but having derangements of the internal structure interpreted by Dalcq as indicating great stability of the predisposition of the disturbed region.

Valid comparison of the skull bones of different fishes depends upon clarification of the question as to whether lateral line organs are necessarily always associated with the same dermal bones. Moy-Thomas (*34*), Oxford University, in an attempt to answer this question experimentally, extirpated lateral line organs of the rainbow trout in early stages of development. He found that the underlying frontal bones develop largely independently of any influence of the lateral line canals.

By interspecific transplants of the vas deferens in larval *Drosophila*, Stern (*57*), University of Rochester, confirmed that the spiral shape of the testis is induced by an influence emanating from the tip of the vas deferens. Vasa deferentia of some species do, and of others do not exert the spiralizing action on the testis.

Rose and Rose (*44*), Columbia University, Marine Biological Laboratory, and Amherst College, in the course of studies on regeneration in the hydroid *Tubularia*, found that water in which *Tubularia* hydranths or cut pieces have been placed will inhibit regeneration if used as a medium for other *Tubularia* tissues.

Goldin and Barth (*20*), Columbia University, Marine Biological Laboratory, and Queens College, compared oxygen consumption with histological changes in regenerating *Tubularia* and reported a disappearance of the oxygen consumption gradient coinciding with a morphological dedifferentiation. Following this, a new polarity is established for tissue structure and oxygen consumption.

When the body of the oligochaete worm *Branchiura sowerbyi* is severed, gills secondarily form in the injured region from segments which normally lack gill structures. Nakamura (*35*), Tokyo Imperial University and Misaki Marine Biological Station, who studied this phenomenon, found that injury to the gut wall is a necessary condition for gill formation. Injection of macerated gut-wall cells into the body cavity of an intact worm results in gill outgrowth. He concluded that some substance produced by the injured cells possesses a gill-inducing capacity.

The rate of eye-spot formation in pieces of a regenerating planarian, *Planaria gonocephala*, follows a gradient depending on the level of the animal from which the regenerating tissue is taken, it has been reported by Watanabe (*65*), Sapporo, Japan. The rate decreases posteriorward, then increases in the posterior region of the body.

Haploid frogs can be obtained by removing the sperm head just after it penetrates the egg. Rotmann (*46*), University of Köln, compared the lenses of such frogs with those of normal frogs. His finding that haploid lenses are the same size as diploid lenses, having more but smaller cells, leads to the conclusion that induction does not influence a specific number of cells. Evidence bearing on this problem was adduced by Fankhauser (*18*), Princeton University, who has succeeded in raising triploid newts, *Triturus viridescens*. These newts have the normal body size, a smaller number of cells compensating for the larger cell size. This may be brought about by a lower division rate in polyploids, by a smaller cell total at the end of cleavage, or by some regulatory mechanism which controls the cell number.

Moore (*33*), Brooklyn College, measured the developmental rate of the nonviable eggs resulting from various crosses between species of frogs. The rate characteristic of the maternal species obtains until gastrulation, when development stops. In viable hybrids—for example, *Rana pipiens* x *R. palustris*—the rate is maternal until the neural plate stage, but then the rate becomes modified to approach that of the paternal species. Moore has suggested that the influence of the sperm begins to be exerted at about the time of gastrulation. At this period the rate changes, or, if the sperm is incompatible, death occurs.

Porter (*42*), Princeton University and Rockefeller Institute, crossed northern with southern varieties of *Rana pipiens*. Study of diploid embryos and haploid embryos containing only the sperm nucleus has been reported to show differences in structure which can be attributed to northern or southern cytoplasm. The structural differences are most apparent in hybrid haploids, and Porter's interpretation is that in normal diploid development they are compensated for or masked by the effect of the nucleus.

Behavior

The newt *Triturus viridescens* ends its land phase and returns to water in the autumn of the year in which it becomes mature. Chadwick (*12*), Vanderbilt University and Highlands Experiment Station, was able to induce the drive to migrate to water by injecting prolactin, and also by injection of pituitary from an amphibian, a reptile, and a bird. There was no effect on the gonads.

The mechanism by which bats are able to avoid obstacles was worked out by Griffin and Galambos (*21*), Harvard University. They have stated that bats avoid obstacles by emitting notes of supersonic frequency and interpreting the reflected sounds they hear. Other senses were said to play a minor part.

The diurnal rhythm of activity of the spider beetle *Ptinus tectus* can be reversed by modifying the periods of exposure to light and darkness, according to Bentley, Gunn, and Ewer (*5*), University of Birmingham. Temperature is also a factor in maintaining diurnal rhythm.

Waloff (*64*), University of London, has described the mechanism whereby wood lice collect in moist air. Activity is decreased at high humidity and an increase in the frequency of turning movements occurs. The strength of the behavior pattern was found to be inversely proportional to the animals' resistance to desiccation.

Interesting behavior is exhibited by larvae of the fly *Platyura fulloni*, as described by Fulton (*19*), North Carolina Agricultural Experiment Station. These larvae are luminous and spin a web by means of which they catch small insects and spiders, thus reversing the proverbial roles of spider and fly.

Protozoa

It has been known for some years that distinct "mating types" may be distinguished in *Paramecium*. When individuals from different groups are placed together under appropriate conditions, they agglutinate in pairs. This "mating reac-



JACK GOODRICH

Mouse foetus, showing developing limb buds



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Giant chromosomes of the salivary gland of *Drosophila melanogaster*

tion" was the subject of a study by Tartar and Chen (*59*), University of California and University of Vermont, on individuals of *Paramecium bursaria* which had been enucleated. They have reported that the cytoplasm alone exhibits reactivity and diversity of mating type. The reactivity results only in the preliminary agglutination but not in true conjugation. The mating characteristics are lost after the fragments have been without the nucleus for a time. Boell and Woodruff (*6*), Yale University, found a significant difference of about 12 per cent in the oxygen consumption of two mating types of *Paramecium calkinsi*, regardless of their physiological state.

By repeating determinations with improved technique, Hall (*23*), Columbia University, has demonstrated that for the ciliate *Colpidium* respiration, formerly regarded as cyanide insensitive, is 88 per cent inhibited by 0.001 *M* cyanide.

Cytology

The arrangement of cytoplasmic inclusions in cells has been regarded as a clue to the molecular structure of protoplasm by Pollister (*41*), Columbia University. The orientation of mitochondria in various types of cells apparently reflects the paths of diffusion in those cells, and he has suggested that the position of the mitochondria is explained on the assumption that they occupy the spaces between lines of long-chain molecules.

Studies by Schrader (*53*), Columbia University, on spermatogenesis of the earwig *Anisolabis maritima* suggest that electrostatic forces of attraction and repulsion, as postulated by Lillie, are at work. The occurrence of quadripolar spindles is taken to indicate that the centrioles adopt the furthest possible position apart due to mutual repulsion. The positions taken by chromosomes and centrioles suggest that the nuclear membrane plays a part in the electrostatic changes presumed to accompany mitosis.

In 1940, Calvin, Kodani, and Goldschmidt (*11*), University of California, described a striking modification of the salivary gland chromosomes of *Drosophila melanogaster* produced by treating the glands with highly alkaline solutions. The "lampbrush" structure of these chromosomes was interpreted as a central double chromonema from which there radiate looped chromonemata which form the "bristles" of the brush.

Calvin and Kodani (*10*) have extended studies on the chemical structure of the lampbrush chromosomes and described the unit of structure as a partially extended and partially folded polypeptide chain.

Painter (*37*), University of Texas, has studied the lampbrush structure in *D. hydei*. According to his interpretation, the lampbrush structure is the result of changes in the chromosome when the chromonemata, the bands, and the matrix are dissolved by the alkaline treatment. He states that the "bristles" are radiating fibers, the appearance of which accompanies the destruction of the matrix.

Evolution

Continuing studies on the blind characin fishes obtained in Mexican caves, Breder and Gresser (*7*), New York Aquarium and New York University, reported a complete gradation in structure from normal to completely eyeless individuals and described differences of behavior between seeing and eyeless fishes. The former go to dark places only under the stimulus of fright. The blind fish avoid light by some unknown mechanism. The authors see in this difference a possible isolation mechanism that would lead to an ultimate segregation of the cave forms.

In recent years much interest has been occasioned by the discovery, in the Pleistocene deposits of South Africa, of anthropoid forms much more manlike than any recent apes. Broom (*8*), Transvaal Museum, reviewed descriptions of some of these australopithecines, which were of an almost human grade of structure and lived in Africa contemporaneously with man living in Europe and Asia. He published a phylogenetic tree in which



JACK GODRICH

***Above.* Skull of Pithecanthropus, the Java "apeman". *Below.* Chapelle-aux-Saints skull of a Neanderthal man found at Corrèze in France. Restorations by J. H. McGregor.**

it is suggested that man arose from some Pliocene australopithecine form.

Park, Gregg, and Lutherman (*58*), University of Chicago, studied the effects of competition in populations of three species of flour beetles, *Tribolium confusum*, *Gnathoceros cornutus*, and *Trogoderma versicolor*, grown in common cultures in various combinations of two species. Certain species, they found, regularly survive others. In certain combinations the outcome of competition depends upon the initial density of the surviving species.

Genetics

Studies on the production of various classes of inheritable changes (mutations) by short-wave radiations have been continued. Kaufman (*26*), Carnegie Institution, showed that chromosome breakages induced in *Drosophila* sperm by x-rays remain inactive until the spermatozoa enter the eggs at fertilization, so that chromosome exchanges and reattachments take place at that time.

Demerec and Fano (*16*) Cold Spring Harbor, showed that at least two classes of chromosome deficiencies produced by irradiation exist: long deficiencies are caused by two independent breaks in the chromosome followed by a deletion of the intervening section; short deficiencies are due to a single "hit", apparently followed by some degenerative process destroying a series of adjacent genes.

Sutton (*58*), Carnegie Institution, proved that some of the deficiencies induced by x-rays are really terminal, that is, involve disappearance of the chromosome ends. This question has been considered in detail by MacClintock (*31*), University of Missouri and Carnegie Institution, who showed that loss of terminal genes in a chromosome may sometimes be followed by a union of the resulting wound surfaces, while under certain conditions such a union does not take place.

More strictly physiological aspects of the mutation process also received some attention. Olenov (*36*), Leningrad, found that *Drosophila* larvae deprived of vitamin B_2 may fail to pupate for as long as 20 days. Supplied with that vitamin, they take about 10 days to complete their development, so that the whole cycle takes about 30 days, or three times as long as normal. Nevertheless, the frequency of mutation in such flies is not greater than in normal ones, although it was shown earlier by Timoféeff-Ressovsky that the mutation process is proportional to time.

Beadle and Tatum (*3*), Stanford University, induced x-ray mutations in *Neurospora sitophila* which differ from normal in their food requirements. Thus, one of the mutants fails to synthesize vitamin B_6, another requires the addition of thiazole, and the third needs *p*-aminobenzoic acid included in culture media.

According to Sonnenblick (*56*), Queens College, sex differentiation in *Drosophila* takes place very early, there being no sex-indifferent stage in development.

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Wholesale Druggists' Association Indicted

ACCORDING to the Department of Justice, a Federal grand jury sitting at Newark, N. J., has returned an indictment charging the National Wholesale Druggists' Association, 23 of its members, and 29 officers and agents, with conspiracy to violate the Sherman Act by fixing wholesalers' margins of profit on drug products. The indictment was the first to be returned alleging use of fair trade contracts in a manner contemplated neither by the Miller-Tydings amendment to the Sherman Act nor the State Fair Trade laws.

The National Wholesale Druggists' Association constitutes the largest group of drug wholesalers in the nation, doing approximately 80 per cent of the wholesale drug business in the United States.



Proceedings of the
AMERICAN CHEMICAL SOCIETY

Official Reports for the Year 1941

Secretary and Business Manager

THE index to the NEWS EDITION, printed in the December 25, 1941, issue, will give ready references to the important undertakings and accomplishments of the past year. This report will be brief.

Two general meetings were held during the year—one in St. Louis, Mo., April 7 to 11, and one in Atlantic City, N. J., September 8 to 12. Four new local sections were established and chartered in 1941: the Binghamton Section with headquarters at Binghamton, N. Y.; the San Diego Section with headquarters at San Diego, Calif.; the Southeastern Pennsylvania Section with headquarters at York, Penna.; and the Wooster (Ohio) Section with headquarters at Wooster, Ohio. The total number of local sections is now 97.

Two honorary members were lost by death in 1941—namely, Paul Sabatier of Toulouse, France, who died on August 14, and Walther Nernst of Zibelle, Oberlausitz, Germany, who died on November 18.

References to committee reports, awards, medals, divisional, local section, and regional meetings (including symposia held by the Divisions of Colloid Chemistry, Industrial and Engineering Chemistry, Organic Chemistry, and Physical and Inorganic Chemistry) will be found in the index to the NEWS EDITION.

The AMERICAN CHEMICAL SOCIETY moved into its new home in April and May of 1941 and is functioning in national headquarters where members are always welcome.

The Committee on the Professional Training of Chemists has been vigorously active, spending days at a time on its duties, and its latest list of accredited institutions will be found on page 1135 of the NEWS EDITION for 1941.

Employer-employee relations have been very carefully considered by the Council and the Board of Directors (see NEWS EDITION for 1941, pages 733, 1014, 1082, 1442–44).

Very special consideration was given to the attempt by the Federation of Architects, Engineers, Chemists, and Technicians to force professional men into a heterogeneous union containing a considerable majority of nonprofessionals. The case was brought before the National Labor Relations Board, counsel for the AMERICAN CHEMICAL SOCIETY conferring and advising with counsel for the intervenors and representing them in the final oral argument before the N.L.R.B. in Washington. The outcome was all that the AMERICAN CHEMICAL SOCIETY had ever hoped to attain. Every one of the principles which the SOCIETY has advocated was definitely established in the findings of the N.L.R.B. (see "National Labor Board Decision Upholds Professional Status of Chemists", pages 165–69, CHEMICAL AND ENGINEERING NEWS, formerly the "NEWS EDITION", February 10, 1942). The election ordered was held on February 11 and the Professional Group voted against union affiliation.

A large portion of the Secretary's time has been spent in strenuous endeavors to retain chemists and chemical engineers in positions where they can render the best service to the country in this national emergency. Your Secretary has been in constant touch with officials of the Selective Service System. Although many errors of local boards have yet to be corrected, at least 90 per cent of the chemists and chemical engineers of America will continue to serve where their years of training and experience will not be lost (see NEWS EDITION for 1941, pages 129, 453, 457, 459, 480, 520, 681, 1464). The entire situation has been summed up in the article entitled "The 'Production Army' *vs.* the 'Combat Army'" (see CHEMICAL AND ENGINEERING NEWS, page 157, February 10, 1942). This was based on an extensive survey by the National Defense Committee of the AMERICAN CHEMICAL SOCIETY, and the results have been transmitted in special letters to the Army, the Navy, and the War Production Board.

By order of the Board of Directors of the SOCIETY, following action taken at the Atlantic City meeting, the Committee on Economic Status was appointed and immediately went into action (see pages 1133, 1195, 1245, NEWS EDITION, 1941). A preliminary tabulation of results, as of January 10, 1942, will be found on page 164 of CHEMICAL AND ENGINEERING NEWS, February 10, 1942. It shows that the SOCIETY'S American membership is composed of approximately 22 per cent chemical engineers, 70 per cent chemists, and 8 per cent in other fields but adequately trained in chemistry or chemical engineering. Thirty-nine per cent have received doctorate degrees; 24 per cent, master's; 32 per cent, bachelor's; and the balance have reached professional status through years of experience and accomplishment or are enrolled as junior members without degrees. Of the total reporting as to sex, 96 per cent were males. This means that the SOCIETY has approximately 1,000 women members. Several hundred replies have been received since January 10, 1942, and are being tabulated, but it is improbable that the general percentages will vary to any great extent. The committee will report in detail at the general meeting of the SOCIETY in Memphis. The report promises to be extremely interesting since it will develop many additional economic data covering emoluments and other pertinent material in the various groups.

The Committee on Patent and Related Legislation, under the guidance of Chairman Walter A. Schmidt, has been extremely active in helping to guide legislation and protect the interests of chemists and chemical engineers.

Subscriptions to all of the SOCIETY'S publications and the SOCIETY'S membership again show a marked increase, greater in 1941 than in any previous year of the SOCIETY'S history. The total paid subscriptions and the total membership figures for the past three years follow:

TOTAL PAID SUBSCRIPTIONS

	1939	*1940*	*1941*
Journal of the American Chemical Society	11,306	11,676	12,505
Chemical Abstracts	13,818	13,934	14,243
Industrial and Engineering Chemistry	20,730	22,196	24,030
Analytical Edition	20,370	22,196	24,030
News Edition	28,052	30,244	34,156

MEMBERSHIP CHANGES AS OF DECEMBER 31, 1941

YEAR	ELECTED	RESIGNED	DECEASED	UNPAID ONE YEAR DROPPED DEC. 31
1939	2,540	445	89	676
1940	3,036	456	94	691
1941	4,466	410	79	782

MEMBERSHIP AS OF DECEMBER 31

	1939	1940	1941
Regular paid	20,319	22,166	24,973
Student paid	1,876	1,885	2,299
Corporation paid	570	592	605
Honorary	10	8	6
Life	16	16	16
Emeritus	52	56	57
Unpaid	676	691	782
	23,519	25,414	28,738

MEMBERSHIP AS OF JANUARY 1

1939	21,591
1940	23,099
1941	25,826
1942	28,347

The number of members not in arrears registered in local sections on November 30, 1941, was 25,505. The number in each section for 1940 and 1941 follows:

NUMBER OF PAID MEMBERS

	1940	1941		1940	1941
Akron	389	431	Northern West Virginia	38	46
Alabama	89	119	Northwestern Utah	46	53
Ames	98	102	Oklahoma	196	213
Baton Rouge	96	125	Omaha	31	32
Binghamton	...	41	Oregon	92	135
California	686	849	Panhandle Plains	48	46
Central Pennsylvania	150	162	Pennsylvania–New York Western Border	51	54
Central Texas	108	101	Peoria	90	118
Chicago	1,677	1,916	Philadelphia	1,231	1,337
Cincinnati	331	356	Pittsburgh	748	817
Cleveland	386	438	Princeton	41	56
Colorado	110	130	Puget Sound	146	148
Columbus	218	238	Purdue	78	88
Connecticut Valley	268	343	Rhode Island	124	135
Cornell	65	85	Rochester	374	409
Dallas–Fort Worth	117	128	Sacramento	63	63
Dayton	105	122	St. Joseph Valley	69	69
Delaware	645	747	St. Louis	360	497
Detroit	480	569	San Diego	...	40
East Tennessee	42	43	Sioux Valley	32	31
Eastern New York	177	202	South Carolina	54	74
Erie	59	54	South Jersey	154	249
Florida	126	156	Southeast Kansas	33	37
Georgia	117	133	Southeast Tennessee	32	31
Hawaiian	47	58	Southeastern Pennsylvania	...	72
Illinois-Iowa	35	40	Southeastern Texas	166	206
Indiana	285	330	Southern California	581	668
Iowa	65	75	Syracuse	189	199
Kanawha Valley	170	201	Texas A. & M.	33	38
Kansas City	153	158	Toledo	80	95
Kansas State College	38	45	University of Illinois	204	203
Lehigh Valley	217	242	University of Michigan	86	88
Lexington	45	54	University of Missouri	46	59
Louisiana	132	169	Virginia	241	299
Louisville	110	144	Virginia Blue Ridge	68	86
Maine	55	51	Washington	694	813
Maryland	348	394	Washington-Idaho Border	40	43
Memphis	66	89	Western Connecticut	207	257
Michigan State College	73	80	Western Maryland	35	54
Midland	154	177	Western New York	481	566
Milwaukee	188	198	Western Vermont	35	39
Minnesota	294	313	Wichita	43	40
Montana	29	34	Wilson Dam	44	54
Nashville	40	51	Wisconsin	169	192
Nebraska	41	43	Wooster, Ohio	...	28
New Haven	110	124			
New York	2,431	2,802			
North Carolina	133	162			
North Jersey	1,480	1,742			
Northeast Tennessee	78	82			
Northeast Wisconsin	58	69			
Northeastern	1,022	1,111	TOTAL	22,009	25,505

The Employment Clearing House, conducted at each general meeting of the SOCIETY, based on personal interviews which are arranged by the SOCIETY between employer and employee, continues to become more important with each meeting (see index to NEWS EDITION for references to detailed information and accomplishments).

The Treasurer's Report which follows clearly points out another successful financial year, with increased income and expenditures, all of which are used for the benefit of the membership.

The collections made through the Business Manager's office for the year 1941 follow:

Dues	$256,177.00
Subscriptions	219,675 80
Back numbers	9,652.13
Postage	19,147.32
Bank interest	1,986 00
Royalties	2,731.17
Reimbursement of general meeting expenses	4,940.48
Decennial Index sales	3,307.30
Building rents	11,916 67
Miscellaneous	3,772 50
TOTAL	$533,306.37

The above amount was duly deposited by the AMERICAN CHEMICAL SOCIETY with the Munsey Trust Co. The collections made through the Business Manager's office in 1940 amounted to $481,740.07. Therefore, in 1941 there was an increase in collections of $51,566.30.

The reprinting of Volumes 1 and 2 of *Chemical Abstracts*, and the sale of these two volumes by G. E. Stechert and Co. announced on page 200 of the NEWS EDITION for 1941, will be long delayed since the journals were reprinted in China and were lost in transit. The SOCIETY has a few, but only a few, complete sets for sale. No full sets of the *Journal of the American Chemical Society* have been available for years, although volumes since 1906 can usually be furnished. Most of the volumes of *Chemical Abstracts* after Volume 10 are still obtainable as volumes. Some 40 complete sets of *Industrial and Engineering Chemistry* are available and are offered for sale in complete sets. In a few years these, too, will be exhausted. The SOCIETY'S stock of journals is being kept in the best possible condition by the occasional purchase of single numbers in order to complete volumes, but otherwise the SOCIETY purchases no journals. Back numbers are mailed directly from Easton, Penna., and orders are sent through the office of the Secretary. In 1941, 122,671 copies of journals were mailed from Easton aside from the regular mailing lists.

In 1941 the number of student affiliates increased from 1,123 in 42 chapters to 1,820 in 64 chapters. Every effort is made for the sake of the students, as well as the SOCIETY, to interest them at an early age in the work of the SOCIETY.

The SOCIETY'S future appears bright.

CHARLES L. PARSONS
Secretary and Business Manager

Treasurer

THE annual audit of the books of the AMERICAN CHEMICAL SOCIETY has been made and the audit is herewith respectfully submitted and recommended to your attention.

ROBERT T. BALDWIN, *Treasurer*

Detailed report follows



F. W. LAFRENTZ & CO.

CERTIFIED PUBLIC ACCOUNTANTS

Executive Offices New York City

100 BROADWAY, NEW YORK

January 30, 1942

BOARD OF DIRECTORS
AMERICAN CHEMICAL SOCIETY:

We have examined the statement of assets and liabilities with related statements of cash and securities of the AMERICAN CHEMICAL SOCIETY as of December 31, 1941, have reviewed the system of internal control and the accounting procedures of the SOCIETY and have examined or tested its accounting records and other supporting evidence, by methods and to the extent we deemed appropriate.

In 1940 the SOCIETY acquired land and buildings in Washington, D. C., at a total cost of $150,000. In 1941 the Board of Directors by resolution ordered that a reserve of $50,000 be set up to be applied against the investment in land and buildings in Washington, D. C., and instructed the appropriate officials not to capitalize any building alterations or improvements and to provide for necessary depreciation. Accordingly, a special reserve of $50,000 has been provided, expenditures for alterations and improvements amounting to $16,082.41 have not been capitalized, and provision has been made for a reserve for depreciation of $1,000.

In our opinion, the accompanying statement of assets and liabilities with related statements of cash and securities presents fairly the position of the AMERICAN CHEMICAL SOCIETY at December 31, 1941, in conformity with generally accepted accounting principles which have been applied on a basis consistent with that of the preceding year, except as explained in the preceding paragraph.

F. W. LAFRENTZ & CO.
Certified Public Accountants

EXHIBIT A

AMERICAN CHEMICAL SOCIETY

Statement of Assets and Liabilities, December 31, 1941

ASSETS		
CASH IN BANK, EXHIBIT B		$ 60,422.06
GENERAL INVESTMENTS, at cost, EXHIBIT C		
Marketable securities (aggregate quoted market value $100,611.75)	$110,009.64	
Other investments		
Mortgage participation certificates, wholly owned mortgage and real property acquired under foreclosure	233,775.91	343,785.55
LAND AND BUILDINGS, WASHINGTON, D. C., at cost	$150,000.00	
Less		
Reserve authorized by Board of Directors $50,000.00		
Reserve for depreciation 1,000 00	51,000.00	99,000.00
ACCOUNTS RECEIVABLE, ADVERTISING	$ 27,990.62	
Less provision for doubtful accounts	2,799.06	25,191.56
CASH ADVANCED FOR FORWARD PURCHASE OF PAPER		36,460.75
PUBLICATIONS (nominal amount)		1.00
FURNITURE AND FIXTURES (nominal amount)		1.00
TRUST FUNDS (contra) EXHIBIT D:		
Cash in bank	69,045.99	
Investments (aggregate quoted market value $480,869.07)	524,433.20	593,479.19
CASH IN BANK FOR ACCOUNT OF 1942 DUES, SUBSCRIPTIONS, ETC. (contra)		214,601.93
TOTAL		$1,372,943.04

LIABILITIES AND RESERVES	
UNALLOCATED RECEIPTS	4,841.93
RESERVE FOR DECLINE IN VALUE OF INVESTMENTS	100,000.00
TRUST FUNDS (contra)	593,479.19
CASH RECEIVED FOR ACCOUNT OF 1942 DUES, SUBSCRIPTIONS, ETC. (contra)	214,601.93
TOTAL LIABILITIES AND RESERVES	$ 912,923.05
EXCESS OF ASSETS OVER LIABILITIES	460,019.99
TOTAL	$1,372,943.04

EXHIBIT B

AMERICAN CHEMICAL SOCIETY

Receipts and Disbursements for the Year Ended December 31, 1941

(Exclusive of Trust Funds and Receipt of 1942 Dues, Subscriptions, etc.)

RECEIPTS			
DUES AND SUBSCRIPTIONS			
Membership dues		$256,177.00	
Subscriptions		219,675.80	$475,852.80
PUBLICATIONS			
Advertising, net		$271,800.73	
Back numbers		9,652.13	
Received for postage		19,147.32	
Directory		118.75	300,718.93
OTHER RECEIPTS			
Royalties		$ 2,731.17	
Income from investments		13,449.08	
Interest on savings bank account		1,986.00	
Income from foreclosed property			
Rentals collected	$3,174.50		
Less expenditures	2,281.64	892.86	
Unclaimed receipts taken into income		285.85	
Payments received on account of principal of wholly owned mortgage and mortgage participation certificates		2,595.42	
Eli Lilly and Company Award for Research in Biological Chemistry for year 1941:			
Receipts			
Award	$1,000.00		
Provision for traveling expenses	150.00		
Total	$1,150.00		
Disbursements			
Award and provision for traveling expenses to David Rittenberg	1,150.00	.....	21,940.38
TOTAL RECEIPTS			$798,512.11
ADD CASH IN BANK, JANUARY 1, 1941			136,212.23
TOTAL			$934,724.34

DISBURSEMENTS		
PUBLICATIONS		
Journal of the American Chemical Society	$ 71,543.43	
Chemical Abstracts	189,545 21	
Industrial and Engineering Chemistry	156,554.44	
NEWS EDITION	60,016.25	
News Service	8,092.76	
Printing advertisements	70,864 19	
Advertising development	10,340.89	
Back numbers	4,347.41	
Total disbursements for publications (Forward)	$571,304.58	

DISBURSEMENTS (*Continued*)

TOTAL RECEIPTS (Forwarded)			$934,724.34
FORWARDED		$571,804.58	
OTHER DISBURSEMENTS			
President's office	$ 675.64		
Secretary's office	23,149.27		
Business Manager's office	34,723.90		
Treasurer's office	10,914.90		
Technologic Monographs	1,009.08		
Scientific Monographs	1,283.30		
Local Sections	26,699.81		
Chemical Exposition	500.00		
A.C.S. BUILDING, Washington, D. C.			
Alterations and improvements	16,082.41		
Furniture, fixtures and equipment	6,852.88		
Operating and maintenance $12,947.88			
Less rentals received 12,938.10	9.78		
Committee on the Professional Training of Chemists	10,049.76		
Committee on Chemical Service to Medicine	1,179.46		
National Roster of Chemists and Chemical Engineers	435.90		
Committee on Economic Status	389.06		
Committee on Patents and Related Legislation	213.41		
Accounting services	2,400.00		
Incidentals	11,360.48		
Cost of securities purchased	9,659.00		
Decrease in balance of unallocated receipts			
Balance, January 1, 1941 $ 7,751.59			
Balance, December 31, 1941 4,841.93	2,909.66		
Final payment on purchase price of $150,000 for A. C. S. BUILDING, WASHINGTON, D. C.	142,500.00	302,997.70	874,302.28
CASH IN BANK, DECEMBER 31, 1941, EXHIBIT A			$ 60,422.06

EXHIBIT C

AMERICAN CHEMICAL SOCIETY

General Investments, December 31, 1941

MARKETABLE SECURITIES, AT COST			
$40,000 U. S. Treasury, 2⅞%, 1955–60			$ 41,537.50
1,000 Niagara Falls Power Co., 3½%, 1966			1,040.00
Shares of common stock			
200	American Tobacco Co., "B"		9,659.00
200	General Electric Co.		6,644.50
200	International Nickel Co. of Canada, Ltd.		9,084.00
100	Lake Shore Mines, Ltd.		5,255.50
300	Standard Oil Co. of Indiana		8,370.00
416	Standard Oil Co. of New Jersey		17,732.64
100	Union Carbide and Carbon Corp.		6,344.00
200	Union Oil Co. of California		4,342.50
TOTAL MARKETABLE SECURITIES (quoted market value $100,611.75)			$110,009.64
FORWARDED			$110,009.64
OTHER INVESTMENTS			
Mortgage participation certificates, wholly owned mortgage and real property acquired under foreclosure:			
Mortage participation certificates			
Due March 1, 1935, 4¼%		$ 74,007.75	
Due February 14, 1936	$15,000.00		
Less payments on account	2,689.53	12,310.47	
Extended to April 1, 1943, 4½%	$30,000.00		
Less payments on account	2,803.63	27,196.37	
Extended to November 21, 1943, 5%	$60,000.00		
Less payments on account	2,100.00	57,900.00	
TOTAL		$171,414.59	
Wholly owned mortgage			
Extended to February 7, 1945, 4½%	$45,000.00		
Less payments on account	6,200.00	38,800.00	
Real property acquired under foreclosure			
Lien on property	$19,000.00		
Foreclosure costs	4,561.32	23,561.32	
TOTAL OTHER INVESTMENTS			233,775.91
TOTAL, EXHIBIT A			$343,785.55

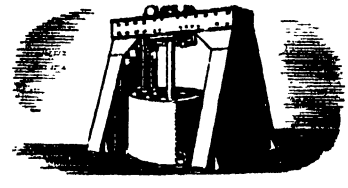
EXHIBIT D

AMERICAN CHEMICAL SOCIETY

Trust Funds, December 31, 1941

SUMMARY

NAME OF FUND	PER DETAIL ATTACHED	TOTAL ASSETS	COMPOSED OF — Cash	COMPOSED OF — Investments	INVESTMENTS AT MARKET VALUE
Chemical Abstracts	1	$196,092.81	$27,065.20	$169,027.61	$152,712.50
Decennial Index	2	171,476.74	16,614.43	154,862.31	141,870.63
Employees' Retirement	3	107,422.04	18,036.61	89,385.43	93,963.44
Permanent Endowment	4	102,386.84	6,205.24	96,181.60	77,112.50
Life Membership	5	7,100.64	179.39	6,921.25	3,158.75
Nichols Medal	6	6,795.03	228.78	6,566.25	8,025.00
Priestley Memorial	7	1,245.02	256.27	988.75	451.25
Garvan Medal	8	960.07	460.07	500.00	3,575.00
TOTAL, EXHIBIT A		$593,479.19	$69,045.99	$524,433.20	$480,869.07



Detail 1

CHEMICAL ABSTRACTS FUND

Bonds, at Cost			
$10,000	U.S. Treasury, 2⅞%, 1955–60		$ 10,384.38
10,000	Boston (City of), 4%, 1948, registered		11,153.48
43,000	Port of New York Authority, 3¼%, 1977		45,526.25
10,000	Westchester Lighting Company, 3½%, 1967		10,800.00
5,000	New York Edison Co., 3¼%, 1966		5,100.00
Common Stock, at Cost			
500	Allegheny Ludlum Steel Corp.		11,200.00
200	American Can Co.		20,871.00
200	General Electric Co.		7,332.00
300	International Nickel Co. of Canada, Ltd.		9,584.50
200	Procter & Gamble Co.		12,188.00
300	Union Carbide and Carbon Corp.		21,735.00
200	Union Oil Co. of California		3,153.00
	Total (aggregate quoted market value $152,712.50)		$169,027 61
Cash in Bank			
Balance, January 1, 1941		$20,943.85	
Receipts			
Income on investments		5,797.85	
Amount received from the Permanent Endowment Fund, representing net income for the year ended December 31, 1941		3,905.00	
Proceeds from sale of investments		26,062.50	
Total		$56,709.20	
Disbursements			
Cost of investments purchased		29,644.00	
Balance, December 31, 1941			27,065.20
TOTAL			$196,092.81

Detail 2

DECENNIAL INDEX FUND

Bonds, at Cost			
$ 3,000	U. S. Treasury 3¼%, 1944–46		$ 3,000 00
10,000	United States Savings Bonds, due March 1, 1949		7,500.00
Common Stock, at Cost			
300	Abbott Laboratories		18,443.50
200	Borden Co.		3,854.00
200	E. I. du Pont de Nemours & Co.		25,076.00
300	Eastman Kodak Co.		41,397.00
100	General Electric Co.		3,728.50
300	International Nickel Co. of Canada, Ltd.		9,172.00
200	Lake Shore Mines, Ltd.		9,897.50
400	National Dairy Products Corp.		6,193.50
205	Procter & Gamble Co.		10,209.81
200	Standard Oil Co. of Indiana		5,818.50
100	Union Carbide and Carbon Corp.		6,919.00
200	Union Oil Co. of California		3,653.00
	Total (Aggregate quoted market value $141,870 63)		$154,862.31
Cash in Bank			
Balance, January 1, 1941		$ 9,626.13	
Receipts			
Income on investments		6,896.00	
Sales of Decennial Indexes			
Second Decennial Index	$ 620.00		
Third Decennial Index	2,687.30	3,307.30	
Total		$19,829.43	
Disbursements			
Salaries		3,215.00	
Balance, December 31, 1941			16,614.43
TOTAL			$171,476.74

Detail 3

EMPLOYEES' RETIREMENT FUND

Bonds, at Cost			
$20,000	U. S. Treasury, 3⅛%, 1943–47		$ 19,987.50
3,000	U. S. Treasury, 3¼%, 1944–46		3,000.00
21,000	U. S. Treasury, 3⅛%, 1946–49		20,573.43
20,000	U. S. Treasury, 3¼%, 1946–56		20,287.50
11,000	Port of New York Authority, 3¼%, 1977		11,110.00
Common Stock, at Cost			
100	E. I. du Pont de Nemours & Co.		14,427.00
	Total (aggregate quoted market value $93,963.44)		$ 89,385.43
Cash in Bank			
Balance, January 1, 1941		$ 2,973.45	
Receipts			
Proceeds from sale of investments		26,750.00	
Income on investments		2,740.16	
Total		$32,463.61	
Disbursements			
Cost of investments purchased		14,427.00	
Balance, December 31, 1941			18,036.61
TOTAL			$107,422.04

Detail 4

PERMANENT ENDOWMENT FUND

As to Corpus			
Bonds, at cost			
$10,000	Baltimore and Ohio Railroad Co., convertible, 4½%, 1960, stamped modified		$ 9,700.00
10,000	Brooklyn Edison Co., 3¼%, 1966		10,194.80
10,000	Duquesne Light Co., 3⅛%, 1965		10,616.80
10,000	New York Central Railroad Company, 4½%, 2013		10,000.00
10,000	Southern Pacific Co., 4½%, 1969		9,900.00
Common Stock, at Cost			
100	Abbott Laboratories		4,892.00
200	Aluminum Co. of America		23,848.00
500	Borden Co.		10,123.00
200	Climax Molybdenum Co.		6,907.00
	Total (aggregate quoted market value $77,112.50)		$ 96,181.60
Cash in bank			
Balance, January 1, 1941		$18,160.24	
Receipts			
Proceeds from sale of investments		31,750.00	
Total		$49,910.24	
Disbursements			
Cost of investments purchased		43,705.00	
Balance, December 31, 1941			6,205.24
TOTAL			$102,386.84
As to Income			
Receipts			
Income on investments		$ 3,905.00	
Income of fund transferred to *Chemical Abstracts* Fund, in accordance with resolution of the Board of Directors		$ 3,905.00	



LIFE MEMBERSHIP FUND

			Detail 5
As to Corpus			
Bonds, at cost			
$ 7,000	New York Central Railroad Co. 4½%, 2013 (quoted market value $3,150.75)		$ 6,921.25
Cash in bank			
Balance, December 31, 1941 (no change during year)			563.79
TOTAL			$ 7,485.04
As to Income			
Balance, January 1, 1941, overdraft		$367.80	
Receipts			
Interest on investment		315.00	$52.80
Disbursements			
Life membership dues and publications, year 1941			331.60
Balance, December 31, 1941, overdraft			384.40
BALANCE			$ 7,100.64

NICHOLS MEDAL FUND

			Detail 6
As to Corpus			
Bonds, at cost			
$ 550	United States Savings Bonds, due October 1, 1949 (at cost)		$ 412 50
1,000	Federal Land Bank, 3%, 1956 (at cost)		1,005.00
1,000	New Jersey Power & Light Company, 4½%, 1960 (at cost)		1,067.50
1,000	Pacific Gas & Electric, 4%, 1964 (at cost)		1,081.25
30 shares	Allied Chemical & Dye Corp., common stock, without par value (at value assigned of $100.00 per share)		3,000.00
Total (aggregate quoted market value $8,025.00)			$ 6,566.25
Cash in bank			
Balance, December 31, 1941 (no change during year)			3.75
Total			$ 6,570 00
As to Income			
Balance, January 1, 1941		$ 375.20	
Receipts			
Income on investments		355.00	
Total		$ 730.20	
Disbursements			
Medal Award expenses		505.17	
Balance, December 31, 1941			225.03
TOTAL			$ 6,795.03

PRIESTLEY MEMORIAL FUND

			Detail 7
As to Corpus			
Bonds, at cost			
$ 1,000	New York Central Railroad Co., 4½%, 2013 (quoted market value $451.25)		$ 988.75
Cash in bank			
Balance, December 31, 1941 (no change during year)			127.00
Total			$ 1,115.75
As to Income			
Balance, January 1, 1941		$ 224.66	
Receipts			
Interest on investment		45.00	
Total		$ 269.66	
Disbursements			
Medal Award expenses		140.39	
Balance, December 31, 1941			129.27
TOTAL			$ 1,245.02

GARVAN MEDAL FUND

			Detail 8
As to Corpus			
Investment (quoted market value $3,575.00)			
25 shares E. I. du Pont de Nemours & Co., common stock (at par value of $20.00 per share)			$ 500.00
As to Income			
Balance, January 1, 1941		$ 285.07	
Receipts			
Dividends on investment		175.00	
Balance, December 31, 1941			460.07
TOTAL			$ 960.07

Journal of the American Chemical Society

The number of Articles, Communications to the Editor, Book Reviews, and New Compounds published in the journal during the past year and (with the exception of New Compounds) the preceding four years and the pages occupied by them are given in the following table:

Articles, etc.	Number				
	1937	*1938*	*1939*	*1940*	*1941*
Physical and Inorganic	382	327	390	369	414
Organic and Biological	436	557	655	659	619
Communications to the Editor	40	53	66	40	52
Books Reviewed	89	119	99	111	73
New Compounds	..	..	..	16	36
	Pages				
	1937	*1938*	*1939*	*1940*	*1941*
Proceedings and Obituaries	40	22	27	5	2
Physical and Inorganic	1498	1422	1576	1561	1671
Organic and Biological	1188	1578	1921	1883	1788
Communications to the Editor	28	36	49	24	30
Book Reviews and Books Received	40	60	40	47	44
Indexes, Additions, and Corrections	46	50	55	48	54
Standing, Title Pages, At. Wt. Table	32	32	32	32	32
New Compounds	..	..	..	6	13
Total Pages	2872	3200	3700	3606	3634

It can be seen from this table that the marked increase in the total number of articles and the preponderance of the organic and biological as compared with the physical and inorganic articles, which began in 1938, were maintained in 1941. The average length of the articles last year—namely, 3.3 pages—was substantially the same as has prevailed in recent years.

The term of Frederick G. Keyes, who was elected to fill the unexpired term of Joel H. Hildebrand as Associate Editor, expired with the current year. I am happy to say that at the Atlantic City meeting of the Council he was reëlected for a second term.

The second terms of G. E. F. Lundell and Hugh S. Taylor as Associate Editors also expired with the current year. At the Atlantic City meeting N. Howell Furman and Paul H. Emmett were elected to succeed them.

I wish to express to Dr. Lundell and Dr. Taylor my appreciation of, and gratitude for, their long, wise, and understanding services in behalf of the *Journal of the American Chemical Society*.

Arthur B. Lamb, *Editor*

Chemical Abstracts

In spite of war *Chemical Abstracts* published more abstracts in 1941 than in 1940. The small increase (505 abstracts) is to be attributed to success during 1941 in the abstracting of European chemical patents after overcoming difficulties which interfered with this abstracting for a considerable period after the outbreak of war in Europe. The 1941 volume contained 5,541 more abstracts of patents and 5,036 fewer abstracts of papers than in the 1940 volume. The abstracts for 1941 total 52,764 in number as contrasted with 52,259 abstracts published in 1940. Of the 1941 abstracts 35,588 are of papers and 17,176 are of patents.

Chemical Abstracts endeavors to cover the chemical literature of the world completely. World-wide warfare presents many serious handicaps in this effort. *Chemical Abstracts* did not approach completeness so closely in 1941 as in normal years. Nevertheless, the record for 1941 is good. Abstracts from many of the papers published during 1941 in the warring or conquered European countries were obtained by some success in getting the needed periodicals (good success until Russia's entry into the war closed the trans-Siberian route), by searching this country for periodicals received in one library or another, and by having abstracts made in Europe, particularly in Switzerland and Germany, and sent by clipper ship.

In general, the policy of *Chemical Abstracts* is to publish informational rather than merely descriptive abstracts. Special emphasis has been placed on this for European and other publications not readily accessible to most Americans at the present time. The average page of *Chemical Abstracts* in 1941 contains 11.5 abstracts of papers or 18.6 abstracts of patents. The corresponding figures for 1940 are 12.1 and 18.0, respectively.

The edition of *Chemical Abstracts* averaged approximately 15,000 copies during 1941.

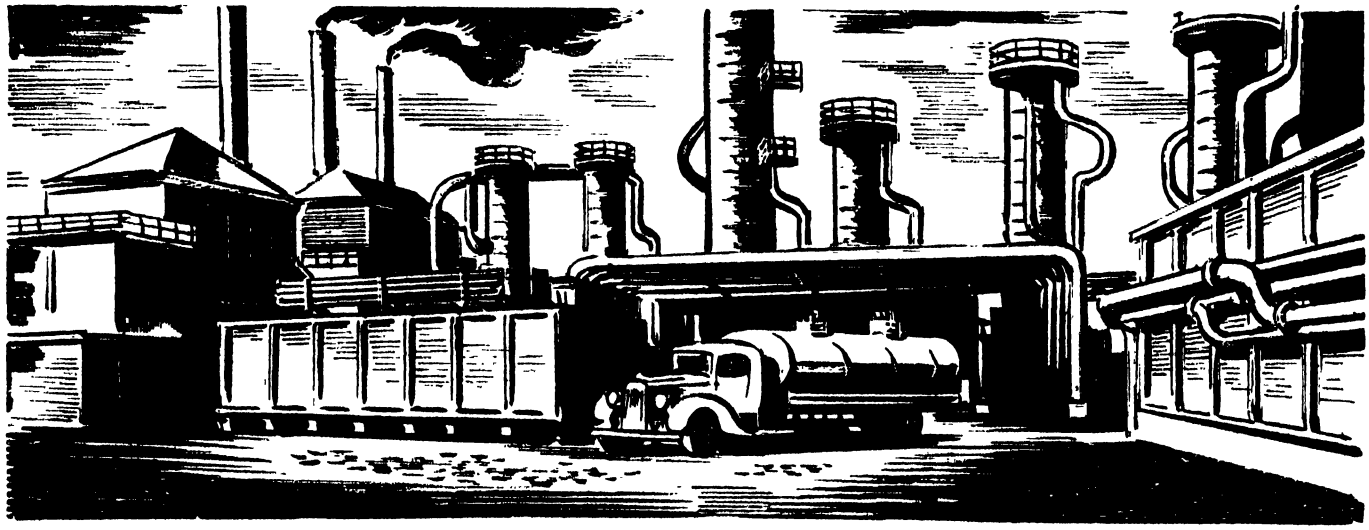
The much-used List of Periodicals Abstracted by *Chemical Abstracts*, with its key to library files, is normally published in revised form every five years. The list was due for revision in 1941, but the war has made postponement necessary. Satisfactory revision with American libraries in their present war-handicapped condition is not possible. The *Chemical Abstracts* office is keeping as well informed as possible concerning scientific periodicals and is willing to help users of abstracts locate full papers whenever possible. Hundreds of inquiries are answered monthly.

The only editorial change during the year was the well-earned elevation of Charles L. Bernier to an associate editorship following the regretted resignation of Janet D. Scott, who left to join the Chemical Warfare Service staff at Edgewood, Md. Miss Scott is continuing to help in the naming and indexing of inorganic compounds. The Editor gratefully acknowledges the valuable help of all of the assistant editors and abstractors, many of whom are continuing their work for *Chemical Abstracts* in spite of heavy national defense assignments. Our work is regarded as being in the same category.

Statistics for the various sections follow:

	1941			
	Abstracts of Papers		Abstracts of Patents	
	No. of pages	No. of abstracts	No. of pages	No. of abstracts
Apparatus, Plant Equipment, and Unit Operations	34.9	647	49.1	1,417
General and Physical Chemistry	256.9	3,171	0.1	1
Subatomic Phenomena and Radiochemistry	122.4	1,927	5.6	106
Electrochemistry	46.2	547	42.4	928
Photography	21.9	262	31.8	466
Inorganic Chemistry	34.0	232	...	...
Analytical Chemistry	95.9	1,051	1.4	24
Mineralogical and Geological Chemistry	53.9	842	0.1	1
Metallurgy and Metallography	150.4	1,919	76.5	1,696
Organic Chemistry	492.9	2,315	88.2	1,451
Biological Chemistry	809.3	9,706	1.5	30
Foods	130.3	1,523	13.8	264
Chemical Industry and Miscellaneous Industrial Products	53.6	967	113.8	2,022
Water, Sewage, and Sanitation	66.7	980	9.8	223
Soils, Fertilizers, and Agricultural Poisons	153.7	1,734	13.8	284
Fermentation Industries	30.2	444	6.7	133
Pharmaceuticals, Cosmetics, and Perfumes	63.5	888	50.5	823
Acids, Alkalies, Salts, and Other Heavy Chemicals	20.4	306	33.2	598
Glass, Clay Products, Refractories, and Enameled Metals	42.6	612	34.4	768
Cement and Other Building Materials	27.7	348	18.2	353
Fuels and Carbonization Products	59.8	771	35.3	701
Petroleum, Lubricants, and Asphalt	45.8	622	88.8	1,236
Cellulose and Paper	64.2	676	34.2	681
Explosives and Explosions	10.6	167	6.0	138
Dyes and Textile Chemistry	58.2	871	100.5	1,584
Paints, Varnishes, and Lacquers	48.1	661	21.0	388
Fats, Fatty Oils, Waxes, and Soaps	31.4	376	11.6	192
Sugar, Starch, and Gums	28.1	374	5.4	96
Leather and Glue	19.1	238	6.6	144
Rubber and Allied Substances	35.2	411	21.6	428
Totals	3,107.9	35,588	921.9	17,176
Book and journal titles	30.1	1,330		
Headings, blanks, and cross references	118.6			

E. J. Crane, *Editor*



Industrial and Engineering Chemistry

INDUSTRIAL AND ENGINEERING CHEMISTRY, including the *Analytical Edition*, in 1941 received 878 manuscripts for consideration. Approximately 60 per cent of these manuscripts have been or will be accepted, some of them still being in process of review and revision which occasionally involves additional experimental work, delaying publication for some months after the receipt of the manuscript. This constitutes the largest number of papers received in any one year since records have been kept. Including the index and contents pages, the volume for the year exceeded 1600 pages for the *Industrial Edition* and was 948 for the *Analytical Edition*. This is a large return for the cost to the members, and well illustrates what is accomplished through the teamwork of members of the AMERICAN CHEMICAL SOCIETY.

Among the features were 13 symposia, some of them emphasized by the use of special inks in printing, decorative typographical devices, or extra illustration. Care was exercised to cover as evenly as possible the whole field of applied chemistry and to maintain a proper balance in each month's issue.

The *Analytical Edition* was once more distinguished by including in the October issue a small monograph emphasizing the place and utility of instruments in the analytical field. The issue has been complimented and reported to be of great utility to those who devote their talents to analysis and testing. It is obvious that the *Analytical Edition* has become the world leader in its field.

In May our offices were moved to the AMERICAN CHEMICAL SOCIETY BUILDING in Washington, where facilities had been made ready and where our work is now conducted in better organized and roomier quarters than we have enjoyed heretofore. The environment makes possible better work with less fatigue and the staff is enabled to carry an even heavier load than heretofore without adding to its numbers.

Once more we are pleased to have an opportunity to thank authors, the considerably greater number of reviewers, and staff members for faithful and cooperative work, without which an enterprise such as this would be impossible. We have been gratified by the increase in our circulation as well as by the world-wide origin of our contributions, and the news and information generally sent us by local section reporters and others interested in the advancement of chemistry.

H. E. HOWE, *Editor*

A. C. S. News Service

THE News Service is operating at a higher level of productivity than at any time since its establishment more than two decades ago. War conditions engender almost limitless opportunity for popular narration of progress in chemical science and industry. The outbreak of hostilities found the News Service in complete readiness to meet its larger responsibilities. Schooled to an appreciation of the vast contributions of the chemist to the contemporary civilization, millions of Americans look to the SOCIETY as a source of authoritative and unbiased information relating to the vital role of chemistry in the conflict between democracy and totalitarianism.

The News Service, it should be reiterated, exercises a reporting function. The material with which it works is derived largely from the SOCIETY'S publications. The articles appearing in *Industrial and Engineering Chemistry* and in the NEWS EDITION provide abundant data from which news narratives for newspapers and periodicals of general circulation may be readily prepared. The News Service also maintains contact with local sections and, whenever possible, publicizes the papers read at section meetings. This phase of News Service activity was strikingly successful during the past year. Cycles of publicity on regional meetings and year-end symposia produced gratifying results.

The more spectacular achievements of chemistry are far from being the sole concern of the News Service, which continually publicizes policies and projects of the SOCIETY definitely helpful to the chemical profession. The publicity given to the statement of the Board of Directors relative to the broad problems of employment in the field of chemistry is an example of this type of service. The work of the Committee on Economic Status and of the Committee on the Professional Training of Chemists are other examples of SOCIETY action which has gained recognition in the press. A special effort has been made by the News Service to stress the unwisdom of drafting for military service scientifically trained men whose abilities can be employed to the greatest advantage in industry.

Publicizing science is more than ever a cooperative enterprise. The News Service works in close association with the growing body of science writers who have so greatly enriched modern journalism. Newspapers are supplied with copy directly; so also are press associations, syndicates, magazines, and other news channels. The volume of published chemical news is increasing, and there is every indication that it will continue to increase, as public interest in chemistry is at a high pitch.

Coverage of the semiannual meetings is the biggest single task of the News Service. In connection with each of these meetings the News Service carries out an advance program of publicity which begins many weeks prior to the event, and which aims to call attention to the chemical resources of the convention area, as well as to focus national attention on the convention itself. The proceedings of these meetings, in addition to receiving extensive notice in the news columns, are, to a greater extent than ever, providing topics for serious editorial discussion. It is noteworthy that during the week of September 7 the *New York Times* carried five separate editorials dealing with significant aspects of the Atlantic City meeting.

Encouraging is the ready and courteous response of chemists to requests for papers, abstracts, and other material. Even in these trying times, when chemists are hard pressed by their professional duties, they make every effort to supply the News Service with the data which are essential to representative exposition of chemical developments. Public recognition, through the press, of the value of chemistry is, in no inconsiderable measure, due to the voluntary cooperation of the chemists themselves.

H. E. HOWE, *Director*

News Edition

THE NEWS EDITION of the AMERICAN CHEMICAL SOCIETY completed its greatest year in 1941 with the publication of 1526 pages. The increase in the size of the volume and marked gains in circulation both serve to indicate its growing importance.

Contributed articles on new developments in industry, chemistry, and economics discussed the application of our present knowledge to the defense program. Much space was devoted to the SOCIETY'S efforts to place chemists where they can contribute most to the war effort and to keep them up to date with the latest action of the Selective Service System and other matters of vital importance. Shorter items dealt with priorities and other government actions, supplies of strategic materials, and defense production. The double page spread, "The Chemical News Parade", pictorializing new plants or series of steps in various processes, continued to hold its popularity. Despite war conditions we were able to continue our World-Wide Chemistry department by stressing news from nations of the Western Hemisphere. Interest in the reviews of industrial research in this and other countries was evidenced by the large number of queries for further information and requests to reprint.

The NEWS EDITION continued to hold with ease its place as the publication with by far the largest circulation of any devoted primarily to chemistry.

H. E. HOWE, *Editor*

Reid Appointed Chief of WPB Chemicals Branch



OEM PHOTO

Ernest W. Reid

APPOINTMENT of Ernest W. Reid, Pittsburgh, Penna., as chief of the Chemicals Branch has been announced by William L. Batt, director of Materials, War Production Board.

Dr. Reid has been assistant chief of the branch since its organization. He replaces Edward R. Weidlein, also of Pittsburgh, who will be retained as senior consultant. Dr. Weidlein has been devoting part of his time to the branch, with his efforts centered recently on development of the synthetic rubber program. He will continue this responsibility for the Materials Division.

Both men, native Kansans who received final training at the University of Pittsburgh, came to Washington in June 1940 as members of the Advisory Commission to the Council of National Defense and have headed the chemicals end of the war effort ever since. Both are from Mellon Institute, of which Dr. Weidlein is director. Dr. Weidlein was chemicals expert for the War Industries Board in 1918 and is a former President of the AMERICAN CHEMICAL SOCIETY and of the American Institute of Chemical Engineers.

D. P. Morgan and W. G. Whitman have been made assistant chiefs and Campbell Osborn executive officer of the branch.

A. C. C. & C. E. Offers to Aid Those Seeking Qualified Employees

THE Association of Consulting Chemists and Chemical Engineers, Inc., 50 East 41st St., New York, N. Y., has distributed to a cross section of American industry and manufacturers a pamphlet calling attention to the offer of the association to supply without charge the names of consulting chemists and chemical engineers especially qualified for a particular problem. These consultants are located from coast to coast and will be found listed with specific reference to their capabilities in the current classified directory of the association. Attorneys, industrialists, insurance executives, manufacturers, and physicians to whom the pamphlet has gone have received it with appreciation.

Diploma Mill Closed

THE Federal Trade Commission advises that the McKinley-Roosevelt College of Arts and Sciences has been ordered to cease and desist from its acts and practices of offering for sale and distribution correspondence courses of study and instruction. The corporation is no longer permitted to use the words "college" or "university" or to advertise in catalogs or in other literature that the business conducted by it is a university or college or institution of higher learning.

The commission finds that this so-called university was not an educational institution of higher learning, did not have authority to confer degrees, did not have a faculty of learned persons acting as instructors, and had conferred a large number of degrees upon a number of persons, including some described by it as members of the faculty of the school conducted by it, notwithstanding the stipulation made in 1936 between the commission and the said McKinley-Roosevelt University, in which it was agreed that these practices were not to be continued.

This corporation was organized in the state of Illinois and the entire business of the school was conducted by a man and his wife from an apartment located in one of the residential districts of Chicago. There have been many such devices for obtaining money from gullible people, but most of these have disappeared and it is good to know that another has joined the list of those which have been investigated, exposed, and ordered to discontinue their evil practice.

Export Control Protects Medicinal Supplies

DRASTIC action has been taken by the Board of Economic Warfare, Office of Export Control, to prevent excessive drains upon stocks of medicinal or pharmaceutical preparations, chemicals, or drugs used solely for medicinal purposes, on hand in the United States. New licensing controls have been announced which will conserve existing supplies and at the same time further remove any possibility of their falling into Axis hands.

Jackson G. Merriam is now employed by the Texas Division of the Dow Chemical Co., at its plant at Freeport, Tex.

Mathieson Alkali Observes 50th Birthday

THE Mathieson Alkali Works, Inc., producer of industrial chemicals, is celebrating its 50th anniversary. Incorporated in 1892 in Virginia, this company was the first to manufacture bleaching powder in the United States and pioneered in the production and marketing of alkalies, synthetic ammonia, and chlorine products. With plants in Saltville, Va., Niagara Falls, N. Y., and Lake Charles, La., Mathieson is one of the major producers of alkalies, chlorine, synthetic ammonia, and numerous other products. At present, all three plants have been geared to maximum production to supply chemicals vitally necessary to our all-out war effort.

Half a century ago, all of the bleaching powder and most of the alkali consumed in this country were still imported from England, and the prejudice in favor of the imported products was strong. To ensure a product equally as good, construction and initial operation of the new company's plant were entrusted to a retired English alkali manufacturer, Neil Mathieson. He sent a son, Thomas T. Mathieson, to this country, and under the latter's supervision a plant was built at Saltville, Va., where there are huge and historic salt deposits.

About that same time, Mathieson obtained control, in this country, of the Castner electrolytic cell for the manufacture of extremely pure caustic soda and chlorine and, to obtain cheap power, a plant was constructed at Niagara Falls. Production began in this plant late in 1896.

Other notable Mathieson accomplishments include commercial production of synthetic ammonia in 1923; development of a true calcium hypochlorite as a new chlorine carrier in 1928; development of sodium chlorite as an improved bleaching agent for textiles, paper, flour, and other materials in 1939; fused alkalies in briquet form for a variety of uses; synthetic salt cake to replace foreign supplies for kraft paper manufacturers; exceptionally pure dry ice and carbonic gas from carbon dioxide, obtained as a by-product from the ammonia soda process at Saltville; especially designed containers for the shipment of liquid chlorine; and distribution of caustic soda in liquid form in tank cars and in specially designed sea-going tanker, plying between Lake Charles and Norfolk, Va., where Mathieson operates a liquid caustic storage terminal.

Mathieson operations are depicted in pictures on pages 272 and 273.

Defense Bulletin Number One
Effective 2-10-42

Priorities and Pyrometers

This Bulletin is intended to explain, to all users of temperature measuring and control instruments, how the National Defense Program affects these instruments, their purchase, use, maintenance, and the replacements necessary.

The information given points out the present scarcity of various materials and lists other materials which can be used as substitutes. The properties of the original materials and the substitute materials are compared.

Recommendations are also given on maintaining present equipment so that it will operate with maximum efficiency and give uninterrupted service.

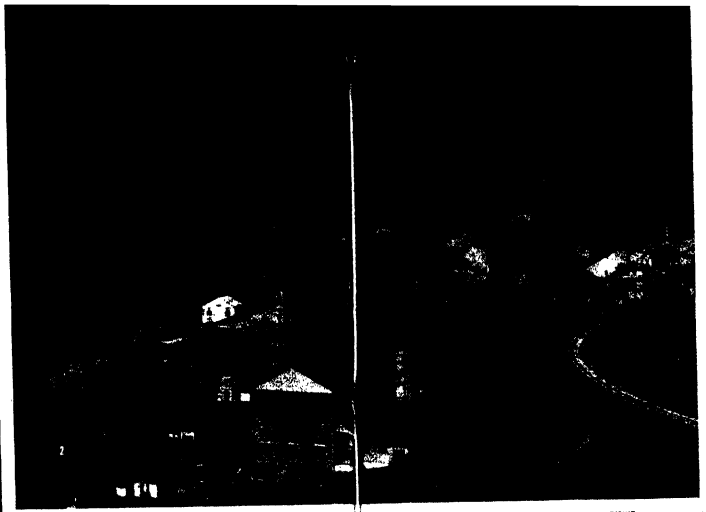
This information is given in accordance with our policy of exerting every effort necessary to further the intelligent application and use of temperature instruments in the interests of our nation's defense.

Wheelco Instruments Co.
851 HARRISON STREET • • • CHICAGO, ILLINOIS

This New Defense Bulletin is important to you. Write for your FREE copy Today.

THE CHEMICAL NEWS PARADE











PHOTOGRAPHS, ROBERT YARNALL RICHIE

Mathieson Alkali Observes 50th Birthday

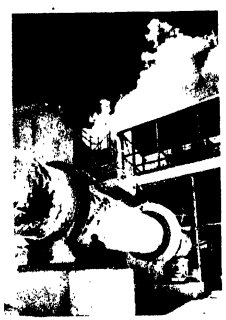
Story on page 270

(1) Loading bulk soda ash at the Saltville, Va., plant, where the company placed its first ammonia-soda plant in operation in 1895. *(2)* The Saltville plant. *(3)* Gas producer recovery kilns at Saltville. *(4)* Cooper shop at Saltville where barrels are made for shipping and handling alkali. *(5)* A furnace for melting soda ash in the manufacture of Purite, a fused alkali product used in refining and desulfurizing iron and steel. *(6)* One-ton containers for chlorine, units of a multi-unit tank car designed by Mathieson for the shipment of liquefied chlorine gas. *(7)* Reading the temperature of lime kilns by means of an optical pyrometer at the Saltville plant. *(8)* One of the lime slakers at Lake Charles. Back of it are the milk of lime tanks and the lime kiln buildings. *(9)* Blocks of dry ice are cut to size for shipment to company-owned warehouses throughout the South. *(10)* Lime slakers at Lake Charles where lime from the kilns is slaked for the causticizing operation. *(11)* Type of tank car in which anhydrous ammonia is shipped from Niagara Falls. A meter registers pressures as the product is piped into tanks. *(12)* Ammoniated brine reacts with carbon dioxide gas in the carbonating towers. Also shown is the Filter Building where the reaction product, sodium bicarbonate, is filtered off.

















American Chemical Society[1]

103RD MEETING. Memphis, Tenn., April 20 to 24, 1942.

104TH MEETING. Buffalo, N. Y., September 7 to 11, 1942.

105TH MEETING. Indianapolis, Ind., spring of 1943.

106TH MEETING. Minneapolis, Minn., fall of 1943.

NINETEENTH NATIONAL COLLOID SYMPOSIUM, Division of Colloid Chemistry. University of Colorado, Boulder, Colo., June 18 to 20, 1942.

Other Scientific Societies

AMERICAN ASSOCIATION OF CEREAL CHEMISTS. Edgewater Beach Hotel, Chicago, Ill., May 18 to 22. Annual meeting.

AMERICAN CERAMIC SOCIETY. Hotel Netherland Plaza, Cincinnati, Ohio, week of April 19. Annual meeting.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Boston, Mass., May 11 to 13. Semiannual meeting.

AMERICAN INSTITUTE OF NUTRITION. Boston, Mass., April 1 and 2.

AMERICAN SOCIETY OF BIOLOGICAL CHEMISTS. Copley-Plaza, Boston, Mass., March 31 to April 4.

AMERICAN SOCIETY FOR TESTING MATERIALS. Atlantic City, N. J., June 22 to 26.

ELECTROCHEMICAL SOCIETY. The Hermitage Hotel, Nashville, Tenn., April 15 to 18.

INSTITUTE OF FOOD TECHNOLOGISTS. Minneapolis, Minn., June 15 to 17.

NATIONAL CHEMICAL EXPOSITION. Stevens Hotel, Chicago, Ill., November 17 to 22.

NATIONAL PETROLEUM ASSOCIATION. Hotel Cleveland, Cleveland, Ohio, April 16 and 17. Semiannual meeting.

SCIENTIFIC APPARATUS MAKERS OF AMERICA. Hotel Hershey, Hershey, Penna., June 1 to 3.

[1] The list of the SOCIETY's National Officers and Directors, Editors, members of Council, Divisional and Local Section Officers, Committees, and Chapters of Student Affiliates appears in the CHEMICAL AND ENGINEERING NEWS three times a year—usually February 10, May 10, and October 10. The latest is printed on page 187 of the February 10 issue.

Local Sections

SECTION AND PLACE	MAR.	SPEAKER	SUBJECT
Akron, Women's City Club	11	**Earle R. Caley**	Chemical Archaeology
Ames, Auditorium, Physics Building, Iowa State College	9	**Lyman J. Wood**	Solid Reactions
California, University of California, Berkeley	5	**Harry N. Holmes**	A Chemist's Adventures in Medicine
Central Pennsylvania, Room 119, New Physics Building, State College	11	**Ivor Griffith**	What Is a Chemist?
Cincinnati, Ohio	11	**M. L. Crossley**	Chemotherapy
Columbus, Room 100, Chemistry Building, Ohio State University	9	**Earle R. Caley**	Chemical Archaeology
Connecticut Valley, Wesleyan University, Middletown	14	**R. M. Burns**	Chemistry of Corrosion
Dayton, Engineers' Club	10	**M. L. Crossley**	Chemotherapy
Detroit, Mich.	9	**John H. Yoe**	
East Tennessee, Dabney Hall, University of Tennessee, Knoxville	6	**G. Frederick Smith**	Quantitative Determination of Organic Compounds by Cerate Oxidimetry
Erie, Penna., Villa Maria College	12	**Earle R. Caley**	Applications of Chemistry to Archaeology
Illinois–Iowa, Science Lecture Room, St. Ambrose College, Davenport, Iowa	11	**Lyman J. Wood**	Solid Reactions
Indiana, Indianapolis	13	**M. L. Crossley**	Chemotherapy
Iowa, Chemistry Auditorium, State University of Iowa, Iowa City	10	**Lyman J. Wood**	Solid Reactions
Kanawha Valley, Charleston, W. Va.	12	**M. L. Crossley**	Recent Advances in Chemotherapy
Kansas City, Mo., University of Kansas City	3	**S. D. Kirkpatrick**	Chemical Industry under Arms
Kansas State College, Chemistry Building, Manhattan	4	**S. D. Kirkpatrick**	Chemical and Engineering Economics
Lexington, Ky.	5	**M. L. Crossley**	Chemotherapy
Louisville, Ky.	4	**M. L. Crossley**	Chemotherapy
Michigan State College, Kedzie Chemical Laboratory, East Lansing	11	**John H. Yoe**	Inorganic Analysis with Organic Reagents
Midland, Mich., Auditorium, Dow Chemical Co.	10	**John H. Yoe**	Organic Reagents in Colorimetry
Minnesota, Minneapolis	7	**John G. Kirkwood**	The Theory of Liquids
New York, Hotel Pennsylvania	6	**Duncan A. MacInnes**	William H. Nichols Medal Award
North Carolina, Auditorium, Withers Hall, State College, Raleigh	3	**G. Frederick Smith**	Manufacture of Perchlorates and Their Industrial Applications
North Jersey, Winfield Scott Hotel, Elizabeth	9	**W. A. Mosher**	Recent Developments in Terpene Chemistry
Northeast Tennessee, Banquet Room, Civic Auditorium, Kingsport	5	**G. Frederick Smith**	Manufacture of Perchlorates and Their Industrial Applications
Northeastern, Huntington Hall, M. I. T., Cambridge, Mass.	12	**V. K. Zworykin**	The Electron Microscope
Oklahoma, Tulsa	7	**S. D. Kirkpatrick**	
Panhandle Plains, Amarillo, Tex.	14	**Harry N. Holmes**	
Pennsylvania–New York Western Border, Carver House, Warren, Penna.	13	**Earle R. Caley**	Applications of Chemistry to Archaeology
Peoria, Ill.	6	**M. L. Crossley**	Chemotherapy
Purdue, Lafayette, Ind.	9	**M. L. Crossley**	Chemotherapy
Rochester, Lower Strong Auditorium, River Campus, University of Rochester	2	**J. F. Kincaid**	Claisen Rearrangement
St. Louis, St. Louis University School of Medicine	2	**S. D. Kirkpatrick**	Chemical Industry under Arms
South Carolina, Chemistry Lecture Room, Wofford College, Spartanburg	2	**G. Frederick Smith**	Manufacture of Perchlorates and Their Industrial Applications
Southeast Kansas, Joplin, Mo.	6	**S. D. Kirkpatrick**	Chemistry in Defense
Southern California, Barker Brothers Building, Los Angeles	6	**Harry N. Holmes**	A Chemist's Adventures in Medicine
Toledo, Room 1, University of Toledo	12	**John H. Yoe**	Inorganic Analysis with Organic Reagents
Virginia, Hotel General Wayne, Waynesboro	13	**H. Mark**	
Virginia Blue Ridge, Davidson Hall, Room 112, V. P. I., Blacksburg	4	**G. Frederick Smith**	Manufacture of Perchlorates and Their Industrial Applications
Washington, D. C., Cosmos Club	12	**M. X. Sullivan**	Hillebrand Prize Award
Western Connecticut, Hubbard Heights Golf Club, Stamford	2	**J. M. Nelson**	Enzymes

Wichita, University of Wichita Science Hall, Room 206	5	**S. D. Kirkpatrick**	Chemical Industry under Arms
Wooster (Ohio), Reining's Restaurant	10	**Earle R. Caley**	Analysis of Insolubles

Buffalo Group to Meet

THE Buffalo Group of the Division of Rubber Chemistry, AMERICAN CHEMICAL SOCIETY, will hold its first 1942 meeting in the Hotel Westbrook in Buffalo, February 27, at 6:30 P. M. William B. Wiegand, director of research of Columbian Carbon Co., New York, assisted by William A. Ladd, electron microscope physicist, will present a paper on "Electron Microscope and the Significance of Its Findings Regarding Colloidal Carbon". Reservations should be made with J. S. Plumb or H. L. Wiley, U. S. Rubber Reclaiming Co., P. O. Box 365, Buffalo, N. Y.

The 1942 membership cards will be sent to members of the group upon remittance of the $1.00 annual dues to Mr. Wiley Secretary-Treasurer.

100 Per Cent A. C. S. Memberships

THE Chairman of the Membership Committee of the Chicago Section of the AMERICAN CHEMICAL SOCIETY informs us that the section now has three concerns with 100 per cent membership: Lindsay Light Co., Schaar & Co., and the J. T. Baker Co sales staff.

Sets of Abstracts

AS USUAL, sets of abstracts of meeting papers in planographed book form will be supplied by the A. C. S. News Service, 1155 16th St., N. W., Washington, D. C. Sets are not guaranteed to be complete, but contain abstracts from all divisions as submitted by authors. The abstracts will be mailed as soon as possible after receipt of order, beginning about April 15, and will also be on sale at Memphis, Tenn.

This enterprise is undertaken in a spirit of service and not for profit. Sets are offered on the following terms:

To members of divisions who forward receipt for divisional dues with remittance and order, 50 cents.

To those without receipt for divisional dues, who remit with order, $1.00.

To those who fail to enclose remittance with order, necessitating correspondence, $1.25.

To those who require bills to be rendered, $1.50.

Detroit Section Sponsors Review Courses

THE Detroit Section of the AMERICAN CHEMICAL SOCIETY is beginning an experiment to keep the information of the chemist current and available. Under direction of R. S. Shane, four intensive review courses are being given for practicing chemists on inorganic, organic, physical, and biological chemistry. Lectures begin March 2.

The courses run for 10 weeks and consist of 20 lecture hours. No tuition is charged, and no academic credit is given. Instruction is by competent men from the staffs of the University of Detroit and Wayne University. Courses are housed by the University of Michigan Extension Service in the new Horace H. Rackham Educational Memorial.

Professional Group Votes against Union Representing It

THE election ordered by the National Labor Relations Board to be held at the plant of the Shell Development Co. on February 11, resulted as had been predicted. The employees classed as professional by the board voted not to choose the Union to represent them, and those who were classed as nonprofessional employees voted in favor of the Union.

The L. S. O. G. Exchange

Edited by A. A. Ashdown, Ed. F. Degering, J. E. Hawkins, and S. L. Redman

Send items to Ed. F. Degering, Department of Chemistry, Purdue University, Lafayette, Ind.

WE, OF the Indiana Section, like to think of the AMERICAN CHEMICAL SOCIETY as a giant molecule bonded together by the local sections, with the individual chemists as electrons, free to carry on this SOCIETY'S great objectives. As all chemical systems depend for their potency upon the work contributed by free electrons, so do our local sections. When each member does his part, however small, the section, and by the same token the SOCIETY, becomes a virile organization.

Good organization makes for a good section. We see to it that our officers have had thorough training. With but few exceptions, our men have served an apprenticeship on the executive committee before being elected to a major office. They are then familiar with the policies and have had an opportunity to observe the methods used in handling the affairs of the Indiana Section. Those that will not give some of their time, and there are some in every section, are weeded out during this apprenticeship.

The Indiana Section also believes that a section with some project in progress which requires the active support of all its members keeps them on their toes. This section's Tuesday noon luncheon, held each Tuesday in the Hotel Severin, in Indianapolis, has long been a rendezvous for our members and visiting chemists. After lunch some member, or invited guest, talks for one-half hour on work he has done or is doing. This training is invaluable. May we add that these meetings close promptly at 1:30? Perhaps this is why Indiana Section members giving papers at national meetings stop on time.

The biennial student meetings of the Indiana Section (the 1941 spring meeting marked the 25th year since their inception) bring all the junior and senior students in Indiana colleges and universities majoring in chemistry and chemical engineering to Indianapolis for a two-day meeting. The program includes inspection trips to our chemical industries and talks by outstanding industrial chemists. In this we have had the wholehearted cooperation of the university authorities, the industries, and the national office of the AMERICAN CHEMICAL SOCIETY.

Few sections have adequate funds to obtain nationally prominent speakers at regular intervals without outside assistance. This section has solved this problem by cooperating with other sections. Starting as a small group, this organization has grown into the Mid-West Cooperating Sections of the AMERICAN CHEMICAL SOCIETY. By sharing expenses it has been possible for each of the cooperating sections each year to have speakers which each, individually, would not be able to entertain. It takes real cooperation to carry on a project of this magnitude and keep everyone satisfied. Differences do occur, but they are not insurmountable if there is a will to pull together.

New members will come easily to the wide-awake section. If your section is on its toes, has some project going that everyone talks about, the chemists in your vicinity will want to belong.

ASA N. STEVENS, Indiana Section

Milk Drying under War Conditions

CARLOS C. VAN LEER, Jr., 4712 Dover Road, Washington, D. C.

SIR JOHN ORR, author of "Food, Health and Income" and adviser to the British Ministry of Health, in November 1941 sent this statement to the writer, "We are determined that, at whatever cost, the health of the children in Britain shall not suffer from the food shortage. After wheat and fats I would put dried milk, either whole or separated, first on the list of imports. If you can fortify it with appropriate vitamins so much the better."

The United States promised to send Britain about 200,000,000 pounds of powdered separated milk from April 1941 to June 1942 and is finding difficulty in meeting this commitment partly because of the increased demand for cheese. Production of this concentrated milk in spite of all efforts continues to fall below that of a year earlier (*21*).

Spread of war to remote areas in the Pacific Ocean means that the Navy and Army also should have enormous quantities of this compact milk to help win what military men call the "battle of transportation". With transportation so hazardous and cargo space at such a premium, less compact forms of milk cannot compete with dried milks. Thus our deficient production of the latter constitutes a handicap.

To grasp the magnitude of this project, consider that it takes the cream from 10 quarts of milk to make a pound of butter—consider, too, that the country's annual butter production exceeds 2,000,000,000 pounds—and it's easy to see why separated milk from this source alone assumes torrential proportions (*5*). To this torrent must be added separated milk produced by ice cream and bottled cream operations, so that even after commercial utilization of around 5,000,000,000 quarts in 1939, the latest year for which figures are available, over 22,000,000,000 quarts remained which found no commercial market (*19*). This latter figure, amounting to over 61,000,000 quarts per day, is 6 per cent greater than that of the total United States consumption of fluid milk and cream in 1939—a quantity which would fill a row of quart milk bottles extending from New York to London every day of the year.

Most of this is fed to animals, despite Department of Agriculture estimates that milk is about 92 per cent wasted when fed to hogs and about 98 per cent wasted when fed to poultry (*20*). Although this milk, combined with cereal grains, does enable farm animals to utilize a much greater proportion of the incomplete proteins of these grains than would otherwise be possible (*1*), this is no especial comfort to mankind for whom it should be accomplishing the same function (*14*).

In February 1941 C. E. Gray, former president of the Golden State Co., Ltd., of California, expressed the opinion that perhaps one half the total amount of this milk, roughly 30,000,000 quarts a day, could feasibly be run through milk-drying machinery. To accomplish this, a somewhat higher price for milk powder would be needed, he explained, to bring in additional milk to new milk-drying equipment.

On December 16, 1941, an industry committee headed by Mr. Gray submitted to government authorities a report including the statement that at least 13,750,000 quarts per day might be brought into production rather quickly and efficiently, thus providing so great an amount of dried milk that even though 200,000,000 pounds were sent to Britain, relatively huge quantities would be available for our own military and civilian uses.

Almost unknown to the public, the amount of this almost fat-free milk run through milk-drying machinery has grown from just over 200,000,000 quarts in 1920 to an estimated 2,500,000,000 quarts for 1941. Since butterfat and most of the vitamin A content have been taken out and there is virtually no fat to turn rancid after drying, this milk powder has found rapidly increasing commercial use. Bakers take the largest quantities, with over 60 per cent of them using it, although it also goes into ice cream, sausage, cereals, prepared flours, etc. Quantities diverted to animal feeding are decreasing. Dried whole milk, more liable to rancidity, has not been used so widely and will not be discussed here

A quart of separated milk, reduced to powder, weighs about 3 ounces, fills three quarters of a cup, and keeps for months in a moistureproof bag. Roughly 1 pound of the milk powder is equivalent to 5 quarts of reconstituted milk. Such milk has sold at an average price of about 1.3 cents wholesale for the five-year period 1933-37 (*22*), but owing to war demand the price has recently increased to almost 3 cents per quart wholesale (*21*). Retailing costs need not add very much to the price of this milk, as the product is not bulky, is light to handle, and is not perishable. It has retailed to a very limited extent in Washington, D. C., Birmingham, Ala., and near San Francisco, Calif., at prices ranging from about 2.5 cents to almost 4 cents to make a quart.



A quart of fluid separated milk, weighing 34.4 ounces, and its equivalent in powdered milk weighing 3 ounces.

What may be termed a "4-cent quart" of separated milk is said by Mary Swartz Rose (*16*) to contain about 3 per cent more of the body-building elements of milk—calcium, phosphorus, and protein—than a quart of whole milk, there being no fat for which to account. This provides the basis for calculating from Mrs. Rose's food cost tables that the quantity of calcium, 1.19 grams, in 1 quart of powdered separated milk (equivalent to 1 quart of separated liquid milk) at 4 cents costs 100 per cent more when bought in evaporated milk at 8 cents per 14.5-ounce can. It costs 120 per cent more in American cheese at 30 cents per pound 257 per cent more in dried navy beans at 9 cents per pound, and 285 per cent more in whole milk at 15 cents a quart. These products are listed as the cheapest food sources of calcium in the United States (*15*).

This dried separated milk must be recognized as an incomparable food source of calcium, not closely rivaled in this respect by any other food in point of cost and capable of being used in prodigious quantities. This sentence is underlined by Henry C. Sherman who says that calcium is probably more often deficient in the dietary than any other chemical element. Sherman (*18*) further expresses the opinion that man can reach the age of 75 or 80 years with the same vigor he now enjoys at 65 simply by a sharp increase in the calcium content of his diet, with more of vitamins A and G (*17*). The *Journal of the American Medical Association* editorializes that among possible explanations of what appears to be a population-wide progressive demineralization with advancing years is first, and most likely, an inadequate amount of calcium in the diet of the average adult (*13*).

Mrs. Rose's tables reveal this milk powder also as the cheapest source of complete protein (*14*). The cost is very little above that of the cheapest incomplete grain or legume proteins.

In addition, this milk at 4 cents is one of the three cheapest United States sources of phosphorus, containing 0.94 gram, by the same tables.

These three pinnacles of body-building value—calcium, phosphorus, protein—are piled one on top of another in the same food. No other single food of comparable cost can match dried skim milk in the quantities of calcium, protein, and phosphorus found in a quart of this powdered milk. And how much less could any other food match the quality of these elements as they exist in milk, except in another form of milk bearing a higher price.

Vitamin G is present in such an amount that this milk powder constitutes one of the cheapest sources of the vitamin, which is relatively expensive at present. As to the general vitamin content, G. E. Holm, senior chemist of the Bureau of Dairy Industry, has supplied the writer with the statement that "practically all of the dried milks manufactured for human consumption are made by processes which do not expose the products to high enough temperatures for sufficient periods of time materially to affect the vitamin contents, except that of vitamin C in some cases. This vitamin is abundant in most vegetables and citrus fruits, which should be a part of every diet whether the milk used be a liquid or dried product."

Closely connected with the work on powdered milk are the contributions of Joseph Goldberger of the Public Health Service in discovering the cause of pellagra and in tracking down "starvation in a sense hardly dreamed of before" (*11*). Dr. Goldberger wrote in 1918, "Milk is the most important single food in balancing a diet and preventing or curing pellagra", but added sadly that it is "frequently hard to procure" (*12*). The chemist may recall the naming of vitamin G in Dr. Goldberger's honor.

As clearly as these considerations establish this milk as a food of singular importance, it cannot be denied that the possibilities involved in making liquid milk into casein wool are exceedingly interesting. The *American Journal of Public Health* (*8*) speaks editorially of casein wool as a good substitute for wool having some advantages over natural wool in that it does not shrink so much and can be worn next to the most delicate skins. There is enough of this surplus milk available to make 1,000,000,000 pounds of casein fiber, more than twice the consumption of wool in the United States at present, according to the journal.

In this connection, L. K. Riggs says that "no matter how we study industrial uses of milk and milk products, it remains true that the cow is a delicate, highly organized, and expensive converter. When this cow does take care of this delicate, highly organized, and expensive conversion of carbohydrates, proteins, and fats of feeds into other carbohydrates, proteins, and fats of milk, a peculiar food value has been added. The time is a long way off when industrial uses can or should claim such products", he asserts. For example, casein is undoubtedly adapted to certain definite chemical reactions which may bring about the production of plastics. Nevertheless, unless this peculiar and exceedingly valuable food product, the protein of milk, has some peculiar chemical characteristics which adapt it to such uses, it is almost certain to be replaced by cheaper and less perfect proteins from a nutritional point of view, he adds (*6*). As to this diversion, the Surgeon General has issued a statement that "these products should not be diverted to industrial use until we have utilized them to the fullest extent as foods".

Concerning the future, a vice president of the Borden Co. in 1936 declared that dry milk has a greater future than any other dairy product, and referred to an estimate that some day its use would increase fivefold as rather reasonable (*4*).

Another Borden executive has told the dry milk people, assembled: "There isn't anything you can use to take the place of those things which the cow puts into the skim milk solids. Is it economic from a national standpoint, from an agricultural standpoint, that we shall save that butterfat and throw away those skim milk solids? It isn't. It's a movement that is on and it is just as inevitable as that airplanes are developing and that automobiles have driven the buggy off the streets. It is just equally inevitable that skim milk solids are going to find their place in the human diet. Therefore there's no use of bucking" (*2*).

Why this most promising dairy product has not been more actively marketed is a matter too involved to deal with here. The industry calls it "a highly marketable commodity" (*7*) and states that its use gives the farmer two pay checks for milk instead of the one for milk fat only. Public health authorities will surely emphasize the point that this powdered milk must constitute a large addition to our national milk supply and must not merely substitute for milk now in use.

Dried milk, both whole and skim, has long been the subject of research and development. It was on the market at least 25 years ago, but the majority of households are unacquainted with it in any form, even though substantial sums have been spent in promotion and distribution (*9, 10*). Various reasons have been advanced for this slowness with which a material of such high food value and low cost has not gone beyond such commercial usage as is made by bakers, ice cream makers, and confectioners. Many believe the name "dry skimmed milk" is one of the principal deterents, but after hearings at which no acceptable alternatives were proposed, the Food and Drug Administration has defined skim milk as well as the products made from that raw material. Some years ago a chief of the Bureau of Dairy Industry said: "Centuries of skimming the cream from milk have not only fixed in our minds the idea that cream is the only thing worth recovering from milk, but unwittingly there has grown into our language the thought that 'skimming' removes the good from anything and leaves a residue of doubtful value" (*5*).

The many demands at present for casein temporarily complicate the problem and, if the American people should awaken to the value of dried separated or skimmed milk, production would have to be stepped up very materially. However, the emphasis on food values that has come with the British demand for the product may so change the situation that demands will justify the utilization of skim milk as the valuable foodstuff it is rather than divert it to less essential outlets.

At the present stage of development the finest samples of powdered separated milk are hard to distinguish from fresh milk, some report. In judging the product, one must be careful, of course, to obtain a representative sample. Since the milk has a remarkable ability to pick up moisture and cake, packaging is all-important. Recently the Rosefield Packing Co., Alameda, Calif., has developed a practicable glassine package, which may be kept in the home for almost a year. Further development of moisture-resisting, inexpensive packaging from materials not too greatly demanded by national defense would be a great contribution and should find large application.

Without the milk-dryer, 61,000,000 quarts a day of separated milk are of limited commercial value. It is hopeless to dream of transporting a thousand miles into great cities and into the South a product so swiftly attacked by bacteria that even costly refrigeration cannot save it for long—not even a pipe dream of it reaching 9,000,000 undernourished American school children. Then, sprayed in fine mist into the warm air whirl of the milk-drying chamber, trapped as fine white powder, this milk takes on seven-league boots. It can be shipped across the American continent, for as little as the cost of moving it 6 miles in fluid form, far beyond the reach of electric power lines or the delivery of ice. The milk powder can be used, small portions at a time, where there is a child but not a refrigerator. It will not freeze in Alaska, or Siberia, or in the atmospheres of high altitude flying. It is stalwart against bacterial attack 100 times as long as fluid milk, in some cases even 1,000 times.

Controlled quick drying, already diverting for man's use 6,000,000 quarts of skim milk a day—ready to make another 15,000,000, 20,000,000, or 25,000,000 available—is another great achievement in food technology. And today its advantages over liquid milk with regard to transportation and storage make powdered separated milk a foodstuff ideally adapted to military requirements. It offers a strategic asset which must not be overlooked.

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(6) *Ibid.*, 15th annual meeting, p. 41 (1940).
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(10) *Ibid.*, 285 (1939).
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(20) *Ibid.*, Yearbook of Agriculture, pp. 296–97 (1926).
(21) *Ibid.*, *Monthly Dry Milk Rept.*, (Nov. 1941).
(22) *Ibid.*, "Production of Manufactured Dairy Products", p. 74 (1938).

February Journal of Physical Chemistry

THE February issue of the *Journal of Physical Chemistry* contains the following articles and reviews of new books:

EDWARD H. FRIEDEN, MAX S. DUNN, AND CHARLES D. CORYELL. Quantitative Investigations of Amino Acids and Peptides. VII. Equilibria between Amino Acids and Formaldehyde.

JOHN H. ELLIOTT. Effect of Substituents on Acid Strength of Benzoic Acid. V. In *n*-Propyl Alcohol.

S. S. HUBARD. Polyiodides of Cesium. IV. A Note on the Molecular Formula of Cesium Tetraiodide.

JULIAN C. SMITH. Solubility Diagrams for the Systems Ethylidene Diacetate-Acetic Acid-Water and Vinyl Acetate-Acetone-Water.

ROBERT LIVINGSTON. Photooxidation of Iodide Ion Sensitized by Eosin. Effect of the Oxygen Concentration and of the Light Intensity.

GUSTAV EGLOFF AND ROBERT C. KUDER. Studies of the Physical Properties of Alicyclic Hydrocarbons. I. Molal Volumes of Monoalicyclic Hydrocarbons at 20° C.

GUSTAV EGLOFF AND ROBERT C. KUDER. Molal Volumes of Aliphatic Hydrocarbons at Their Melting Points.

F. LONDON. On Centers of van der Waals Attraction.

S. LEVINE AND G. P. DUBE. Stability Properties of Hydrophobic Colloidal Solutions.

MARGARET W. KELLY AND KATHLEEN SPENCER ROSTLER. Effect of Potassium Salts upon Aluminum Oxychloride Hydrosol.

C. E. MARSHALL AND W. E. BERGMAN. Electrochemical Properties of Mineral Membranes. III. Estimation of Ammonium-Ion Activities. IV. Measurement of Ammonium-Ion Activities in Colloidal Clays.

M. L. ANSON AND A. E. MIRSKY. Communication to the Editor. Reversibility of Heat Denaturation of Protein.

Index of 4,000-Cards on Chemical Analysis by X-Ray Diffraction Issued

A 4,000-CARD file index of x-ray diffraction data for use in the method of chemical analysis by x-ray diffraction has been published by the American Society for Testing Materials. The compilation was sponsored by a joint committee of the A. S. T. M. and National Research Council under the chairmanship of Wheeler P. Davey, Pennsylvania State College. These data are for use in the method developed at the Dow Chemical Co. by J. D. Hanawalt and originally published in the *Analytical Edition* of *Industrial and Engineering Chemistry*[1].

The file index includes not only the original published data with later corrections, but additional data contributed by the Aluminum Co. of America and the New Jersey Zinc Co., and taken from the technical literature in the English language. The cards give all pertinent data found in the sources with provision for insertion of accessory data, such as crystal structure, density, etc. The index identifies the three strongest lines in the x-ray diffraction pattern of some 1,300 crystalline compounds, the chemical names and symbols of which are as given by the various sources.

An A. S. T. M. committee is perfecting a tentative recommended practice for the identification of crystalline materials by the x-ray diffraction method, with early publication anticipated.

The 4,000-card index packed in finished container boxes can be obtained from A. S. T. M. Headquarters, 260 South Broad St., Philadelphia, Penna., at $50 per set.

[1] Vol. 8, 244 (1936); 10, 457 (1938).



T. S-A CUNNINGHAM

Vignette of a chemist

Insect Spray Production Is Important in South Africa

PRODUCTION of insect sprays from pyrethrum extract is an important activity in South Africa, with one of the largest manufacturers using 90 per cent of the pyrethrum extract output in the Union. This firm is using some American manufacturing processes, on a royalty basis, while other manufacturers are reported as importing their basic material, largely from the United States.

Imports of liquid insecticides in 1939 attained a value of £13,194, the latest available figure, of which the United States furnished 95 per cent. Of imports of nonagricultural insect powders and insecticides in the same year, totaling £38,132, the United States supplied 33 per cent, United Kingdom 45, and Kenya Colony, 12 per cent. Manufacturers' agents are the usual marketing medium.

Chemical Trade between Canada and U. S. Increases

GREATLY expanded chemical and allied exports to the United Kingdom mark the increase in Canada's foreign trade in these commodities, preliminary Canadian official figures indicate.

From a total exportation of chemicals valued at $52,541,100 during the first 11 months of 1941, $23,761,000 worth represented exports to the United Kingdom and $13,420,300 to the United States.

Nevertheless, it was reported, the United States continues to be the outstanding source of chemicals and allied products for Canada. Total Canadian imports for the first 11 months of 1941 were $60,006,100, of which more than $49,450,700 worth were imported from the United States, as compared to imports from Britain of $5,292,900.

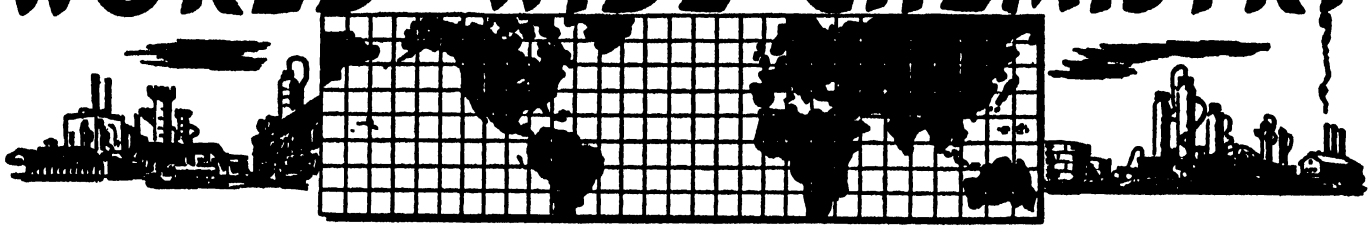
Netherlands Indies Looks to U. S. for Formic, Acetic Acid

THE United States is, or was at the time of hostilities, replacing the Netherlands and Japan as the outstanding source of formic and acetic acids to the Netherlands Indies, it is reported through official channels. Freezing of Japanese accounts, prior to actual war, further stimulated trade with the United States for such important rubber coagulants.

Peru's Imports of Citric, Tartaric Acids Increase

INCREASED imports by Peru of citric and tartaric acids—88 metric tons for 1940 compared to 58 in 1939—are reported. The United States and Italy were chief suppliers in 1940, with the United States having the larger part of the market. France, Britain, and Argentina furnished small amounts.

WORLD-WIDE CHEMISTRY



A peacetime capital investment of $170,000,000 in the chemical industry of Canada in 1939 has been expanded by more than $112,000,000, with the construction since February 1940 of 23 new plants for the production of explosives and other war materials as well as their chemical ingredients. In addition to enlargement of existing ammonia plants, two new units have been erected to make nitric acid from nitrogen of the air. A large extension to a carbide plant has been built to obtain more acetylene for use as such or as a source of acetone. Construction of a plant for production of a certain explosive necessitated the building of new units to manufacture chemicals in which aniline oil, ethyl alcohol, carbon monoxide, and chlorine were needed. Phosphorus and chlorates are being made in greater quantities.

Exports of chemicals from Canada in 1941 increased by 19 per cent to about $59,000,000 and, although the Dominion is not self-sufficient in chemical products, the unfavorable trade balance declined to only $6,000,000 as against a comparable figure of over $20,000,000 in 1940.

A leader in the chemical industry re-recently said, "The industry's growth pattern has been radically altered since 1939. The process of developing the laboratory's findings to the stage where production can be undertaken has been replaced almost entirely by the enlargement of capacity based on the dictates of wartime demand."

Iron and Steel Production More Than Doubled Since 1938

The Dominion's 1938 monthly production of pig iron was 59,000 tons and of steel, 96,000 tons; in October 1941 Canada produced 137,000 tons of pig iron and 223,000 tons of steel. The industry is centered in three primary works at Sydney, Nova Scotia, and Hamilton and Sault Ste. Marie in Ontario. Sydney uses iron ore chiefly from Newfoundland and coal and limestone from Cape Breton. The coke ovens and blast furnaces at Hamilton and Sault Ste. Marie work with United States coal and iron ore. During 1941 about one half of the iron ore used at Sault Ste. Marie came from the new Helen siderite mines on Lake Superior in Ontario.

Restrictions on Imports Stimulate Glass Production

Production in the glass industry expanded considerably in 1941, permitting more efficient use of the excess furnace and machine capacity. Existing bottle designs have been frozen, and many of the industry's machine shops are producing parts needed for war purposes. Despite advances in labor and material costs, the industry was able to maintain selling prices at general prewar levels, largely because of economies resulting from the larger volume of business which permitted higher furnace loads.

New Trade Agreements Promote American Relations

A Canadian trade mission headed by The Honorable J. A. MacKinnon, Minister of Trade and Commerce, visited South America recently and reached agreements with Argentina, Brazil, and Chile whereby these countries are granted most-favored-nation treaty privileges with Canada. Understandings were reached with Ecuador, Peru, and Uruguay for better trade relations. Chemical materials will form an important item in the improved trade channels thus being opened.

Nickel Production Sets All-Time High

World nickel production and consumption in 1941 were at an all-time high. Output from Canadian mines and smelters increased about 50,000,000 pounds above previous annual figures. The United States consumed over two thirds of the world's total nickel output in 1941, compared with an annual consumption of about one third during recent years.

Electricity Plays Major Role in New Production

Never in Canada's history has there been such a demand for electricity. Canada is using more than five times as much electricity as in World War I. Present developments yield 8,800,000 hydraulic horsepower, and there are 34,000,000 horsepower in reserve in undeveloped resources. Electricity formerly used in electric steam boilers is being utilized for other industrial purposes. Central station output for uses other than steam boilers showed an increase of over 20 per cent in 1941. Canada's manufacturing and mining industries are over 80 per cent electrified. Increasing production of copper, nickel, and aluminum and the requirements of other groups such as the textile, pulp and paper, and chemical industries have created a great demand not only for electricity but also for electrical equipment. The electrical apparatus industry is making a notable contribution in manufacture of special war equipment for navy, army, and air force requirements.

With the knowledge that research has played such an important part in peacetime activities, development and research work in the seven nickel research laboratories operated by the largest producer, in Canada, the United Kingdom, and the United States, is being stressed. New nickel applications arising from current conditions, added to the background of research and development, will be available to help bridge the period of readjustment when peace is re-established. President Stanley of International Nickel Co. of Canada states that "the producers continue their intensive efforts to speed Empire production by supplying essential Canadian nickel at a maximum rate".

Rayon Production Makes New Record

Plant expansion in Canada's rayon industry has not been large scale, but improvements in equipment and maintenance are enabling the two major manufacturers to keep up a rate of production which employs about 5,000 persons and to play a vital part in maintaining textile supplies.

EDITOR'S NOTE. Those interested in further details should address the correspondent whose name and address appear for each country, and enclose sufficient international coupons to prepay the reply. United States stamps should not be sent.

Estimates of Canada's consumption in 1941, prepared recently by one of the principal companies, follow:

	Pounds
Domestic	
Viscose	14,200,000
Acetate on the basis of 130 denier	7,000,000
Imported	
Staple fiber	7,000,000
Acetate filament	2,300,000
Viscose and miscellaneous	1,600,000
Total	32,100,000

Petroleum Industry Steps Up Production

Canadian refineries have been reorganized and new installations have been and are being made to provide not only for the huge increase in volume of output but also for the manufacture of new products. Production of crude oil from the bituminous deposits of Athabaska was begun during the year. Blending agents necessary for aviation fuels have been imported heretofore, but a new plant projected for making such products from Turner Valley and refinery gases is expected to be in operation this summer. For production of motor gasolines the most important new Canadian development of suspensoid cracking will afford an improvement of approximately eight in the octane number over the usual thermal cracking process, according to a recent statement by one of the industry's leading executives.

Fuel oils, new lubricants, and asphalts are in much greater than normal demand, mostly for war needs.

Intense competition promoted research for improved products in recent years, and the better methods of processing thus developed are proving of great value.

Mineral Output Sets New Record

Canada's mineral production in 1941 reached an all-time high at $553,941,000, an increase of 4.6 per cent over the previous record of $529,825,035 in 1940.

Metals were valued at $393,269,000 in 1941 as against $382,503,012, an increase of 3 per cent. Gold production was slightly higher than in 1940, at 5,322,247 fine ounces worth $204,906,500 compared with 5,311,145 fine ounces at $204,479,083 last year. Silver output, at 20,437,196 fine ounces valued at $7,813,000, showed a decrease of 14 per cent.

The combined value of the base metals —nickel, copper, lead, and zinc—was $166,157,000, compared with $155,922,881 in 1940. Base metal production figures cannot be disclosed, but Canada holds an exceptionally strong position as a producer.

The value of the remaining metals produced in 1941 was $14,393,000, and included antimony, bismuth, cadmium, chromite, cobalt, manganese, magnesium, molybdenum, tungsten, arsenic, iron ore, mercury, radium, selenium, tellurium, titanium ore, uranium, and precious metals other than gold and silver.

Fuels, including coal, natural gas, and crude petroleum, were valued at $83,363,000 in 1941, compared with $78,837,874 in 1940.

Nonmetallic minerals, other than fuels, at a value of $31,616,000 gained 21.5 per cent, and structural materials advanced 8 per cent to $45,693,000.

S. J. Cook

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Ottawa
January 20, 1942



Cellulosa d'Italia, the 130,000,000 lire company formed for production of cellulose from domestic raw materials, opened the first plant to use straw at Chieti last summer. Two other factories—one also for straw at Capua and the other for chestnut residues at Cuneo—were to go into operation during the winter months. Cellulose Regionale, another recently formed company, has commenced production in its plant at Ferrara.

Liquefaction of Methane Gas Investigated in Italy

Liquefaction of methane gas has been studied in laboratories of the Italian State Railways. It is reported that the problems involved are difficult to solve because of the complicated and costly plant required. Meanwhile investigations into problems of the methane gas engine have also been conducted by the National Motor Institute at Naples.

There are considerable natural deposits of methane gas in Italy. The more important ones are those in Parma province, Tuscany, Emilia, and Romagna which are developed by the Ente Nazionale Metano, a 20,000,000 lire company formed in 1940. The gas is carried in pipe lines to Florence and Bologna. Construction of a large circuit has been proposed connecting Ferrara, Padua, Milan, and Turin with a long pipe line which would also be able to draw on the extensive though rather scattered deposits in the Po Valley. Most of the gas used at present is still being carried in chrome-molybdenum steel cylinders with a capacity of 30 to 50 cubic meters. There are about 75,000 of these, but because of the time taken up by filling, storing, and transporting, only one in ten of these cylinders is in actual use at any given time. More containers cannot be manufactured at present because of the shortage of metals. The Italian methane gas production was estimated at 26,000,000 cubic meters for 1940. One cubic meter of methane gas is said to be equivalent to 1.5 liters of petrol.



A cargo vessel of 3,000 tons dead weight to be driven by producer gas derived from coke and coal is being built in a Copenhagen shipyard for delivery next summer. The ferry boat between the Danish islands of Alsen and Tünen has been converted to generator gas produced from peat. In Sweden the first generator-driven vessel has made its trial journey at Göteborg. Ferry boats serving the islands around Stockholm are to be converted from oil to generator gas and will resume full operation when this has been completed. The Finnish Government is reported to be considering compulsory conversion of agricultural tractors to gas generators. The Norwegian fishermen have been offered subsidies covering the total cost of conversion and fuel during the first three months of operation for the installation of generator equipment in their fishing boats.

Norsk Hydro Acquires Light Metal Interest

Norsk Hydro, the well-known Norwegian chemical producer, has maintained its dividend for 1940–41 at 6 per cent. Profits show slight increases which are absorbed by larger deductions for tax and depreciation. Security holdings have increased as a result of the acquisition of an interest in A. S. Lettmetal, a new company, while fixed assets including estate property, waterfalls, and plant declined, after deduction of reserves for depreciation and obsolescence.

Sweden Tries New Process for Shale Oil Production

The Swedish Shale Oil Co. is reported to have carried out experiments at Narke with a new process for the immediate production of oil from shale deposits, developed by Frederik Ljungström. Electrical heat elements are inserted in some drilling holes and heat the shale below the ground to 400° C. with the result that gas and vapor rise through other holes. These are condensed to oil. About 75 per cent of the oil contents of the shale, it is claimed, can be obtained by this method which does not require large investments apart from the equipment for the electricity supply.

G. Abrahamson

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December 27, 1941



Conditions in Mexico for production of iron and steel are unusual. Scattered all over Mexico are suitable iron ores, some remarkable for their content. But the coal mines which could supply metallurgical coke are found only in the northern region of the State of Coahuila, near the United States border.

Pig iron is produced in Monterrey only where the Fundidora Co. operates a blast furnace and produces 350 to 400 tons of pig iron daily. Part of this is used for steel. The company is constructing a second furnace which should be ready in about two years. Its capacity will be about 500 tons per day.

The Fundidora of Monterrey is not the sole producer of steel. The Consolidated Co. in Mexico City and the iron plant of Mazatlán are also important producers. Several small converters being installed will operate with smelting pots and will have an output of about 40 tons per day.

Production in 1940 reached 147,000 tons of laminated steel. Imports of this material in 1937 were 195,000 tons.

Several attempts have been made to reduce the iron ores with various kinds of coal. Some blast furnaces have been built to operate with charcoal, but have not been successful. An electrical furnace is also almost completed which will operate with charcoal as the reducer to produce pig iron.

A process has recently been patented by Professor González to treat the ore in a rotary furnace heated by oil. As the reducer, any coal and also peat may be used. A magnetic separator concentrates the mixture. An experimental furnace is already working in Mexico City with 5 to 6 tons' daily capacity.

New Plants Being Opened to Boost Acid Production

Production of sulfuric acid in Mexico is small, and the high price impedes development of various industries. The shortage may be caused by the lack of superphosphate output. Agriculturists are using fertilizers on a very small scale, and for this reason small plants only are producing superphosphates from bones. Sulfuric acid in large quantities is made by the American Smelting Co. in the northern part of Coahuila by using gases from the toasting of blendes. Another plant produces sulfuric acid free from arsenic by burning sulfur in a contact installation. At present the only sulfur available in Mexico is the very impure sulfur produced in the State of San Luis Potosí. A plant has just been completed to refine the sulfur from this important deposit, and the product obtained can compete with that of the United States.

Two plants are making hydrochloric acid. The sodium sulfate by-product is used in the preparation of sodium sulfide, and the country produces all the sulfide required for the tanning industry. Several lakes, partly dried, in the northern part of Mexico produce sodium sulfate. They are being exploited on a very small scale only and give a product not free from chlorides. The output is used in the glass industry. A plant which will give sulfate free from chlorate is being installed at one of these lakes, and the product will be used by a new plant for cellulose sulfate.

Nitric acid production is very low, and all of it is obtained from imported nitrate. The principal dynamite plant of Mexico produces its own nitric acid.

War Increases Problems of Meeting Alkali Requirements

Imports of sodium hydroxide in 1940 were 16,721 tons valued at $865,000. In the same year 16,766 tons of sodium carbonate worth $540,000 were imported. Under present conditions of the industry alkalies have more importance than acids, and only a small part of the required alkalies are produced in the country.

Studies have been made during the past few years to eliminate this difficulty. Electric power can be produced at a low rate. The country has a high plateau in its central part with plenty of rain, the plateau having level differences over 1,000 meters. Waterfalls are numerous and of good volume. Production of electrolytic soda has been contemplated but, owing to the industrial situation, use of the chlorine produced at the same time as the soda has been difficult. A more economical solution would be to build small plants to recover the alkalies of many of the alkaline lakes of this region.

An electrolytic soda plant, Productos Químicos Mexicanos, has commenced operations in Mexico City with a capacity of 3 tons per day. Besides the sodium hydroxide they produce several by-products from their lime and chlorine—potassium chlorate and calcium arsenate, the latter made with domestic arsenic. In products for agriculture they are manufacturing copper sulfate monohydrate. Several plants make this last product despite the high price of sulfuric acid and difficulty in the banana zone in competing with the product imported from U. S. under cheap return freight rates.

A new plant is producing carbon bisulfide, using sulfur from San Luis deposits as the raw material. This plant will meet requirements of the market for this product, of which 154 tons at $20,000 were imported in 1940.

The production of sodium carbonate from the lakes is in its preliminary stage, and a plant built at Lake Texcoco is producing about 3 tons of sodium hydroxide a day. Entry of the United States into the war has created a difficult problem in this country, due to the shortage of sodium carbonate.

A new plant for precipitated calcium carbonate will soon be opened in Mexico City, and will fill the country's requirements. In 1940, 447 tons were imported valued at $21,000.

Domestic Trees Used for Cellulose Output

The high altitude in the center of the country makes possible the growth of trees which normally thrive in northern latitudes only. Wood from the Mexican fir tree is used to obtain cellulose sulfate at a plant operating for the last few years near Mexico City. In a short time a new plant will be opened which will use reagents produced in the country.

Requirements of the country are far from being met. Last year 37,000 tons were imported with a value of $2,200,000. Several plants are being built to produce cellulose using other kinds of domestic woods as well as nonligneous material.

Naval Stores Industries Being Developed, Classified

Among naval stores industries, production of linaloe oil, which is typical of the country, should be mentioned. This oil is obtained in isolated regions and by primitive methods. Last year 34 tons worth $58,000 dollars were exported.

The turpentine industry has developed considerably and well distilled products are obtained. But, due to differences in altitudes, various kinds of pine trees produce turpentines of different compositions. Some of them have a high content of pinene, and others contain very little of this hydrocarbon. These grades are becoming known now and are being classified for export.

New Law Encourages Development of Industry

Among efforts made by the government to foster development of new industries is the law of April 21, 1941. A tax exemption is granted for five years to those industries whose activities are new or necessary to the industrial development of the country.

FERNANDO OROZCO D.

INSTITUTO DE QUÍMICA
UNIVERSIDAD NACIONAL
MEXICO, D. F.
January 22, 1942





A WAR MESSAGE
to
ALL EMPLOYERS

★ From the United States Treasury Department ★

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POTOMAC POSTSCRIPTS

Allocations

Agar. The War Production Board has frozen all agar supplies in this country in the hands of persons having more than 50 pounds. Prior to June 1941 the major part of this country's agar supply came from Japan. Small quantities have also been received from China and Java. California manufactures a small amount.

General Preference Order M-96 prohibits the purchase or sale of agar from or by persons having more than 50 pounds in their possession, except as specifically ordered by the Director of Industry Operations or for use in bacteriological media. Any person seeking to purchase agar under the exemption for use in bacteriological media must certify to the seller that the agar is to be so used, and the seller must furnish a copy to WPB.

Cobalt Blue. Cobalt blue has enlisted for the duration with the issuance of Conservation Order M-39-b. An amendment has also been issued to General Preference Order M-39 placing cobalt in all forms under an allocation system. Previously only metallic cobalt and chemicals to be processed into metal were allocated.

Order M-39-b prohibits the use of cobalt in all pigments after May 1, and restricts its use until that time to 40 per cent of the amount used in the first six months of 1941. Most seriously affected will be the glass industry, particularly in the production of blue bottles. Ceramics will suffer, but to a lesser extent. Blue enamelware, inks, fabric dyes, paints, and stains are expected to turn to ultramarine blues composed of chemical synthetics. Blue optical glass and blue glass for other safety uses are not included in the prohibition.

Items made of cobalt not covered by the prohibition are restricted until March 31 to 23 per cent of the amount used in the first six months of 1941, and after that date to 35 per cent in any calendar quarter.

Exceptions include military orders and orders from certain other government agencies, on ratings of A-1-j or higher, and for these uses: chemical catalysts, cattle and plant food, chemical reagents, cobalt alloys of all kinds, decolorizer for glass, dryers, ground coat frit, hard facing compounds, laboratory and research equipment, pharmaceuticals, plating, and health supplies. The exception for ground coat frit will permit the production of enameled steel. Cobalt acts as a filler coat for steel, similar to shellac on wood, and is the only satisfactory binder for enamel on steel. Hard facing cobalt compounds are used in oil drilling for drill stems in place of industrial diamonds and otherwise in industry where extreme hardness is necessary.

Cobalt is one of the important steel alloys. Africa is a principal source of the metal, with a small amount coming from Canada. Domestic production is negligible.

Diphenylamine. Diphenylamine, chemical synthesizer and reagent, has gone under complete allocation control, according to terms of General Preference Order M-75. The order provides for monthly allocations and regular reports upon which allocations will be based.

Diphenylamine is used in the production of powder and other explosives, rubber, soap, sheep dip, insecticides, and dyes. Increased military demands have outrun existing supplies. New production is being considered to relieve the shortage.

Vitamin A. WPB acted February 10 to conserve vitamin A for human consumption. The main source has been fish liver oils. Supplies from Norway and Japan before the war accounted for approximately 75 per cent of the total consumed in the United States. Vitamin A is found also in several vegetables and in dairy products. It is said to be essential for maintaining good eyesight and as such is especially essential for the Air Corps. Vitamin A also aids in building up resistance against infection.

The order, L-40, prohibits the manufacture of multivitamin tablets, capsules, pills, or liquids containing more than 5,000 units of vitamin A in the largest daily dose recommended by the label or accompanying instructions. WPB Health Supplies Branch pointed out that competent medical authority states the average human body cannot absorb more than 5,000 units of vitamin A per day, so that units in excess of 5,000 are wasted.

The restrictions do not apply to preparations containing only vitamin A, or preparations containing vitamins A and D where the vitamin A potency is 25,000 units or more in the recommended daily dosage. Such a preparation is intended as a therapeutic dose for persons suffering from an unusual insufficiency of vitaminA, in which cases the body can absorb more than 5,000 units per day.

To conserve for human consumption fish liver oil having a high potency, the use or dilution for use is prohibited in the manufacture of feed of fish liver oil with a potency of more than 12,000 units of vitamin A per gram, effective February 10. Beginning April 10, feeds which in the form recommended for consumption contain more than 1,000 units of vitamin A per pound, derived from fish or fish liver oils, cannot be manufactured or prepared. The Health Supplies Branch stated that many feeds contain an excess of vitamin A. This occurs where fish oils are used for their vitamin D content which is found in combination with vitamin A in fish liver oils. Feed manufacturers may fortify their product by adding synthetic vitamin D to make up the difference caused by this restriction. It is believed also this order should stimulate the production of vitamin A from sources such as carrots and alfalfa.

Wool. As part of the wool conservation program, rayon producers will make available in March small sample lots of rayon tops to worsted manufacturers and thus stimulate experiments in the blending of rayon staple with wool in worsted materials. Sample lots will consist of rayon top 5½ denier, cut 4 and 5 inches, dull and bright, obtainable in lots not exceeding 200 pounds. The rayon being made available to the worsted manufacturers will replace in part new wool which has been curtailed by the Wool Conservation Order M-73.

Price Regulations

Fats and Oils. Revisions in Fats and Oils Price Schedule 53 are contained in Amendment 2, issued by Leon Henderson, Administrator, OPA.

Since the original order covered old lard made prior to October 1, 1941, OPA is allowing the addition of 1.895 cents per pound to the October 1 price for new cash lard as a ceiling maximum. This brings the permissible ceiling figure for cash lard in tierces up to 12.695 cents per pound. The amendment also permits addition of 0.675 cent to loose lard ceiling prices, making that maximum now 11.425 cents. On leaf lard, an addition of 0.49 cent is permitted, with the new ceiling 11.615 cents. An addition of 0.79 cent to the October 1, 1941, level is allowed for steam rendered pork fat, bringing the new ceiling to 11.325 cents.

No change is made in the lard or cottonseed oil futures ceiling prices as set in Amendment 1 to the fats and oil schedule. These prices were the closing bids of October 1, 1941. However, a provision in the new amendment states that the maximum price ceiling for lard futures contract months after September 1942 shall not exceed the September 1942 futures top set by OPA.

Salicylic Acid. Quotations by some resellers of salicylic acid at prices three times those of producers for comparable grades and quantities caused the issuance of Price Schedule 103, according to OPA. The schedule, which became effective February 16, sets prices for producers and primary jobbers and for wholesalers at levels prevailing at this time. It does not apply to the quantities ordinarily sold by retailers.

Conferences of OPA with producers, resellers, and exporters of salicylic acid and with representatives of other government agencies indicated that no justifiable reasons exist for producers and primary jobbers charging prices in excess of 35 cents per pound, or for resellers and exporters charging prices in excess of 46 and 49 cents per pound for U. S. P. salicylic acid in 100-pound and 150-pound barrels.

Salicyclic acid is used chiefly in the manufacture of aspirin and other internal and external medicinals, in making chrome and khaki dyes, and in vulcanizing natural rubber. The acid itself is made from phenol, which is under allocation by the War Production Board.

Steel Barrels and Drums. Price Schedule 43, covering used steel barrels and drums, has been modified in Amendment 2. A feature of the amendment is limitation of the ceiling to three classifications of barrels and drums only. These are the 50- to 58-gallon capacity; the 29 to 33; and the 14 to 16. These three sizes include 98 per cent of all steel barrels and drums in use. The ceiling price for raw used drums has been extended to any purchaser, instead of only the user and reconditioner as before. Other changes are specified in the amendment.

Titanium Pigments. To avert threatened increases in prices for titanium pigments, Price Schedule 98 has been announced, effective March 1. Prices established in the schedule are those prevailing October 1, 1941, and continued through to date as a result of a request made January 3 by Mr. Henderson to the five producers of these pigments to refrain from price increases. Necessity for the price schedule was emphasized by the increased demand for these pigments as a result of the national war effort, and an apparent desire on the part of dealers other than the producers to quote higher prices.

The price for titanium dioxide (regular grade), 20 tons or more, delivered in bags in eastern territory, is 14.5 cents per pound. Additional charges are permitted for lesser quantities: 5 tons or more, but less than 20 tons; 1,000 pounds or more, but less than 5 tons; and 50 pounds or more, but less than 1,000 pounds.

For deliveries in western territory, differentials, starting at 0.25 cent per pound for quantities of 20 tons or more, are permitted to be added to the maximum prices set for eastern territory. A like additional charge is permitted for delivery in both eastern and western territories in barrels.

Vitamin C. Mounting prices asked by some resellers for vitamin C (ascorbic acid)—in some cases double those charged by the producers—has caused the Office of Price Administration to issue Price Schedule 104. Price ceilings are set at approximately the prevailing prices, for producers and primary jobbers and for resellers. The quantities in which retailers ordinarily deal are not covered by the schedule. No considerable quantity is sold at retail, however, most retail sales of vitamin C being made in compounded forms not covered by the schedule.

No justifiable reasons are said to exist for producers and primary jobbers charging prices in excess of $1.65 per ounce, or for resellers charging in excess of $2.15 per ounce for sales of large quantities.

Domestic Manganese War Program Developed

To free American steel and alloy production from reliance on ocean shipping or naval convoy, the U. S. Bureau of Mines has developed a domestic manganese war program. The plan is designed to provide enough manganese to produce 87,000,000 tons of steel annually through utilization of low-grade domestic ore. Some 12 pounds of the metal are usually required for each ton of steel. The bureau will make available to industry its knowledge, experience, technical personnel, and processes and will supervise operations if industry so requests. The specific program provides for establishment of eight mills, three hydrometallurgical plants including one electrolytic unit, and one matte smelting plant. If industry is unable to undertake production rapidly, the bureau is prepared to assume responsibility for the necessary output at request of the War Production Board.

DPC Contracts with Mathieson for Magnesium Plant

Negotiations for a new magnesium plant at Lake Charles, La., have been completed between Mathieson Alkali Works and the Defense Plant Corporation. The contract calls for immediate work on a structure which will cost about $22,500,000 and will have a capacity of 36,000,000 pounds a year. Owned by DPC and operated by Mathieson, the plant will be located strategically with respect to raw materials and inexpensive fuel. Dolomite, obtainable at near-by quarries, will be used as a source.

Export of Metal Drums Controlled Further

To conserve further the stocks of steel in United States, the Board of Economic Warfare has announced new provisions covering exportation under general or unlimited licenses of metal drums and containers, filled or unfilled, for oil, gas, and other liquids and solids. The provisions became effective February 20.

Unlimited licenses authorizing the exportation of metal drums and containers, including gas cylinders, remain valid and are in no way affected by the new provisions. These licenses have been issued to the British Purchasing Commission, Belgian Congo Purchasing Commission, Netherlands Purchasing Commission, Universal Trading Corporation, and to American oil refining companies trading with other American republics.

Soap and Glycerine Advisory Committee Appointed

Formation of a Soap and Glycerine Industries Advisory Committee has been announced by the Bureau of Industry Advisory Committees, WPB. Members are R. R. Deupree, Procter & Gamble Co.; F. A. Countway, Lever Brothers Co.; E. A. Moss, Swift & Co. Soap Works; A. R. Robson, Fels & Co.; E. B. Hurlburt, J. B. Williams Co.; N. S. Dahl, John T. Stanley Co.; L. Webb, Jr., Hunnewell Soap Co.; W. C. Hardesty, W. C. Hardesty Co.; J. S. MacIntosh, Holbrook Mfg. Co.; E. H. Little, Colgate-Palmolive-Peet Co.; Dan Flick, Armour & Co. Soap Works; F. H. Merrill, Los Angeles Soap Co.; H. D. Banta, Iowa Soap Co.; Gordon Fulton, Beach Soap Co.; Russel H. Young, Davies-Young Soap Co.; R. H. Giebel, Harshaw Chemical Co.; and Werner G. Smith, Werner G. Smith Co.

Mercury Stock Pile Not Regular Supply Source

The Miscellaneous Minerals Branch, War Production Board, has asked manufacturers and contractors who use mercury in filling defense orders to obtain their mercury from the usual trade channels. The growing tendency of manufacturers is to come directly to the government stock pile. Representatives of WPB request that the stock pile be regarded as an emergency measure to be used only when mercury is not available elsewhere. If supplies are unobtainable from the usual sources, manufacturers should communicate with War Production Board, Miscellaneous Minerals Branch, Temporary "R" Building, Washington, D. C.

Dyestuffs Advisory Committee Formed

Arnold L. Lippert, Textiles, Clothing, and Leather Goods Branch of WPB, has been designated government presiding officer of the recently formed Dyestuff Manufacturers Industry Advisory Committee. Committee members are A. R. Chantler, E. I. du Pont de Nemours & Co., Inc.; E. K. Halback, General Dyestuff Corp.; S. C. Moody, American Cyanamid Co.; H. B. Marshall, Ciba Co.; Jack Crist, Southern Dyestuff Corp.; T. Thomas Roberts, Arnold Hoffman & Co.; and C. M. Richter, Pharma Chemical Corp.

VITAMINS AND DEFENSE

IN all wars since history began disease has been the cause of more casualties, both military and civilian, than the weapons of the enemy. During the last World War it began to be recognized that some of these diseases, such as scurvy, were caused by a definite deficiency of some essential ingredient in the diet while others probably spread because of lowered resistance of the population due to this and other dietary lacks. Because of their relationship to life, these essentials were termed vitamins. Since practically nothing was known about them at the time, little could be done toward correcting these deficiencies.

Since then science has made tremendous strides in the chemistry of vitamins. The structure of most of those isolated has been determined and methods for synthesizing many of them developed.

The nations of the world have not been slow to recognize the importance of the vitamins. In her rearmament program Germany included factories for their production along with those for manufacturing guns, explosives and other munitions of war. One important ingredient in the emergency ration of the German parachute troops has been tablets of synthetic Ascorbic Acid (vitamin C). Our own Government has also recognized the importance of this vitamin and has included a product containing synthetic Ascorbic Acid in the ration of those now training for defense of our nation both on land and sea.

The United States and the British Empire have also included the maintenance of civilian health and morale in their defense plans. Enriched flours and breads, to which a number of the vitamins together with certain minerals have been added, have received official sanction. This development has been hampered by an insufficient supply of one of the vitamin ingredients — Riboflavin (vitamin B_2).

Chas. Pfizer & Co., Inc. have been glad to assist in the Defense Program. We have been one of the largest producers of Ascorbic Acid (vitamin C) for several years. There has been a continual increase in our production of this synthetic vitamin and plans are now in the process of consummation which will still further enlarge our productive facilities.

After a research program of several years, the production of Riboflavin (vitamin B_2) was started by our Company in 1940. At the present time we are bending every effort toward a great increase in the size of our productive facilities in order to assist in supplying the large quantities of this essential vitamin which are needed.

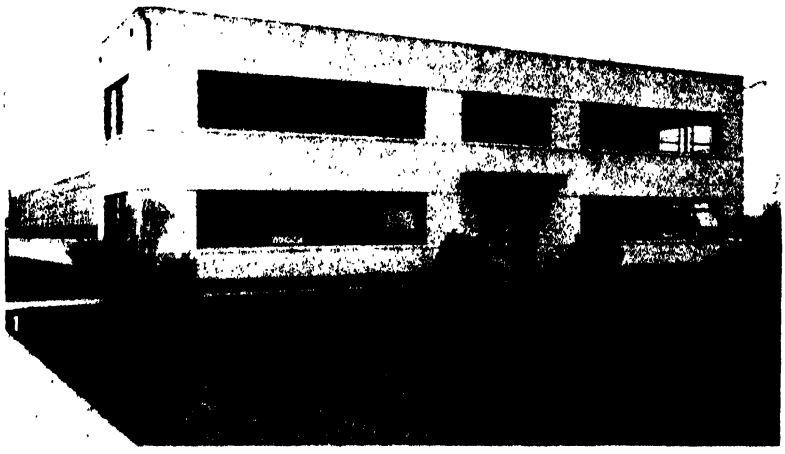


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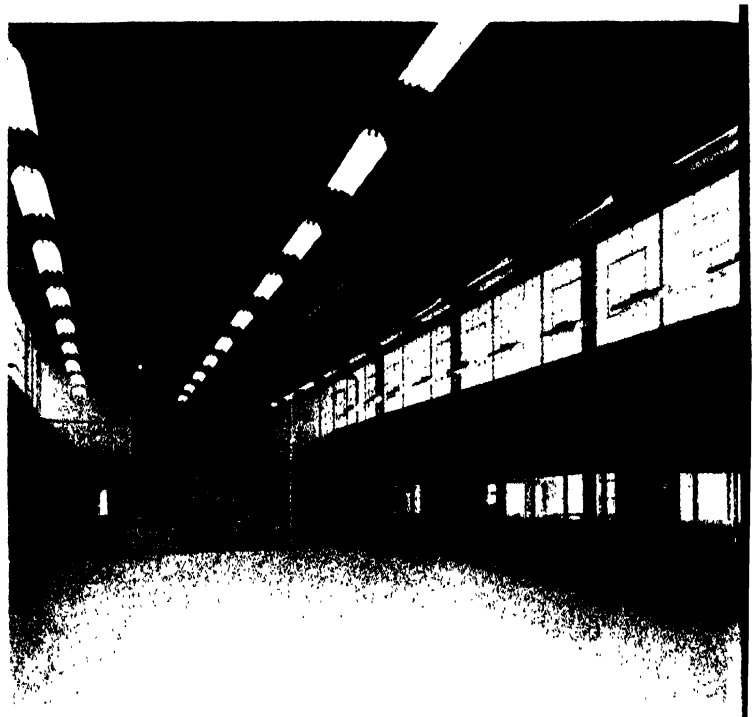
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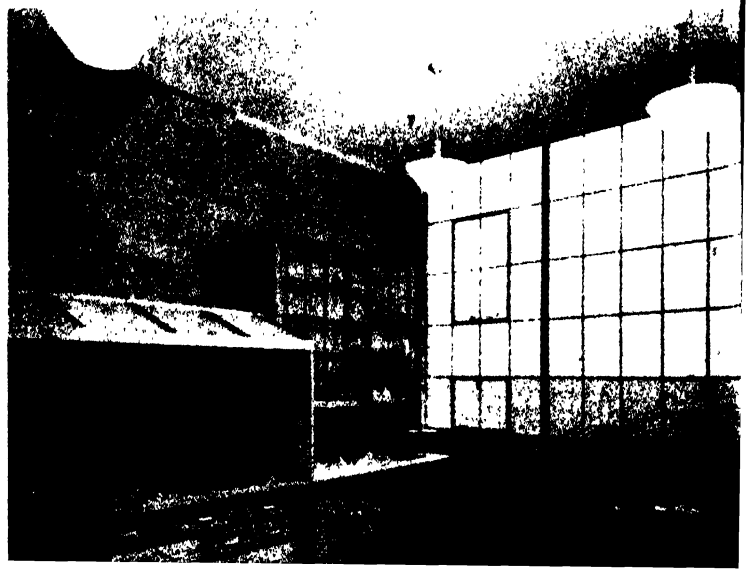


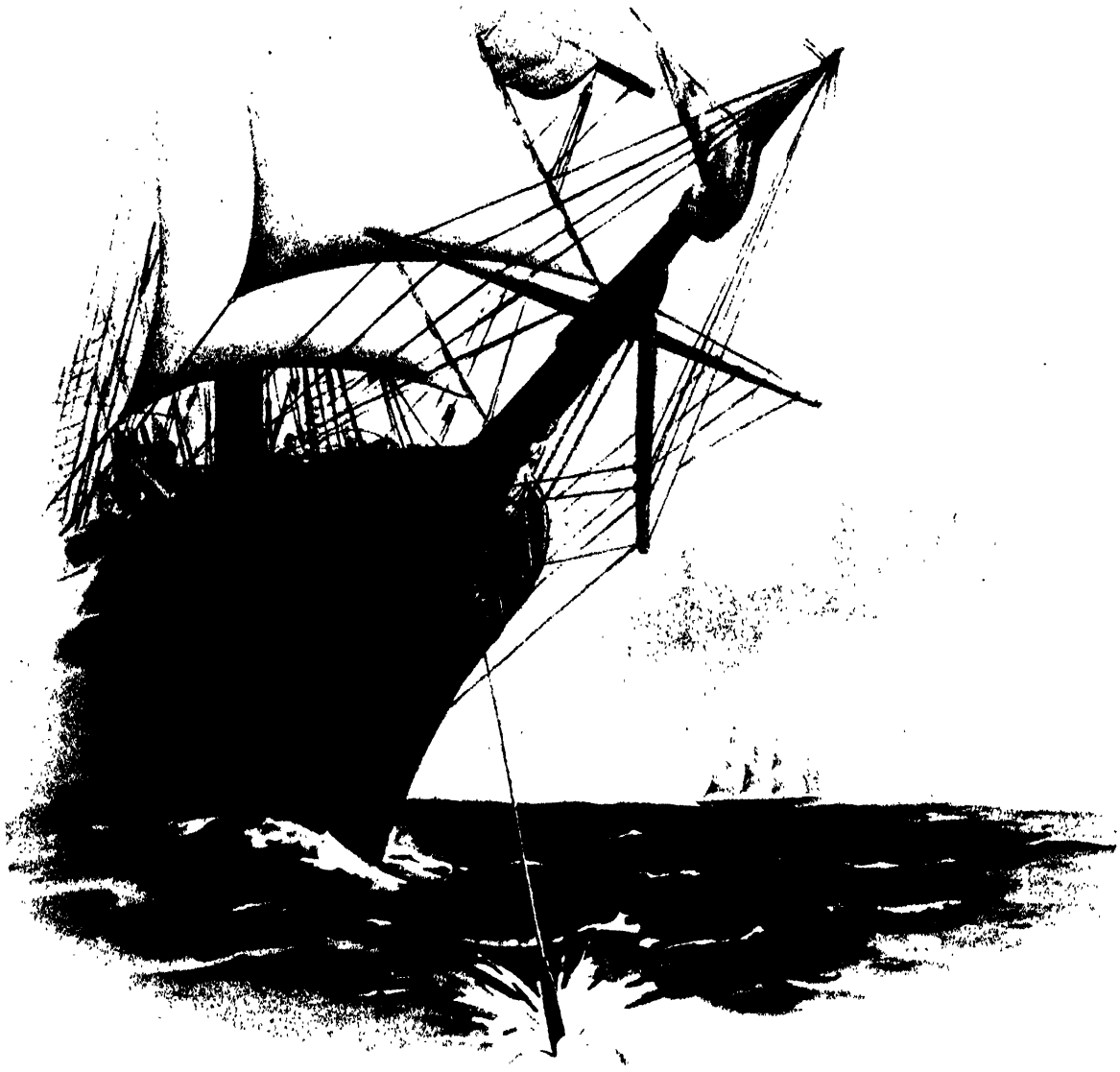
CONTINUING its policy of expansion through research in synthetic resins and industrial applications, the Plaskon Co., Inc., has dedicated a new and enlarged laboratory. (1) General external appearance. The floor area which is devoted to aboratories is 3,500 square feet with a volume of 42,000 cubic feet. Engineering and pilot-plant space amounts to a floor area of 6,250 square feet and a volume of 137,800 cubic feet, due to the great ceiling height in this division. The laboratory has 42.5 per cent of its space devoted to engineering and pilot-plant use. Each conventional laboratory opens directly into the engineering laboratory and is separated from it by steel and glass partitions only. Artificial illumination here is obtained from 60 daylight fluorescent lamps of 100 watts each. (2) View of chemical laboratory and laboratory office. (3) Engineering laboratory. (4) Service room housing steam, vacuum, air, heating, and hydraulic equipment. (5) Another view of chemical laboratory











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NECROLOGY

Lawrence J. Henderson

LAWRENCE J. HENDERSON, Abbott and James Lawrence Professor of Chemistry at Harvard, died February 11 in Boston. He was 64 years old. Dr. Henderson had been director of the Fatigue Laboratory at Harvard Business School since it was established in 1927 and chairman of the Society of Fellows at Harvard since its founding in 1933.

Born in Lynn, Mass., he graduated from Harvard in 1898, receiving his medical degree at the same university in 1902. He studied at the University of Strasbourg in 1902 to 1904 and received degrees in 1934 from the University of Grenoble and Cambridge. Harvard conferred on him a doctorate in science in 1932. Dr. Henderson became a lecturer in biological chemistry at Harvard in 1904, reaching a full professorship in 1919. During his career he served as exchange professor at the University of Paris, Silliman lecturer at Yale, Leyden lecturer at the University of Berlin, and Mill lecturer at the University of California.

He had been a member of the AMERICAN CHEMICAL SOCIETY since 1922. He was foreign secretary of the National Academy of Science and a fellow of the American Academy of Arts and Sciences. Dr. Henderson belonged to several scientific organizations and contributed to the literature. He was a member of the French Legion of Honor.

Otto S. King

OTTO S. KING, vice president and a director of the Ohio Chemical and Manufacturing Co., died February 1 at Lenox Hill Hospital, New York, after a four-day illness. Mr. King was 65 years old.

With his father, the late John M. King, he formed the King Oxygen Works, of which the Ohio company is a successor. Mr. King was organizer, former president, and honorary life member of the Compressed Gas Manufacturers Association.

Arthur Michael

ARTHUR MICHAEL, professor emeritus of organic chemistry at Harvard University, and professor emeritus of chemistry at Tufts College, died February 8 at the age of 88.

Dr. Michael was born in Buffalo, N. Y., and was educated there and at the Universities of Berlin and Heidelberg and the School of Medicine in Paris. He was professor of chemistry at Tufts College from 1882 to 1889 and from 1894 to 1907. After devoting some years to research, he was appointed professor of organic chemistry at Harvard University, retiring in 1936.

He had been a member of the AMERICAN CHEMICAL SOCIETY for many years, and was also a member of the National Academy of Sciences. He possessed a large scientific library and a famed collection of Oriental antiques.

Ezra Frick

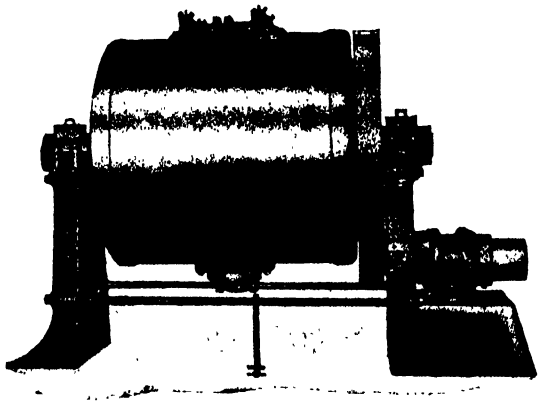
EZRA FRICK, president of the Frick Co., died on February 2 at the age of 86.

Mr. Frick was the son of George Frick, who in the middle of the century had established himself as a builder of steam engines. He entered the Frick Works as an apprentice in 1875 and began an uninterrupted term of active service with the firm that continued for more than 65 years. As the company grew and extended its scope, Mr. Frick became foreman of the erecting department, general clerk, purchasing agent, and in 1896 general manager. In 1924 he was elected president.

As a pioneer in the refrigerating and ice-making industry, Mr. Frick was one of the founders of the Ice Machinery Builders' Association, and its secretary in 1908. He was president of the Refrigerating Machinery Association in 1919–20, and was elected an honorary member in 1936. He was a charter member of the American Institute of Refrigeration.

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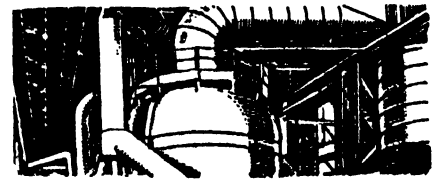
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INDEX numbers of wholesale prices for chemicals and allied products have been released by the U. S. Department of Labor. With 1926 as 100, the indexes are:

PRODUCT	NOV. 1941	OCT. 1941	CHANGE FROM A MONTH AGO %	NOV. 1940	CHANGE FROM A YEAR AGO %
Chemicals and allied products...	89.8	89.7	+0.1	77.5	+ 15.9
Chemicals....	88.3	88.4	−0.1	85.1	+ 3.8
Drugs and pharmaceuticals...	123.2	124.1	−0.7	95.5	+ 28.5
Fertiliser materials..	77.3	77.3	0	69.9	+ 10.6
Mixed fertilisers.....	79.6	77.5	+2.7	74.2	+ 7.3
Oils and fats.	92.9	93.4	−0.5	42.3	+119.6



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by R. W. SHANNON

With a Foreword by BRADLEY STOUGHTON, Ph.D.

CONTENTS: Part I: Industrial Iron Products in General. Introduction. The Different Kinds of Iron Products. Part 2: Sheet Steel and Tin Plate. Definitions, Annual Production in the United States, Types of Steel Used, The Principles of Rolling Sheet Steel Products. Continuous Hot-Rolling of Sheets. The Sheet Steel Makers' Contribution to Industry. Tables Pertaining to Sheet Steel Products. The Shaping Process: Hot-Rolling and Shearing. The Refining Process: Annealing. The Refining Process: Pickling. The Refining Process: Cold-Rolling. The Refining Process: Resquaring; Flattening Operations; Oiling. Protective Coatings. The Refining Process: Metallic Coating Processes. Inspection; Forming and Painting; Preparation for Shipment. The application and use of Sheet Steel and Tin Plate (with Brief Descriptions) of Principal Grades and Finishes. Appendix "A." The Nature and Effects of the Annealing of Sheet Steel. Appendix "B." Definitions of the Terms Used Herein for Describing the Texture of Sheet Steel Surfaces. Appendix "C." Definitions of Terms Relating to the Physical Properties of Sheet Steel. Appendix "D." Abbreviations for Treatments, Finishes and Quality of Sheet Mill and Tin Mill Products. Appendix "E." How to Specify Sheet Steel Products. Appendix "F." Tolerances, or Standard Permissible Variations of Sheets in Gage Weight, Gage Thickness, Size and Flatness, Adopted by the Association of American Steel Manufacturers, March 28, 1929. Appendix "G." Notes. Bibliography. Index.

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by FRANCIS P. VENABLE

CONTENTS: History and Occurrence. Zirconium and Its Properties. Compounds of Zirconium with the Elements. Compounds of Zirconium with the Halogens and Their Acids. Compounds with the Acids of Sulfur and Selenium. Compounds with Acids of the Nitrogen Group and Rare Inorganic Acids. Compounds with Acids of the Silicon Group. Zirconic Acid and the Zirconates. Compounds with Organic Acids and Radicals. Analytical Methods. Technical Applications of Zirconium and its Compounds. Patents. Bibliography. Index.

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BEARING METALS AND BEARINGS

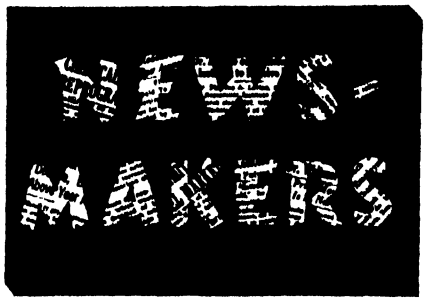
by W. M. CORSE

Consulting Metallurgical Engineer, Secretary, Institute of Metals Division, American Institute of Mining and Metallurgical Engineers

CONTENTS: History — Early Developments. Bearing Metals. History of Development of Bearing Metals. Types of Bearing Metals. White Metals. Bronzes. Graphite Bearing Metals. Types of Bearings. Factors Deciding Choice of Type. Bearing Design. Bearing Troubles and Failures. Testing Bearing Metals and Bearings. Lubrication. Effect of Bearing Metal on Lubricants. Bibliography — Literature References from 1900 to 1928 inclusive — Bearing Metals — General Papers. Mechanical Properties. Description and Properties of Alloys Suitable for Bearing Metals. Structure and Constitution. Mechanical Testing. Physical Properties. Effect of Various Factors on Structure and Properties. Chemical and Physico-chemical Properties of Bearing Metals and their Components. Manufacture. Bearings — General Papers on Bearings and Lubrication. Descriptions. Bearing Design. Bearing Troubles and Failures. Friction and Lubrication. Empirical Laws of Friction. Theory of Lubrication. Lubricants. Lubrication of Bearings. Testing Lubricants and Bearings. Abstracts of Selected Papers. Tables Showing Properties of Bearing Metals. Index.

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Arthur B. Ash has left the position of development chemist with the U. S. Rubber Co. plant at Mishawaka, Ind., to accept a position as a staff member of the Research Department, Michigan Alkali Co., Wyandotte, Mich.

C. O. Ball, since 1935 assistant director of research of the American Can Co., has joined the staff of the Owens-Illinois Can Co., Toledo, Ohio, as technical director, and will be in charge of the company's entire metal container research and development program.

Marston T. Bogert, in addition to his regular university duties as emeritus professor of organic chemistry in residence at Columbia University, has become connected with Ralph L. Evans Associates. He will aid them in study ing the many chemical problems constantly arising in the progress and development of their business and research, particularly those related to the present emergency, to the end that the present plant capacity, physical equipment, and all other resources of the organization may be devoted increasingly to wartime needs. He will also work on those problems which will confront them later in the post-war adjustment period, because of anticipated changes in chemical needs of our future way of living.

H. L. Bullock, president of Bullock, Smith, and Associates, 136 Liberty St., New York, will give two lectures on "Safety Practice in the Powder and Explosives Industry" as part of an extension course to be given at Columbia University during the spring semester.

John J. Cramer has resigned from the Procter & Gamble Co., to take a position as research chemist with the J. B. Ford Co., Wyandotte, Mich.

Grant Crane, son of E. J. Crane, Editor of *Chemical Abstracts*, has been made a captain in the Marine Corps.

Claude F. Davis is now associated with the Schwarz Laboratories, Inc., 202 East 44th St., New York, N. Y., as chief chemist in the Analytical Division.

Frank E. Dolian, Commercial Solvents Corp., Terre Haute, Ind., has reported for active duty as a lieutenant with the U. S. Army, and his work has been taken over by **Frank E. Maple**.

Robert P. Fischelis, secretary and chief chemist of the New Jersey Board of Pharmacy and member of the New Jersey State Board of Health, has been released for part-time service as Chief of the Section of Medical and Health Supplies of the Civilian Supply Division, War Production Board.

C. W. Fleetwood, who for more than four years has worked at the Indianapolis plant of the U. S. Rubber Co. as a research chemist, was transferred in October to the Munitions Division, Des Moines Ordnance Plant. After training at the Remington Arms Co. Lake City Ordnance Plant and Frankford Arsenal for the position of assistant superintendent in the Explosive Area of the Des Moines Ordnance Plant, he is now located at Des Moines, Iowa.

E. Stanley Glines has been appointed chief of the aluminum and magnesium unit of OPA. Mr. Glines recently resigned as senior partner of Glines & Co., New York bankers and industrial consultants. During the period that Herbert Hoover served as Secretary of Commerce, he was chairman of an advisory committee on Far Eastern affairs to that department. He served as chief engineer at Hog Island during the last war.

Howard A. Herder and **Vernon G. Leach** have become members of the Technical Advisory Board of Bituminous Coal Research, Inc., to guide the program at the Battelle Memorial Institute, Columbus, Ohio.

R. L. Hicks, since 1939 research chemist at the National Aniline Division of the Allied Chemical & Dye Corp., is now on the research staff of the newly formed Institute of Gas Technology, 3325 South Dearborn St., Chicago, Ill.

Harry N. Holmes, President of the AMERICAN CHEMICAL SOCIETY, was initiated into the Alpha Chi Sigma Fraternity at Akron, Ohio, on December 19 by the Gamma Chapter of the Case School at a trichapter Founders' Day in which the Cleveland Professional Chapter, the Akron Professional Chapter, and Gamma participated.

Harold W. Jackman, formerly works manager of the Battle Creek Gas Co., Battle Creek, Mich., has joined the staff of the Illinois State Geological Survey, Urbana, Ill., as chemical engineer.

James L. Jensen is now associated with Distillation Products, Inc., Rochester, N. Y., as research biochemist in the Biological Department. He was formerly research assistant in the Department of Agricultural Biochemistry at the University of Minnesota, where he received his Ph.D. degree in December 1941.

Frederick F. Johnson has left the Mellon Institute of Industrial Research to accept the position of chief of pharmaceutical research and development, Cutter Laboratories, Berkeley, Calif.

John J. Linker has been appointed chief engineer of the Crane Packing Co., Chicago, Ill. He was formerly chief engineer of the Flintkote Corp.

Charles B. Norris is now principal engineer in charge of plywood strength and design, Division of Timber Mechanics, Forest Products Laboratory, Madison, Wis.

Alexander W. Schneider, formerly with the Geo. A. Breon Co., and more recently studying on a research fellowship at Iowa State College, has joined the research staff of the Central Soya Co., Inc., Decatur, Ill.

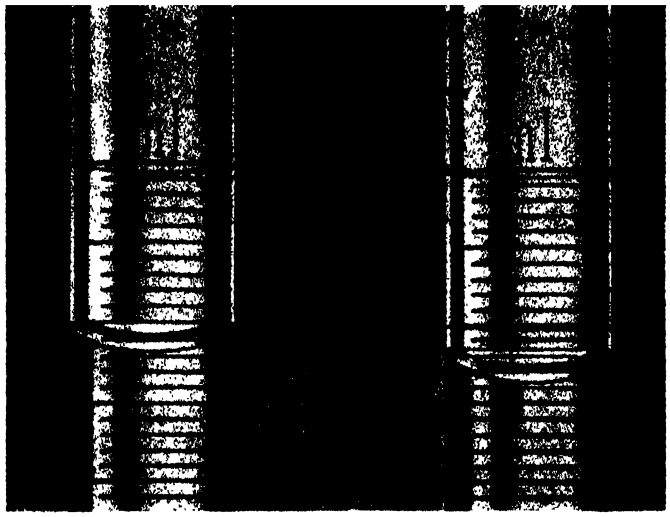
Homer L. Shaw has been appointed a research engineer on the technical staff of the Battelle Memorial Institute, Columbus, Ohio. He was formerly associated with the Jones and Laughlin Steel Corp.

George M. Snodgrass has been appointed manager of the Eastern Sales Division of the Sawyer Electrical Manufacturing Co., with headquarters in Cleveland, Ohio.

Harold H. Tucker, for 12 years chief chemist and dyer at the J. Laskin & Sons Corp. in Milwaukee, Wis., has become director of research of the John B. Stetson Co., Philadelphia, Penna.

Harold C. Urey, 1934 chemistry Nobelist and professor at Columbia University, will present the Edgar Fahs Smith Memorial Lecture at the University of Pennsylvania, Harrison Laboratory of Chemistry, March 20 at 4:00 P. M. Professor Urey will speak on "Physical and Chemical Properties of Isotopic Compounds".

Walter Williams, formerly in the Chicago territory, has been assigned to the St. Louis territory of Manning, Maxwell & Moore, Inc., Bridgeport, Conn., to take the place of **Harold Moore**, who has joined the armed forces.



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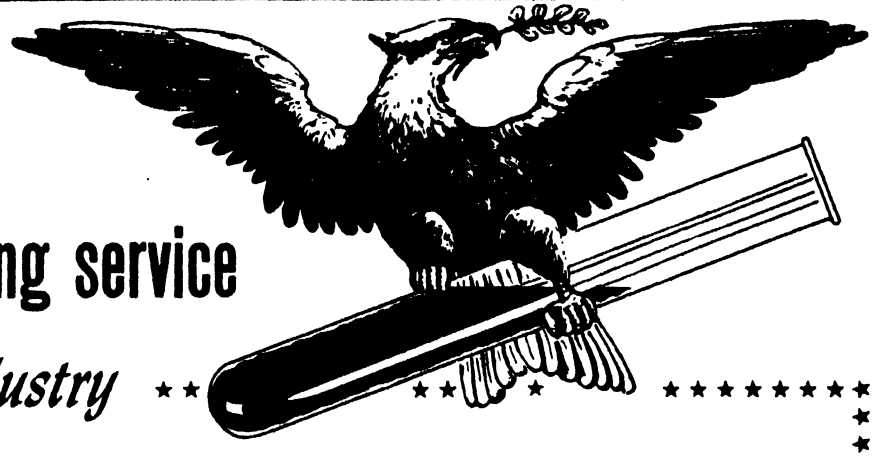
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Les Grands Problémes Actuels de la Chimie de la Houille. *Eug. Mertens* and *J. Massinon.* 2nd ed., rev. 344 pages. H. Vaillant-Carmanne, S. A., Impr. de L'Académie, Place St.-Michel, 4, Liége, Belgium, 1941.

A REVIEW of constituents of coals and theories on their formation with special emphasis on the earth formations and other factors—presence of vegetation, rainfall, etc.—in southern Belgium and a comparison of changes on north-south changes in terrain are presented. Heterogeneity of coals even in the same deposit is discussed and tables for various beds show how the composition varies from roof to base of the vein, ranging in volatile material from 8.19 to 31.22 per cent.

The problem of chemical constitution of coal is difficult due to necessity of studying its geological formation. Geological phenomena proceed very slowly and are impossible to duplicate in a laboratory.

Since vegetation is the primary material in generation of coal, the chlorophyll present is involved in the synthesis of the material. The fixation of carbon is primarily a chlorophyll reaction, and the freeing of oxygen from the molecule probably occurs through the transformation of aldehydes by polymerization to soluble hexoses and a small portion of pentoses. These "hydrates of carbon" undergo a transformation to aromatic structures designated as lignins. Lignins in the course of evolution in their vegetable skeletons become insoluble materials, carbonic hydrates, and "greasy materials" immobilized in certain cells which finally produce special substances such as waxes, resins, tannins, latex, glucosides, etc.

Sugars, starches, celluloses, and lignin have a probable role in coal formation, but there is much conjecture on the influence of geologic pressures and time in coal generation. An estimated probable time involved in coal formation is of the order of 7.9×10^6 years.

Low-temperature distillation of coal with theoretical and manufacturing practices for production of semicoke are given. Generally speaking they state that the low-temperature process has had little development and so far the main uses have been for the production of semicoke. However, the light liquid products obtained have considerable economic value as nondetonating aviation motor fuels. The refined oils have interest for use in Diesel engines, and the heavier fractions from the mazut may be used for lubricating machines and for the impregnation of wood. Many millions of dollars have been spent in the United States alone in an endeavor to commercialize low-temperature carbonization of coal.

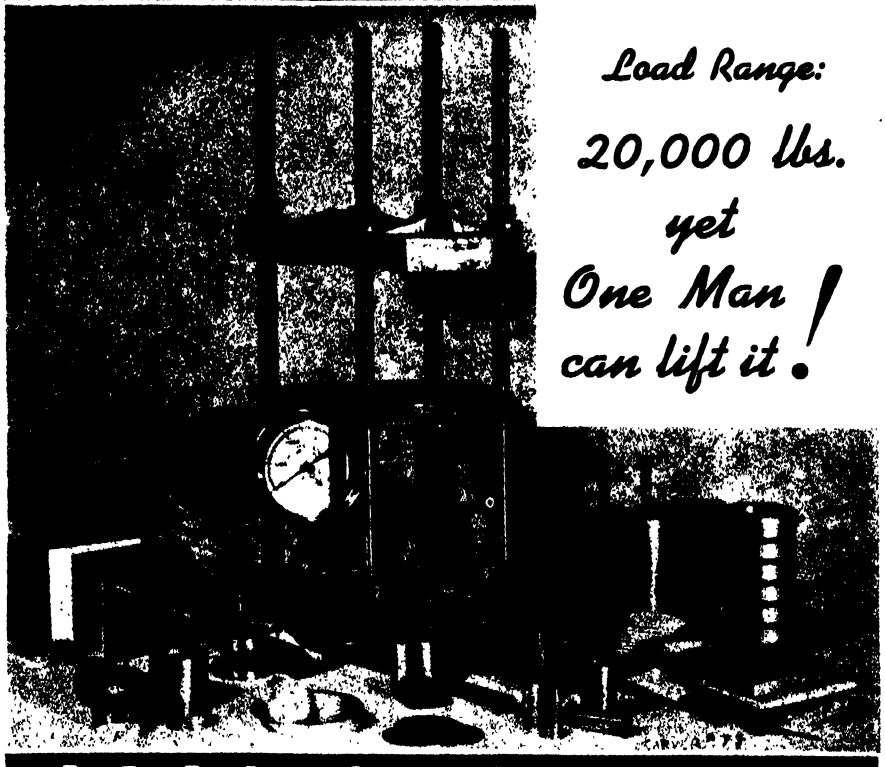
A history of the chemical and commercial development of coal hydrogenation by the Bergius process is given. The source material for this chapter is carried to 1939, and generally speaking there is no new material.

Hydrogenation of coal as a solution to the lack of indigenous oil supplies follows general lines of many papers. In discussing the economic aspect, the Falmouth Report and the Report of the British Labor Party are drawn on heavily. In respect to Belgium a quotation from the speech of the President of the National Motor Fuel Society says, "Hydrogenation of coal is capable of bringing Belgium an interesting solution to the motor fuel problem."

The Fischer-Tropsch synthesis is reviewed with a literature survey and discussion of the chemical theory. The latest reference given is for 1940; the discussion is adequate for the material presented. It makes an excellent textbook presentation since various aspects of the problem are presented and generalizations are made. Curves and tables of results for various catalysts and temperatures are given together with the influence of contact times. In addition to hydrocarbon synthesis, the importance of the production of methyl, ethyl, propyl, and butyl alcohol and the historical development is shown. Solvent extraction is a method of preparation of carbon from Belgian coal and is a new industry which has produced material of considerable value.

As a textbook or supplementary reference the work is on the whole a good review. The presentation leaves out entirely the extensive development, both in chemical research and commercial development, of the hydrogenation of oil and olefin hydrocarbons in the United States. In view of the extensive literature avail-

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able in United States publications, this is an oversight that seems explainable only by present difficulties of all research and writings in countries at war and under enemy domination.

GUSTAV EGLOFF

Symposium on New Methods for Particle Size Determination in the Subsieve Range. v + 111 pages. American Society for Testing Materials, 260 South Broad St., Philadelphia, Penna., 1942. Price, paperbound, $1.25.

THIS publication includes eight technical papers presented at the A. S. T. M. spring meeting in Washington, D. C., March 4, 1941. Following a summary and evaluation of test methods by Herbert E. Schweyer and Lincoln T. Work are papers on the permeability method for determining shape and surface of fine powders, surface area of portland cement, an improved hydrometer method, and determination of subsieve particle size distributions by sedimentation methods. Use of the electron microscope is described briefly, and a new method, low-temperature adsorption isotherms, for measuring surface areas and for determining size of particles is discussed. The concluding paper covers determination of specific surface by adsorption from solution. A number of the papers include extensive bibliographies.

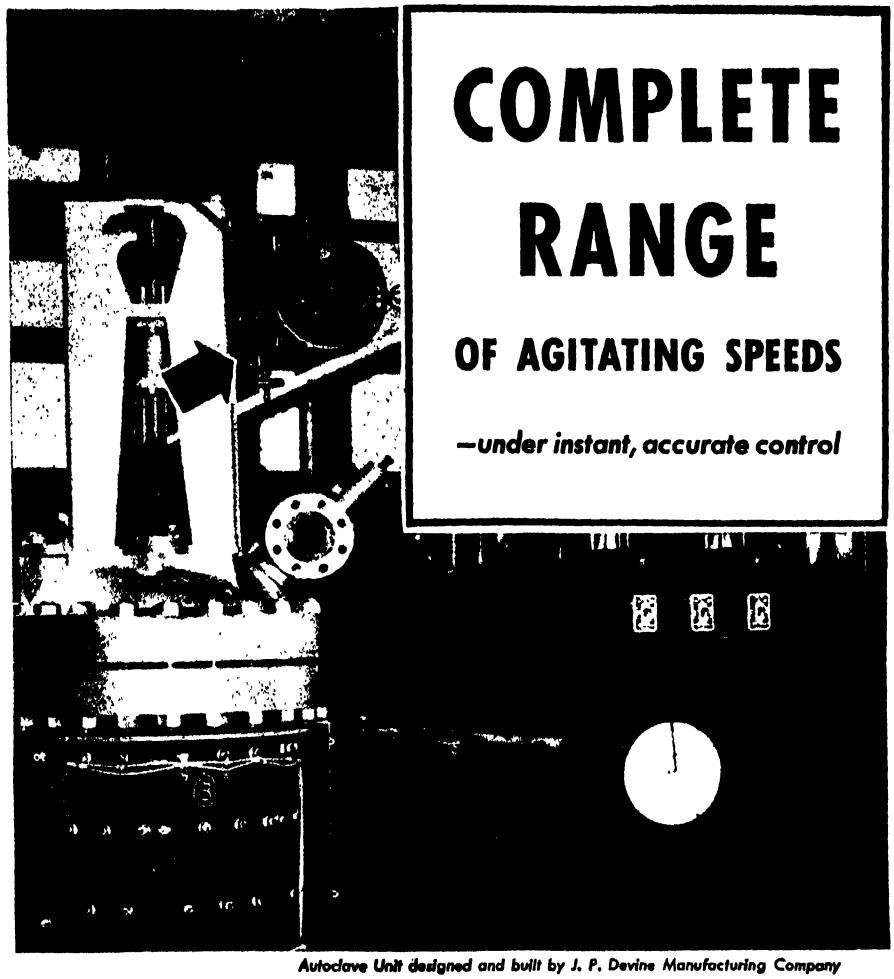
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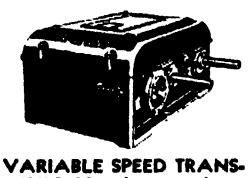
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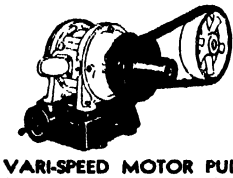
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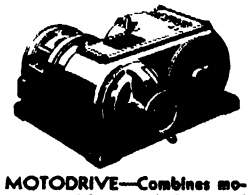
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Butane
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Butene 2
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Carbon Monoxide
Chlorine
Dimethylamine
Dimethyl Ether
Ethane
Ethyl Chloride
Ethylene
Ethylene Oxide
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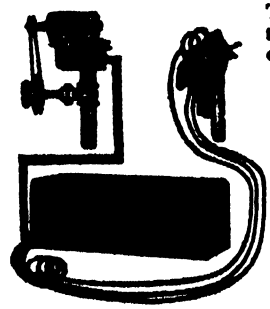
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Methane
Methyl Bromide
Methyl Chloride
Monoethylamine
Monomethylamine
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Nitrogen
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Oxygen
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DENSITY CONTROLLER for PULPS



The Masseo-Adams Density Controller, first used in ore classifiers, now has many applications in non-metallic and chemical plants—including potash and phosphate plants, washing coal, etc. Maintains *visual* control of density by motor-operated regulation of dilutant supply valve. Also available with standard chart recorder or with arm and weights for sink and float process. Widely optional location. *In writing, please describe your problem.*

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Photo Courtesy of Alloy Fabricators, Inc., Newark, N. J.

. . . Because these tanks are made from Jessop SILVER-PLY Stainless-Clad Steel*

The battery of tanks shown in the illustration are for the transportation of bulk grain products. No severe corrosive conditions are encountered, yet the owner wanted to prevent any chance of contamination so he used stainless equipment. At the same time, he wanted to hold down material costs. The natural solution to his problem — and the one he used successfully — was to have his tanks made from Jessop SILVER-PLY Stainless-Clad Steel. The stainless steel cladding on the inside provides the same protection as solid stainless while the mild steel backing reduces the material costs.

It is more important today than ever before to consider the use of Jessop SILVER-PLY Stainless-Clad Steel for processing, handling, and storage equipment. . . because equipment made from SILVER-PLY requires far less shutdown time for cleaning than non-stainless equipment; in addition the use of SILVER-PLY in place of solid stainless conserves strategic stainless alloys. If you are not familiar with Jessop SILVER-PLY Stainless-Clad Steel write today for our 24-page descriptive booklet and our new price list.

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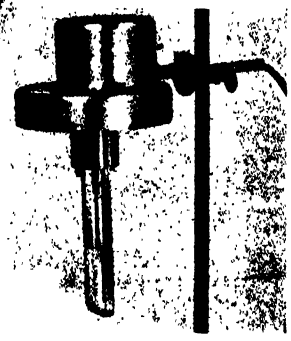
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VARIABLE SPEED UNIT Four speed changes regulated by finger-controlled lever.



SINGLE SPEED UNIT for use where speed variations are not required.

***SAVE* valuable production time** and insure closer control on defense orders by running viscosity tests direct in plant containers where your material is being processed.

***NOTE* these advantages:** Continuous or intermittent indicating — Simple, sturdy, easy to operate and clean — Permanently standardized, no adjustments.

Operator can easily convert any model to either portable or stationary use as desired.

The Synchro-lectric Viscosimeter operates anywhere in *plant* or *laboratory*. It will test solutions in suspension and of any degree of opacity, and is not affected by temperatures to 600°F. Just a few seconds are required to complete the reading which requires no technical skill. The instrument is permanently standardized, requires no adjustments. Viscosities are indicated in *centipoises* in wide ranges on a large, easily read dial. Accuracy is within one percent of full scale based on Bureau of Standards values.

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. . . Operating Efficiency of Amsco-Nagle Pumps Results from Design Simplicity . . .

The need for conserving vital metals and man-power makes the use of Amsco-Nagle Horizontal and Vertical Shaft Centrifugal Pumps all the more important.

Their simplicity of design effects an operating efficiency that minimizes the replacement cost of bearings, packing and other parts. When such maintenance is necessary, it can be accomplished quickly and easily and without the customary pump dismantling.

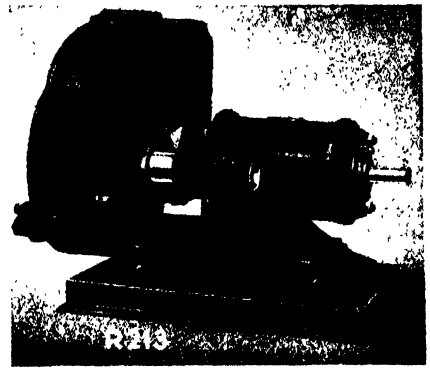
In the horizontal pumps the casing and the bearing stand are held rigidly together by tubular supports. (In the vertical shaft series these tubes also function as discharge pipe and lubricating duct respectively.)

Amsco-Nagle Type "A" Horizontal Shaft Pumps are self-priming without the use of ducts or jets or the need for recirculation. Submerged bearings and their attendant troubles are eliminated in the Type "QW" Vertical Shaft Units. Bearings are supported in a rigid, fully enclosed column. The Types "SD" and "SW" have steadying and intermediate sleeve bearings supported in split yokes which make them simple to replace. They are readily lubricated from above the floor plate.

Impellers, casings, and plates can be made of abrasion or corrosion resistant materials best suited to the liquid or solids in suspension being handled. Impellers of various types are available, depending on the nature of the application. They are screwed onto the shaft, simplifying installation.

Amsco-Nagle Pumps are available in capacities in the range of 7,000 g.p.m. for heads of 200'. Vertical shaft units are available for wet or dry pit application. Horizontal types can be furnished with pulley or for direct connection.

Check the design and operating advantages of these sturdy pumps for the chemical and processing industries; determine for yourself how they can help save time and cut costs during this critical period—send for Bulletin 940.





Note accessibility of stuffing box on this Amsco-Nagle 1½" Type "A" Frame 7 Horizontal Pump (R213). Casing can be removed after loosening nuts on bolts clamping the tube supports.

Impeller is screwed on. Water end on horizontal pumps held on by three clamp-dogs. This is a 2" Type "T" Frame 10 unit (R222).

Pumping end, bearings and floor plate are rigidly tied together by tubular members which also function as discharge pipe and lubrication duct, respectively, in this 2" Type "SW" Frame 10 Amsco-Nagle vertical shaft pump (R282) which has a setting (or submergible length) of 14 ft.

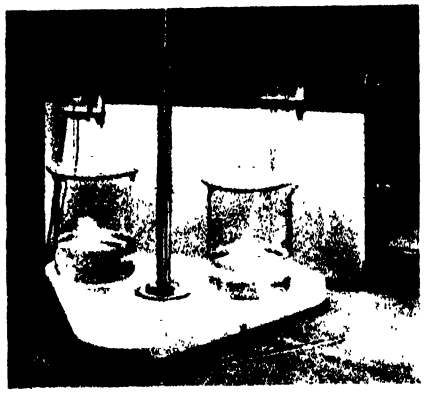


R282

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Fluorescent
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Supplies soft, glareless fluorescent illumination of daylight quality, correct intensity and color characteristics to beakers in which titrations are being carried out.

Reflector is vitreous enameled and fitted with snapswitch, connecting cord and plug. Length, 12½ inches; height, 8 inches; depth, 4½ inches. Operates from 115 volt 60 cycle circuits.

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New Porcelain Glaze Developed

In the search for substitutes to replace national strategic materials, the chemists of Westinghouse, East Pittsburgh, Penna., have developed a new porcelain glaze which has increased the strength of porcelain more than 100 per cent, made manufacturing easier, and imparted better weather resistance. Ralston Russell, Jr., research engineer, is pictured recording the results of a tension test on the new type porcelain insulators.

Ethyl Turns Research to War Needs

MERGER of all technical services to provide maximum cooperation with the oil and automotive industries and organization of a War Committee to adapt



Julian J. Frey

the company's research facilities to the needs of the armed forces are announced by the Ethyl Gasoline Corp. Both the newly established Technical Service Department and the War Committee are headed by Julian J. Frey of Detroit, manager of the Technical Sales Division since 1930.

Five divisions have been incorporated into the new department. Managers are: Refinery Technology Division, William H. Hubner; Gasoline Testing Division, John Clifford Pope; Agricultural Division, C. G. Krieger; Truck, Bus, and Fleet Division, Errol J. Gay; and Passenger Car and Automotive Accessories Division, Richard K. Scales.

Members of the War Committee are Julian J. Frey; Earl Bartholomew, director of engineering laboratories; George Calingaert, director of chemical research; Graham Edgar, vice president; S. D. Heron, director of aeronautical research; and O. E. Kurt, manager of manufacturing technical division.

Chemistry Advisory Council Discontinued

BECAUSE of greatly changed conditions the Board of Directors of Chemist Advisory Council, Inc., has voted to discontinue the present activities of the council. The office at 60 Madison Ave. has been closed. The organization will be maintained and valuable records preserved so that the work of the council may be resumed when a need arises. The cooperating committees all over the United States are asked to continue so that they may be called upon whenever the council's services are needed. Any correspondence regarding the council may be directed to W. T. Read, Rutgers University, New Brunswick, N. J.

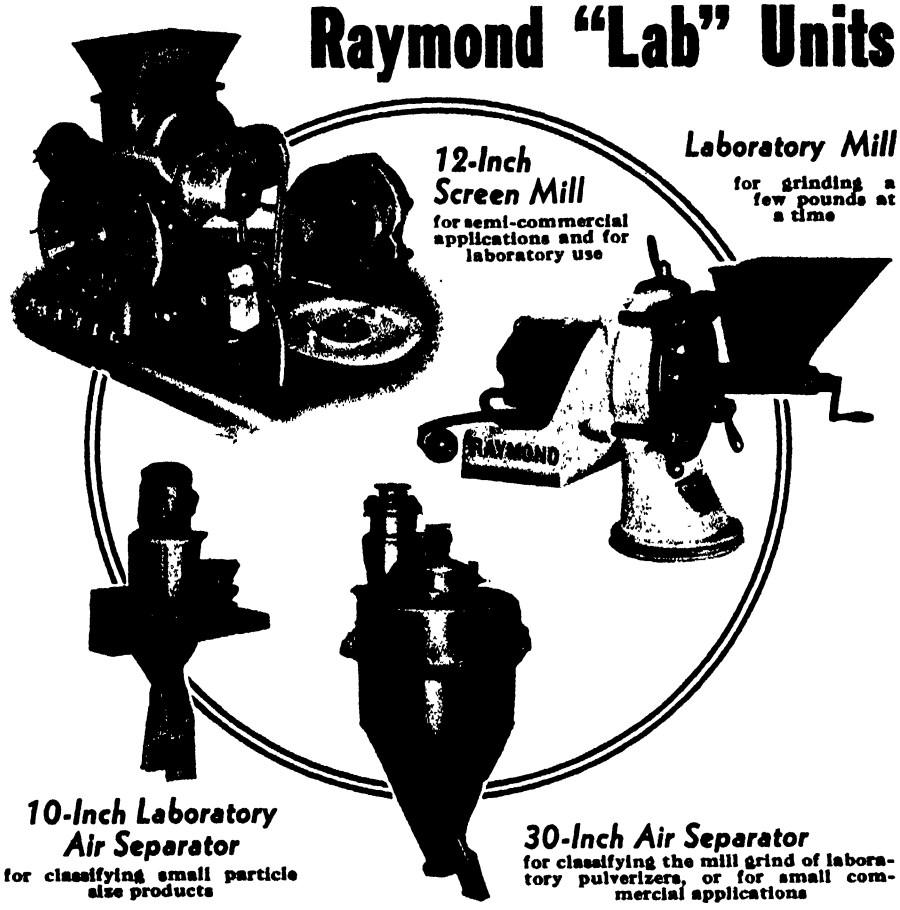
Swift Research Grant Set Up

THE University of Nebraska has received from Swift & Co., Chicago, a grant for research on nutritional anemia in relation to pregnancy and lactation, under direction of Ruth M. Leverton. Dr. Leverton, who received her Ph.D. from the University of Chicago in 1937, has already done some work on the treatment of nutritional anemia in young women which indicates that a liberal amount of meat in the diet of pregnant and lactating women may prevent the common occurrence of nutritional anemia. These studies are to be continued under the present grant.

Phi Lambda Upsilon Elects Officers

WILLIAM N. SANDSTROM, University of Minnesota, was re-elected national president of Phi Lambda Upsilon at its recent election. T. F. Buehrer, University of Arizona, for 12 years national secretary-treasurer, became vice president. L. F. Audrieth, University of Illinois, again will serve as editor of the *Register*, and secretary and treasurer are C. S. Carlson, University of Pennsylvania, and Herschel Hunt, Purdue University. Phi Lambda Upsilon now has 38 chapters with an active and alumni membership exceeding 11,000.

Raymond "Lab" Units

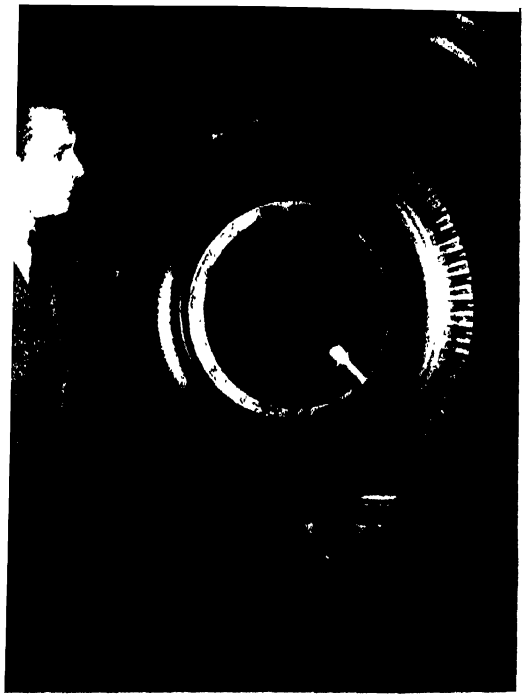


PRODUCT CONTROL now is more important than ever in the manufacture of essential powdered materials. For this purpose, Raymond offers a practical line of small capacity pulverizers and air separators for conducting tests and developing new products.

These machines are specially designed for experimental work and minor industrial applications. They produce the *same character of finished material* as the large commercial pulverizers and air separators, a feature of particular advantage in laboratory research.

For complete details of these "pilot units," send for RAYMOND Laboratory Bulletin No. 48.

RAYMOND PULVERIZER DIVISION
COMBUSTION ENGINEERING COMPANY, INC.
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Sales Offices in Principal Cities
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Reclaimed Rubber Victory Tires

Harvey S. Firestone, Jr., president of The Firestone Tire & Rubber Co., examines one of the company's new Victory passenger car tires made entirely of reclaimed rubber as it comes off the production line. Firestone is also developing a line of tractor and farm implement tires of reclaimed rubber. The new product will give reasonably satisfactory service at moderate speeds. Firestone is the largest producer of reclaimed rubber in the world.

Weak Illumination for Use in Blackouts

C. S. French, Department of Botany, University of Minnesota, Minneapolis, Minn.

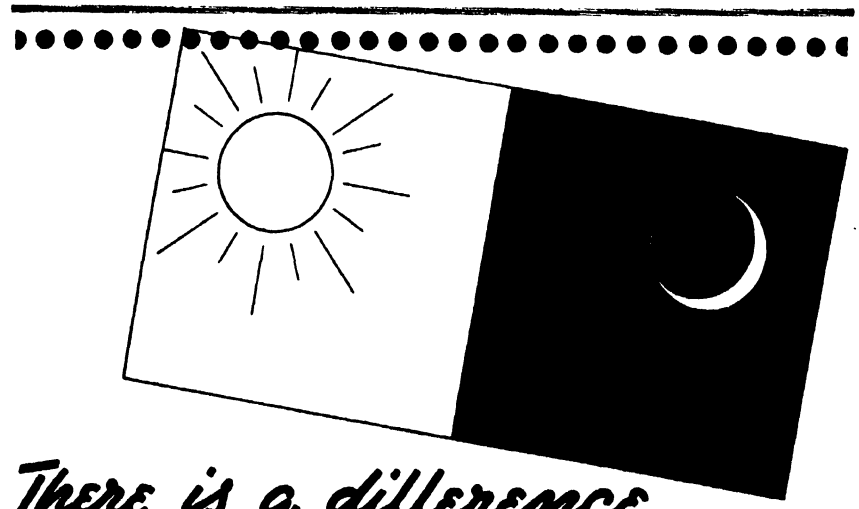
THE recent article by Henry E. Millson[1] discusses some extremely interesting and useful applications of both fluorescent and phosphorescent substances to the production of weak illumination sufficient to maintain normal life during blackouts. That author, perhaps rightly, objects to lamps emitting infrared because of the possibility of airplanes being equipped with infrared detectors. It would seem still more likely, however, that the wide use of ultraviolet lamps which he advocates would make ultraviolet photography with quartz lenses a very profitable procedure, indeed, for an invading air force.

To prevent pedestrians being run over and to supply a small beam of light wherever needed, it might be well to supplement the fluorescent and phosphorescent fixtures by advocating the wide use of an appropriately designed flashlight.

The problem resolves itself into supplying very weak illumination upon the object without the lamp itself being visible. This requirement is well met by a beam of light restricted to a small angle such as comes from a pen type of flashlight with an 8-inch black paper tube the size of a pencil slipped over the end of the bulb. The lamp is then practically invisible, unless pointed directly at the observer, yet gives adequate light for reading street signs and house numbers at a range of 15 feet. If the tube were made of some plastic material colored deep green or blue and painted flat black over most of the inside, it should be possible to have enough light emitted diffusely from its entire surface to prevent the person using it from being run over and yet not be visible from any distance. For such use the hole in the tip might be fitted with a removable plug or shutter. Such flashlights presumably could be designed to sell for a few cents each.

For signs, house numbers, and warning signals the widespread use of phosphorescent paint would seem to be of great advantage. It is, however, difficult to understand the advisability of using large fluorescent or phosphorescent screens as light sources for illuminating other objects. Whatever arrangement is devised the light itself would inevitably be brighter and more conspicuous than the material to be illuminated. Furthermore, it is not possible to control the direction of the light emitted from a large diffuse source. A relatively brighter small aperture beam of light giving the same illumination upon any object would appear to be far less dangerous than a large diffuse source. It is, however, essential that the direction of the beam be properly controlled and not pointed at the sky.

[1] NEWS EDITION (AM. CHEM. SOC.), 19, 1266 (Nov. 25, 1941).



Movie on Gelatin Manufacture

A SOUND motion picture made available by the Gelatin Products Co., 9425 Grinnell Ave., Detroit, Mich., traces the manufacture of gelatin capsules from its inception in France over a century ago to the present day. Diagrammatic illustrations point out the accuracy of the rotary die process. The picture also shows the inspection and control activities employed by the company, with views of the engineering department, machine shop, and laboratory.

Albert A. Haniford has been appointed to the Sales Department of Manning, Maxwell & Moore, Inc., Bridgeport, Conn.

A. D. Whipple, chief engineer of Alladdin Industries, Inc., has changed his residence from Alexandria, Ind., to 5241 North Kimball Ave., Chicago, Ill.

Motion Picture Shows How to Fight Incendiary Bombs

THE first film authorized for training purposes by the Office of Civilian Defense, entitled "Fighting the Fire Bomb", is being distributed. It is accompanied by an instruction manual containing supplementary lectures, material for a quiz based on the film, and other instructional material. The film was produced by Transfilm, Inc., under the technical supervision of the Chemical Warfare Service and the National Fire Protection Association. The Instructor's Manual was produced by the Safety Research Institute.

Copies are made available to state and local defense councils by the Office of Civilian Defense. Prints of the film and copies of the manual may be purchased from Transfilm, Inc., 9 Rockefeller Plaza, New York, N. Y., at $38 for the 16-mm. print in black and white, $68 for the 16-mm. color print, and $65 for the 35-mm. in black and white. Single copies of the manual are sold for 50 cents.

Stuart J. Saks, assistant to the president of Morris Machine Works, Baldwinsville, N. Y., for the past two and a half years, has been elected president of the company.

Film on Sulfur Production Available

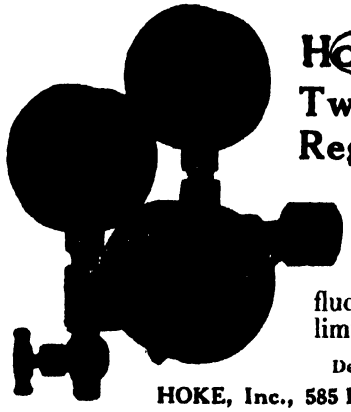
THE Story of Sulfur" is the latest addition to the U. S. Bureau of Mines' library of films in sound visualizing the mineral and allied industries. The film, prepared under supervision of the bureau and a large sulfur-producing company, is 16 mm. in size and requires 25 minutes for projection. Applications for copies for exhibition should be addressed to the Bureau of Mines Experiment Station, 4800 Forbes St., Pittsburgh, Penna., and should state specifically that the borrower is equipped to show sound film. Transportation costs and payment for any damages are the only charges.

Monsanto Employees Move to Conserve Rubber

CONSERVATION-CONSCIOUS Monsanto has a new club—the first of this type CHEMICAL AND ENGINEERING NEWS has heard about. Monsanto Share-Your-Car Club are being formed in 14 plants and 10 branch offices to pool transportation so that employee-owned cars will carry capacity passenger loads. Badge of membership is a red, white, and blue sticker on the automobile window.



Tin-Can Camera



OK
HOKE
Two-Stage Regulator

Maintains constant pressure even when volume demands fluctuate between wide limits. Unique features.

Details in Bulletin N21

HOKE, Inc., 585 Eagle Ave., New York

STEAM JET EVACTORS
AIDING NATIONAL DEFENSE

Numerous Croll-Reynolds Evactors are working overtime maintaining high vacuum in plants making explosives, synthetic rubber, airplane lubricants and a long list of other ordinance materials. They are maintaining high vacuum on engines and turbines of dozens of American ships sailing the seven seas.

While the large and special units require up to three months or more for fabrication the smaller ones are sometimes made in two weeks, or less, when the demand is urgent. These include single and multi-stage units for vacuum up to a small fraction of 1 mm. absolute, also small condensers and vacuum chilling equipment.

A recent development is a vacuum-cooled condenser for maintaining condensing temperatures down to 34° F. Inquiries will be handled as promptly as possible under the circumstances.

CROLL-REYNOLDS CO.
17 JOHN STREET — Established 1917 — NEW YORK

INDUSTRIAL CHEMISTRY of COLLOIDAL and AMORPHOUS MATERIALS

By Warren K. Lewis, Lombard Squires & Geoffrey Broughton

An important new book for the modern chemical engineer, particularly those producing new synthetic materials. It is written by three men who have had wide industrial as well as research experience. Warren K. Lewis is Professor of Chemical Engineering, Massachusetts Institute of Technology. Lombard Squires is Chemical Engineer with E. I. du Pont de Nemours Co. Geoffrey Broughton is Chemical Engineer with the Eastman Kodak Company.

540 pages (illustrated)
Published February 3rd — $5.50

THE MACMILLAN COMPANY, 60 FIFTH AVENUE, N. Y.

THE WALL STREET OF CHEMISTRY

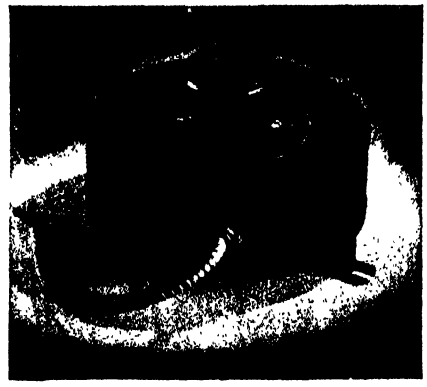
	Annual Earnings		Per Common Share	
	1940	*1941*	*1940*	*1941*
Atlantic Refining Co.	$ 6,217,453	$14,348,000	$2.11	$5.16
Atlas Powder Co.	1,441,444	1,561,616	5.71	6.13
E. I. du Pont de Nemours & Co.	86,945,173	90,401,470	7.23	7.50
Freeport Sulphur Co.	3,033,471	3,149,030	3.81	3.95
Lindsay Light & Chemical Co.	94,431	111,779	1.28	1.57
United Gas Improvement Co.	26,391,349	20,606,189	0.97	0.72
Devoe & Raynolds Co.	249,920	1,178,188	1.16	7.08

The **Atlas Powder Co.** reports that 1941 was a year of intense activity in all major departments. Sales and other operating revenues amounted to $34,517,750, an increase of 68 per cent over 1940. Sales of products for direct military use, plus fees received for work on government-owned ordnance plants, represented approximately 28 per cent of the total sales and operating revenues. Sales of commercial products increased 45 per cent over 1940. Federal income, excess profits, and capital stock taxes were $4,621,214, compared with $1,105,891 in 1940. The number of employees at the close of 1941 was 4,380, compared with 3,104 at the close of 1940.

E. I. du Pont de Nemours & Co., Inc., reports that sales and other operating revenues were about 40 per cent greater in 1941 than in 1940, while net income was about 4 per cent greater, principally because of higher federal taxes. Total taxes in 1941 were equivalent to about 127 per cent of earnings available for dividends, compared with 65 per cent in 1940. During 1941, $50,600 was expended for plant construction, 68 per cent for additional capacities, and 32 per cent for renewal and betterment of equipment and facilities. The company is constructing and operating a number of new plants for the Government.

The Devoe & Raynolds Co., Inc., reports that on November 30, 1941, it completed the most successful year in its history, both sales and profits establishing new records. All divisions of the company are now concentrating heavily on war business. During the year the company sold 29,000 shares of 5 per cent cumulative preferred stock at $101 a share, using the proceeds to redeem 15-year 4.25 per cent sinking fund debentures and 7 per cent cumulative preferred stock.

Rheostat Cages



A variety of rheostat cages have been developed by the Ohmite Manufacturing Co., 4835 Flournoy St., Department 9B, Chicago, Ill., for use with Ohmite rheostats. A cage enclosure is a convenient form of table top or surface mounting and is advisable where there is possibility of mechanical injury to the rheostat or human contact with electrically "live" parts.

Ventilated cages with perforated sides are most generally applicable. Other types available are dustproof cages, cages to house rheostats in tandem, explosion-proof cages, ventilated cages with one half closed as a splash guard, and laboratory type semienclosed table-top cages.

Branding Tires



To combat the growing wave of tire thefts, The Firestone Tire and Rubber Co.'s dealers and stores will give motorists theft protection by branding their initials on the sidewalls of their tires. Branding also facilitates the tracing of tires that may have disappeared.

The motorist who utilizes the extra mileage plan is assigned a specific day on which to bring his car in each month for a bumper-to-bumper inspection. To speed the branding, service men will use a special electrically heated iron.

Ultra-Violet Products, Inc., 5205 Santa Monica Blvd., Los Angeles, Calif., announces a new model of Mineralight, ultraviolet ray black-light lamp, useful for identifying the tungsten ore scheelite and other minerals which also fluoresce under black light.

Investigate . .

BARNSDALL SPECIAL WAXES

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Samples and Information Gladly Furnished

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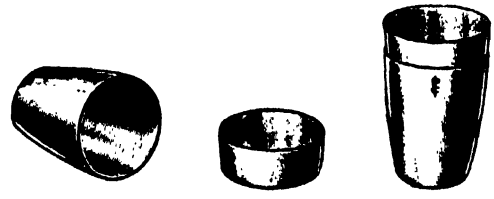
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DIMETHYL ETHER
ETHANE
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ETHYLENE
ETHYLENE OXIDE
HELIUM
HYDROGEN
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ISOBUTANE
KRYPTON
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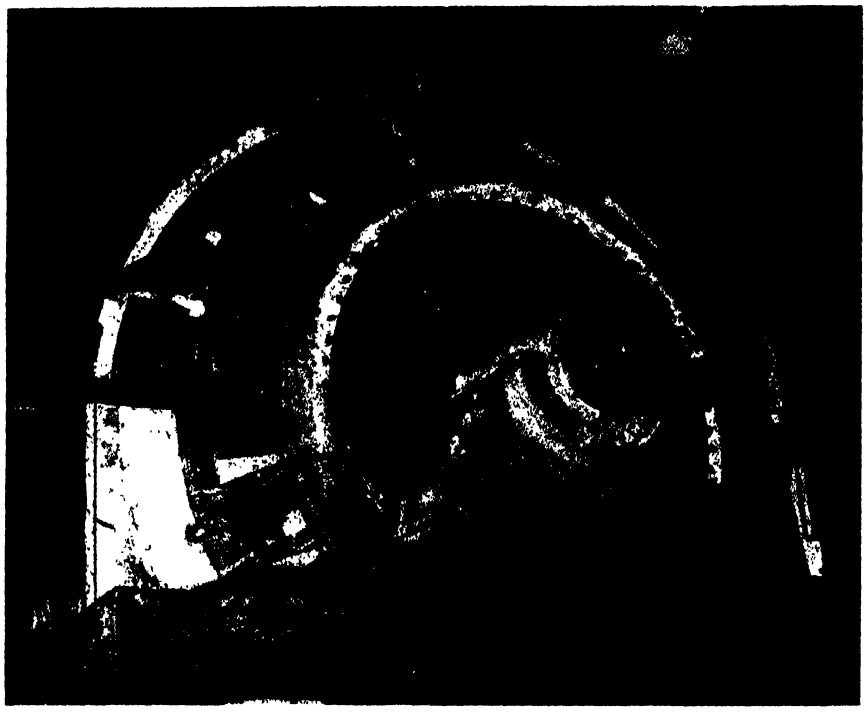
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Specifically for the determination of volatile matter in coal and coke, these crucibles have become widely accepted. Their features are light weight, uniform wall thickness, and the ability to withstand repeated heating to 1000°C. without appreciable change in weight. They are useful in a variety of laboratory procedures where extreme resistance to corrosion is not essential.

For further details, obtain a copy of Bulletin E-65 from your laboratory supply house or write direct to:

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Rotary Converter

An important element in the gasoline that powers America's fighting planes is created by an electrolytic process requiring direct current. This 5,440-kw. rotary converter nearly ready for shipment at the Westinghouse East Pittsburgh works soon will be installed at a Niagara Falls chemical plant. Operating from a 6-phase, 25-cycle line, the unit will deliver direct-current power at 135 to 355 volts, 16,000 amperes. The armature spider acts as a fan and eliminates brush dust by a special ventilating design.

Fiberglas Replacing Strategic Materials

As a new basic material made of ingredients plentiful in the United States, Fiberglas is assuming rapidly increasing importance in replacing scarce strategic materials such as cork, aluminum, nonferrous asbestos, and mica.

In several of its fabricated forms Fiberglas is replacing aluminum—for instance, fiberglas-insulated cables can be used without metal conduits in airplanes. Fiberglas is taking the place of cork in certain types of low-temperature insulation. In the manufacture of ground insulation for electrical equipment, Fiberglas is combined with mica, and Fiberglas electrical insulation is replacing asbestos in electric motors, generators, and transformers.

Electric tapes woven from glass fibers show greater tensile strength than similar electric tapes made of either cotton or asbestos, and this strength is retained through a temperature range rising well above that at which other tapes are destroyed.

Savings in both space and weight have been made possible in the manufacture of magnetic type electrical equipment, such as Class B motors, built on frames a size smaller than was formerly standard for a given power output. Use of Fiberglas thermal and electrical insulation in a modern battleship makes possible a saving of approximately 60 tons, equivalent to the weight of munitions required to fire four to five salvos from the main battery, or of enough fuel oil to give the vessel six additional days away from its base.

Gas Purification Plant

The Girdler Corp., Louisville, Ky., is proceeding with the design and erection of a Girbotol plant to purify and dehydrate 25,000,000 cubic feet per day of condensate-separator gas from the McKamie, Ark., field for the McKamie Gas Cleaning Co., of Arkansas. This is the first purification plant designed to produce a marketable gas from this extremely sour field. The gas, which contains about 4,500 grains of hydrogen sulfide per 100 cubic feet and approximately 5 per cent carbon dioxide, will be purified to pass the very sensitive Bureau of Standards test for hydrogen sulfide.

A gasoline recovery plant will also be erected and later it is planned to add another plant to convert the recovered hydrogen sulfide to elemental sulfur, sulfuric acid, or some other useful product.

Victor Chemical Employees Victory-Minded

The Victor Chemical Works, Chicago, Ill., report that 99.48 per cent of the employees at all plants and offices have voluntarily subscribed to the defense bond purchase plan. Employees may purchase Defense Bonds, Series "E", of any denomination from $25 to $1,000, through pay-roll deductions of from 50 cents per week up. A special Bond Savings Fund is set up by the company for the employee and when enough is accumulated in that fund, the bond is purchased and given to the employee.

STOP GAS and ACID Leaks with CHARLAB CHEMICAL PUTTY

Waterproof—Acid Resistant—Stays Plastic

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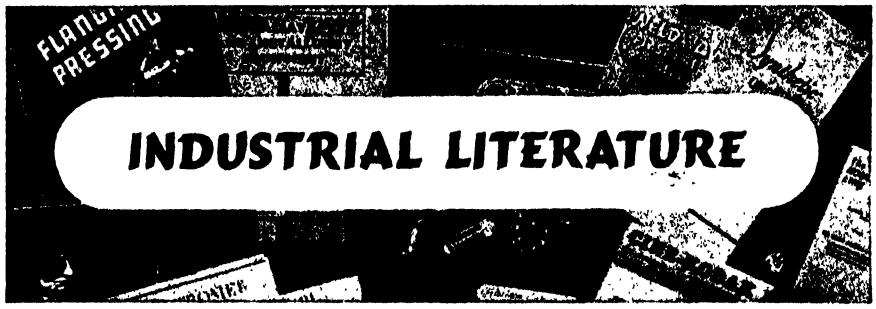
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Listed publications should be requested directly from the company concerned. Use business stationery, mention bulletin numbers, and refer to this journal. Publications will be sent free unless otherwise noted.

Acid-Resistant Alloy Steel. Available in various cast and rolled forms as well as in pumps and valves, this high-nickel, high-chromium, molybdenum low-carbon alloy steel, containing less than 50 per cent iron, is described in a 12-page booklet. Complete information on corrosion resistance and welding and physical properties is included. *Bulletin W-350-B42 IE.* Worthington Pump and Machinery Corp., Harrison, N. J.

Automatic Control and Recording Instruments. A 4-page pamphlet shows briefly a complete line of industrial instruments. Each type is illustrated. *Bulletin 585 IE.* The Bristol Co., Waterbury, Conn.

Ball and Pebble Mills. This catalog contains 54 pages of illustrations and descriptions on construction and operation of a large line of mills. *Catalog T IE.* Paul O. Abbe, Inc., 143 Center Ave., Little Falls, N. J.

Building Heaters. A series of 4 data sheets gives specific information on heat diffusers designed to provide economical heating for large spaces. The heaters are built in sections, which makes for ease in handling, decreased erection costs, and convenience in installation. *Data Sheets 46R-1, 46Q-1, 46P-2, and 46P-1 IE.* Carrier Corp., Syracuse, N. Y.

Control Instruments. A 4-page pamphlet, slanted to plant operators, power plant engineers, and research men, describes industrial models of recording gas analyzers and recorders, pH instruments, pyrometers, and moisture indicators. *List CEC IE.* Cambridge Instrument Co., Inc., 3732 Grand Central Terminal, New York, N. Y.

Conveyors. This 16-page pamphlet illustrates a great many uses for belt and apron conveyors and bucket elevators. *Bulletin 410 IE.* Chain Belt Co. of Milwaukee, Milwaukee, Wis.

Dispersed Rubber. A file of catalog and data sheets is devoted to the manufacture and use of dispersed rubber. Included is a complete listing of physical properties and a detailed description of equipment used in the fabrication of dispersed rubber products. *Handbook on Water Dispersed Rubber IE.* Dispersions Process, Inc., 1230 Sixth Ave., Rockefeller Center, New York, N. Y.

Fans. An improved design in industrial fans is described in a pamphlet just issued. *Form 3349-10-41 IE.* Buffalo Forge Co., Buffalo, N. Y.

Feedoweight. A 14-page bulletin covers equipment for feeding, proportioning, or batching. This bulletin is well illustrated and includes tables of capacity and installation drawings. *Bulletin 551 IE.* Merrick Scale Mfg. Co., Passaic, N. J.

Glass. This 30-page booklet has been prepared to aid manufacturers in adapting glass as a substitute for strategic materials no longer available for many uses. This booklet contains extensive data on physical properties of flat glass products. *Booklet G 225 IE.* Pittsburgh Plate Glass Co., Pittsburgh, Penna.

Hydraulic Machinery and Equipment. A 40-page booklet presents an extensive pictorial review of uses of hydraulic equipment. Also included are engineering tables and data relative to current practices in design and general applications. *Bulletin 110-A IE.* Watson-Stillman Co., Roselle, N. J.

Liquid Level Controls. A loose-leaf catalog lists in detail a series of mercury switch equipment for dependable and accurate control of liquid levels. The catalog is bound in a file folder to permit the addition of new catalog pages as they are issued. *Liquid Level Controls Catalog IE.* Fred H. Schaub Engineering Co., 325 West Huron St., Chicago, Ill.

Metal Equipment. This 8-page booklet illustrates many metal items, such as cabinets, work tables, tote boxes, trays, hopper trucks, and tanks, that are fabricated to order for the process industries. *Metal Equipment for Industrial Processing Booklet IE.* Glasco Equipment Corp., 544 West 30th St., New York, N. Y.

Metallurgical Heat Treating. Furnaces and control equipment for carburizing are described in a 25-page catalog. Included are illustrations of a large variety of items carburized with this equipment, which is entirely automatic and requires only the setting of a few simple controls for the job. *Catalog T-623 IE.* Leeds & Northrup Co., 4907 Stenton Ave., Philadelphia, Penna.

Metallurgical Laboratory Equipment. A 20-page loose-leaf catalog covers ap-

HIS NEEDS
AND YOURS



Our Country's defense program has imposed tremendous responsibilities on the chemical industries.

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is glad to do its utmost in providing needed defense chemicals, and is equally cognizant of its responsibilities to the industries it serves.

While priorities must rule, they do not rule out our desire to serve the chemical using and chemical producing industries where priorities are unavailable. With expanded production facilities and personnel, HOOKER welcomes consultation and statements of requirements and will utilize all of its resources and resourcefulness to meet customers' needs as promptly and fully as possible.

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Antimony Trichloride, Anhydrous
Arsenic Trichloride, Anhydrous
Monochlorbenzene
Orthodichlorbenzene
Paradichlorbenzene
Trichlorbenzene 1:2:4
Tetrachlorbenzene 1:2:4:5
Tetrachlorbenzene 1:2:3:4
Pentachlorbenzene
Hexachlorbenzene
Monochlortoluene
Ammonium Benzoate
Benzoate of Soda
Methyl Benzoate
Benzoic Acid
Benzoic Anhydride
Benzal Chloride
Benzotrichloride
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Benzyl Alcohol
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Para Nitrobenzoyl Chloride
Chlorinated Paraffin
Methyl Dichlor Stearate
Dichlor Stearic Acid
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Dibenzyl Disulfide
Alpha Chlor Naphthalene
Dichlor Naphthalene
Polychlor Naphthalenes
Cyclohexanol
Methyl Cyclohexanol
Piperidine
Acetyl Chloride
Butyryl Chloride
Iso Propyl Chloride
Phosgene
Propionyl Chloride
Sulfuryl Chloride
Thionyl Chloride
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713-B

paratus designed for precise and rapid analysis in the metallurgical field. Illustrations of several assemblies of the complete apparatus required for certain analyses and a price list are included. *Precision Control Equipment for the Laboratory Catalog IE.* LABORATORY EQUIPMENT CORP., Benton Harbor, Mich.

Photoelectric Colorimeter. A 4-page pamphlet describes a portable instrument, said to be sturdily built and simple in operation. This pamphlet details both design and operation. A full list of accessories is included. *Lumetron Model 400 IE.* PHOTOVOLT CORP., 95 Madison Ave., New York, N. Y.

Refractory Coating. A 4-page pamphlet discusses the breakdown of furnace walls and suggests procedure and materials for the repair of such linings. *Why Furnace Walls Break Down Pamphlet IE.* BRICKSEAL REFRACTORY CO., 1029 Clinton St., Hoboken, N. J.

Resin Emulsions. A series of 7 data sheets has been issued on various resin emulsions. Two pages are devoted to a stiffener for felt hat bodies. Three pages suggest uses for resins and lacquer emulsions. *Technical Data Sheets IE.* AMERICAN RESINOUS PRODUCTS CORP., Peabody, Mass.

Rotary Pumps. This 26-page catalog is devoted to the construction, installation, performance, applications, and accessories of a complete line of rotary pumps. *Gast Rotaries Catalog IE.* GAST MFG. CORP., Benton Harbor, Mich.

Stainless Steel Equipment Fabrication. This 16-page booklet contains suggestions to aid the engineer who is designing or specifying stainless steel processing equipment. The welding of stainless steel is discussed in detail with a series of drawings indicating good and poor procedure. *What to Look for When You Specify Stainless Steel Booklet IE.* S. BLICKMAN, INC., Weehawken, N. J.

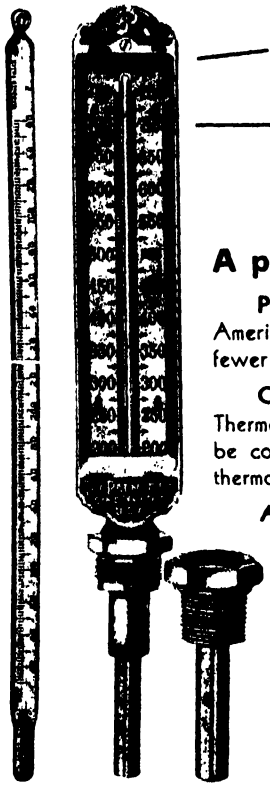
Steam Traps. Float-thermostatic steam traps, compressed steam traps, and liquid level controls are fully described in an 8-page bulletin. Complete information on sizes, capacities, and installation details is included. *Bulletin 450 IE.* SARCO CO., INC., 475 Fifth Ave., New York, N. Y.

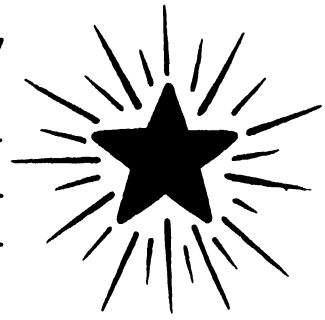
Steam Turbines. Two pamphlets cover the design and construction of steam turbines, with and without reduction gears. *Bulletins 1951 and 1955 IE.* MOORE STEAM TURBINE DIV., WORTHINGTON PUMP AND MACHINERY CORP., Harrison, N. J.

Temperature Control for Galvanizing Kettles. Close control of temperature of galvanizing kettles is important because the type of coating is dependent upon the spelter temperature, and the life of the kettle is dependent upon keeping the temperature within certain limits. Designed for fuel fired kettles, this control system is described in technical detail. *Bulletin 38-4 IE.* THE BROWN INSTRUMENT CO., Wayne and Roberts Aves., Philadelphia, Penna.

Tramrail Conveyors. A 12-page booklet describes and illustrates equipment and many applications of interest to anyone using overhead conveyors. *Booklet 2008-A IE.* CLEVELAND CRANE & ENGINEERING CO., 1191 East 283rd St., Wickliffe, Ohio.

A New STAR To Follow In 1942





ECONOMY!

A paramount Issue of the Day

Palmer Thermometers, made with extreme care, by skilled American workmen, mean extra life to these instruments, and fewer repairs.

Careful annealing, which is a feature of every Palmer Thermometer, gives you a round dollar value, which should be considered before you sign your next order, for any thermometers.

And "Red-Reading-Mercury" . . . the easy to read RED column, costs you no extra. Buy thermometers that will give you real service.

WRITE FOR CATALOG & PRICES

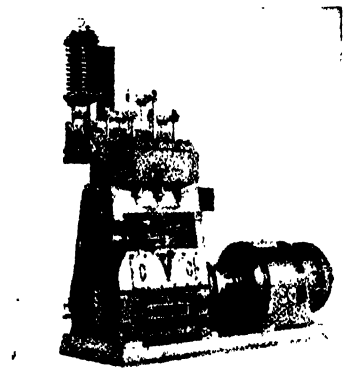
THE PALMER CO., MFGRS.

Industrial, Laboratory, Dial and Recording Thermometers

2517 Norwood Ave., Cincinnati, Norwood, Ohio

Canadian Plant: King and George Sts., Toronto

High-Pressure Power Pumps



A LINE of high-pressure vertical triplex constant-stroke pumps has been developed by the Aldrich Pump Co., Allentown, Penna. The pumps are of various sizes from 10 to 150 h. p. for pressures up to 9800 p. s. i. and capacities up to 220 g. p. m. Improved design makes the pump particularly applicable to gear-head motor or speed-reducer drive. Provision has also been made in the larger sizes for the use of built-in gearing, or belt direct to crankshaft.

These pumps can be fitted with synchronized suction valve control for services such as central hydraulic accumulator systems where several presses are in constant operation. For special process work at the high pressures encountered in oil refining and the chemical industry the outboard plungers are sealed dust- and weather-tight with a removable cover.

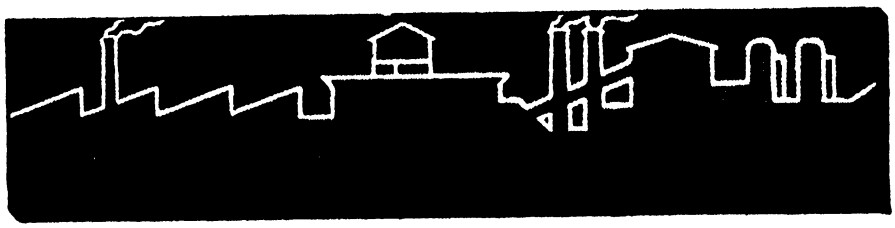
High Impact-Resistant Phenolic Molding Plastic

THE Bakelite Corp., unit of Union Carbide and Carbon Corp., New York, N. Y., has announced the development of a new impact-resistant phenolic molding plastic, designated as Bakelite phenolic resin XM-15000, that can be preformed on automatic tabletting machines.

When molded it has approximately twice the shock resistance of general-purpose phenolics. Its water resistance is also good when compared with other shock-resistant phenolic plastics.

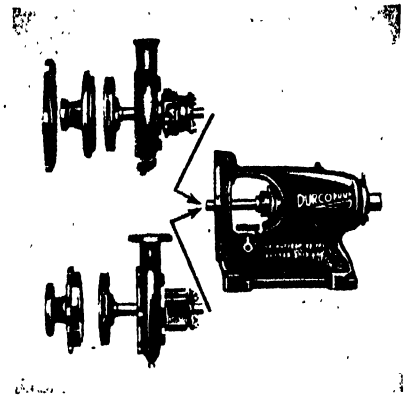
Corrosion-Resisting Valve Capacity

JENKINS BROS., 80 White St., New York, N. Y., announces that it has materially increased productive capacity of corrosion-resisting alloy valves. The line of globe, angle, Y, and check valves has been augmented by solid wedge and double disk-taper seat gates in sizes to 6 inches. Another innovation is "certified castings", each casting being x-rayed as well as pressure-tested.



Convertible Chemical Pump

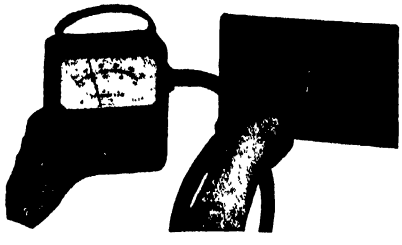
A NEW series of corrosion-resisting pumps in which it is possible to get 480 combinations of alloys, types, and sizes with heads and capacities to meet practically any requirements was displayed at the recent Exposition of Chemical Industries by The Duriron Co., Inc., Dayton, Ohio.



Durcopumps that are made in the high-silicon irons, Duriron and Durichlor, can be converted to stainless steel pumps by substituting the wet-end parts. The exchange can be made without disturbing the setting of the pump.

Other features include the interchangeability of newly designed open and closed impellers with negative pressure on the stuffing box, oversize ball bearings throughout, and microadjustment of the impeller to obtain maximum efficiency.

Intake or Exhaust Grille Jet



THE Illinois Testing Laboratories, Inc. 420 North LaSalle St., Chicago, Ill., offers a new intake air exhaust grille jet, developed for use with the Velometer. This jet has two calibrated air intake openings, one at the end of the main member. This member forms a compensating tube and extends from the grille face outward from or beyond the critical suction zone.

At right angles to this main member is a branch tube also calibrated, to which is attached the flexible tube connecting the jet to the Velometer. The air actuating the Velometer movement is inspirated through this branch tube by the force of the suction exerted upon the main member or compensating tube.

Portable Still

THE necessity for full recovery of chlorinated solvents (used principally in vapor-type degreasers) in industrial plants brings a development by the Phillips Manufacturing Company, Chicago, Ill., of an electrically operated and controlled, fully automatic, air-cooled, portable still and condenser.

All heaters and controls are mounted integrally on the easily removed pot head, assuring easy cleaning and servicing, as well as easy access to the pot with no fixed fittings on the interior to trap solids.

The collector chamber of the condenser tower is fitted with a moisture trap to ensure removal of water which may be in solution with dirty batches, and the clean solvent discharge pipe is at a level permitting draining into a standard drum lying on the floor.

Sewage and Sludge Sampler

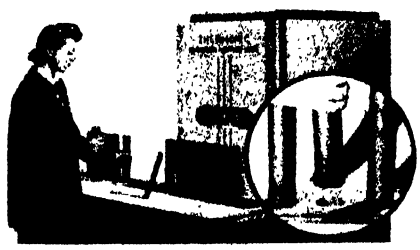
THE P. F. T. sewage and sludge sampler for sampling still or flowing liquids without disturbing the liquid bodies or contaminating the samples, has been introduced by the Pacific Flush-Tank Co., 4241 Ravenswood Ave., Chicago, Ill.



The unit consists essentially of a metal cylinder with an inflatable rubber valve at each end, supported at the axis of the cylinder. On one side is a sample withdrawal cock and a vent cock. The valves are closed, the unit is lowered to the desired depth in the medium to be sampled, and after the liquid has flowed through the cylinder for a few moments the valves are again inflated, closing both ends of the unit.

Brazing Equipment

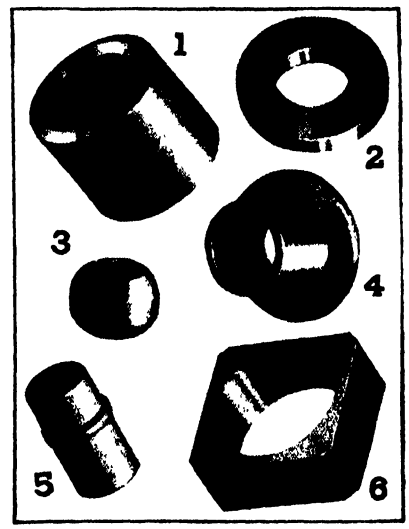
THERMONIC Induction heating, applied by push-button control to brazing units of work at the rate of 10,000 a day, has been developed by the Induction Heating Corp., 389 Lafayette St., New York, N. Y.



The temperature is controlled exactly to the brazed area and adjoining areas, with no annealing beyond, and no metallurgical change. Seven units are brazed at one time, using a silver-brazing alloy which gives a strong joint free from internal oxidation.

Porous Iron Bearings

THE Keystone Carbon Co., Inc., 1935 State St., St. Marys, Penna., announces the addition of Selflube porous iron bearings to its line of self-lubricating bronze bearings. The new bearings are stronger than porous bronze bearings, and are interchangeable with them in most applications. They were introduced to conserve copper and were perfected after years of research work in the company's laboratories.



The bearings are made from powdered iron, which is molded to size in the shape desired, then baked, and finally saturated with a good grade of oil. They have an average porosity of 25 to 35 per cent, enabling them to store a large amount of oil which forms a protective, continuous oil film on the bearing surface.

Rustproofing Solution

RUSCAT is a new rustproofing and metal cleaning solution developed by the Research Laboratories of The United States Stoneware Co., Akron, Ohio. Its principal use is for the cleaning and preparation of metal surfaces before the application of corrosion-resistant paints and coatings and for preventing further rust formation.

Its use produces a mild etch over metal surfaces, resulting in the development of a chemically adherent inorganic base over which the lacquers and coatings are made to gain their maximum adhesion. A thorough chemical cleaning of the minute pores of the metal is achieved, along with the removal of all surface contamination, scale, and rust.

Employee Profit Sharing

IN ACCORDANCE with company policy, the Quaker Chemical Products Corp., Conshohocken, Penna., distributed a portion of 1941 earnings to each office, factory, and laboratory employee in the form of a bonus based on present salary,

CONTINUED ON PAGE 312

EMPLOYMENT CLEARING HOUSE

MEMPHIS, TENNESSEE

APRIL 19–24, 1942

▼ ▼ ▼ ▼

ST. LOUIS, April 1941 — 1200 interviews

ATLANTIC CITY, September 1941 — 1000 interviews

MEMPHIS, April 1942 — ?

A service maintained for and limited to members and paid student affiliates of the American Chemical Society.

Since personal conference between employer and prospective employee is its main objective, the Clearing House will be open only to those registered at the Memphis meeting.

Advance registrations now being accepted.

For forms write to

American Chemical Society
1155—16th Street, N. W.
Washington, D. C.

See CHEMICAL AND ENGINEERING NEWS January 10, page 36.

RATES to be paid in advance. Standard setting 5c a word, minimum charge $2.00 each; include 8 words for box address. Exceptions see ⟶ Display, $7.50 per column inch. No discounts or allowances.

SEND advertisements with remittance to INDUSTRIAL AND ENGINEERING CHEMISTRY, 332 West 42nd St., New York, N. Y., to reach there not later than 10:00 A.M. on the 10th and 25th, closing dates for NEWS EDITIONS of the 25th and 10th, respectively. Insertions made in order of receipt provided necessary remittances are complete.

Employers are requested to mention in their announcements the section of the country in which the open position is located to ensure replies only from those who are geographically available.

In printing these advertisements the SOCIETY assumes no obligations as to qualifications of prospective employees or responsibility of employers.

Unemployed members of the AMERICAN CHEMICAL SOCIETY seeking employment for themselves are allowed in one calendar year 3 free announcements, one per issue, set in standard style and limited to 50 words each, including 8-word box address. Excess words 5c each. Additional standard announcements 50% of regular rate.

Employed members of the AMERICAN CHEMICAL SOCIETY seeking new positions are permitted 3 standard announcements during the calendar year at 50% of the regular rate—include 8 words for box address.

Employers seeking chemists and chemical engineers are permitted 3 standard announcements, not to exceed 50 words each including box address and not more than one per issue, during the calendar year without charge, provided they agree in writing to acknowledge all replies (excess words 5c each), otherwise full rate applies.

The AMERICAN CHEMICAL SOCIETY is vitally interested in the welfare of its members and in seeing that the chemical industry is manned with competent chemists and chemical engineers. These pages are part of our service in that connection. In addition most of the larger sections of the AMERICAN CHEMICAL SOCIETY and several of the smaller ones have active employment committees. Local section secretaries in your area will inform you as to any employment aids that may be available locally.

An Employment Clearinghouse is operated at each national meeting of the SOCIETY for the purpose of bringing together representatives of industry looking for chemists and members and student affiliates in attendance wishing to make such contacts. For further details, consult the preliminary and final programs as printed in the NEWS EDITION prior to each meeting.

In the New York area, special employment facilities are offered by the Employment Bureau of the Chemists' Club, 52 East 41st St., New York, N. Y. In the Chicago area, the Chicago Section maintains an employment service at 413 Stevens Hotel, Chicago, Ill.

Those replying to announcements should be careful to send copies and not original documents. Advertising circulars will not be forwarded and to that end all letters will be opened at the forwarding office.

SITUATIONS OPEN

Those announcements in which the letter "P" is part of the address key have paid in full and are not committed to acknowledge replies. The Society regards acknowledgment by employers of all applications as an act of common courtesy but can assume no responsibility for their failure to do so.

WANTED BY large Eastern concern for immediate employment; Chemists or chemical engineers for research and development work in petroleum and polymer chemistry. Our own employees have been advised of this advertisement. Replies will be treated in strictest confidence. Submit photograph with details of experience and qualification
Box 22-N-1, Ind. & Eng. Chem., Easton, Pa

RESEARCH CHEMIST wanted with actual working knowledge of formulation and production of synthetic resins, particularly of the phenolic type, to develop new thermo-setting resins from certain natural raw materials.
Box 28-T-1, Ind. & Eng. Chem., Easton, Pa.

GOOD OPPORTUNITY for Chemist experienced in production or research on manufacture X-ray intensifying screens. Give complete details including education, personal history, experience, salary desired, references. Include small recent photograph. Location New York City.
Box 35-T-1, Ind. & Eng. Chem., Easton, Pa.

GRADUATE ASSISTANTSHIPS at the University of Maine. Applicants may work half time toward the master's degree in chemistry or chemical engineering. Remuneration $500 plus tuition for twelve hours' laboratory instruction per week for the school year. Applicants should be in the upper quarter of graduating class. All applications must be received before March 15 and should include complete personal data, photograph, official transcript, preferred research field and three reference letters.
Box 11-N-2, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST. With advanced degree and 3 years' experience in biochemical field. Experience with tobacco analysis highly desirable but not essential. Give personal data, qualifications, salary expected and enclose photograph in first letter.
Box 30-N-2, Ind. & Eng. Chem., Easton, Pa.

PLASTICS CHEMIST for development work on by-products. Must be free to travel for prolonged periods. Send full data regarding education, experience, salary desired and small photo.
Box 67-NP-2, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER for sales promotion of industrial instrumentation in process industries. Sound technical training and several years process experience essential. Send photo and complete record with first letter. The Foxboro Company, Foxboro, Mass.

RESEARCH CHEMIST with broad training in the food industry. Good foundation in physical and organic chemistry necessary. Applicants should give educational history, scholastic grades, experience, age and other personal data, and recent photo. Excellent opportunity for qualified person.
Box 10-TP-2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST with experience producing synthetic rubber. Good opportunity for capable man. Give past experience and former employment. Address: Bradley Murray, P. O. Box 1889, Tulsa, Okla.

ORGANIC CHEMIST of Bachelor or Master grades. Applicants should give educational history, experience, age, and recent photo. Opportunity for qualified person in research laboratory of prominent food organization.
Box 14-TP-2, Ind. & Eng. Chem., Easton, Pa.

WANTED IMMEDIATELY, Chemical Engineer or Mechanical Engineer with working knowledge of inorganic chemistry, as assistant in directing operations. Experience in leaching, evaporation, and electrodeposition desirable but not essential. Location near Pittsburgh, Pa. Send full particulars and photograph with first letter.
Box 17-T-2, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEERS and Chemists. Recent graduate, for laboratory and plant research work, mostly inorganic. Location near Chicago. Thorough knowledge of chemical fundamentals essential. Give full personal and scholastic details. Application must include photograph.
Box 20-T-2, Ind. & Eng. Chem., Easton, Pa.

ORGANIC RESEARCH Chemist, Bachelor or Master. Experienced in coal tar products. Location, Wisconsin. In first letter of application state age, experience, education, salary expected, citizenship, marital status.
Box 21-TP-2, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST of Master or Ph.D. grade. Applicants should give educational history, experience, age, and recent photo. Opportunity for qualified person in research laboratory of prominent food organization.
Box 22-TP-2, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEERS. Large chemical company in the East has positions available for several outstanding chemical engineers, experienced or recent college graduates, who are technically proficient for engineering and process development work. Must have B.S. or M.S. degree from good technical college. The work involves studies and investigations of processing, raw materials, plant equipment, plant layout and cost reduction. Good opportunities for capable engineers. State age, college, year graduated, degree, by whom employed, present salary and salary expected. Will keep confidential. Enclose small photograph.
Box 23-TP-2, Ind. & Eng. Chem., Easton, Pa.

BACTERIOLOGIST, M.S. or Ph.D., with 3-5 years' applied experience in the field of sanitation and disinfection wanted by prominent eastern manufacturer for research and development work. Creative ability must be established. Consideration will be given only to those who fully meet the above requirements. In replying give full academic industrial and personal background. Transcript of academic record, scientific and personal references, and recent photograph will be requested.
Box 25-TP-2, Ind. & Eng. Chem., Easton, Pa.

CEREAL CHEMIST. Preferably with two or three years' experience. Applicants should give educational history, scholastic grades, experience, age, and recent photo. Excellent opportunity for qualified person in research laboratory of prominent food organization.
Box 26-TP-2, Ind. & Eng. Chem., Easton, Pa.

WANTED: OUTSTANDING Chemical and Metallurgical research engineer for large California aircraft company. High caliber man with a master's or doctor's degree, 5 to 10 years in teaching and industrial experience required in developing and analysing materials, chemicals, and processes. Salary dependent upon qualifications. Submit details of education, experience, personal data, salary requirements, and photograph.
Box 28-TP-2, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER to supervise construction and operation of equipment handling sulphuric acid. Give full particulars regarding education, experience, and salary desired.
Box 30-TP-2, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST for a food research laboratory. Sound training in the fundamentals of chemistry required. Details of educational history and experience, age, and other personal data, and recent photo should be submitted.
Box 31-TP-2, Ind. & Eng. Chem., Easton, Pa.

DIRECTOR OF RESEARCH—MAN OF WIDE EXPERIENCE

High attainments and outstanding accomplishments in organic chemical and related fields for large and successful company undertaking program of expansion in research work setting up new department. Unusual salary to the right man.

Box 32-TP-2, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER. Applicants should give educational history, scholastic grades, experience, age, and other personal data, and recent photo. Excellent opportunity for qualified person in research laboratory of prominent food organization.
Box 33-TP-2, Ind. & Eng. Chem., Easton, Pa.

ORGANIC RESEARCH chemist with recent extensive experience in the field of pigments, dyestuffs or intermediates for research work with large, expanding Eastern chemical company. Please give full particulars, including detailed history.
Box 39-TP-2, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST active in pharmaceutical or biological research, with considerable recent experience, for permanent position with progressive chemical firm. Compensation commensurate with qualifications. Give full particulars.
Box 40-TP-2, Ind. & Eng. Chem., Easton, Pa

A LARGE NATIONALLY known manufacturer with a large research organization needs a number of technical men. Among those needed is one with industrial or research experience in Asphalt Flooring or Paving Materials. Another needed should be a mature research chemist for development work and industrial sales problems on non-metallic building material products. Applicants should possess a good personality to be able to handle field contacts when required. Another is wanted for development and sales assistance on pressed wood products. Experience in coatings, finishes, and panel manufacture desirable. Another is wanted for research in asphalt, roofing research and manufacture. This man must be a B.S. or better in Chemistry or Chemical Engineering. In all cases give full details; education, experience, salary desired. Location Chicago.
Box 54-TP-2, Ind. & Eng. Chem., Easton, Pa.

A LARGE NATIONALLY known manufacturer with a large research organization needs an organic chemist for research work in the wood products research section. Applicants should be specialized in wood chemistry. Some industrial experience in this line is desirable but not essential if academic training is adequate. Applicants should be aggressive and have sufficient ability to be able to eventually carry considerable responsibility in fiber and hardboard research work. Give full details of education, experience, age, salary expected.
Box 55-TP-2, Ind. & Eng. Chem., Easton, Pa.

AN EXCELLENT OPPORTUNITY for a young pharmaceutical Chemist to direct the manufacture of Ampoule preparations in a well established New York Pharmaceutical Firm. He must have a thorough knowledge of the preparation, analysis, filtration, sterilisation, and sterility testing of Ampoule solutions. Applications stating age, experience, and salary requested.
Box 56-TP-2, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER with at least five years' commercial experience to work in plastic field, principally in production but also in design of equipment for plastic operations. Plant located in the Midwest. Sound training and experience required. State qualifications, salary expected and recent photograph.
Box 59-TP-2, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 310)

Address communications to the box number indicated and Mail to Easton, Penna.

The American Chemical Society has no information concerning the position advertised—or in regard to those seeking employment.

(Situations Open Continued)

METALLURGICAL CHEMIST College graduate between 27 and 35 years of age having at least three years' industrial experience in metallography and analytical chemistry wanted for research work in a progressive organization in Chicago area. Candidate must be fast and accurate particularly in metal analyses and must have ability for research work and report writing and must be able to assume responsibility for carrying an outlined research program to completion. Excellent opportunity for advancement. Give full details of experience, education, personal data, salary requirement, and enclose a snapshot. Must be United States citizen. Reply.
Box 57-TP-2, Ind. & Eng. Chem., Easton, Pa.

WANTED
SALES AND SERVICE ENGINEER

A large well established Chemical Engineering and Consulting Organization supplying water conditioning service and chemicals essential to industrial plants, has a few vacancies in its sales and service staff. Qualifications should include knowledge of chemistry, engineering principles and the ability to meet and talk with people. Compensation on a basis of salary, bonus and expenses, with excellent opportunity for advancement. Our entire staff has knowledge of this advertisement.

Box 60-TP-2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST or CHEMICAL Engineer. Well grounded in organic and physical chemistry for industrial Research relating to the process industries. Experience not absolutely essential. Initiative required. Give personal data, education, reference, expected salary, and recent photo.
Box 63-TP-2, Ind. & Eng. Chem., Easton, Pa.

RESEARCH FELLOWSHIPS in Wood chemistry available September 1942 for M.S. candidate. Full time research and study. Stipend $50 per month for nine months. Bachelor degree in chemistry or chemical engineering required. Address applications to Dean D. S. Jeffers, University of Idaho, Moscow, Idaho

ANALYTICAL CHEMIST. 3 to 5 years' experience in analytical chemistry. Able to develop analytical methods for newly synthesized compounds, mostly organic. Must be familiar with micro-analytical methods. Control on manufactured products. Give full information. State if draft deferred. Plant located near New York City.
Box 93-TP-2, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER for sales development work with products and processes recently developed by an established organization that is pre-eminent in its own field and is seeking to establish new markets for related products and processes. Applicant must be thoroughly trained in fundamentals of chemistry and engineering, able to express himself clearly, and shall have had at least 5 to 10 years' experience in similar pioneer sales development work. Apply by letter stating qualifications briefly and requesting detailed application blank.
Box 96-T-2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST or CHEMICAL Engineer with research and development experience in automotive grease and lubricants, location metropolitan district New York. Applicant should give educational history, experience, record of previous employment, age and draft status.
Box 97-TP-2, Ind. & Eng. Chem., Easton, Pa.

THREE ORGANIC Chemists M.A. degree 1941 or 1942 preferred wanted for organic research developing new uses and products for organic chemical manufacturer. Submit full details concerning education, scholarship, experience, personal data, references, draft status, and recent photo. State salary desired. Address Post Office Box 460, Niagara Falls, N. Y.

RESEARCH CHEMIST with considerable experience in the chemistry of lignin, capable of supervising and conducting theoretical and practical work on various types of lignin. Salary open, dependent on experience.
Box 99-T-2, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST. Eastern A. C. S. approved college with modern well equipped laboratory and library needs instructor for next academic year. Candidate should be less than 28 years old, preferably single, with a Ph.D. from leading university. Instructor will have light teaching load, and plenty of opportunity for research.
Box 103-T-2, Ind. & Eng. Chem., Easton, Pa.

TEACHING FELLOWSHIPS in chemistry, State College of Washington; master's and doctor's programs in organic, inorganic, analytical, physical, and physiological chemistry. One-half time assisting, stipend $450, plus out-of-state tuition.
Box 104-T-2, Ind. & Eng. Chem., Easton, Pa.

ORGANIC RESEARCH Chemist and Assistant Chemists for research and development work. Excellent opportunity for the right parties. Industrial experience welcome but not necessary. Give complete details including education, personal history, citizenship, draft status, experience, salary desired, send recent photo. Location, North Jersey.
Box 105-TP-2, Ind. & Eng. Chem., Easton, Pa

CHEMIST or CHEMICAL Engineer wanted for production work in field of thermo-plastic wire coverings. Excellent opportunity. New England location. Advise all particulars in first letter and enclose recent photograph.
Box 106-TP-2, Ind. & Eng. Chem., Easton, Pa.

OPENINGS in WASHINGTON, D. C., for chemists or chemical engineers, preferably with industrial experience and with specialized knowledge in either organic chemicals, heavy chemicals, drugs and insecticides, or petroleum. Some knowledge of economics essential. Salaries $2600-$4600.
Box 112-T-2, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(A.C.S. MEMBERS)

SPECIAL LIBRARIES ASSOCIATION will recommend trained chemical and technical men and women librarians at no cost to employer or member. Competent persons are now available. Write to the Executive Office, 31 East Tenth Street, New York, New York, for additional information.

PHYSICAL CHEMIST, Ph.D., 1937. Nine years college teaching, general, analytical, physical. Research in electro organic and catalysis Expert glassblower. Polarograph. Sigma Xi. Age 30, married. Research or teaching position desired in East.
Box 49-T-10, Ind. & Eng. Chem., Easton, Pa.

WANTED: Opportunity for chemical career. A.B. chemistry major, now working for M.A. Experience limited to one year in inorganic analytical field. Now employed in bacteriological laboratory. Prefer N.Y.C. or vicinity. Age 33.
Box 15-T-12, Ind. & Eng. Chem., Easton, Pa.

COLLEGE TEACHING or research, Ph.D., 1940. Organic major. Two years' college teaching, general, organic, analytical; two years' graduate assistant. Phi Beta Kappa, Sigma Xi, fellowships, publications. Available June, 1942. Woman, single.
Box 21-T-1, Ind. & Eng. Chem., Easton, Pa.

ORGANIC BIOCHEMIST, Ph.D., 1942. Available March 1. Experience in vitamin D and sterol research, including spectrophotometric and chromatographic technique. Interested in vitamin, enzyme, or drug research. East preferred. Age 26, single, draft deferred. Protestant Member of Phi Lambda Upsilon, Sigma Xi Publication.
Box 24-T-1, Ind. & Eng. Chem., Easton, Pa.

SYNTHETIC ORGANIC Chemist. M.S. leading university. Additional graduate research. Young, responsible, good personality. Draft deferred. Excellent organic training. Industrial experience. Desires organic research position in a metropolitan area. Presently employed.
Box 12-N-2, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, D. Eng., 13 years' experience in plant research, development and control including construction, installation, maintenance, operation in the oil refining industry, age 38, married. Desires new connection where his abilities can be utilized fully.
Box 49-N-2, Ind. & Eng. Chem., Easton, Pa.

SPECTROGRAPHER CHEMIST, M.S. accredited college. Two years' industrial experience in spectrographic, radiographic, and X-ray diffraction analysis. Desires research analytical position employing these techniques. Preferably in East or Middle East. Married, 26.
Box 63-N-2, Ind. & Eng. Chem., Easton, Pa.

DEVELOPMENT and RESEARCH chemist, Ph.D., chemical engineer, 14 years' successful direction in fermentations, cereal chemistry, biochemistry, yeast, foods. Careful worker, adaptable, invention minded, publications, patents, office experience, four languages, excellent credentials. Interested in responsible position or good opportunity for advancement.
Box 65-N-2, Ind. & Eng. Chem., Easton, Pa.

PRODUCTION CHEMIST. Graduate chemical engineer with twenty years' experience in heavy chemicals, acids, purified cellulose fibre, nitrocellulose, viscose-cellulose film, paper coatings, lacquer formulation. Positions held: chief chemist, development engineer, production department head, plant superintendent. Primary interest: production supervision.
Box 74-N-2, Ind & Eng. Chem., Easton, Pa.

SYNTHETIC RESIN Chemist. Five years' experience in technical research on synthetic coatings and adhesives. Also experienced in photochemistry. I have shown originality; and I have obtained practical results. Married. Age, 28. Harvard training. Now employed, seeking better opportunity.
Box 68-N-2, Ind. & Eng. Chem., Easton, Pa.

POSITION TEACHING general or physical chemistry desired by Ph.D. from large midwestern university having one year post-doctoral research experience, three years' experience teaching general chemistry. Age 27, married, selective service classification 3A. Sigma Xi, Phi Kappa Phi, Phi Lambda Upsilon. Opportunity for research is essential. Available June 1942.
Box 78-N-2, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, 13 years' experience in pigment manufacturing and wet metallurgical processes. Research and manufacture of lithopone, zinc pigments, titanium dioxide, barytes reduction, zinc liquor purification. Electrolytic manganese. Pilot plant operation. Available now.
Box 80-N-2, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.A., 1941 from A.C.S. accredited university. Employed as research chemist by large marine products company. Desires change to concern active in defense. Experienced in pilot plant design and operation.
Box 11-T-2, Ind. & Eng. Chem., Easton, Pa.

COLLEGE TEACHING Physical Chemist and Metallurgist, Ph.D., Midwestern college, 1933, nine years' of teaching and seven of industrial research experience desires to return to teaching. Position sought would offer opportunity to pursue fundamental research already well underway on thermodynamics and kinetics of surface reactions of metals and gases, and metals and liquids. Prefer to have opportunity to direct research where the publication of results is encouraged. Married, Protestant, 37, Phi Lambda Upsilon, Alpha Chi Sigma, Sigma Xi.
Box 16-T-2, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, Ph.D., 1942, desires industrial position. Research involves isotopes, mass spectrometer, low temperature, and high vacuum work, glass blowing. Thoroughly experienced in new physico-chemical techniques. Excellent training in organic chemistry. Publications in physical and organic chemistry. Age 25. Phi Beta Kappa, Sigma Xi, Phi Lambda Upsilon, honors. Available June.
Box 18-T-2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S., 1940, midwestern university. Versatile, aggressive, practical. Now employed but desires a position with better opportunity. Draft-exempt. Excellent educational background, good chemical engineering training. Petroleum, inorganic, organic, and plastics experience.
Box 19-T-2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, Ph.D., 1941, from large midwestern university available for teaching or industrial research position. Experience in teaching of general, organic, and analytical chemistry. Research on analysis and synthetic resin coatings under industrial fellowship. Major, physical chemistry; minors, organic and mathematics. Honor Societies. Publication. Available immediately.
Box 27-T-2, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, Ph.D. March 1942. Major fields: physiological and organic. Good background in bacteriology. Experience as laboratory assistant in food analysis, bio-assays, toxicology, pharmacology. Research in fat synthesis and metabolism. Considerable work with laboratory animals. Desires research or teaching position.
Box 29-T-2, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMISTRY student, B.A. May 1942 Eastern university, age 21, advanced courses in instrumental quantitative, organic; scholastic prizes, honors, active and experienced in college publications, desires summer, possibly permanent position — research, development, or technical editorial. Eastern location, available May 20.
Box 34-T-2, Ind. & Eng. Chem., Easton, Pa.

PLASTICS or SYNTHETIC rubber position desired by chemist with about a year's research experience in plastics, some teaching experience and advanced training in Chemistry and Chemical Engineering. Now employed. Married. Honor societies.
Box 35-T-2, Ind. & Eng. Chem., Easton, Pa.

RESPONSIBLE TEACHING, research or development position desired by Chemical Engineer Ph.D. 1934. 6 years' industrial research, development and control experience (inorganic heavy chemicals). 6 years' teaching. Patents. Present research on waste gas recovery and industrial utilization of agricultural by-products. Age 35. Married.
Box 37-T-2, Ind. & Eng. Chem., Easton, Pa.

DRUG RESEARCH and development. Ph.D. organic chemistry, registered pharmacist, 15 years' experience conducting and directing pharmaceutical research and development with large ethical firms. Desires executive position. Experienced Food & Drug Rules, many publications and patents.
Box 41-T-2, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 311)

(Situations Wanted Continued)

PH.D., 5 years' research in Sweden, biophysical effects of short waves and isotope separation, 2 years' research fluorine chemistry in America, many publications. Austrian, Christian, single, age 29, first citizenship papers obtained.
Box 42–T–2, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, M.S., with Ph.D. in agricultural biochemistry. Graduate training includes work in chemical engineering, organic chemistry, biochemistry, and bacteriology. Five years' experience in food industry. Sigma Xi, Phi Lambda Upsilon. Desires position in the Middle or Far West.
Box 43–T–2, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST Ph.D. 1939, 3½ years' industrial experience in research including the development and production of organic chemicals. Employed at present. Desires position with opportunity for advancement. Married, 3A deferred.
Box 46–T–2, Ind. & Eng. Chem., Easton, Pa.

SYNTHETIC ORGANIC Chemist, Ph.D., 38, single. Seven years' experience in dyes and intermediates, insecticides, plasticizers, special fruit and petroleum products. Available on short notice. Phi Beta Kappa, Sigma Xi. Moderate salary requirements.
Box 47–T–2, Ind. & Eng. Chem., Easton, Pa.

COLLEGE or UNIVERSITY Professorship. Ph.D. from leading university, experienced teacher general and organic chemistry. Research, publications, administrative and industrial experience. Interested also in high-type course for non-chemistry majors. Married.
Box 49–T–2, Ind. & Eng. Chem., Easton, Pa.

RESEARCH, DEVELOPMENT, in vital industry. M.S. in Applied Science, June 1942. B.S. in Chemical Engineering 1940. Research in thermosetting resins, applications to surface coatings. Graduate emphasis on organic. Advanced mathematical training. East preferred.
Box 50–T–2, Ind. & Eng. Chem., Easton, Pa.

INORGANIC CHEMIST Ph.D. Executive. Eight years' experience supervising research in the dry color industry. Expert in systematic development of new processes. Responsible for many outstanding developments. Publications, patents. Employed but desire to enter new field.
Box 52–T–2, Ind. & Eng. Chem., Easton, Pa.

PLANT MANAGER or Superintendent. Chemical Engineer. Plastics, solvents, synthetics, extracts, heavy chemicals, Plant operation, maintenance, inventory and cost control and reduction, organise, personnel (union) relations. Accustomed full responsibility. Native, married, Protestant, forty. Patents, publications, references. Available reasonable notice and salary.
Box 53–T–2, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., desires laboratory position in large or small essential industry. Excellent mastery of organic; also experience in analytical and biological chemistry, organic metal compounds, foods, bacteriology and college teaching. Now employed in Midwest. American; Protestant; age 36; draft 1-B.
Box 58–T 2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST: will complete work for Ph.D. 1942. Major inorganic and analytical. Good training in organic. Desire position doing research. Preferably New York City or vicinity. 18 years' practical experience. Publications. Available immediately.
Box 61–T–2, Ind. & Eng. Chem., Easton, Pa.

RESEARCH and INDUSTRIAL Chemist. Eng. Ph.D. Excellent scholastic standing. 13 years' successful research in electrochemistry, microchemistry, catalysis, food. Broad background, experience in physic, electronic, X-ray, spectrographic. Literature surveys. Publications. Patents. Desires research, leading position. Married 35. Prefer N. Y.
Box 62–T–2, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. 1928, minor physics, 13 years' experience synthesis, aliphatic, aromatic, heterocyclic compounds, also enzymes, vitamins, coal tar products and plasticizers; familiar with physico-chemical methods. Want responsible position in organic research, preferably with biochemical applications. North or South America.
Box 65–T–2, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, Pharmacist, Bacteriologist. Ph.D. in Chemistry, citizen United States, seeks position. Will accept librarian position with industrial research laboratories. Speak, write, translate English, French, German. Location immaterial.
Box 68–T–2, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., 1942 from Eastern University. Thorough training in Organic and Physical Chemistry and Bacteriology. Research experience in organic synthesis, nitrogen heterocycles, medicinals, endocrinology. Desires position as research organic chemist with progressive industrial firm. Available in early Spring. Eastern location preferred.
Box 69–T–2, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.A. 1941. Training and research specialised in organic analysis and physicochemical analytical methods. Publications. Read German, French. Background biochemistry, colloids. Age 24. Draft deferred. Employed. Desire research or development position. West preferred but any location acceptable.
Box 73–T–2, Ind. & Eng. Chem., Easton, Pa.

PHARMACEUTICAL CHEMIST, Ph.D. 1942. Gentile, married, draft deferred, Sigma Xi and Rho Chi. Desires location with pharmaceutical manufacturer or teaching.
Box 74–T–2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST and PHYSICIST, extensive practical and laboratory experience, ballistics, ordnance engineering problems, military explosives, analysis of data. Excellent university training, undergraduate chemical engineering, postgraduate chemistry and physics, Tau Beta Pi, Sigma Xi, scholarship honors. Prefers permanent position with progressive organisation. Employed, married, 32.
Box 76–T–2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, Ph.D. 1934. Thoroughly grounded, over five years' experience in the organic field (fats, soaps, resin, other aliphatics). Anxious to enter the Petroleum or plastics field. Location immaterial.
Box 87–T–2, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., desires change to responsible position in industrial research or development work. More than six years' experience with aliphatic reactions and chemicals and their industrial application, including surface-active agents, coating compositions. Languages. Location immaterial.
Box 88–T–2, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, research and development. B.S., Chemical Engineering; M.S., Chemistry and over six years' varied experience in synthetic organic chemistry. Now employed but desires more responsible position in a metropolitan area, preferably in New York or Chicago.
Box 89–T–2, Ind. & Eng. Chem., Easton, Pa.

SYNTHETIC POLYMER chemist. Thorough industrial research and development experience in Thermosetting, Thermoplastic and ore soluble fields. M.S. in organic and physical chemistry, Tau Beta Pi. Desires responsible position in above or related fields.
Box 91–T–2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, Organic Ph.D. Teaching or research. Twenty years' College Professor. Agricultural Experiment Station Research Experience. Protestant. Married. Location immaterial. Now employed, but desire change. July 1, 1942.
Box 90–T–2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.A., sixteen years' experience in research, production, and control especially in foods, bacteriology, and biochemistry. A good plant manager and superintendent; successful research and sales experience. Can get things done and usually make money for employers. Age 39, married, Protestant.
Box 92–T–2, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, PH.D.

with long and thorough experience in the field of synthetic and natural fibers, viscosity of high polymers, microtechniques. Fourteen years' of research and development work. Numerous publications and patents. Foreign languages. At present engaged in independent industrial research and consulting work. Available on short notice.

Box 95–T–2, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, B.Ch.E., 1940, Tau Beta Pi. Single, 23, 3A draft. Two years' experience development synthetic resins and plastics, mainly laminated phenolics. Desire any position in plastics industry. Metropolitan area preferred, but will consider anywhere. Available immediately.
Box 100–T–2, Ind. & Eng. Chem., Easton, Pa.

EXPLOSIVES CHEMIST. 1½ years' dynamite plant; analysis, testing of powder, mixed acid and nitroglycerin. Explosives laboratory; some plant operation. Graduate ESMDT course powder and explosives. Desire explosives development or inspection. Cal. Tech. Publication. Inorganic analysis. 2-B deferred. 23, single. Anywhere.
Box 101–T–2, Ind. & Eng. Chem., Easton, Pa.

ORGANIC BIOCHEMIST, Ph.D., 1942. Available immediately. Research experience in organic syntheses and enzyme chemistry. Interested in organic, biochemical or drug research. Age 24, single, draft deferred. East preferred. Member Phi Beta Kappa, Phi Lambda Upsilon, Sigma Xi.
Box 102–T–2, Ind. & Eng. Chem., Easton, Pa.

PHYSIOLOGICAL CHEMIST Ph.D., 31, with 8 years' experience in theoretical and practical research including nutrition and some teaching. Education soundly based on organic, physical and analytical chemistry. Desires position in which creative ability, independent thinking and knowledge of the biochemical methods will be of service.
Box 107–T–2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, PH.D., 1939, inorganic chemistry M.S., 1925, chemical engineering. Eighteen years' teaching experience includes inorganic, industrial, physical. Publications. Honor societies. Employed but desires greater opportunities.
Box 109–T–2, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, B.S. Specialising in acetylation of cellulose and carbohydrates, and adaptation of these to plastics and hot melt paper coatings. Experience in alkyd resins, and design and operation of pressure equipment. American, married, Protestant, age 39. Available immediately.
Box 110–T–2, Ind. & Eng. Chem., Easton, Pa.

RUBBER CHEMIST Graduate chemical engineer, with 8 years' experience in rubber, synthetic resins, and organic chemical research and development. Laboratory and plant supervision, plant design, consulting work and promotion of new products. Patents. Now employed, but desires position for development of available raw material.
Box 111–T–2, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL CHEMIST, educated abroad, Dr. Ch.E., citizen. 25 years' responsible positions in U. S. A. with leading firms: edible and technical oils, fatty acids, distillation, extraction, hydrogenation; manufacturing of intermediates and dyestuffs; textile industry, scouring, fiber lubrication, dyeing (skein and raw stock). Laboratory, pilot and commercial plant; creative ability. Seeking connection, preferably production department where better results (quantity, quality, yield) are wanted. Married, Christian, excellent health; unaffected by draft. Go anywhere.
Box 113–T–2, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(NONMEMBERS)

CHEMIST and BACTERIOLOGIST, female, Bachelor's degree in Chemistry, Jan. 1942 Excellent background in organic biochemistry. Two years' analytical research experience. Knowledge of German, typing. American, 21. Location immaterial.
Box 48–T–2, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST A.B., M.S. 1934. Recent work toward Ph.D. Midwestern university. Age 33, married. Ten years' teaching small college. Well qualified, but no extravagant claims. Publications, languages—some Spanish. Employed. For your protection am Negro.
Box 51 T–2, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST, married, age 31. Bacteriological and immunological background. Six years' research with proteins, nucleoproteins, carbohydrates and nucleic acids. Extensive analytical experience. Now engaged in research in large Eastern University Medical School. Desires position where competence and originality are recognised. Several publications. Excellent references.
Box 75–T–2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, Ph.D., many years' experience in vegetable oils. (Refinery, hydrogenation, fatty distillation, etc.) Wants position in production or research with chance for advancement.
Box 79–T–2, Ind. & Eng. Chem., Easton, Pa.

BACTERIOLOGIST and FERMENTATION Chemist, M.S. 1939. Two and one-half years' industrial research experience. Desire change of employment, prefer eastern location.
Box 82–T–2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST B.S. 1930, with excellent background in biochemistry, physical and analytical chemistry. Research on enzymes, surface tension; development of analytical methods. Publications. Age 33, married. Desires industrial position, location immaterial.
Box 94–T–2, Ind. & Eng. Chem., Easton, Pa.

GRADUATE WOMAN Chemist, age 32, excellent knowledge German, French, some Spanish; also medical and engineering phraseology. Experienced research and executive office routine. Writing ability. Wants position combining research and office, or research and laboratory, or reporting for trade paper. No straight abstracting or stenography wanted.
Box 108–T–2, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER: Highly successful record in development and production work in organic chemicals. Experienced in handling personnel. Would like responsible position in development or production work. Location immaterial. Christian. Age 29. Now employed in East.
Box 114–T–2, Ind. & Eng. Chem., Easton, Pa.

MISCELLANEOUS

BUSINESS OPPORTUNITIES • FOR SALE • WANTED • ETC.

Five cents a word, minimum charge $2.00; display available at $7.50 per inch; in advance. No discounts or allowances

MICRO-ELEMENTARY ANALYSES: C, H, N, S, P, Halogens, Methoxyl, Mol. wt., etc., U.S.P. and other official tests, Purity tests, Microinorganic assays, Spot tests, Micro-distillations, Toxicological investigations, and typical micro-chemical research work. Dr. Carl Tiedcke, 366 Fifth Avenue, New York, N. Y.

ASKING for INQUIRIES for manufacturing of fine organic chemicals in limited quantities. Box 85-N-2, Ind. & Eng. Chem., Easton, Pa.

WANTED to BUY: a three to ten pound supply of asbestos for Gooch Crucibles. Box 36-N-2, Ind. and Eng. Chem., Easton, Pa.

WANTED to BUY: manufacturing process for Diphenylamine. Offers: Box 70-N-2, Ind. & Eng. Chem., Easton, Pa.

WANTED: "American Ceramic Society, Journal (with Bulletin)": 1918, 1919, 1921-1928: 1930, 1931, 1933-1941, paying $4-per year, "Journal of Physical Chemistry": vol. #2 (1898) #4, 7; Vol. 6 (1902) #4; Vol. 10 (1906) #10, paying $5-per number. Dr. G. H. Fransius, 201 East 82nd Street, New York, N. Y.

WANTED to BUY: Complete set Beilstein's Handbuch der Organischen Chemie, 4th edition. Will consider incomplete set if details of contents of main volumes and supplements are submitted. State condition and price. Box 36-T-2, Ind. & Eng. Chem., Easton, Pa.

WANTED BOOKS: Bode and Altpeter's "Das Pyridin und seine Derivativ," Hickinbottom's "Reactions of Organic Compounds," Hollin's "Synthesis of Nitrogen Ring Compounds," Hans Meyer's "Analyse und Konstitutions ermittlung organischer Verbindungen," Barnett's "Anthracene and Anthraquinone," Te-Pang Hou's "Manufacture of Soda," Everest's "Higher Coal Tar Hydrocarbons," and Hewitt's "Synthetic Coloring Matters Derived from Pyridine, Quinoline, Acridine and Xanthene. Box 38-T-2, Ind. & Eng. Chem., Easton, Pa.

WANTED: 1 to 5 lbs. acetoin (Acetylmethylarbinol) 1/4 to 1 lb. acetylpropionyl. Advise purity and price. Box 64-T-2, Ind. & Eng. Chem., Easton, Pa.

WANTED: Quotations on Bilstein "Handbuch der Organischen Chemie," 4th edition and 4th supplementary complete or in parts; Gmelin 8th edition; Berichte 49, Nos. 8-12; 61, No. 8; 64, No. 1. Box 67-T-2, Ind. & Eng. Chem., Easton, Pa.

WANTED: Beilstein's Handbuch der organischen chemie, Vols. 15, 17, 18, 19, 20, 21. Price $2.00. Box 72-T-2, Ind. & Eng. Chem., Easton, Pa.

WANTED: 1000 pounds Cerium Chloride Tech, 1000 pounds Maleic acid anhydride, 5000 pounds Sodium Glutamate, 25 pounds Boron Amorphous, 100 pounds Zirconium Metal Powder, 500 grams Tryptophane, 20 kilos Asparagine, 100 lbs. Xylose, Kilo Aesculin, 5 kilos Histidine HCL. Box 77-T-2, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Heavy duty horizontal hydraulic pump. 4 bronze cylinders, bronze pistons 1 1/2 inch diameter. Capacity 4- to 600 gallons hourly. Pressure 4000 lbs. Geared for motor drive. Little used. Located Baltimore. Box 15-T-2, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Old established commercial laboratory. Splendidly equipped. Centrally located in highly industrialised area. Rare opportunity for mass production metallurgical chemist. Can accommodate six chemists. Dissolving partnership. Box 24-T-2, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Complete set Chemical Abstracts, 1907-1942, with all three decennial indexes, complete, unbound. In Vol. 1 numbers 1, 2, 4, and 6-11 inclusive are original, the rest of Vol. 1 only being reprinted but hardly distinguishable from the rest. Perfect condition. $700. Box 44-T-2, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Journal American Chemical Society, 1907-1942, complete, unbound, in perfect condition. 36 volumes. $300. Box 45-T-2, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: 1 Type K L & N Potentiometer equipped with 1 No. 2109 Lamp & Scale, 1 Type R Galvanometer, 1 No. 8240 10 point Rotary Switch, 1 .01 Ohm Standard Resistance. These items also sold separately. Also 1 International Electric No. 3021 Size No. 1 Type SB Centrifuge. Box 66-T-2, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Trans. Faraday Society, V. 22, 23, 32-35. Journal Soc. Chemical Industry, 1882-1933. Journal Chemical Soc. London, 1900-39. Electrochemische Zeitschrift, V. 1-13 (1894-1907). hf. cf. General Index "Berichte," 1888-1896. hf. cf. Chemical Abstracts 1930-33 and 35 Annual Reports Chemical Society—London, various volumes. Box 70-T-2, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Truck, warehouse, hopper and tank scales. All sizes and capacities. Vibrating screens and crushers. New and used. Immediate delivery. Priced low. Many of America's nationally known firms are our customers. Write for literature and prices. Bonded Scale Company, Manufacturers, Columbus, Ohio.

WE OFFER: All Caesium and Rubidium Salts, Gallium Germanium Indium metals and salts, Zirconium metal powder, Powdered Iron almost spectroscopically pure, Ferroboron, Ferrouranium, Cerium Chloride Tech. quantity, Mischmetal, Selenium Red, Beryllium metal and salts, Titanium metal and salts, Quinine Valerate. Box 78-T-2, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: American Chemical Society publications: Journal 1895-1941; Abstracts, complete with all indices; Industrial and Engineering, complete. Proceedings National Academy, complete. Zeitschrift anorganische, Volumes 100-120 and 124-126. All in fine condition and most bound. Box 80-T-2, Ind. & Eng. Chem., Easton, Pa.

NEED BALANCES? We have just purchased 85 unused pulp balances in fine polished mahogany glass cases with cointerpoised sliding front door, equipped with leveling feet, drawer for weights, capacity 100 gr., sensitivity 1 mg., diameter of pans 85 mm., beam, column and bows are of lacquered brass, aluminum pans. These are fine general laboratory balances for small weightings, such as pulp, dispensing samples, prescriptions, sugar, gold, silver and others. Ready for immediate delivery, no priorities are needed. We suggest ordering promptly to assure deliveries. Most inexpensively priced at $27.50, value $40.00. Subject to complete guarantee and approval. Write or wire immediately, the Laboratory Exchange, 24 E. 21st Street, N. Y. C. Algonquin 4-3879.

LIQUIDATING the entire laboratory of the Estate of Dr. Frederick H. Getman removed by us to New York from Stamford, Conn., for disposal. A large selection of general physical laboratory instruments and equipment such as Hilger Spectrometer, Gaertner Spectrophotometer complete, Gaertner Cathetometer, Gaertner Measuring Microscope, Cenco Thermostatic Water Bath, Leeds & Northrup Instruments, Weston Meters, large General Electric Company Motor Generator 110 v. a.c. to 125 v. d.c., Cathodes, Hanovia Ultra Violet Lamps, Colorimeters, Glassware, Chemicals, Mercury, Standard Cells, Beckmann Thermometers and others. U. S. Bureau of Standards Certified, 2 Barometers, Fortin type, Mercurial U. S. Signal Corps. Type, Barnstead Stills, Microscopes, Electrodes, Fine analytical balances, Schmidt & Haensch Polarimeter, Edwards Gas Density Balance, etc. Write or visit us for complete selection. Send us lists of your needs promptly. The Laboratory Exchange, 24 E. 21st St., N. Y. C.

FOR SALE: Subject to Prior Sale. Fully guaranteed equipment. Subject to complete approval. International Centrifuges, very fine analytical balances (substantially as good as new). All makes are now available Becker, Troemner, Voland, Torsion Scales, Hydraulic presses, Barnstead Water Stills, Freas and other make drying ovens, horizontal sterilizing autoclaves, Colloid Mills, Vacuum Ovens, Microscopes, Colorimeters, Spectrophotometer, etc. Write us your needs for immediate attention. The Laboratory Exchange, 24 E. 21st St., N. Y. C. Algonquin 4-3879.

WANT TO BUY. We are buying everything in laboratory equipment, Instruments, Balances, Microscopes, Refractometers, Spectroscopes, Polarimeters, Lenses, Cameras, Glasses, etc. Turn your surplus or equipment you no longer need into bonds and help win the war. We are in need of equipment to meet the demand from war working industries, Universities, Chemists, Metallurgists. Time is of great importance. Look around and write us what you have to sell. Highest possible quotations will be cheerfully given, all purchases are cash. Write promptly and give description of equipment. The Laboratory Exchange, 24 E. 21st Street, N. Y. C.

Industrial News

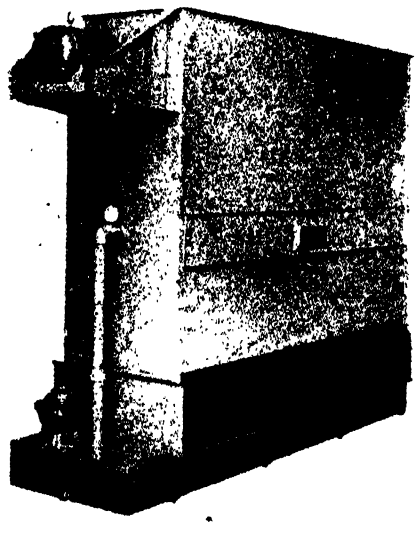
CONTINUED FROM PAGE 307

years of service, and the value of the individual to the corporation. Some employees received the equivalent of three months' salary. This year's-end bonus payment is in addition to a similar bonus distributed in July 1941.

Evaporator

THE Niagara Blower Co., New York, N. Y., has announced the production of a new evaporative type unit for removing heat from industrial liquids, quenching baths, jacket water, oils, hydraulic fluids, oil lubricating systems, soap and other solutions, chemicals, and coolants.

The new unit consists of a casing containing tubes through which the hot liquid passes. A spray system drenches the tubes constantly with circulated water and air is drawn through the sprayed coils by a fan, applying the principle of evaporative cooling. Only the water evaporated is consumed, saving 95 per cent of the water ordinarily used with shell and tube heat exchangers.



In addition, provision is made for bypassing the air, controlled by thermostat operated dampers, maintaining a constant liquid temperature, for a heating coil in the liquid tank, for pre-heating solutions as required for controlled temperature quenching baths, preventing freezing in winter, and preventing the separation of high melting point fats from solution.

Installations have been made in wire drawing, heat treating departments, machinery lubricating systems, Diesel engine power plants, and chemical processes.

Optical Lens Tissues

THE Emil Greiner Co., 161 Sixth Ave., New York, N. Y., has become the exclusive distributor to the laboratory and chemical supply trade for Ross optical lens tissues. These are said to be superior to the Japanese types heretofore generally used.

CHEMICAL AND ENGINEERING NEWS
HARRISON E. HOWE, Editor
PUBLISHED BY THE AMERICAN CHEMICAL SOCIETY
VOLUME 20 MARCH 10, 1942 NUMBER 5

War and Chemical Industry

W. S. LANDIS
American Cyanamid Co., 30 Rockefeller Plaza, New York, N. Y.

TWICE within the period of my active connection with the chemical industry, our country has been engaged in a major war. In each the conflict started on a distant front, and months of active campaign elapsed before America formally became a party to the struggle. In each America was called upon to supply munitions to one group of the contending nations before she herself became an active participant. The two events, separated by a quarter of a century, however, found a very different economic situation in the country at the time of our active participation.

At the outbreak of the first war, America was more highly industrialized than any other nation, but her industries were principally of the heavy type, such as metallurgical or conversion units, operating on native raw materials. Plants were large and reflected some standardization and mechanization. In the chemical industry we produced mostly heavy chemicals. Our fertilizer industry was significant, but our dyes, pharmaceuticals, and fine chemicals were largely imported. Thus, many of our basic industries were dependent on foreign sources of supply for these latter products.

When blockade shut off these imported materials, our whole textile industry, wool and cotton goods, suffered from lack of dyes, our fertilizer and soap industries from lack of potash, our health from shortage of important drugs and medicines. The total economic destructive effect was far greater than the intrinsic value of the chemicals themselves; in fact the latter was relatively insignificant as compared with the capital and consumers goods in the production of which these chemicals are used.

This dislocation of industry resulted in serious attention being devoted immediately after the close of the war to a domestic production of these critical materials, and within the decade of the 20's a respectable, fine chemical industry was developed on the meager skeleton of the small prewar units. It is unnecessary to go into detail as to the extent of this postwar development. We chemists are all well aware that we are entering the second war with a complete line of production, which had amply shown its ability to meet all peacetime requirements. In tonnages our fine chemicals exceeded that of any other nation; in quality they were the equal of any. The relatively new units and the large scale of consumption gave us a modern and highly efficient plant. Our schools supplied well-trained technicians. Our apparatus builders met all the exacting demands of our skilled engineers. We rapidly put this fine chemical industry on an undreamed of production schedule. And this present war found a wholly different chemical structure than the previous war, and one in which we are so much better equipped for peace and war needs.

Nevertheless, war exerts a most destructive effect on all organized industry. Industry fights against war. It does not want it. For war disrupts the orderly program of development, confuses our managements, robs us of our trained personnel, destroys our customer service. Through excessive taxation created by extraordinary expenditures, it limits our capital needed for natural growth and expansion and improvement, lowers the standard of living and morale of our employees, destroys the value of our securities. War exerts an enormous restraining influence upon industry's desire to serve mankind and better the human standards. And no industry wants war.

How many of you have ever thought this example through? Prior to the outbreak of World War I, Germany had a virtual monopoly of the fine chemicals. She was practically the sole producer of potash, so vital to industry and agriculture. When the Allied blockade stopped all exportation of these essentials, each affected nation proceeded to meet this emergency and any subsequent repetitions through development of home production. Germany lost these important foreign markets forever. Her economic balance had been established on the basis of monopolistic control with high returns from the dyes, pharmaceuticals, and heavy chemicals, which exports supplied the exchange for purchase of foreign raw materials and foods and sustained her industry. No previous preparation had been made for meeting such a catastrophe; in fact, defeat in the war was never contemplated. But such was the course of events. There could be but one ultimate answer—either she must regain this lost trade position or the nation must lose its pre-eminent position. The politicians would not reopen the problem to find a peaceable and permanent solution. Therefore a new war must come. The age-old principle, "You feed them or fight them", came into action. And now this new war is upon us.

The man of science should not be blamed for this catastrophe. His mission is to give the world an ever-rising standard of life. He should leave to the economist the adjustment of the delicate balances frequently upset by continuous scientific development. But the economist has failed and the politician was unequal to the task. War is again upon us.

This same situation is likely to be duplicated. The same fundamental program is again under way. The less highly developed countries and dominions and colonies all are building and expanding fundamental domestic industry. The chemical industry serves all. It is primarily a service industry, and secondary to the development of such fundamentals as agriculture, textiles, leather, paper, and the like. The dislocation of all industry, particularly the chemical, in any country active in a war interferes with the dependent infant industries in foreign lands. They, in turn, demand self-sufficiency as to secondary supplies and, just as America and England did following the last war, they

[1] Presented before the Western Connecticut Section of the AMERICAN CHEMICAL SOCIETY January 26, 1942.

may be expected to prepare themselves so that it does not happen again. We can therefore expect intensive development of a fundamental chemical industry in these distant lands, already awake to the importance of home production. China, India, South Africa, Australia, the several South American Republics, Mexico, all will see that their fundamental chemical requirements will be met by home production. Again we shall face an unbalancing of the previous status quo. The same problem will in the future again confront the economist—the establishment of a new balance. Let us hope war will not again be the politician's dictation as the only way out.

The industrial chemistry of peace and of war travel the same path only in part. While both are founded upon the same science and in general employ much of the same apparatus and types of process and chemical knowledge and experience, there are still some important differences. At the outbreak of the present war our chemical industry had only a reasonable amount of producing capacity for the manufacture of peacetime explosives. Private industry had no capacity for the production of military explosives. We were just coming out of a long and deep depression. At the depth of this depression some 10 years ago our industry was operating at probably not over 40 per cent of its rated capacity. By 1937 we had begun to approach capacity in some branches, but over all there was still a very considerable margin of unused plants. In 1939 the activity was lower than the peak reached in 1937. After the outbreak of war in Europe foreign customers began to come into our markets and early in 1940 we had overtaken some of the recent losses. By the middle of the year most of our chemical units were again at capacity. From 1936 on, the industry had undertaken within its own means a very considerable expansion program. The figures for 1941 are not yet available, but they do reach a very large sum. None of this, however, was devoted primarily to munitions production. However, certain of our former foreign customers began to establish units designed primarily for munitions production on this side of the Atlantic. By the close of 1940 not only were our own plants operating at capacity but certain of the munitions units established under foreign auspices were also producing.

As our country entered the war, industry still had very little knowledge of the demands that it might be called upon to meet. It is true that back in 1940 a few munitions plants of chemical classification were built in this country and in that of our neighbor to the north, Canada. In fact, they actually got into operation before the close of the year. It is also true that in the first half of 1940 our own procurement divisions began to concern themselves in a serious manner about the possible entry into the conflict and the necessity of more of these chemical munitions plants. But even this program was a very meager one, calling for relatively few units, relatively small production capacity, and some of them badly located with respect to efficient operation.

The chemical industry could not be expected to know the demands of our military and naval units. It had no knowledge of the programs and, in fact, possessed no facilities for the production of propellents or high explosives, gas or incendiaries. It had no knowledge of the types, varieties, or quantities involved or necessary in any chemical project. There is no use for such equipment in peacetime industry and, even though some of the apparatus may be interchangeable for daily routine operations, such a type of plant as the explosive plants, which produce a commodity circumscribed by hazard and require a distributed layout, would be extremely inefficient for competitive peacetime production of nonexplosives.

Another factor that must be considered was the position taken by our authorities that munitions plants must be located within certain prescribed areas of this country which, as it happens, offer very little market for chemicals of any sort, and therefore possess no fundamental chemical manufacturing units of any great importance. Industry certainly could not be expected to build large chemical units for the production of dyes on the western prairies, when the raw materials and the ultimate markets are along the Atlantic seaboard. Even though these dye plants possess certain facilities for the production of intermediates, which might be raw materials for explosive manufacture, and the operations of nitration use raw materials and equipment, closely related to high explosive production, that was no reason for industry locating in these inaccessible districts prescribed by the procurement authorities. I challenge any criticism of industry as not having prepared itself for an emergency, the magnitude of which was entirely unknown, probably even to those responsible for the projection of the program. Industry cannot be charged with lack of preparedness to produce materials in a geographic territory where it could find no markets and which was unfavorably situated in respect to raw materials.

The program was passed to industry piecemeal, merely some additional capacity for a few reagents. Next were added units for the production of some finished explosives, then a few loading plants, hardly chemical in character. This first stage looks so insignificant as compared to the one recently handed us that we are somewhat bewildered.

We possess most of the technique of production, of design, but are wondering where the materials of construction and the manpower for operation are coming from. Chemical apparatus builders were geared to an industry that shows the flattest industrial curve of all industry and one that has not come into the equipment market on anything like the scale contemplated. We do face an equipment problem in meeting the schedule put before us.

The chemical industry has done its own engineering and finishing of its own installations. Both employ a very experienced technique. We have always been able to meet amply our own construction requirements in our peacetime program, but it is not so simple to expand indefinitely such organizations quickly. We therefore find ourselves spread very thin in competent technical assistance.

The factories are operating at capacity. It is expected that some of this capacity will be released with the restriction in the production of normal consumer goods, but it is very doubtful if much of this can be made available for munitions production, nor will it release many competent technicians, although there may be made available certain production labor of doubtful value in the munitions program. We are seriously viewing a difficulty with the draft boards, who are far from being sufficiently cooperative to understand that a competent chemical technician is not easy to replace.

I would like to emphasize a marked distinction between the chemical industry, particularly one producing munitions, and the ordinary manufacturing industry dependent largely upon machine tools. The machine tool receives a piece of metal which it reduces to specifications by a cutting operation. We might also include grinders, even forging equipment, in this classification. It is almost inconceivable that such a tool could be wrecked by even a poorly trained mechanic. At most, the piece under fabrication might be spoiled, but the damage to the tool would be relatively insignificant before it shut itself

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automatically off by either blowing a fuse or throwing a belt. In the chemical industry, however, we build the largest capacity equipment that economic conditions permit and subdivide this by weight or volume to meet the customer demands, not pound by pound or piece by piece as in the mechanical industry. Chemical reactions are often susceptible to very slight changes of conditions—in one case proceeding quietly to the required end, in another producing corrosive conditions that quickly destroy the equipment, or the reactions, even proceeding in an undesired direction and destroying the whole plant. It is not so much the case of destroying material immediately under production, as it is the protection of our plant from such unlimited destruction as may take one or more years to rebuild.

Many years are needed to develop a competent chemist. I am not referring to the operator who follows the prescriptions of the chemist and in types of production so simple that relatively little could go wrong. I am more particularly speaking of complex types of operations, where slight changes of condition may be noted and call for immediate countermeasures by a highly trained and experienced man to prevent widespread destructive action. These are the men who have spent four to six years in education and have years of laboratory and plant experience in acquiring a knowledge of all of the special conditions that might arise in carrying through various processes.

The problem of personnel becomes very serious in chemical plants producing explosives or dealing with the agents and intermediates which may develop dangerous conditions. We spread our units to limit the accidental destructive effects of a process going wrong. But this in turn requires more of the experienced type of supervision and control, the kind we lack most.

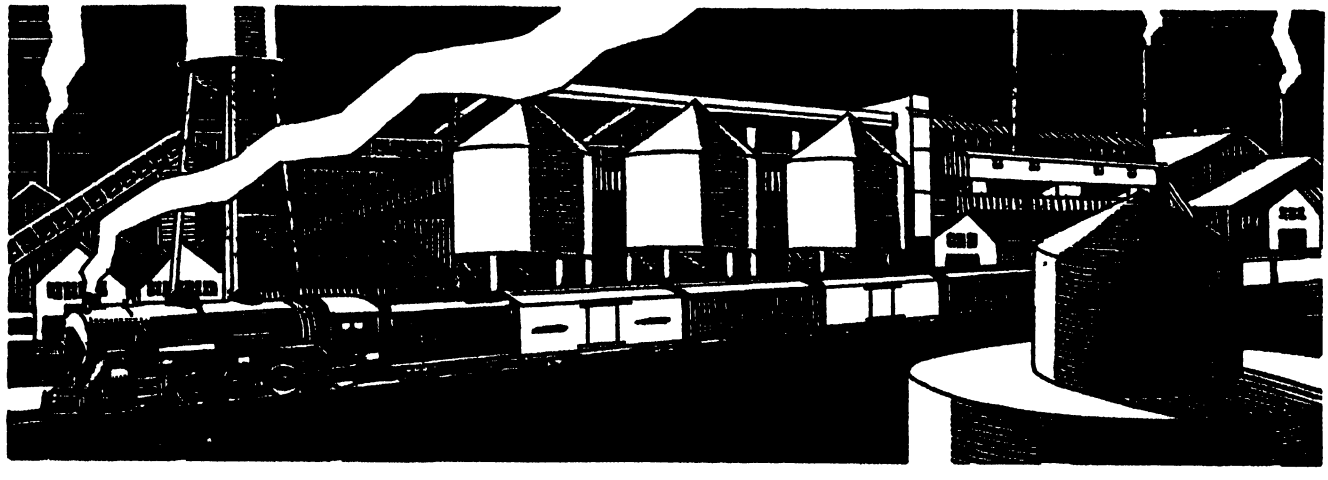
Another difficulty is the very great influence of local conditions. It is simpler to produce high explosives in the northern countries where plenty of cold water is available for service than in the South. It is a simpler problem to locate these plants where the necessary raw materials are easily procurable. Many of our raw materials require special types of package or transportation equipment. If we can locate nearer to these sources of existing production, some of which is going to become available as peacetime industry is curtailed, it will greatly simplify this problem of transportation and storage. Our plants of the type we are discussing have very complex and difficult waste disposal problems. Geography can play a very important part in facilitating the solution of this problem. Unfortunately politicians were more frequently consulted and their demands heeded than competent advice from the chemical industry in this problem of location. Fortunately this situation is improving, but only after costly mistakes that can hardly be rectified now.

I do not propose to discuss quantities and locations or give information which by any chance could be harmful to our national program. I am confining myself to broad principles. The chemical industry is taking on this construction work just as fast as our procurement divisions are prepared to release the projects. It is spreading itself very thin but will accomplish the task. It can find its place only in an order of priorities which are assigned to it although, being a pioneering institution, it generally finds means of accomplishment for it has been up against similar problems before. It must have a top priority in holding its man power. It cannot afford to lose operators, assistants, and supervisors, for these are the backbone of the expanded organizations. And yet we are running constantly against local draft boards refusing deferment of assistant operators whom we are holding for training to take responsible positions in the greatly expanded production units to come. We are prepared and want to assist in the location of these new units in the logical and most efficient centers.

In my opinion, the chemical industry will continue to produce a rather high percentage of its normal peacetime production. Many of these materials go directly into military and naval equipment without change in specification as peacetime goods disappear from the market. The military and naval requirements will probably take up most of the chemical supplies. The problem of raw material supply is going to be very serious because the explosive program draws upon the common heavy chemicals, such as acids, alkalies, and alcohols, all so essential in our peacetime production. How to stretch these supplies to take in the increased explosive program presents a grave and serious problem. It is one that industry can best solve but, unfortunately, industry has been called upon to supply relatively little talent that possesses the comprehensive knowledge of the interdependence of the units of the whole chemical industry. To my surprise, the other day, five prominent men in the chemical industry sitting around a table, were all of them entirely unacquainted with the top chemical consultant in the Office of Production Management. And of the upper staff only one, not an industrialist, was known by reputation.

Some of the committees of the industry have been performing a wonderful service, but after all they are not more than advisory boards. If we are to carry out this program, there must be a better informed organization to solve the complex problems listed above.

We have a year ahead of construction and organization which will practically duplicate in structure and in value the entire manufacturing chemical industry. The present structure is going to operate to a very high degree of capacity in most of its units. We have to find an organization as large as we now possess to get this new unit into production, a task that will require the utmost exertion of anyone in the industry and all the competent help we can get from all sources. There will be no fads nor frills, and we will probably have to lay on the shelf many of our pet projects. No one will be released for lack of employment. There will be fewer holidays and longer hours for most of us. The future can be summed up in two words—"hard work".



Preparation of Plastics and Elastomers in Liquid Ammonia

RICHARD G. ROBERTS

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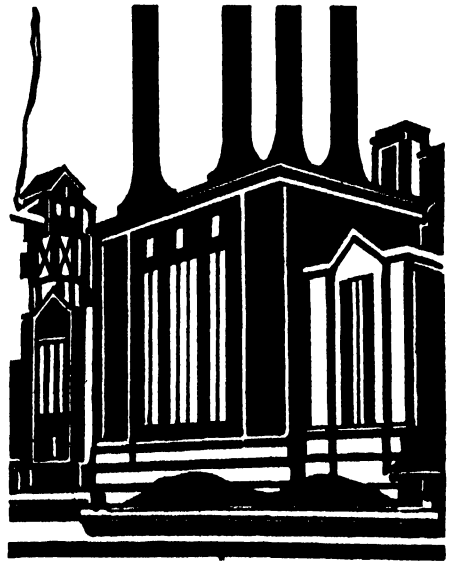
WHEN proteins such as casein and gluten are added to liquid ammonia in a suitable container, an exothermic reaction is initiated which results in the formation of a gel. If the container is left open to the atmosphere, the gel shrinks to a friable mass as the liquid ammonia boils away. If the container is kept closed, except for a connection to a mercury seal, however, the protein gel will shrink to one fourth its original size within 48 hours, forming a hard, tough, hornlike plastic. These plastics have a high tensile strength of 7,000 pounds per square inch. They will hold nails or screws with great tenacity, but the nails must be driven in slowly or the plastics will shatter. They can be sawed as easily as a hard wood or a phenol fiber board.

Experiments on reducing the tendency of these plastics to shatter were carried out in liquid ammonia upon elastic-forming substances, such as rubber latex and Thiokol derivatives, that might prove suitable when combined with the proteins. Rubber latex was found to coagulate instantly in contact with liquid ammonia. Its use as a matrix for holding the proteins, both before and after being placed in the liquid ammonia, therefore, was evident. Thiokol, as such, cannot be used as a matrix for powdered proteins and, if the proteins were added to the reagents used for preparing Thiokol in the usual way, the sodium sulfide and prolonged boiling would alter them unfavorably. Because of this, an attempt was made to prepare Thiokol in liquid ammonia.

When sodium sulfide, which is slightly soluble in liquid ammonia, is added to a solution of sulfur in liquid ammonia, an ammonia-soluble polysulfide is formed. If ethylene dichloride is added, a vigorous exothermic reaction follows with the formation of a heavy yellowish oil. The ammonia is allowed to evaporate, some water and casein or gluten, if desired, are added, and the temperature is quickly raised. At 70° C. a flocculent precipitate forms. As the boiling point is approached, the flocculent precipitate suddenly begins to coalesce, rapidly rises to the surface, and in less than one minute forms a tough, yellow, elastic layer which continues to float on the surface. When dichloroethyl ether was used in place of ethylene dichloride, no elastomer was obtained, but instead a black tarlike material found to be suitable for waterproofing cloth.

Some other elastic-forming substances were also studied. Milkweed latex coagulates in liquid ammonia, more slowly, however, than rubber latex, forming a resilient plastic that will not shatter. Goldenrod sap, obtained from the plant by extraction with benzene following an extraction with ammonium hydroxide, also gives a resilient plastic in liquid ammonia. Isoprene will polymerize in liquid ammonia with formation of a transparent rubberlike compound, but the market price is comparatively high. Development of stickiness in the coagulated latex after standing for two or three weeks caused some trouble. In general the latex coagulated in liquid ammonia seemed to be less sticky than that coagulated in acetic acid. Because of the proteins which were to be included in the new elastomer, a vulcanization at elevated temperatures was undesirable. It was found on trial that coagulated rubber latex by itself or in combination with other materials can be cold vulcanized in liquid ammonia at −33.4° C. by the addition of either flowers of sulfur or ammonium sulfide. Such cold vulcanized rubber has not developed any stickiness after two years.

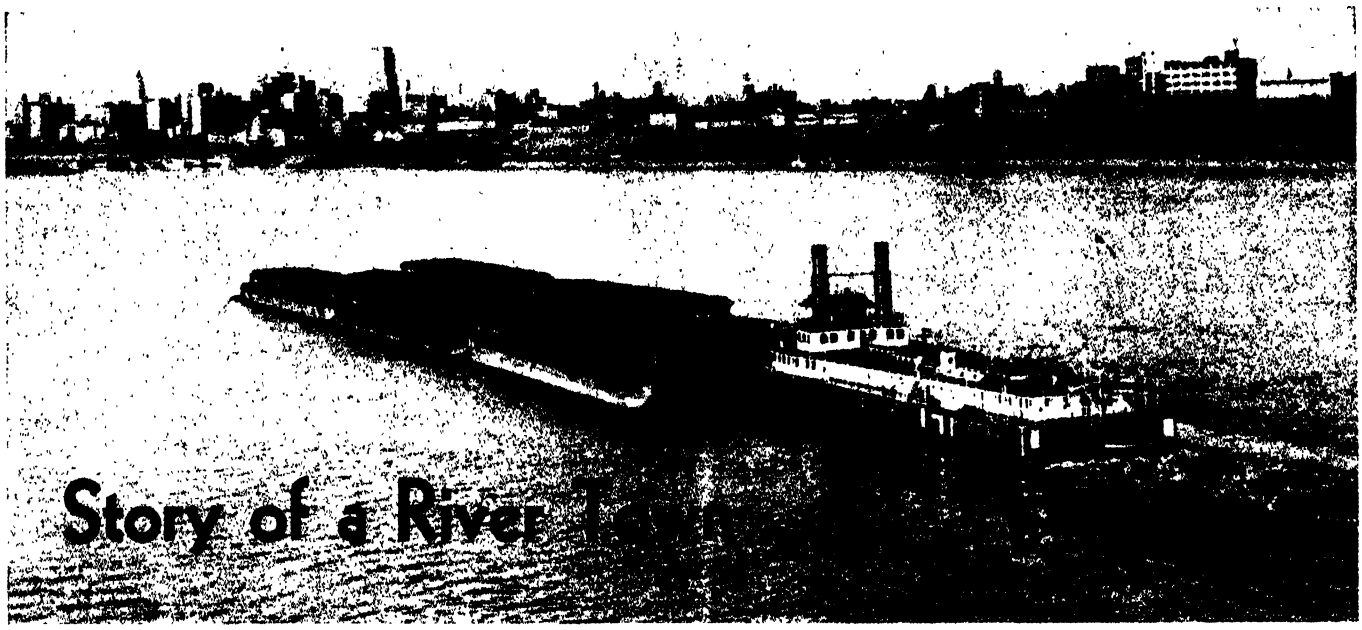
Since it was possible to prepare both plastics and elastomers in liquid ammonia, the third step was an attempt to prepare a group of substances combining some of the desirable properties of the other two classes. When powdered casein or gluten either alone or mixed with other substances such as powdered egg shells, magnesium powder, or iron oxides are quickly stirred into rubber latex, a dough is formed which can be rolled into any desired shape and dropped into liquid ammonia. The latex coagulates, the dough swells to twice its original size, and a vigorous exothermic reaction takes place. As the ammonia boils away, the dough again shrinks to less than its original size, leaving a hard, tough, resilient plastic.



Properties of this plastic depend upon the quantities of the various materials used in forming the dough. With as little as 15 per cent of solid latex, either casein or gluten forms a resilient substance that is nonporous and has considerable stretch. Above 15 per cent latex the substance resembles elastomers, and below 15 per cent plastics. Addition of finely pulverized egg shells, which themselves contain a protein, increases the toughness. Powdered magnesium, which is the least reactive metal soluble in liquid ammonia, adds hardness and lightness forming a plastic which floats on the liquid ammonia or on water. Black oxide of iron adds extreme hardness and density. Examination of these new substances under magnification indicates that the latex and proteins react to form a new compound and not merely a fine-grained mixture. These new resilient plastics or plastic-elastomers are insoluble in ethyl alcohol, but some of them which contain none or a slight amount of rubber will swell and soften if left standing in water. This tendency can be decreased by the usual treatments with formalin or lime water or by treating the substances in liquid ammonia with hexamethylenetetramine or aldehyde ammonia. Gluten is preferable to casein, which has so many uses in plastics, glues, and paints, because its plastics prepared in liquid ammonia are less soluble in water. By this method plastic-elastomers may be prepared from comparatively inexpensive domestic materials already produced in large amounts.

The manner in which liquid ammonia brings about the formation of protein plastics is unknown. Previous work[1] with regenerated cellulose has shown that treatment with liquid ammonia increases the tear strength by 200 per cent, tensile strength by 70 per cent, and weight by 27 per cent with a decrease in area of 24 per cent. With casein plastics made in liquid ammonia the volume decreases by 75 per cent in passing from a tough gel to a translucent hornlike stage. The Kjeldahl nitrogen increases from 75 to 300 per cent in various proteins, and in some of these materials, which could also be used as fertilizers, the nitrogen content of the water-insoluble fractions increases by as much as 100 per cent. These gains in nitrogen content are probably due to both ammonolysis and ammonation, and are certainly accompanied by types of bonding which can account for hardness, toughness, and high tensile strength.

[1] Roberts, Richard G., *J. Am. Chem. Soc.*, 60, 3084 (1938).



Story of a River Town

Barges serve the modern port of Memphis

CHILD of cotton, nurtured by the river, Memphis grew in the lusty age of river traffic and the westward expansion of the South. In its early days, Memphis was a rendezvous of free booting river men and planters of the white gold. Yet despite this virile heritage, the city would have died but for the determined efforts and heroic toil of the doctors, public health technologists, chemists, and engineers who brought it through its hour of trial. Memphis pays tribute to the scientists of that day and will welcome their present-day successors when the AMERICAN CHEMICAL SOCIETY meets there, April 20 to 24.

Examination of the city's records shows its history to be divided into two parts. At first the story concerns the troubles of a small town that was gradually growing too big for its breeches. Coming practically unscathed through the Civil War, the city was booming through the 70's when it received a blow that nearly knocked it out. In 1878 the dreaded yellow jack hit the town with all the force of a homesick hurricane. It was then that the scientists of the day took over and rebuilt the sick and almost depopulated town into the healthy and thriving city it is today.

It had been a long hard road from the time that Hernando DeSoto first stumbled into the muddy waters of the Mississippi. Three countries, Spain, England, and France, had laid their claim to the territory in which Memphis is situated and had engaged in a long fight for control of the bluff territory. Even in 1783, when the United States gained nominal possession of the bluffs, Spain still labored under the impression that the Mississippi Valley was her private property. Soon after Tennessee was admitted to the Union as a state in 1796, the Government found it necessary to establish a military post, Fort Adams, at the site of Memphis to curb the ever increasing influence of the pugnacious Spanish.

This proving ineffectual, President Washington in 1798 authorized a new structure, named Fort Pickering, to be located several miles down the bluff. The new fort afforded ample protection and from then to 1819 life on the lower bluff was that of an ordinary peaceful frontier outpost.

In 1819 the town of Memphis was laid out by the owners of land grants—John Overton, James Winchester, and Andrew Jackson. General Jackson, however, severely criticized for his interest in land operations in this territory, sold his claims to John McLemore in 1823 to save himself from future political embarrassment.

Memphis suffered but little, being born in an age when towns, like Topsy, just grew, and city planning was as yet not taught in the universities. The site was exceptionally well laid out—362 lots were laid off on the lower bluff with wide streets and four public squares named, according to their purpose, Auction, Court, Exchange, and Market. Lots were to be sold to actual settlers only, and payment for them was to be completed within five years.

Although four names are mentioned prominently in the annals of the founding of Memphis, it was one man, John Overton, who was directly responsible for the making of the town. Judge Overton, single handed, looked after the multitude of details that are the natural consequence of the start of a new venture. It must be said, however, that his absorbing interest was not primarily for the future of the country or for personal acclaim, but largely for the accumulation of wealth.

Memphis, blessed by a particularly advantageous location, was settled rapidly. Settlers were chiefly Germans, who were thrifty farmers, mechanics, and home builders, and Scotch-Irish, who were the adventurers, politicians, and land speculators. Geographical influences affecting the growth of Memphis are numerous. The lower Mississippi stood in need of a port midway between New Orleans and St. Louis. This central position later made it a terminal of almost every railroad, thus placing it on the east-west as well as the north-south trade routes. Located in the heart of the richest cotton region in the world and one of the most extensive hardwood lumber forests in the United States, Memphis has long served as a shipping point for these raw products. Because of the vast distances between the cities of the South, Memphis has annually distributed large quantities of manufactured goods and raw materials to a huge hinterland. In any discussion of Memphis there must be constant reference to cotton and lumber, river and railroad, marketing and distribution.

From 1820 to 1860 the city's growth was phenomenal. Prior to this time the Southwest, including Alabama, Mississippi, Arkansas, Louisaina, and west Tennessee, had only two thirds as many inhabitants as the state of Kentucky alone. Yet during the brief span of 40 years, from 1820 to 1860, this southwestern region, with the addition of Texas, became three times as populous as Kentucky, whose density of population had meanwhile doubled. As the Southwest went, so went Memphis, its population jumping from 53 in 1820 to 22,623 in 1860.

This spectacular gain can be ascribed very largely to cotton. Whitney's gin was invented. There was a rush west-

ward for the richer land obtainable. There was a demand for cotton buyers and factors, the planters having learned early that they lost money trying to dispose of their own crop. Planked roads were bringing neighboring towns nearer and were winning much of the cotton from the hills of north Mississippi. Larger and larger steamboats were plowing the Mississippi and its tributaries. Four railroads constructed in the 50's completed its transportation system. Memphis became the largest inland cotton market in the world. In 1860 roughly 400,000 bales of cotton valued at $16,000,000 were handled in a single season.

The boom was on with a vengeance. Prophets of the day were saying, "It is destined in our opinion to be the largest city in the Southwest. . . . . If Memphis would be great she must make railways and build factories." Real estate and slave values reflected the temper of the times. A piece of property worth $200 in 1850 sold five years later for $2,000. Buildings rose by the block, and the prices of slaves soared. While field hands cost only from $750 to $1,000, carpenters were selling for $2,500, blacksmiths' hammerers for $1,114, and painters for $1,005.

For a while everyone was happy—a slave in every house and two chickens in every pot. But when the end came it came suddenly and without warning. In 1860 the temper of the town was western in every respect; by 1861 it was rapidly southern and caught in the emotionalism of the early days of the War between the States. By 1862 it was in the hands of Commodore Davis of the federal fleet. Military rule was established, merchants were required to obtain federal permits to do business, families of men absent in the Confederate Army were compelled to leave the city, and many were made prisoners.

On July 3, 1865, by order of General John E. Smith, military authority over municipal affairs was ended. The dark days of the war were officially over.

Having been occupied by federal troops almost from the beginning of the conflict and but occasionally harassed by daring raids of General Nathan B. Forrest, Memphis had not materially been hit by the civil strife. There were no great areas of burned and pillaged buildings, no gaping shell holes and other phenomena usually brought about by war. There were, however, more serious problems at hand. The city had held its own, but its hinterland in Mississippi, Arkansas, and Tennessee had been sacked. Millions of dollars had been lost through the emancipation of the slaves as many planters held all of their tangible assets as slaves. Levees and railroads had been destroyed. Between 1860 and 1870 the negro population had increased from 3,000 to 15,000, creating a race problem where one had hardly existed before. There were four distinct unassimilated groups in the city—the Negroes, federal soldiers, northern merchants, and natives.

Returning confederate soldiers, dismayed though they were with the new Memphis, nevertheless accepted the new situation and began to rebuild. During these new formative years, they were constantly harassed by the reconstructionist, carpetbagging East Tennessean governor, "Parson" Brownlow. Of Brownlow, little that is good may be said. By such methods as disenfranchisement of 80 per cent of the money and landed interests, organization of his own militia, use of federal troops and a muzzled judiciary, and the rushing of a Negro franchise act through the legislature before even the Negro knew what he was voting for, and other extra-legal methods, he was able to control the State through two terms as governor. The disenfranchised Confederates, having no resort to the ballot box, turned the social organization of the Ku-Klux-Klan into a vigilantes association and joined battle with the Brownlow militia and the Union League. In January 1868, Negroes were given the right to hold office and to serve on juries. A severe Ku-Klux act was passed the following autumn, and civil war was imminent. Only the concerted efforts of 13 ex-confederate generals of the State prevented bloodshed at this time. The *New York Herald* said, "The only state that is in the hands of a born swaggerer and bully. . . . It is a pity that the country should hear the murmur of war, even though faintly, simply because an irritable, ill-natured, narrow minded, and pugnacious man happened to be governor of Tennessee."

Yet in the face of these dismaying factors, Memphis by 1870 had doubled its population. The city had rebuilt four railroads, two new lines were under construction, and roads to St. Louis, Kansas City, and El Paso were projected. Cotton, still thousands of bales short of its 1860 peak, was much dearer because of the high postwar price. Banking capital was short of the 1860 total by $300,000, but increased insurance funds more than made up the difference. Eleven steamboat lines averaging 16,306 tons were operating boats out of its harbor. It led the United States in the production of cottonseed oil with an annual output of 74,000 barrels. The city listed five daily newspapers and three suburbs among its assets. To top the cake, the central location of Memphis was already making it popular as a convention town, for the National Typographical Union held its annual meeting there in 1867. The lusty young giant of a river town was now back in its stride and was preparing to enjoy the fruits of a commercial prosperity, all blissfully ignorant of the dark days ahead.

It was in the years between 1873 and 1880 when there were both the tragic era and the transition of Memphis from an oversized town to a city. In general, the health of Memphis from its inception was wretched. Situated on high ground in the midst of a swampy region flooded annually by the waters of the Wolf and the Mississippi Rivers, it was only natural and expected that its citizens would be subject to the chronic ailments of the lowlands—chills and fever. Sanitary conditions at the time were perhaps no better than the poorest medieval borough. The water supply consisted of defective wells and cisterns, supplemented in 1873 by a plant reputed to purify river water. Milk was both polluted and diluted. According to the *Ledger*, the streets were "huge depots of filth, cavernous Augean stables, with no Tiber to flow through and cleanse them". The thousands of privy vaults drained into Gayoso Bayou, once a brisk stream but now a series of stagnant pools, separated by dams of decaying organic matter and human excrement. Under such conditions, the early August docking of a steamboat to put off two sick passengers was but a prelude to disaster, for within two days the passengers had died and the yellow fever was spreading rapidly through the lower buff. By the first of September the disease had spread to the top of the bluff. On the ninth the board of health at last recognized the malady for what it was, and issued a warning that the fever was epidemic. Then began an exodus that lasted until only 15,000 were left of a total population of 40,000. Those remaining, mostly Negroes who seemingly were immune, had no alternative but to let the fever spend itself.

When the frost came in October, followed closely by a sharp freeze, the end of the epidemic was announced. Immediate signs of recovery were not apparent. Thousands of refugees failed to return, and the debt became so pressing that the city surrendered its charter and became a mere taxing district of the State.

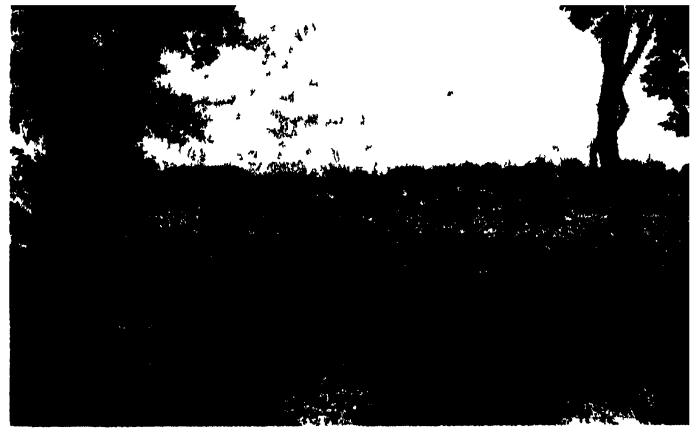
Though Memphis suffered more than most American cities, unsanitary conditions were general throughout the Nation until the end of the century. In the last half of the 19th century, as a result of the experiments of European scientists like Louis Pasteur and Robert Koch, preventive medicine made significant advances. Their disciples in America were men like William H. Welsh, William Osler, and Hermann Biggs. The work of such men finally resulted in the formation of the Public Health Service in 1902.

The fever in Memphis was of more than local significance; it was an event of immense national importance, for it aroused the country to the ever-present threat of disease at the very time that the discoveries of Pasteur and Koch were being disseminated. The experience of the city was a warning to the Nation, and the sanitary campaign upon which it embarked proved an inspiring example.

The devastating effects of the epidemics and subsequent conditions left Memphis in worse shape than in the dark days of

Sketches from Old Memphis

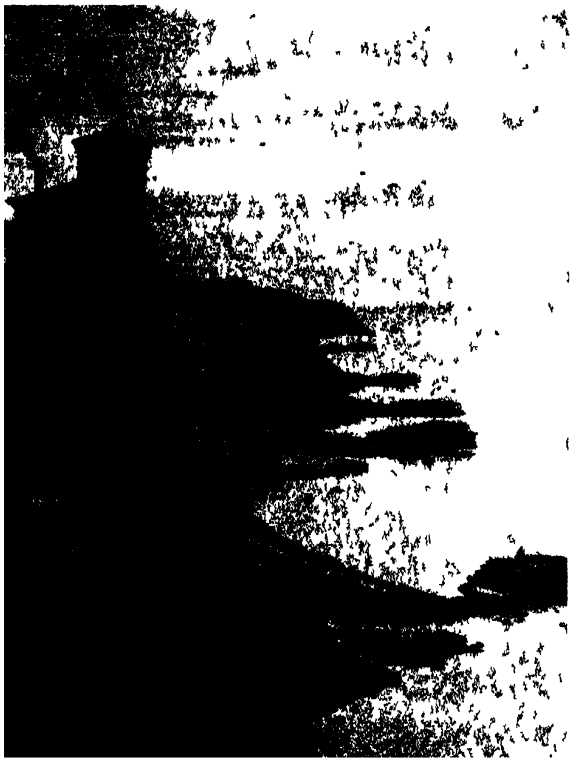
A. C. S. Meeting April 20 to 24





Upper right corner An early view of Memphis on the Mississippi. *Above.* The great naval battle before Memphis on June 6, 1862. The federal ram *Monarch* running down the *Beauregard*. From a sketch by A Simplot. *Below.* Reinforcing the Chickesaw Bluffs at Memphis.





Above. Memphis under quarantine rule in 1873 The method of bringing food into the plague-stricken city. From sketches by Moise. *Below.* The cotton levee in Memphis before the war





The Memphis levee in the 90's

Reconstruction The city charter was not restored until 1893. Trade volume, however, returned to the improved city and by 1890 Memphis had grown in population to 64,589. The Mississippi River was spanned with a railroad bridge in 1892, the first south of St. Louis, and in 1909 the Harahan Bridge, with double railroad tracks and double vehicle passageways, was built. The bridges increased trade with the Southwest, and Memphis became the greatest cotton market and hardwood lumber center in the world

From the turn of the century to the present, the city's history has been that of any ambitious town in a period of commercial and industrial expansion. Enlarged by repeated territorial acquisitions, the city has long since outgrown the peripheral parkway outlining its limits in 1909 and has engulfed seven suburban communities. With a population of over 300,000 it is one of the most rapidly growing cities in the Nation. This is due as much to its recent industrial development as to its increased importance as a commercial and business center.

A measure of this recent expansion is the rapid increase in the chemist population of Memphis. Several attempts had been made to arouse interest in a local section of the AMERICAN CHEMICAL SOCIETY, once in the early 20's and again about 10 years later. At neither time, however, were there the minimum 20 members required to petition for a charter. By 1939, through establishment of many new industries and expanded operations of several old ones, a number of additional chemists had been brought to Memphis, and another start was made. An organization meeting in January of that year was attended by 50 chemists of Memphis and the near-by University of Mississippi. Twenty-three of these were members of the SOCIETY, and a petition was drawn up for the establishment of a local section.

The Memphis Section was chartered with 38 members at the Baltimore meeting in 1939. Activities of the local section then made membership in the AMERICAN CHEMICAL SOCIETY more attractive, and local support zoomed. In 1942 more than 100 members are enrolled and taking an active part in the preparations for the 103rd meeting. This meeting will be the climax to three years of intensive effort through which the Memphis Section has become one of the fastest growing sections of the SOCIETY. With not enough chemists in Memphis to start a group 10 years ago, the industrial and chemical expansion has attracted enough chemists to the city to build a strong section which within three years of its founding is to be host to the entire SOCIETY.

This, however, is but the epitome of the city itself and a token of the future destiny of the capital of the midsouth. Situated in the richest agricultural region in the Nation, Memphis is bound to play an important role in the rising chemical and industrial development of agricultural products.

The bluffs that witnessed the passing of the French and the Spaniards have seen the magnificent steamboats of the 80's resolve into the quiet efficiency of the present-day barge. Gone are the flatboatmen, the slave traders, and the carpetbaggers. In their places are a new people who have built bridges, erected tall buildings, and founded an industrial center in the midst of an agricultural empire.

Memphis in its heroic age was a strident river town. But it has kicked off its boots caked with Mississippi mud, augmented its cotton and hardwood income with factory payrolls, and is today the metropolitan center of the new South. Looking for the future to the increased industrial development of its agricultural wealth, Memphis welcomes the AMERICAN CHEMICAL SOCIETY as a guide to the new era—when agriculture will be fused to industry—through chemistry.

Basic Patent Covers Bridge-Type Instruments

U. S. PATENT 2,263,932, electronic signal indicator and circuit therefor, has been issued to Nathan Schnoll, Palisade, N. J., and assigned to Industrial Instruments, Inc., Jersey City, N. J. This patent provides the basis for industrial instruments such as the Solu-Bridge and Solu-Bridge controller, as well as laboratory instruments of the conductivity bridge type, incorporating an alternating-current-operated Wheatstone bridge with a cathode null indicator.



Harahan Bridge across the Mississippi at Memphis

Division of Rubber Chemistry Postpones Meeting

THE meeting of the Division of Rubber Chemistry scheduled for April 1942 in Memphis, Tenn., in conjunction with the 103rd meeting of the AMERICAN CHEMICAL SOCIETY, has been cancelled by unanimous action of the Executive Committee, H. I. Cramer, Secretary of the division, reports. This action was taken after a survey of the principal laboratories in the rubber industry disclosed the universal sentiment that the time and energy of all technical men within the industry should be directed unstintingly to problems growing out of the present emergency. The committee concurred and agreed that the interests of the war program would be served best if the division deferred meeting until the Buffalo convention next September. By that time the present state of flux in all matters related to rubber should have crystallized to the point where a beneficial and successful program centered around vital problems of the industry can be organized. More detailed plans for the fall meeting will be announced in May.

Philadelphia Section Sponsors Home Defense Course

A PRACTICAL course in home defense is being given by the Speakers' Bureau of the Philadelphia Section, AMERICAN CHEMICAL SOCIETY, on consecutive Friday evenings at the William Penn High School, 15th and Mt. Vernon Streets, according to Donald L. Gibson of the Publicity Committee.

The original course was mapped out by Captain Joseph Chandler, Chemical Warfare Service Reserve, and includes civil air defense and chemical warfare defense. The lectures will include and have covered such subjects as air attack, first aid for gas attack victims, use of a gas mask, and identification of chemical agents and poison gas. Most of the instructors are present or former Chemical Warfare Service officers.

Cooperation of the Junto (Philadelphia's Adult School), the Philadelphia Section, Williams, Browne, and Earle, Inc., Arthur H. Thomas Co., and The Philadelphia Police College has contributed this valuable course of instruction.

With the A. C. S. in Hawaii

AN ENCOURAGING report on how chemists responded in an actual war situation and some helpful suggestions on how they may be organized for service are contained in a letter to Secretary Parsons written under date of January 23 by the Hawaiian Section Councilor, J. H. Payne, who says:

The Hawaiian Section has been active in the recent emergency. Being the first section of the A. C. S. under fire (and we hope the only one), unique problems have arisen of course. We prepared immediately a roster of all chemists in the Territory so that we could have a record of what each was doing during the emergency and who would be available for specialized tasks. A committee to coordinate cooperation with the local armed forces here was organized. This committee consists of A. L. Dean, H. D. Kirschman, Allan Duvall, and J. H. Payne, chairman.

We have already rendered some good service on three important projects, one for the Navy and two for the Army. This type of front line work is unique to most of us, but I assure you that members of the Hawaiian Section are performing in a highly commendable fashion. Please spread the word that Hawaii has the situation in hand and always will.

Teaching Fellowships Offered at New York University

A NUMBER of teaching fellowships in chemistry are available for the academic year 1942–43 in the Washington Square College of Arts and Science, New York University. Applicants should expect to receive their bachelors' degrees this June, having majored in chemistry.

These fellowships are offered on the basis that the recipient will carry on work in the graduate school leading to the doctorate. For this reason part of the remuneration is in the form of free tuition, equivalent to $200, for three full courses annually in the graduate school. There is an additional annual stipend of $700. Reappointments are made on the basis of scholarship and proficiency in teaching. Teaching fellows spend an average of 10 hours per week instructing in the laboratory and additional time to grade the papers and keep records for their students.

For application forms and further information, address William C. MacTavish, Chairman, Department of Chemistry, Washington Square College of Arts and Science, Washington Square, New York, N. Y. All applications should be received not later than April 1. Appointments will be made early in April.

Sets of Abstracts

AS USUAL, sets of abstracts of meeting papers in planographed book form will be supplied by the A. C. S. News Service, 1155 16th St., N. W., Washington, D. C. Sets are not guaranteed to be complete, but contain abstracts from all divisions as submitted by authors. The abstracts will be mailed as soon as possible after receipt of order, beginning about April 15, and will also be on sale at Memphis, Tenn.

This enterprise is undertaken in a spirit of service and not for profit. Sets are offered on the following terms:

To members of divisions who forward receipt for divisional dues with remittance and order, 50 cents.

To those without receipt for divisional dues, who remit with order, $1.00.

To those who fail to enclose remittance with order, necessitating correspondence, $1.25.

To those who require bills to be rendered, $1.50.

Objective Tests in Organic Chemistry

DURING the past school year over 25,000 copies of the cooperative objective tests in organic chemistry were distributed to over 100 colleges and universities.

The 1942–43 series is now nearing completion, and will cover the following topic examinations:

Alkanes, alkenes, alkynes
Alkyl halides and halogen compounds
Alcohols, ethers, halohydrins, and alkene oxides
Aldehydes, ketones, ketenes
Acids, saturated and unsaturated
Halogen, hydroxy, and oxo-acids
Anhydrides, acid halides, esters, and salts
Classified replacement reactions
The carbohydrates
First semester examination, Nos. 1–9
Thioalcohols, thioethers, sulfonic acids
Nitroparaffins, amides, urea, urea derivatives, amines, amino acids, proteins, nitriles, and isonitriles
Foods and metabolism
Organo-nonmetallic and metallic compounds
Alicyclic compounds
Benzene, naphthalene, anthracene
Aryl halogen compounds
Phenols, aryl alcohols, ethers
Aldehydes, ketones, quinones
Aryl carboxylic acids
Aryl sulfonic acids
Aryl nitro compounds, amines, and diazonium salts
Heterocyclic and miscellaneous compounds
Antiseptics, dyes, stains, and indicators
Terpenes, rubber, resins, fibers, detergents
Processes, reactions syntheses, and tests
Second semester examination, Nos. 10–26.

These tests are said to represent an improvement over the 1941–42 series with respect to both construction and use. Validity data will be supplied with each set so that of the 20 items appearing on each test, the instructor may select only a few of the more valid items and thus adapt the test to a 5-, 10-, 15-, or 20-minute quiz.

Complete sets are available to instructors of organic chemistry, industrial chemists, or graduate students at 20 cents per set in lots of five or more, if orders are received on or before July 1. Subsequent to that date the minimum price will be 25 cents per set. All sets ordered in lots of less than five are 50 cents each. Orders should be sent to the chairman of the committee, Ed. F. Degering, Department of Chemistry, Purdue University, Lafayette, Ind.

Origin of the Clerget Method[1]

C. A. BROWNE — U. S. Department of Agriculture, Washington, D. C.

THE earliest contribution by Clerget relating to the method of double or invert polarization, which bears his name, is found in a short notice in the weekly *Comptes Rendus* of the French Academy of Sciences for May 8, 1843[2], entitled "The Analysis of Sugars by Polarized Light". The article is short, and I have made the following translation:

The beautiful observations of Monsieur Biot upon the phenomena of polarized light indicate the utility in qualitative and quantitative analysis which can be derived from the optical properties of solutions of many substances. This utility would be especially very great for industry when a practical determination of the nature of the sugars or of the richness of saccharine liquids is desired. The formulas which Monsieur Biot has given in his memoirs furnish the complete solution of the problem which, however, does not seem to have been generally applied to its full advantage.

In my opinion this is due to the fact that these formulas, because of their precision and need of the use of logarithms, demand an expenditure of time that cannot ordinarily be given, principally for the reason that they require for one of their elements an exact determination of the density of the liquids under examination by means of the balance.

This consideration has caused me to seek means of simplification, and I have developed a process of fixed weights which eliminates density determinations. It is based upon the numbers, obtained by the single addition of two figures or by simple subtraction, which permit the weighable quantity of crystallized sugar contained in mixtures to be read off directly in hundredths upon the divided circle of the observation apparatus.

This statement clearly indicates that Clerget's method, so-called, is simply a practical modification of an analytical polariscopic procedure previously elaborated by Biot who was the actual originator of the process. The story of Biot's part in the development of the method of double polarization is now almost forgotten.

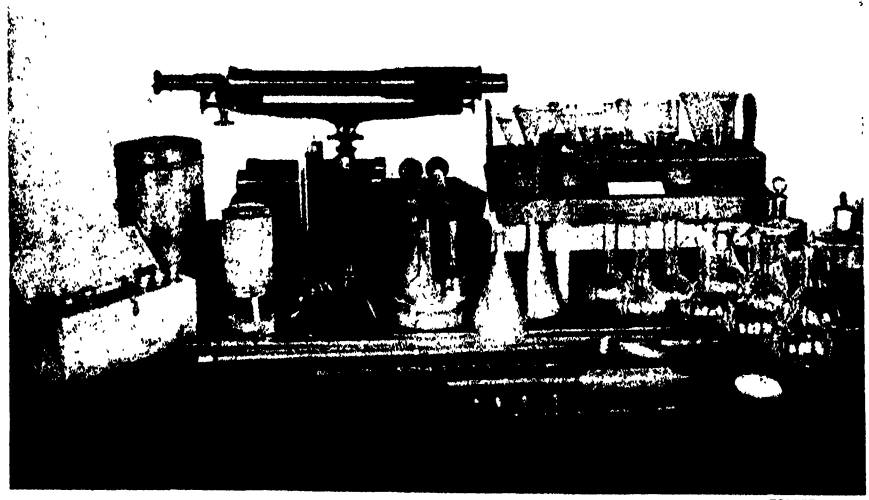
In 1834 Dr. Pallas, head physician of the military hospital of Saint Omer and owner of a maize plantation in French Africa, presented to the French Academy of Sciences an interesting observation on the apparent changes in sugar content of cornstalks during their period of growth. The question was referred by the academy to a joint committee of chemists and physicists who after consultation recommended that Pallas be encouraged to continue the investigation which gave promise of leading to conclusions of scientific and industrial importance. In a later report Pallas stated that, if the ears of corn were removed at the beginning of their development, the sugar content of the stalks seemed subsequently to undergo a considerable increase. This important observation was referred by the academy to another committee of distinguished scientists, consisting of the agricultural chemist Boussingault, the physical chemist Regnault, the industrial chemist Payen, and the physicist Biot, who reported that the conclusions were of such importance to plant physiology and industry that the problem would be taken over by Professor Biot for accurate analytical verification. Biot's brilliant solution of this problem, contained in the *Comptes rendus* of the academy for 1842, verified Pallas' statement as to the increase in sugar content of cornstalks as a result of removing the ears. But it also marked the establishment of a new polariscopic method, using the principle of inversion, for determining cane sugar in mixtures of other sugars—a now universally employed method which has been of inestimable value to pure science, to agriculture, and to industry in all parts of the world.

Only the main steps in Biot's development of the double polarization formulas that he employed in this work will be given. For details reference is made to the original article by Soubeiran and Biot, entitled "Recherches expérimentales sur les produits sucrés du maïs"[3], of which the year 1942 is the centenary.

Biot found that when a solution of pure cane sugar was inverted in the cold for 4 to 5 hours with 0.1 its volume of hydrochloric acid, a direct reading of 1 circular degree on his instrument was changed to −0.38 circular degree or a difference of 1.38 circular degrees when correction was made for dilution. For sulfuric acid the factor under the conditions of his experiment was found to be 1.3867 for a solution of pure sucrose. For a similar volume of clarified cornstalk juice under the same conditions an average invert reading of −0.3411 circular degree was found on five samples for each degree of direct reading which gives a difference of 1.3411 circular degrees. Then $\frac{1.3411}{1.3867} = 0.967116$ which is the sucrose equivalent for each circular degree of direct polarization of the juice. We have here for the first time in scientific literature the introduction of what we now term the Clerget factor, but which in justice to the man who originated it should be renamed the Biot factor.

Direct polarization of the juice from the cornstalks from which the ears had been plucked, calculated to a tube length of 500 mm., was found by Biot to be 42.02 circular degrees which, multiplied by 0.967116, gives 40.64 circular degrees as the polarizing power of the sucrose in the juice. For converting circular degrees (S) obtained in a tube of L mm. length into grams of sugar per 1 cc. Biot employed the formula $1.4\frac{S}{L}$ which, divided by the density of the juice, gives the weight of sugar in 1 gram of juice. In this way Biot found the weight of sucrose in 1 gram of juice from the cornstalks on which the ears had been removed to be 0.1066 grams or 10.66 per cent and from cornstalks on which the ears had been left to be 0.0815 grams or 8.15 per cent, equivalent to an increase of 2.51 per cent sucrose as a result of removing the ears.

This is the first application of a classic method of sugar analysis now common in



ROBERT BLENK

Photograph of an original set of Clerget apparatus purchased by Valcour Aime of Louisiana about 1850 and now preserved in the Louisiana State Museum, New Orleans

[1] Paper presented before the Division of Sugar Chemistry and Technology at the Dallas meeting of the AMERICAN CHEMICAL SOCIETY, April 19, 1938.

[2] *Compt. rend.*, 16, 1000-1 (1843).

[3] *Compt. rend.*, 15, 523-42 (1842).



Jean Baptiste Biot (1774–1862)

Column 1	Dates of juice extraction
Column 2 (δ)	Densities of the juice compared with that of distilled water at 4° C.
Column 3 (l)	Lengths in millimeters of the observation tubes in which the direct polarisations were made
Column 4 (α)	Direct angular polarisations using the bluish violet transition tint of the field as the end point (a Soleil double quarts end-point device was used, as the half-shadow polariscope had not yet been invented)
Column 5 (l')	Lengths of the tubes, variable as in the previous case, in which the invert polarisations were made
Column 6 (α')	Original direct readings recalculated to tubes of length l'
Column 7	Nature of the inverting acid which is sulfuric
Column 8	Degree of dilution of the original juice produced by addition of the inverting acid which is $^{5}/_{9}$ths
Column 9 (α'')	Recalculation of the revised direct polarisation (α') to correct for this dilution
Column 10 (α''')	Observed invert reading in tubes of length l'
Column 11 $\left(\frac{\alpha'''}{\alpha''}\right)$	Calculated value of the invert polarisation for 1 circular degree direct polarisation of the juice
Column 12	Same value for pure sucrose which, with sulfuric acid as the inverting agent, was found to be −0.3867, temperature and other conditions being the same as in the juice experiments

thousands of research and industrial laboratories in all parts of the world. A glance at the original record of Biot's brilliant polariscopic determination of the sucrose content of cornstalk juice helps in evaluating the part which Clerget played later in applying his teacher's discovery to practical sugar laboratory conditions.

Page 536 from the *Comptes rendus* of September 12, 1842, gives the observational data of Biot's analyses. The upper half of the table relates to the juice of the cornstalks with ears removed and the lower half to cornstalks with ears unremoved.

An interesting feature of this table is Biot's employment of curved arrows pointing to the right and left as well as plus and minus signs to indicate directions of rotations of his direct and invert readings.

Biot used seven different observation tubes of odd lengths such as he no doubt had available in the miscellaneous equipment of his laboratory. He made no attempt to standardize his method, which would have enormously simplified the labor of calculation. As a pure physicist he was not interested in commercial and industrial applications of the principle he had discovered. Biot turned this phase of the problem over to his pupil, Clerget, who in a most masterful way completely revised the technique of his method without any change in the principles involved.

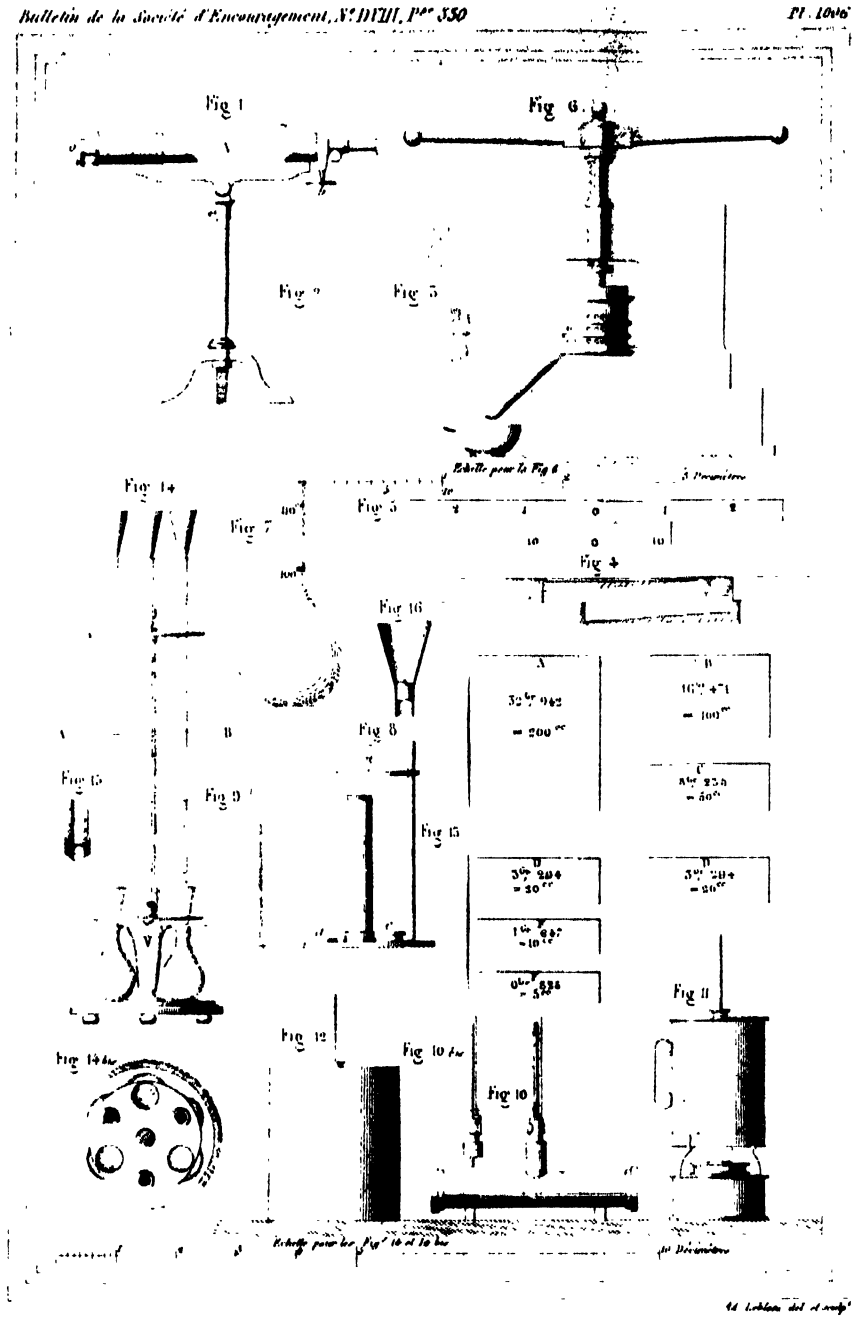
The first important change Clerget introduced was substitution of the new Soleil saccharimeter with a 100-degree point sugar scale for the circular scale polarimeter. Instead of apparatus of variable dimensions, carefully standardized tubes and flasks of uniform construction were used. Instead of making calculations upon the basis of density alone, as was done by Biot, Clerget introduced an optional procedure for sugar and molasses in which a normal weight of product was

Expériences d'inversion faites sur les sucs extraits des tiges de maïs par la pression, puis défiqués, traités par l'alcool, rapprochés au bain-marie et décolorés. — TABLEAUX F ET G.

NATURE du liquide observé, avec l'indication de l'époque de son extraction	Sa densité, celle de l'eau distillée étant prise pour unité. δ	LONGUEUR du tube dans lequel il a été observé primitivement, exprimée en millimèt. l	AZIMUT de déviation de la teinte extraordinaire bleu violacé ou violet bleuâtre. α	LONGUEUR du tube dans lequel le mélange acide a été observé, exprimée en millimèt. l'	DÉVIATION de la teinte bleu violacé transportée dans cette liqueur par la loi de proportionnalité. α'	NATURE de l'acide introduit dans la liqueur primitive	PROPORT. de dilution de la liqueur primitive dans le mélange	DÉVIATION produite par la liqueur primitive dans le tube l' à cet état de dilution. α''	DÉVIATION intervertie observée dans cette même longueur α'''	RAPPORT d'inversion calculé $\frac{\alpha'''}{\alpha''}$	RAPPORT d'inversion imprimé par le même acide au sucre de cannes pur, constatable.	REMARQUES diverses.
Suc des tiges châtrées.												
18$\frac{1}{2}$ Août 14.....	1,05619	522,0	+34°25	289,0	+18°96	sulfurique	$\frac{5}{9}$	+16°86	− 6°00	−0,3559	−0,3867	
19.....	1,05980	519,0	38,50	289,0	21,44	sulfurique	$\frac{5}{9}$	19,06	− 6,4	−0,3378	−0,3867	
19.....	1,05106	520,5	34,25	289,0	19,02	sulfurique	$\frac{5}{9}$	16,90	− 5,3	−0,3135	−0,3867	
24.....	1,05106	520,5	34,25	501,5	33,0	sulfurique	$\frac{5}{9}$	29,67	−10,53	−0,3551	−0,3867	
24.....	1,05106	520,5	34,25	501,5	33,0	sulfurique	$\frac{5}{9}$	29,67	−10,24	−0,3452	−0,3867	
Rapport moyen d'inversion pour le suc de maïs châtré.....										−0,3411	−0,3867	
Suc des tiges non châtrées.												
18$\frac{1}{2}$. Mélanges des deux sortes. Août 24.	1,07763	525,5	+59,75	289,0	+32,86	hydrochlorique	$\frac{10}{11}$	+29,87	−10,10	−0,3381	−0,3800	Très-peu de tiges châtrées mêlées aux non châtrées.
24.	1,07763	525,5	59,75	501,5	57,02	sulfurique	$\frac{111}{100}$	50,26	−15,80	−0,3143	−0,3867	
Non châtrées seules.												
Septembre 8.	1,12593	518,0	58,50	501,5	56,64	hydrochlorique	$\frac{10}{11}$	51,49	−18,00	−0,3496	−0,3800	Graine mûre.
Rapport moyen d'inversion pour le suc des tiges de maïs non châtrées.....										−0,3340	−0,3822	

(536)

Original tabulation of Biot's results in determining the sucrose content of corn juice by his method of inversion



Original apparatus of Clerget for analyzing sugar products by Biot's inversion method
(Compare with photograph, page 322)

taken. Improvements in clarification with gelatin and alcohol, lead subacetate, and animal charcoal were introduced to obtain water clear solutions (any trace of color interfered with the readings on polariscopes with a tint end-point device). The process of inversion was carefully formulated, with emphasis on temperature control. A complete table was constructed to simplify the calculation work. All these improvements with minute directions and practical examples of procedure for analyzing sugar canes, sugar beets, and different sugar factory and refinery products were described by Clerget in a memoir which he read before the Society for the Encouragement of National Industry on October 14, 1846, and published for distribution in pamphlet form in the following month. A plate of this classic treatise shows all the beautifully constructed apparatus that Clerget devised for the performance of his method. Except for later improvements in certain details the process followed today is essentially the same as that described by Clerget 96 years ago.

At the Louisiana State Museum in New Orleans is an almost complete original set of Clerget apparatus exactly as illustrated in the old plate and as pictured on page 322. The Soleil saccharimeter, tubes for direct and invert reading, set of normal weights, weighing scoop, long tubes for bone-black filtration, flasks, funnels, tempering baths, hydrometer, and other equipment are identical with those shown in the plate of Clerget's original publication. This collection of old sugar testing apparatus is one of priceless historic value and it is hoped that the New Orleans members of our AMERICAN CHEMICAL SOCIETY will see that it is always well taken care of and preserved for the benefit of future generations.

This covers briefly the facts relating to the origin of one of the best known and most beautiful analytical procedures in the history of chemistry. It should be of particular interest to American chemists since the impelling motive which caused Biot to develop the principles of this method was the solution of a problem concerning the sugar content of the stalks of America's chief agricultural crop—Indian corn. And whenever we employ the Clerget method let us be as mindful of the originator of the process, as was Clerget himself—the originator not only of the Clerget process but of the polariscope and the founder of the art of polarimetric analysis—Jean Baptiste Biot.

Lactic Acid Replaces Formic Acid for Many Brazilian Uses

LACTIC acid has in recent years displaced to some extent the use of formic acid by Brazilian tanneries and other industries, according to a U. S. Department of Commerce report. Only relatively small quantities of lactic acid are used for edible and pharmaceutical purposes. According to the latest figures reported, imports in 1939 were lactic acid, 18,251 kg. compared with 24,558; formic acid, 76,787 kg. compared with 134,702.



Color manufacture—drying stove



PHOTOREFLEX STUDIO, EMERY, BIRD THAYER D G. CO

BORN in Warrensburg, Mo., in 1889, **E. R. Foster** attended the public schools of Warrensburg and graduated from the Warrensburg normal school in 1909. Later this institution became a four-year college, and he received the degree of B.S. in education from it. From five years as chemistry teacher and principal of Nevada, Mo., high school, Mr. Foster went to Chicago University for one year. The next year he began the first of 26 years of service in the Chemistry Department at Central Missouri State Teachers' College, Warrensburg, where he is now associate professor of chemistry. This service was interrupted only once when in 1926 he did graduate work and served as assistant instructor in the University of Kansas Chemistry Department. Mr. Foster holds a master's degree from Kansas, having made a study of 1,000 of his own students over a period of years as a thesis. His records today show that he has given over 22,000 student credit hours of fundamental college chemistry in his classes since 1915.

Kansas University is a stronghold for the AMERICAN CHEMICAL SOCIETY, and it was there that Mr. Foster became a full member. He has served on committees for the SOCIETY and has been on the Senate of Division of Chemical Education. In 1941 he was chairman of the Chemistry Section of the Missouri Academy of Science. In 1940 and 1941 he helped revise the state course of study in chemistry as a member of the Chemistry Committee appointed by the State Education Department of Missouri, and was asked to assist in the chemistry examinations for the Examining Board of the Merit System in the State of Missouri. Mr. Foster has been active in civic work and has served a number of local organizations in an official capacity.

The local golf club claims him as a former president and champion in various years. He is author and proud possessor of two holes-in-one. Other top-ranking recreations are hunting and fishing. His hobby is archeology, and he has a large collection of Indian artifacts taken by his own searching in Missouri near Warrensburg.

Robert T. Foster was born in 1914 and reared in Warrensburg also. After receiving his diploma from Warrensburg high school in 1931, he attended Central Missouri State Teachers College—selected because of its convenient location in Warrensburg and because that's where his father teaches. He had decided to major in chemistry.

Robert graduated from college with an A.B. in foreign language and a B.S. in chemistry in June 1935. In August 1936 he added to the list his B.S. in education from the same institution. While in college he found time for several extra-curricular activities, including editor-in-chief of the college yearbook, athletic manager, and member of the golf team.

In 1936 Robert secured a position as a chemist for the Cook Paint and Varnish Co., Kansas City, Mo., a job doomed to be a short one because by May of 1937 he had joined the State Board of Health of Missouri as a chemist and bacteriologist. In the fall of 1937, he obtained a scholarship for graduate study at the University of Michigan, receiving the master of science degree there.

Robert returned to the State Board of Health of Missouri, where he serves at the present time. In 1940 he was made director of the State Board of Health District Laboratory, Springfield, Mo. This laboratory, with a personnel of eight assistants and technicians, is running approximately 4,000 tests a month of a chemical and bacteriological nature.

Robert is a very new A. C. S. member. He secured his required amount of practical experience four months ago and, immediately upon becoming eligible, applied for membership.

Robert and his father have been closely associated in school and recreation, and now they find another common interest in the AMERICAN CHEMICAL SOCIETY.

Missouri's Fosters

Brooklyn Poly Sets Up Paint Research Fellowship

A RESEARCH fellowship in paint technology, the Joseph J. Mattiello Fellowship, has been established in the Department of Chemistry, Brooklyn Polytechnic Institute. Funds to maintain the fellowship, which has been assigned to Sidney Siggio, a graduate of Queens College, will be provided by royalties accruing from sales of the first volume of "Protective and Decorative Coatings", prepared by a staff of chemical specialists under the editorship of Dr. Mattiello. The more than 30 collaborators on the volume have waived their royalties to support the fellowship.

Haverford Shortens Time Needed for Degree

TO PERMIT its undergraduates to complete their work for the bachelor's degree before being drafted into the military service, Haverford College, Haverford, Penna., has instituted an accelerated course which begins operation this year. By attending for two summer terms and three regular terms a student may meet the degree requirements. In the summer term, which will run for ten weeks from June 22, a man may take one full-year course and one half-year course. On petition he may be allowed to take two full-year courses. Courses in chemistry will include full-year courses in elementary chemistry, quantitative analysis, and organic chemistry, and half-year courses in organic preparations and chemical thermodynamics.

Cooperative Chemistry Test Announced

THE Committee of Examinations and Tests, Division of Chemical Education, AMERICAN CHEMICAL SOCIETY, has announced that the 1942 cooperative chemistry test will be available by April 1. Inquiries should be addressed to the Cooperative Test Service, 15 Amsterdam Ave., New York, N. Y.

The accumulation of data and experience of the past six years have modified the concept of what a test should measure and how this should be accomplished. As a result of a conference held at the University of Chicago last June, the 1942 form of the test is considerably different from those of the past four years.

On the committee sponsoring this test are B. Clifford Hendricks, Rufus D. Read, Ed. F. Degering, Laurence S. Foster, Earl W. Phelan, Theodore A. Ashford, and Otto M. Smith, Chairman.



(1) The assembly of Ignitron anode plates is shown in these three stages. Starting from the left to right, the porcelain subassembly has been properly located in place and the three insulating bushings that support the shield are positioned. Next the shield support and the thermal baffles along with the anode head are added, and last the graphite basket shield is fastened on with a simple spotlight tight clamp. (2) Two 400-kw., 575-volt Ignitron rectifiers supply power to a coal mine in West Virginia. The ease of maintenance and the short-time overloads give them an advantage over rotary converters. (3) Power for aluminum production is supplied by this line of Ignitrons, the total rating of which is 60,000 amp. at 645 volts direct current. (4) Half of a 1,000-kw., 250-volt Ignitron rectifier which is installed in a large steel mill.







Ignitron Rectifiers

IGNITRON rectifiers, manufactured by the Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penna., are being installed at an increasing rate in the electrochemical industry to help turn out the vast quantities of aluminum, magnesium, zinc, chlorine, and other chemicals needed in the war program. During the past 15 months 170 ignitrons, having a capacity of 500,000 kilowatts, have been installed in the United States and Canada. The company has orders for 270 more units which will add another 800,000 kilowatts of direct-current power to the Nation's supply. This progress, made since 1938 when the first commercial ignitron for a chemical plant was installed in the Buffalo Electro-Chemical Co. for the manufacture of hydrogen peroxide, is attributed to the advantages of the ignitron in supplying continuous current without interruption. For such service the much lower arc drop of the ignitron rectifier gives it a distinct advantage over the conventional grid-controlled rectifier.

The ignitron rectifier consists of a gas-tight steel container in which there is an anode of graphite and a cathode of mercury. The principle provides a method of reliably starting an arc in a few microseconds and is based on the fact that current passed between high- and low-resistance materials in contact sets up a gradient at the junction sufficient to create a cathode spot. Once the cathode spot is started, the anode will pick up the current if it is positive with respect to the cathode. The arc will be extinguished as the anode becomes negative, and will not carry current until the next positive half cycle, when the cathode spot is re-established by the next synchronously timed impulse.

During the extinguishing period the anode is surrounded by a deionized gas, as it is bearing a reverse voltage. To counteract the influence of other anodes while

they are conducting current, each anode and cathode must be mounted in a separate chamber, and this construction permits the installation of a minimum of shields and grids—enough only to care for the transition period. This allows the anode to be close to the cathode, guaranteeing a low arc drop.

Rectification does not depend on either the gas or electrode materials. Mercury, however, is peculiarly suitable for the cathode for it has the right density for the required conductivity and insulation strength. The vaporized mercury provides the path for current flow, condenses, and flows back to the cathode pool. The anode is graphite and withstands operating temperatures better than other available materials. Because it does not melt but vaporizes directly, it withstands arc backs with negligible injury.

Occasionally a cathode spot will spontaneously appear on an anode when it is bearing reverse voltage and should be maintaining its high resistance to reverse current. When this happens, a reverse current will flow. This is the phenomenon known as arc back. Once formed, a cathode spot on the anode will maintain itself as long as current is conducted to it, and the rupturing of this current requires the opening of protective circuit breakers.

In the multianode tank rectifier, in which the arc is maintained in the chamber continuously, it is necessary to use grids, shields, and baffles to guard against arc back. Considerable separation of the anode and cathode is required for this, as well as for mechanical reasons. The shields, grids, and electrode separation increase arc drop, the amount of increase being proportional to the extent to which arc back is minimized. Elimination of the source of ionization in the ignitron during the period when the anode must withstand high reverse voltage removes the major condition which is favorable to arc back. Elimination of the chief cause of arc back makes it possible to reduce the anode-cathode spacing and the amount of shielding and griding. This is done in the ignitron with substantial decrease in arc drop and consequent gain in efficiency.

Robert E. Divine Retires

ROBERT E. DIVINE, one of the oldest active members in the Western New York Section of the AMERICAN CHEMICAL SOCIETY, voluntarily retired March 1, after some 52 years of active service in the chemical profession. For a number of years he has been associated with the Hooker Electrochemical Co. as a member of the Research and Development Department. Mr. Divine was one of those few chemists who, in the early 1900's, formed what was then the Buffalo Section of the A. C. S. Although in recent years he has been active in the American Society for



JANE HARDCASTLE

Robert E. Divine

Testing Materials and American Oil Chemists' Society, his chief devotion has been to the AMERICAN CHEMICAL SOCIETY in which he has served continuously on the Soap Committee since before World War I, as well as on the Glycerine Committee. He was also the first chemist employed by the Larkin Co., where he headed their technical work for eight years.

Taylor Receives Longstaff Medal



Hugh S. Taylor

THE Longstaff Medal of the Chemical Society of London has been awarded to Hugh S. Taylor, chairman of the Department of Chemistry, Princeton University. The medal is conferred every three years upon a fellow of the society "who, in the opinion of the council, has done the most to promote the science of chemistry by research". It is the highest honor the society's council can bestow on a fellow.

Dr. Taylor, who is the David B. Jones Professor of Chemistry, received the Nichols Medal of the AMERICAN CHEMICAL SOCIETY in 1928.

Hass to Deliver Priestley Lectures

H. B. HASS, head of the Department of Chemistry at Purdue University, will deliver the 16th annual series of Priestley Lectures at The Pennsylvania State College, March 16 to 20. This series of five lectures, presented as a memorial to Joseph Priestley by the faculty of The Pennsylvania State College and the local chapter of Phi Lambda Upsilon, was established in 1926.

Dr. Hass, who is a world authority on the nitration and chlorination of the paraffin hydrocarbons, will speak on "Synthesis from Aliphatic Hydrocarbons". His work in this field has been to a large extent responsible for the rapid and important industrial development and production of the chloro- and nitroparaffins. In his lectures he will discuss "Function of Research in the University", "The Nitroparaffins", "Reactions of the Aliphatic Nitro Compounds", "Chlorination of Hydrocarbons", and "Chlorinolysis and Other Reactions of the Chloro-Paraffins".



H. B. Hass

Complete duplicate copies of the lectures may be obtained at $1.00 per copy by application to John P. Wilkins, Department of Chemistry, The Pennsylvania State College, State College, Penna.

Swift Gives Grants to Chicago and Texas

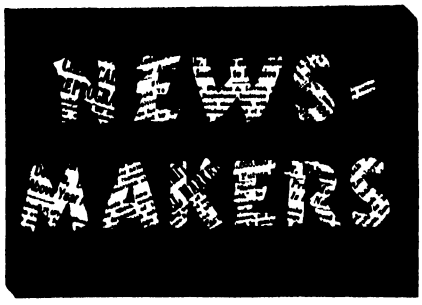
THE University of Chicago has received from Swift & Co., Chicago, a grant for 1942, to be used for studies on diet in relation to health and longevity, under the direction of A. J. Carlson, emeritus professor of physiology. Until his recent retirement, Dr. Carlson was Frank P. Hixon Professor and chairman of the Department of Physiology, University of Chicago. He purposes to study the growth and length of life of rats fed various levels of food intake of diets containing either animal or vegetable protein and various types of fat.

The University of Texas has also received a grant from Swift for 1942, to be used for fundamental studies of new nutrition factors in meats. This work will be under the direction of Roger J. Williams, who has recently been named a joint recipient, along with his brother, Robert R. Williams, of the Charles Frederick Chandler Medal of Columbia University, award in chemistry. Dr. Williams is known for his discovery of pantothenic

acid and for his work on other members of the vitamin B-complex, chiefly inositol, biotin, pyridoxin, and folic acid, in their relation to yeast nutrition.



Mrs. John J. Bruff, better known to many as Eleanor, after serving as a member of the staff of *Industrial and Engineering Chemistry* since February 1925, yielded to the demands of home duties and retired from the organization on March 1. Eleanor has been a very valuable and hard-working assistant and she will be greatly missed.



Myron Bakst has been transferred from the Federal Telegraph Co., where he was employed as a chemical engineer, to the Intelin Division of the International Telephone & Radio Manufacturing Corp., East Newark, N. J., where the work deals with chemical engineering application and coordination between laboratory, pilot plant, and production in the field of resins.

Esther L. Batchelder has left her position as director of home economics at the Rhode Island State College to become chief of the Division of Foods and Nutrition, Bureau of Home Economics, Washington, D. C.

Ronald F. Brown, recently instructor in chemistry at Purdue University, now is an assistant professor of organic chemistry at the University of Southern California.

M. E. Carlisle has been appointed general purchasing agent of the Pittsburgh Plate Glass Co., Pittsburgh, succeeding **J. A. Bechtel** who is retiring as head of the Purchasing Department after 50 years of service with the company. **Homer M. Hoffman** becomes purchasing agent of the Glass Division, and **E. J. Peters** purchasing agent of the Paint Division.

Edwin L. Dennis, chief combustion engineer of the Coppus Engineering Corp., Worcester, Mass., has been relieved of his duties as instructor at Louisiana State University at his own request. He will devote his full energies to the increasingly vital problem of efficient combustion in industrial plants.



Kenneth A. Mack

Kenneth A. Mack, formerly chief chemist and chemical engineer for Baker-Perkins, Inc., Saginaw, Mich., is commandant of the 437 Ordnance Company (Avn. Bomb.) and station Ordnance officer of Midland Army Flying School. Captain Mack is a graduate of the University of Michigan and the officer's aviation Ordnance course at Aberdeen Proving Grounds, Md.

At the annual meeting of the stockholders of the Rumford Chemical Works, Rumford, R. I., **A. E. Marshall,** president, was elected chairman of the board.

Charles L. Parsons, Secretary of the AMERICAN CHEMICAL SOCIETY, was elected a corresponding member of the Sociedad Colombiana de Quimicos at its February 10 meeting.

T. E. Schneider, for many years sales manager of the chemical division of International Minerals & Chemical Corp., formerly International Agricultural Corp., has resigned following his purchase of the detergent products division of the company's business. Mr. Schneider's new company, known as the Tesco Chemical Co., Atlanta, Ga., is manufacturing cleaning specialties, vegetable oil soaps, soap powders, and disinfectants.

Charles V. Seiler has joined the research and development staff of the Bakelite Corp., New York. Mr. Seiler received his science degree recently from Brooklyn College.

Elmer J. Weis, former aircraft parts manager, has been made vice president of the Pacific Pump Works, Huntington, Calif. Mr. Weis originated and has been responsible for the operation and supervision of the company's aviation hydraulic actuating assemblies division.

Mathieson Right to Oyster-Shell Burning Process Upheld

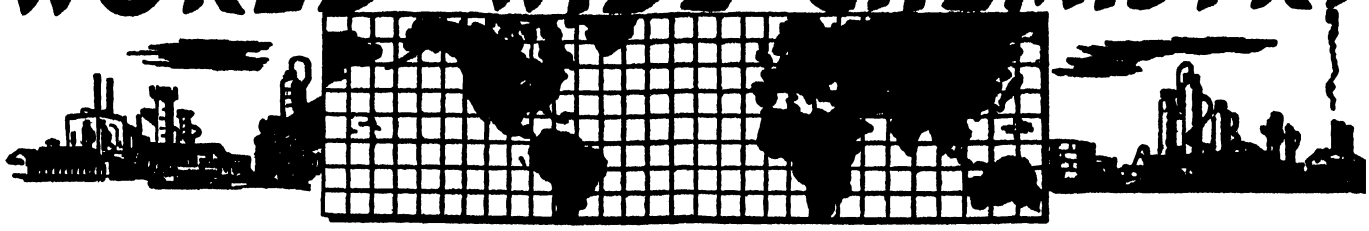
AN ASSERTED monopoly of the right to burn oyster shells in rotary kilns, for the purpose of making high-test carbon dioxide and lime, has been broken, according to an announcement of the Mathieson Alkali Works, New York. On February 9 the Supreme Court of the United States refused to review the decision of the Circuit Court of Appeals for the Fifth Circuit in the case of W. D. Haden Co. *vs.* Mathieson Alkali Works, Inc., which was favorable to Mr. Allen's company. The W. D. Haden Co., of Houston, Tex., asserted a broad monopoly of this shell burning process on the basis of U. S. Patent 1,896,403, and selected Mathieson as the point of attack to establish this monopoly because the company burns oyster shells at its Lake Charles, La., plant.

The crushing of the shell before calcining is an essential part of the process covered by this patent, as was determined in both the U. S. District Court for the Western District of Louisiana and the Circuit Court of Appeals for the Fifth Circuit. However, it was shown that Mathieson washes shells as dredged from the reefs and subjects them to no crushing treatment before calcining in rotary kilns of special design. The Mathieson process, therefore, according to the decision of the lower courts which has now been approved by the Supreme Court, does not violate the Haden patent.

Rubber Industry Seeks Technicians

GOOD chemists, engineers, and supervisory personnel are needed by the rubber manufacturing industry. This present shortage in technical and management men will probably be extended to the bottom classifications of labor by midsummer. War goods output, it is said, will more than take up the slack caused by an end to tire manufacture. The tire companies have not laid off workers but instead have cut the length of the work week to 30 and in some cases 24 hours, pending the expansion of arms production. In another three or four months the rubber industry is expected to be back to the 36-hour week.

WORLD-WIDE CHEMISTRY





Although no outstanding changes are reported from British chemical markets, the system of control gradually gains ground. Following tin, cadmium, and antimony under commodity control is nickel, whose buyers now need separate licenses. Control of molybdenum and tungsten metal, except in sintered or powdered form, has been transferred from the Ministry of Supply to the Ministry of Aircraft Production. An association of importers and distributors of arsenic has been formed. It will allocate all supplies for distribution on a quota basis. A recently formed asbestine importers' association will act as agents for distribution to approved users of this material, which is imported by the Ministry of Supply.

Pressure for Fertilizer Supplies Continues Unabated

Evidence that chemical supplies from the United States are reaching the British market is increasing. Large arrivals of triple superphosphates, however, were absorbed in record time and left the market for phosphatic fertilizers very much where it was. Ground phosphate is not available at present. Such quantities of other phosphatic manure as are produced in England are very quickly taken up by farmers who wish to complete fertilizing at the earliest possible moment. As for potash, supplies have improved a little so that the strict economies in consumption have been somewhat modified. Small quantities of potash salts have been provided for nonpriority crops in certain localities. Chilean potash nitrate with 15 per cent each of nitrogen and K_2O is distributed for vegetable crops. The government sponsorship of lime application has raised consumption to levels so high that factories find it difficult to meet the demand. In July to December 1941 deliveries were 40 per cent above the preceding year. Additional sources have been opened up, particularly use of waste and ground lime. More factories also have been set up by the government, although labor is difficult to provide. Deliveries of ammonium sulfate will be 30 per cent over the 1940–41 figure when the current season is ended, it is estimated.

A new outlet for chemical products in British agriculture is iodized mineral feeding supplements, given to offset the shortcomings of straw pulp and silage.

Refractory Insulating Material Improved

Improved refractory insulating material can be obtained if the highly porous grog of fine texture produced by firing mixtures of pulverized coal and fire clay is bonded with additional clay and coal and shaped by the dry-press process. By development of the process, full-size refractory insulating bricks having a relatively dense and slag-resisting face have been produced by the Refractory Materials Joint Committee of the Gas Research Board and the British Refractories Research Association. The physical properties of a dry-pressed, grogged, clay insulating firebrick—firing shrinkage, permeability, apparent porosity, bulk density, and cold-rushing strength—change roughly in proportion to the distance from the face receiving the pressure, leaving a medium layer of less compact texture than the surface in the pressed brick.

The expansion effect of alkali chlorides on fire-clay products may have serious consequences under certain conditions, one of which is temperature. Cracks developed after exposure for several hours to a temperature of 1,000° C.

The minimum temperature at which susceptible firebricks are attacked by pure dry methane is between 600° and 700° C., and the presence of moisture in the methane may increase considerably the resistance of firebricks to disintegration at 800° C. Resistance to disintegration by pure dry methane is dependent upon the thermal history; a firebrick was rendered inert by refiring to 1,400° C., or to 1,300° C. in a reducing atmosphere, for several hours.

When coal containing chloride or hydrochloric acid is burned or carbonized, chlorine will be liberated under oxidizing conditions and, in the presence of steam, hydrochloric acid will be generated. Sodium chloride at 1,000° C. can cause the volatilization, to some extent, of certain constituents of refractory materials in a dry, inert atmosphere, free from oxygen. The chlorides of iron, aluminum, calcium, and magnesium were among the volatilized products of reaction with fire clay and silica test pieces.

Need for Intensive Operation in Coke-Oven Industry Stressed

The necessity of removing hydrogen sulfide from gas may become so general after the war that the British gas industry will have to develop processes for improved purification, with a view to the separation of other gas constituents also, according to F. Booley in a lecture before the Coke Oven Managers' Association. Ethylene will sooner or later be used to greater advantage than as a fuel. The war has brought unexpectedly large demands for certain constituents of coal tar, particularly of high-temperature tar. New uses will increase the demand as more of the coal-tar constituents become available as pure compounds.

In many cases owners of high-temperature coke-producing plants are content to sell crude by-products, and the advantage of producing a pure or refined product passes outside the industry. Unless it becomes alive to the immediate necessity for development of research, the initiative must pass to others. Collaboration between coke-oven owners would facilitate the solution of postwar problems of reconstruction. The information obtained in the past two years will make possible improvements in new and rebuilt plants after the war which, under normal conditions, might have taken 20 years to become standard practice.

Mr. Booley's remarks indicate the present viewpoint of a large section of the British chemical and allied industries. The tendency in research is generally toward concentration of effort and exchange of experience for development of large-scale plans for coordinated reconstruction after the war.

Canvas Waterproofed with Chlorinated Rubber Product

A chlorinated rubber product is offered in the British market for treatment of

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EDITOR'S NOTE. Those interested in further details should address the correspondent whose name and address appear for each country, and enclose sufficient international coupons to prepay the reply. United States stamps should not be sent.

canvas and other surfaces. The material, normally available in two colors, gray and greenish brown, is sold in the form of a spreading paste applied with a palette knife and flat scraper. The product makes the fabric completely waterproof and protects it against acids, alkalies, corrosion agents of other kinds, and atmospheric influences.

Oil-Retaining Bronze Saves Lubricating Oils

An oil-retaining bronze is being offered to British industry as a means of saving lubricating oils. Bearings made from this material contain 88.0 per cent copper, 9.7 per cent tin, and 1.4 per cent graphite. Manufacture by die pressing, leaves spaces between the metal particles which on immersion absorb oil to the extent of 25 to 30 per cent of the volume of the bearings. It is claimed that the resulting oil film on the surface is sufficient for smooth running without further lubrication over several years.

Powder Metallurgy Research Progresses

The mixture of graphite and copper used in the above and other oilless bearings cannot be obtained by fusion mixing, since the graphite will float on the molten copper. Powder metallurgy, which has made great progress in Great Britain during the past year, is also used for the alloy of copper and tungsten required for electrical contacts and for the preparation of collector brushes for generators from flake copper powder. If the molding pressure is exercised at right angles to the ultimate current flow, a selective orientation of the copper particles will result which reduces resistance in the current-flow direction. Porous nickel filter tubes, produced by the powder method, have been used in chemical works as protection against solids in liquids and gas fed to them. The new "heavy alloy" containing 90 per cent tungsten, 7.5 per cent nickel, and 2.5 per cent copper and a similar alloy consisting of tungsten and lead are also made from powders of these metals.

Synthetic Camphor Output Gains Increased Attention

In view of events in the Far East, much satisfaction is expressed in Great Britain that the country has a synthetic camphor production and is largely independent of the monopoly for the natural product. The so-called camphor substitutes, camphor equivalents in cellulose acetate plastics, are still a center of trouble, particularly so far as the alkyd phthalates and aryl phosphates are concerned. This branch of the industry, reports V. E. Yarsley, has done remarkably well during the past year in making up for formerly imported supplies and at the same time coping with a rapidly increasing demand.

Nine Thousand Molds Used for Plastic Lenses

It is estimated that 9,000 different molds are being prepared from which it should be possible to fit every pair of eyes in the services with plastic lenses. Thermoplastic sheet is also used in the army in the treatment of wounds; the new molded plastic "cast window" enables the doctor to peer into the wound without cumbersome trouble with bandages.

Locations of Vegetable Oil Industry Decentralized

Acquisition, use, treatment, disposal, and consumption of paint, lacquer, and varnish containing tung oil, oiticica oil, stillingia oil, drying oil made from castor oil, or thickened or mixed oil in which any of these oils is an ingredient, has been prohibited except by license, which will be granted for war purposes only. This measure stresses the need for economics in the consumption of vegetable oils, also emphasized by the reduction of the butter and margarine ration from 8 to 6 ounces a week.

The English oil extraction industry has changed considerably since the outbreak of war. Originally concentrated in some ports on the east coast which have been frequently visited by enemy bombers, the industry is now dispersed to many different places. Production has not suffered. Opportunities to build up reserves have, it is believed, been taken and good stocks of edible and technical oils are on hand. The addition of vitamin D to margarine has been doubled. Good allocations are being made to soapmakers. Demand for certain oils for lubrication is steady. As vegetable oils and raw materials for oil extraction take up a large amount of shipping space, there seems to be scope for an international arrangement in this field.

G. Abrahamson

150 Halfway St.
Sidcup, Kent
January 24, 1942

Netherlands Indies Iron Sulfate Imports Increase

Imports by the Netherlands Indies of iron sulfate were 132 metric tons in 1940, compared to only 3 tons in 1939 and 7 in 1938, according to a trade survey. A domestic plant at Surabaya manufactures carbon disulfide and sulfuric acid, stocks of which are consumed largely in the batik industry and include both domestic and imported amounts as required.

Guano Fertilizer Demand in South Africa Exceeds Supply

Demand for guano fertilizer among South African agriculturists is approximately five times the supply annually, with the government distributing this natural product after gathering it from publicly owned islands around the coast. Efforts are being made to raise the production to 10,000 tons annually, by protecting the nesting areas of the guano-producing birds.

The price for the forthcoming allotment of guano, April 1942, will be approximately $24 per short ton, or approximately $2.40 per 200 pounds, delivered packed in bags. This is the minimum quantity supplied. The major demand is from wheat growers in the western part of the Cape Province.

Imports to Chile of Sodium Hydroxide Gain

Chilean imports of sodium hydroxide continue to increase, according to the U. S. Department of Commerce, despite an annual production of 1,500 to 2,000 metric tons. Imports in 1939, with the United States and Great Britain as the principal suppliers, were 2,358 tons, compared to 1,652 tons in 1937. In 1939 the British share of the market was 1,354 metric tons to 952 from the United States. Prior to the war Germany, Japan, and Sweden participated in the trade in small amounts.

Brazil Exports Bone Meal, Animal Fertilizers

Brazil is a source of bone meal, other animal fertilizers, cottonseed cake, and cottonseed bran, according to a digest of such exports showing that the country's large packing houses shipped abroad 10,127,460 kg. of bone meal and similar products between January and October 1941. Cottonseed cake shipments through the crop year March-September were 3,270,000 kg. and cottonseed bran, 10,999,806 kg.

Guatemala Experiments with Derris Production

Experimental production of derris is reported from Guatemala. The principal grower has attained a production of 200 pounds and is said to be working on the problem of increasing the rotenone content of the output. The cuttings in general use are the Philippine variety, having a low rotenone content.

A dip of nearly 50 per cent in Chilean exports of carpenters' glue is indicated in government statistics showing that such exports were 103,200 kg. in the first eight months of 1941 against 202,800 in the same period for 1940.

. . . addressed to the men
who are putting resins
to work for victory

HERCULES
Designer of Resins for Industry

Have you any problems in which new kinds of resins—resins with out-of-the-ordinary properties—can be useful?

You already know our phenolics and maleics. They have been sold for years under the Lewisol name. You also know our ester gums, under the Imperial Brand name.

The other Hercules Rosin Esters—with a wider range of properties—some of them extremely useful under today's constantly changing conditions—are not as well known. On these we have a large backlog of technical data, ready to turn loose on your problems with a minimum of time-consuming development work.

Among these resins are the three Pentalyns*—pale, hard, heat-stable pentaerythritol esters of rosin—valuable because they can be cooked to full body with the softer oils *without discoloration or decomposition*. Hercolyn* and Abalyn*, too, are very important today—two *liquid resins*, the methyl esters of rosin—widely used as resin plasticizers, solvents, pigment-grinding aids, and modifiers for blown asphalt. There are special ester gums from Staybelite* (Hercules' hydrogenated rosin), ranging from very viscous liquid resin-plasticizers to *balsams* or brittle solids—and Vinsol* Ester Gum—hard, high-melting, solvent-resistant. New and challenging is Poly-pale* Ester Gum—higher-melting and with a heavier body than gum esters.

These and the other Hercules Rosin Esters will bear investigating. Many can be put to work right away—using already-available data to help you get started faster on your own part in the victory drive. Hercules is still designing resins for tomorrow—improved over anything known today. But before that "tomorrow" can be realized, before industry can set forth to win the peace with these new tools, there's a war to be won. If Hercules resins can help, we want them used. Call on us for specific suggestions on your war-production problems. Technical data and samples will come to you immediately, without obligation.



*Reg. U. S. Pat. Off. by Hercules Powder Company

SYNTHETICS DEPARTMENT
HERCULES POWDER COMPANY
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POTOMAC POSTSCRIPTS

Allocations and WPB Actions

Aluminum and Magnesium. Programs for the production of 2,000,000,000 pounds of aluminum and imports of 450,000,000 pounds from Canada and for output of 725,000,000 pounds of magnesium annually have been announced by W. L. Batt, director of materials of the War Production Board. By May 1942 American plants will be turning out aluminum at between three and four times the rate of the best peacetime year, 1937, when production was around 300,000,000 pounds, and by the end of 1942 will reach the rate of 1,450,000,000 pounds.

Current production of magnesium is at the rate of about 60,000,000 pounds and by midsummer will be between 200,000,000 and 250,000,000 pounds per year. The Dow Chemical Co. is to build a plant in Michigan to make an additional 144,000,000 pounds of magnesium annually from new salt brine wells containing three times as much magnesium as the wells at Midland, Mich. Including the plant now producing magnesium from sea water in Texas and another Texas plant now in construction, which will be operating by early summer, Dow will be producing about 270,000,000 pounds, or over a third of the whole program.

The ferrosilicon process, developed by the Union Carbide & Carbon Corp., Ford Motor Co., and Dominion Magnesium Co. in Canada, will produce about 157,000,000 pounds annually. Work has already been started on three plants, which are expected to be in operation in less than six months. By the fall of 1942 plants producing magnesium by other processes are expected to be producing 96,000,000 pounds annually, and experimental pilot plants are working on the reduction of olivine.

Cellophane. A 30-day extension on Limitation Order L-20, relating to cellophane, was ordered February 16 by the Director of Industry Operations, WPB. Studies of cellophane uses are being made and either a further extension of L-20 or an order to replace it will be issued at the end of the 30 days.

Chlorinated Rubber. All stocks of chlorinated rubber in the United States, except those going into a specified use, have been ordered frozen, preparatory to requisitioning by the War Production Board or diversion into war production.

An amendment to General Preference Order M-46 provides that chlorinated rubber may be used only as a paint for interior use in industrial plants where resistance to chemical corrosion is necessary; as a paint in arsenals and for ship bottoms and other submarine uses; for flameproofing military fabrics, including tents; for tracer bullets; for adhering rubber articles to metal; and for electrical insulation. Stocks on hand for all other uses must be reported at once to the Chemicals Branch, WPB, and held for later disposition.

Although facilities for production of chlorinated rubber are being increased greatly, current military demands are much in excess of supply. The material has been under a monthly allocation system since November 1, and none is now going for nonmilitary use.

Principal civilian uses for chlorinated rubber which are prohibited by the order are swimming pool paint and other concrete and masonry paint; treatment of fabrics, papers, and printing inks for greaseproofing and to increase resistance to chemical action; bottle cap closures; and fast drying paint finishes.

Glycerol. Major producers of liquid and potash soap will be directed to process their fats and oils to obtain the maximum amount of glycerol from their production, WPB has announced. Smaller companies, however, may not be required to effect a complete recovery of the glycerol in their products because of the relatively small amount involved and the excessive cost of getting it.

Phenol and Anhydrous Ammonia. Substantially increased capacity for the production of phenol and anhydrous ammonia was called for by the Requirements Committee of WPB at its first meeting. The increased capacity, William L. Batt, chairman of the committee, said, was found to be necessary to meet requirements of the greatly expanded military program. Appropriate federal agencies, he said, will immediately take the necessary steps to carry out the committee's determinations.

Tungsten. Further conservation of tungsten, vital in alloy steel, has been ordered in Conservation Order M-29-b. This regulation prohibits use of tungsten in grinding wheels and gages and as a coloring material for rubber, linoleum, paper, or other similar materials after May 1. Until that date use of tungsten in these items is limited to 17.5 per cent of the amount used during the year ended June 30, 1941.

All other tungsten users, except those specifically exempted, must reduce their use between February 1 and March 31 to 12 per cent of the amount used in the year ended June 30, 1941. After April 1 they are limited by calendar quarters to 17.5 per cent of the amount used in the base year.

Exemptions include use of tungsten for Army, Navy, Lend-Lease and other government contracts; to comply with safety regulations; orders bearing preference ratings of A-1-j or higher; corrosion-resisting material; alloy steels; hard-facing materials; hard-cutting tools and tool tips; atomic hydrogen welding rods; laboratory reagents and pharmaceuticals; laboratory research equipment; electrical equipment; radio and x-ray equipment; and electronic relays and electric lighting uses, both filament and fluorescent.

Price Regulations

Fertilizer. Price control action designed to aid the American farmer in his all-out food production campaign have been taken by Price Administrator Leon Henderson in the form of a freeze of fertilizer prices, a major item of cost to farmers, on the eve of spring planting. This order, Temporary Maximum Price Regulation No. 1, forbids the retail sale of mixed fertilizer, superphosphate, and potash on and after February 27 at prices above those at which any seller of fertilizer at retail did business during the five-day period from February 16 through February 20. This temporary regulation has a life of 60 days from February 22, but on or before its expiration will be supplanted by a permanent regulation.

Fertilizer sales down to a minimum of 250 pounds are covered. OPA will scrutinize all such small lot sales with extreme care for possible evasions. Some 75Q mixers will be affected by the fertilizer order. In 1940 the industry produced 8,310,853 tons.

Paraffin Wax. Letters have been sent to exporters of paraffin wax notifying them not to buy from producers or jobbers at prices in excess of those allowed under Price Schedule No. 42 for ordinary domestic sales. This is in accordance with the terms of the schedule establishing one set of ceiling prices for all sales made within this country either to domestic consumers or exporters and another somewhat higher set of prices for export sales to persons in foreign countries and for export sales to persons in the territories or possessions of the United States.

OPA has received reports that some producers and jobbers have been offering wax to exporters at the higher ceilings applicable only to sales to individuals or concerns outside continental United States, exclusive of Alaska. Such sales would be clearly a violation of the schedule, OPA Administrator Henderson stated.

PYROXYLIN plastics amounting to 112,944 pounds and synthetic resins valued at $46,013 at works were reported among bonding and bushing materials used by Canada in production of artificial abrasives in 1940.

Need a Solvent - Now

IMMEDIATE availability in plentiful commercial lots is one of the vitally important reasons why you profit by using Furfural. And far from sacrificing quality in your product, you may find that you are doing a better than ever solvent job at a lower cost. In bulk Furfural costs less than a dime a pound.

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Selective Solvent—for refining lubricating oil, wood rosin, and other substances requiring the separation of color, odorous material, unsaturates or foreign bodies from the primary substance.

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The uses of Furfural are not limited to solvent applications for it is used in many other ways. In resin manufacture it finds increasingly important application. Consider it also as a penetrant, preservative, fungicide and chemical intermediate.

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FURFURAL - FURFURYL ALCOHOL - HYDROFURAMIDE
. . . TETRAHYDROFURFURYL ALCOHOL . . .

Indiana Standard to Build Toluene Plant

THE Standard Oil Co. of Indiana has concluded a contract with the Government to build and operate a toluene plant at its refinery in Whiting, Ind. This one plant will produce as much as the total annual output of toluene in the United States in World War I. Construction will be started as soon as details can be arranged and necessary materials obtained. It is anticipated that more than a year will be required to build the plant.

Standard is negotiating with the Government concerning erection of an alkylation and butane isomerization plant at Whiting to increase its output of 100-octane aviation gasoline. Existing facilities at the Whiting refinery, already operating at capacity, are supplying large amounts of aviation gasoline. Since the quantities of aviation fuel required for the Nation's war program far exceed the possible output of existing capacity in the whole industry, additional plants must be built.

New WPB Section Studies Chemical Plant Facilities

IN THE Chemical Branch, Material Division, War Production Board, of which E. W. Reid is chief, a Section of Plant Facilities has been set up with C. T. Thompson as chief, for the purpose of putting idle chemical equipment to work for essential chemical war needs and to aid in diverting equipment from nonessential to essential uses. The section will also act as a liaison office between principals who may be able to produce some essential product and those who may have equipment either idle or not engaged in direct war production. The new section is anxious to contact persons with idle equipment who may desire to produce some critical item and need additional equipment, as well as those wishing to divert existing production to meet some direct war demand.

The agency is concerned with existing equipment only and not with new equipment. Persons having such equipment should list and describe it, give information as to past usage, and if possible suggest other usage for which it might be adapted. They should also report whether the equipment could be used in place or would be available for relocation under some circumstances. Manufacturers are urged to make the most of this further opportunity for national service.

BOLIVIAN chemical imports showed a slight gain during 1940 with the United States and United Kingdom being the principal suppliers. Principal consumers were mines, textile mills, soap factories, tanneries, the malt liquor industry, and drug trade.



Sulfur for Defense

America's sulfur requirements in 1942 will exceed those of 1941, according to Langbourne M. Williams, Jr., president of Freeport Sulphur Co. "Fortunately," he states, "the Nation's enormous unmined reserves, large above-ground stocks and great productive capacity place us in a strong position to meet any challenge of the future." See pages 336–337.

Plastic Disks for Blackouts

PLASTIC disks about the size of a nickel, said to give maximum reflection of light from minimum candle power, are the latest contribution of science to blackouts. Reflecting sharply the light from a blackout colored flashlight or similar shaded source, the disks may be worn on belts, armlets, and clothing, or used as directional signals and signs of danger spots such as stairways and elevator shafts, the du Pont company, Wilmington, Del., reports. Made wholly of Lucite methyl methacrylate resin, each disk has a hole in the center and may be nailed, riveted, screwed, or wired in place.

The reflectors, on sale at retail stores, are injection molded for Lumelite Corp., New York, from Lucite produced by the du Pont Plastics Department.

Synthetic Methanol Production Increases

SYNTHETIC methanol production in the United States for the first 11 months of 1941 totaled more than 50,335,800 gallons, against 41,055,000 gallons for the same period of the previous year, the U. S. Bureau of the Census reports.

In January through November 1941, crude methanol output came to 5,089,500 gallons, compared to 4,810,000 in the same months of 1940. Stocks at the end of November 1941 were 1,080,300 gallons of synthetic methanol and 683,400 of the crude.

Argentina to Sell Alcohol from Corn to U. S.

A PLAN to help Argentina dispose of some of her surplus corn has been worked out by government officials responsible for obtaining industrial alcohol for the production of smokeless powder. Under a program which has won the approval of this Government and the cooperation of Argentine officials, that country will use available distilling facilities for the production of industrial alcohol from the surplus corn and ship the product to the United States.

The program will enable Argentina to convert her corn into a commodity which the United States requires for armaments and for that reason is not likely to stir up complaints from farmers in this country. Economic relations between the United States and Argentina have been complicated for years by the fact that the country's two major exports, beef and corn, are directly competitive with U. S. production.

Argentine distilling interests, it is reported, have been inquiring in United States markets for second-hand industrial alcohol distilling equipment with which to augment their own facilities. Since this country is also trying to expand its industrial alcohol output, it is doubtful if the inquiries will result in any actual sales.

U. S. Pushes Cultivation of Medicinal Plants

JUST as the last war resulted in creation of a self-contained American synthetic chemical industry, so this war is expected to result in new vegetable drug industries here and in South America. Most of the imported European drugs can be grown in the United States. Many of the Oriental drugs can be grown in either Mexico or Latin America, or else substitutes can be produced. About 30 per cent of the country's former drug supplies came from Europe and about 25 per cent from the Far East. Most of the plants grow wild. Loss of certain characteristics under cultivation raises another major problem. Cheap labor is also a factor; this is why digitalis (foxglove) which grows in most of America's backyard gardens was imported. The Department of Agriculture is advising farmers on cultivation of plants for medicinal raw materials, and an expedition under government sponsorship is going to South America to develop increased supplies.

One of the vitally important jobs under way, besides finding sources of plants, is to make the alkaloid and other plant principles from the raw materials. S. B. Penick & Co., E. R. Squibb & Sons, Merck & Co., Abbott Laboratories, and Eli Lilly and Company are busy in these fields of research.

Canary Islands Must Raise Fertilizer Imports

THE Canary Islands are developing as a market for fertilizers, with reports that thousands of tons, especially nitrates, are being imported annually because of the intensified system of cultivation. Unless negotiations for a limited amount of ammonium nitrate and sodium nitrate from Chile are successful, it is said, 1942 crops in the islands may suffer materially. The Canaries export principally bananas, potatoes, tomatoes, and onion seed.

The most recent figures on fertilizer imports by the islands are for 1934 and show, in metric tons, potash fertilizers 7,113; sodium nitrate 339; synthetic nitrates 1,145; ammonium sulfate, 22,578; and superphosphates, 16,508.

British India Studies Molasses Utilization

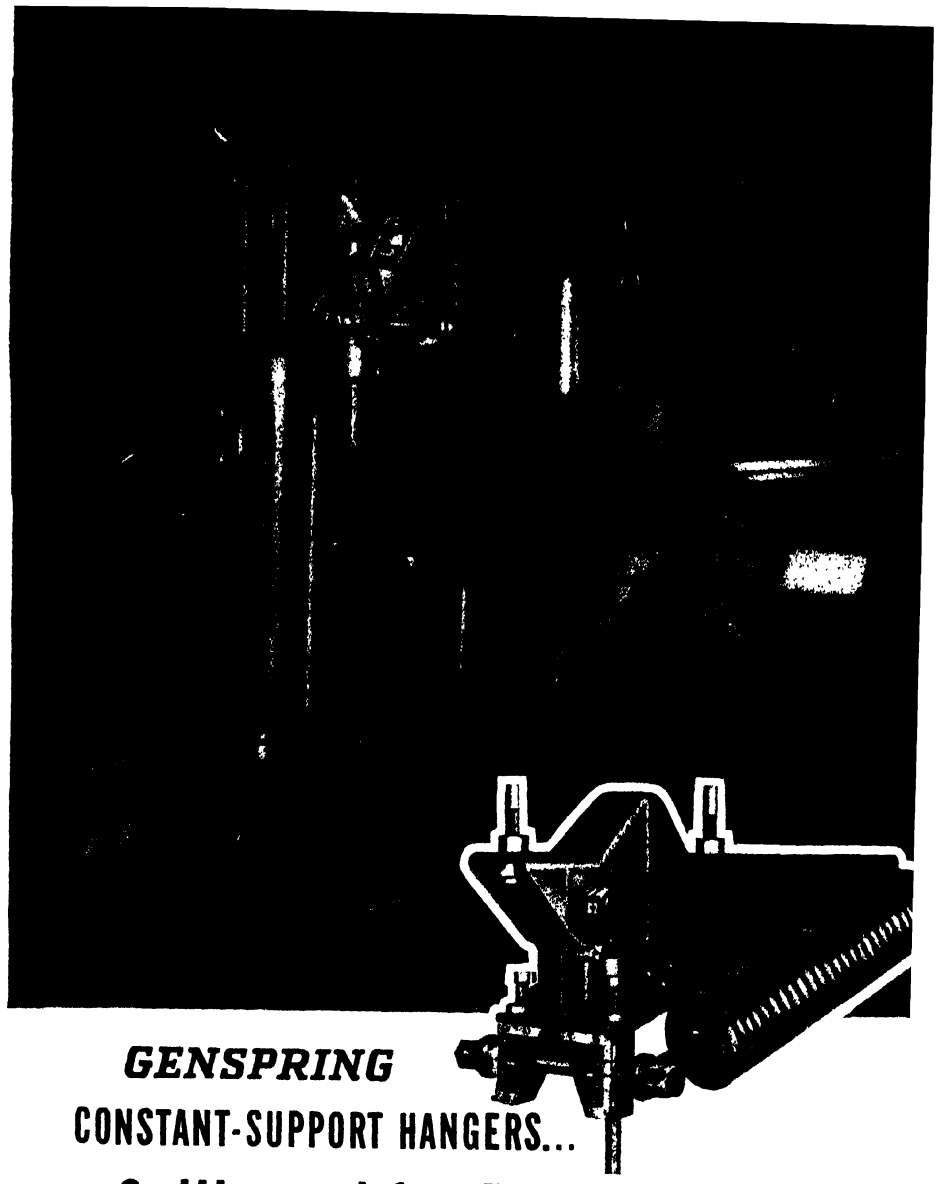
UTILIZATION of waste molasses, left after sugar crystallization, offers a problem in British India, according to reports received here which have attracted interest because of the steps being taken in the United States to conserve raw materials for alcohol production for munitions.

An accumulation of 500,000 tons annually is reported from India where research has been under way seeking to convert it to use. Power alcohol produced domestically from fermentation of molasses already has been adopted for mixture with gasoline, and compositions for road surfacing have been produced. Efforts are being directed to extraction of potassium salts and recovery of organics including citric and oxalic acids and butyl alcohol or acetone from the waste.

Shortage of Raw Materials Hits Mexican Chemical Industry

THAT the shortage of many raw materials is affecting the chemical and pharmaceutical industry of Mexico is revealed in a listing of basic needs. These are said to be acetylsalicylic acid, quinine and salts, medicinal solutions, cyanides, coal-tar dyes, olive oil, essential oils, cocoa butter, citric and tartaric acids, and ammonium sulfate. The soap and oils industry is concerned by a shortage of sodium hydroxide, essential oils and dyes, while lack of linseed oil, dyes, varnishes, hydrochloric and sulfuric acids, alum, chromium, potassium bichromate, sodium bichromate, and tanning extracts trouble the shoe and tanning industry.

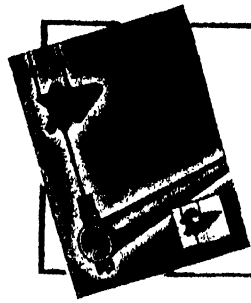
PHILIPPINE imports of chemicals and allied products during the first nine months of 1941 declined slightly to $8,991,000, compared with $9,236,700 in the same period of 1940. The bulk of these products was imported from the United States.



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CONSTANT-SUPPORT HANGERS...
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Before shipment to you, every GENSPRING Constant-Support Hanger for power piping is *individually* tested at the factory under load-and-travel conditions that duplicate the actual service specifications. However, should you find it necessary, field adjustments up to ± 16% of the hanger's rated load are easily made.

These are only two of the manufacturing and design features that make GENSPRING the outstanding hanger



WRITE FOR complete Data Book on GENSPRING Hangers containing piping-travel calculations.

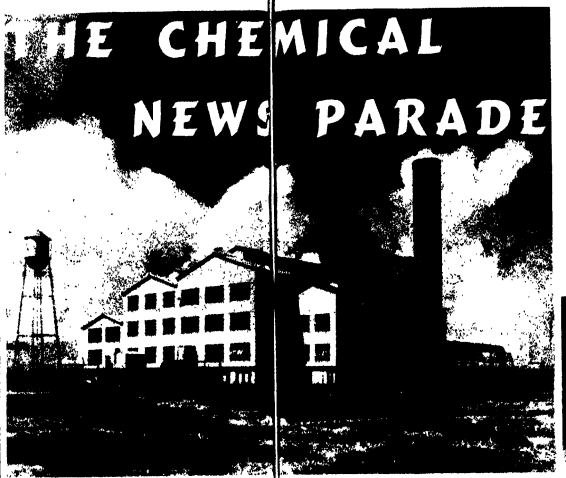
GENSPRING CONSTANT-SUPPORT HANGERS BY



Right. The power plant at Freeport Sulphur Co.'s Grande Ecaille mine in Louisiana, considered one of the world's most unusual sulfur mines because of the extremely unstable marshland on which it was developed. For the plant foundation 3,500 piles, each 75 feet long, had to be driven. They sank the first 45 feet into the Mississippi delta before being struck by pile drivers. Land around the building has been filled. *Left.* This is sulfur, a primary chemical raw material to meet mounting needs of wartime industry, shipments from the Gulf Coast sulfur mines are at an all-time high. In 1941 they rose to an estimated 3,375,000 long tons, more than 750,000 tons above the previous record.

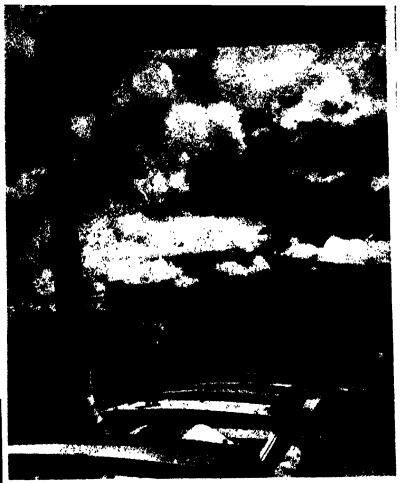


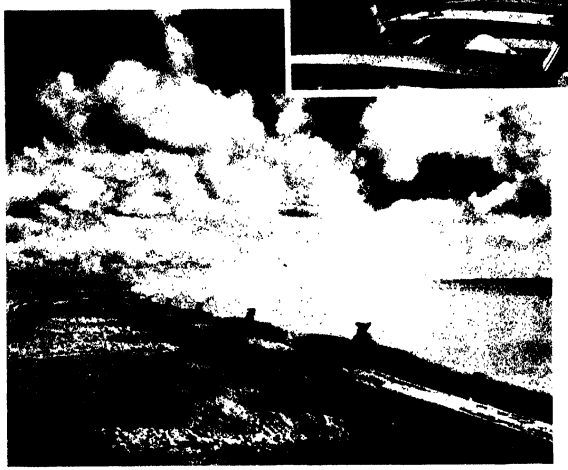
THE CHEMICAL NEWS PARADE



Left. Sulfur shipments are made night and day from Port Sulphur, La. Despite heavy demands, the sulfur industry's large above-ground stocks of mined sulfur have been maintained with practically no reduction. These stocks now total about 4,000,000 tons. *Lower left corner.* Bank of boilers in the Grande Ecaille plant. These boilers furnish steam to help heat 3,000,000 gallons of water a day, used there in mining sulfur by the Frasch process. Superheated water at about 330° F. is forced into the underground sulfur-bearing formations to melt the sulfur, which is then extracted in molten form. *Below left.* Pumps, driven by steam turbines, pump the hot water through insulated pipes from the power plant to the sulfur wells at the mining area about a mile away. The wells consist of four concentric pipes, which keep separate the hot water, compressed air, and molten sulfur. *Below right.* Three 800-pound high-pressure air compressors supply air to the mine area for pumping the sulfur wells. Air at about 600 pounds pressure is supplied to a central relay station, from which it goes into wells at about 400 pounds pressure.

Right. On the muddy Mississippi beneath billowing clouds at Port Sulphur a barge gets its load. Sulfur mined by the Frasch process is guaranteed better than 99.5 per cent pure and free from arsenic, selenium, and tellurium. *Below.* To maintain a relatively low formation pressure, water injected into the formations must be bled from the mine—removed through special "bleed wells", piped from the mine area, and purified by aeration, as shown here, before disposal. *Lower right corner.* Dredge cuts mud from lake and bayou bottom at Grande Ecaille to fill underground cavities. About 6,750,000 cubic yards of mud have been pumped into the formations, and about 7,500,000 used for surface fill.















American Chemical Society[1]

103RD MEETING. Memphis, Tenn., April 20 to 24, 1942.

104TH MEETING. Buffalo, N. Y., September 7 to 11, 1942.

105TH MEETING. Indianapolis, Ind., spring of 1943.

106TH MEETING. Minneapolis, Minn., fall of 1943.

NATIONAL CHEMICAL EXPOSITION. Stevens Hotel, Chicago, Ill., November 17 to 22, 1942.

NINETEENTH NATIONAL COLLOID SYMPOSIUM, Division of Colloid Chemistry. University of Colorado, Boulder, Colo., June 18 to 20, 1942.

Other Scientific Societies

AMERICAN ASSOCIATION OF CEREAL CHEMISTS. Edgewater Beach Hotel, Chicago, Ill., May 18 to 22. Annual meeting.

AMERICAN CERAMIC SOCIETY. Hotel Netherland-Plaza, Cincinnati, Ohio, week of April 19. Annual meeting.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Boston, Mass., May 11 to 13. Semiannual meeting.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Chicago, Ill., June 22 to 26.

AMERICAN INSTITUTE OF NUTRITION. Boston, Mass., April 1 and 2.

AMERICAN LEATHER CHEMISTS ASSOCIATION. Bolton Landing, Lake George, New York, N. Y., May 25 to 27.

AMERICAN SOCIETY OF BIOLOGICAL CHEMISTS. Copley-Plaza, Boston, Mass., March 31 to April 4.

AMERICAN SOCIETY OF BREWING CHEMISTS. Netherland-Plaza Hotel, Cincinnati, Ohio, May 25 to 27.

AMERICAN SOCIETY FOR TESTING MATERIALS. Atlantic City, N. J., June 22 to 26.

ELECTROCHEMICAL SOCIETY. The Hermitage Hotel, Nashville, Tenn., April 15 to 18.

INSTITUTE OF FOOD TECHNOLOGISTS. Minneapolis, Minn., June 15 to 17.

NATIONAL PETROLEUM ASSOCIATION. Hotel Cleveland, Cleveland, Ohio, April 16 and 17. Semiannual meeting.

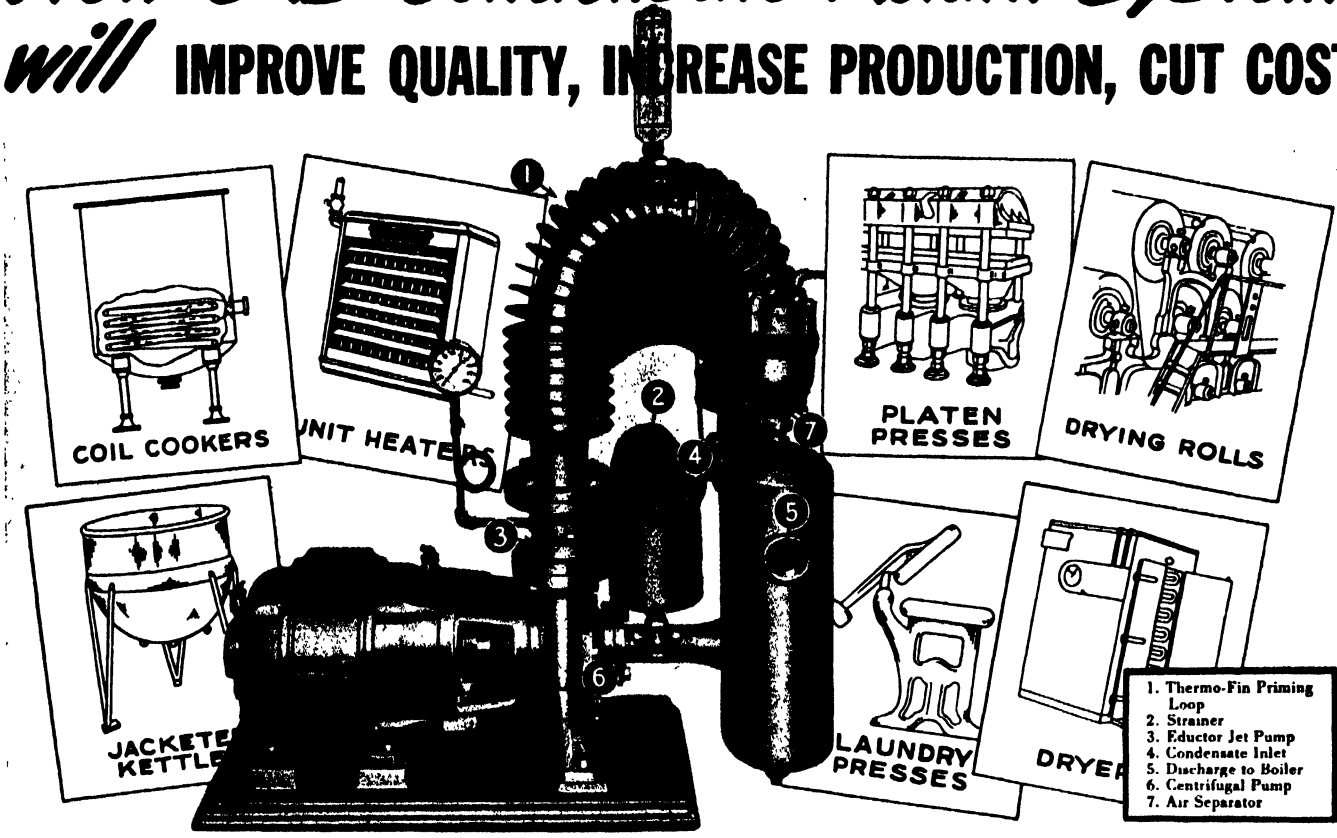
SCIENTIFIC APPARATUS MAKERS OF AMERICA. Hotel Hershey, Hershey, Penna., June 1 to 3.

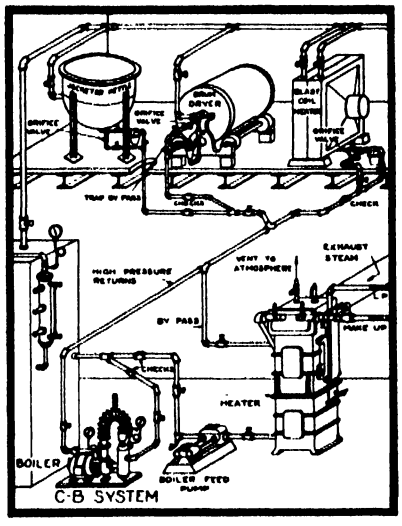
Local Sections

SECTION AND PLACE	MAR.	SPEAKER	SUBJECT
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Baton Rouge, Room 104, Nicholson Hall, Louisiana State University	23	**Harry N. Holmes**	Vitamins and Public Health
Binghamton, N. Y., Carlton Hotel	30	**W. G. Bywater**	Anticonvulsive Drugs
Central Texas, Chemistry Building 15, University of Texas, Austin	17	**Harry N. Holmes**	Strategic Raw Materials and the National Defense
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Cleveland, Cleveland Engineering Society	18	**F. H. Emery**	Chemical Analysis by the Use of Light
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Georgia, Dining Hall, Georgia School of Technology, Atlanta	30	**H. Jermain Creighton**	Mannitol and Sorbitol
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Milwaukee, Wis.	20	**Albert L. Henne**	Aliphatic Fluorides
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Montana, Bozeman	25	**Albert L. Henne**	Aliphatic Fluorides
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Northeast Tennessee, Franklin Club, Elizabethton	23	**H. Jermain Creighton**	Mannitol and Sorbitol
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[1] The list of the SOCIETY's National Officers and Directors, Editors, members of Council, Divisional and Local Section Officers, Committees, and Chapters of Student Affiliates appears in CHEMICAL AND ENGINEERING NEWS three times a year—usually February 10, May 10, and October 10. The latest list is printed on page 187 of the February 10 issue.

New C-B Condensate Return System will IMPROVE QUALITY, INCREASE PRODUCTION, CUT COST





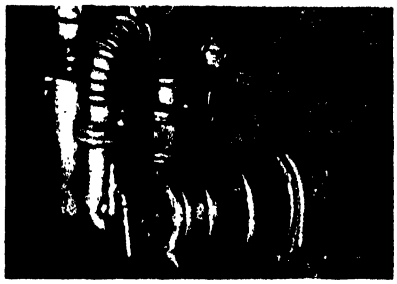
Rapid Positive Removal of Condensate, Elimination of Air and Return to Boiler in Process Work

Operating on the eductor principle, the new Cochrane-Becker Condensate Return System rapidly removes hot condensate from steam process equipment and returns it to the boiler at high pressure and close-to-process temperature.

The eductor action is continuously energized by a jet from a specially designed pump and given balance and continuity by a loop, forming a closed circuit to insure positive priming. An air separator completely removes entrained air and gases continuously and automatically, the condensate being returned to the boiler at maximum temperature and pressure.

Because the circuit from boiler through equipment and back to boiler is thus a closed system, there is no flash loss as in the usual open return system.

Many large corporations are using the C-B system with remarkable results. Testimonials to the savings effected are on file and will be mailed on request.



Rubber Company Speeds Production.
Saves 20% in Fuel. "Uniform temperatures maintained on presses are a big factor in the increased production we have experienced since installing this system. We also have better than 20% saving in fuel."
Pierce, Roberts Rubber Co., Trenton, N. J.

Write for Publication No. 3025, or better yet, ask us to make a survey of your steam consuming equipment, return lines, steam consumption and boiler facilities. We will estimate savings to be effected by the C-B system and submit it for your consideration.

C-B SYSTEM

Cochrane
CORPORATION
3113 N. 17th St., Philadelphia, Pa.

Akron Rubber Group to Meet

THE Akron Rubber Group announces that its spring meeting is scheduled for March 20 at the Akron City Club, Akron, Ohio. The General Electric Co. will present its program entitled "Lamps in the Spectrum" or "Applications of Radiation from Filament and Gaseous Discharge Sources".

Big Demand for Space at National Chemical Exposition

TERMED "the most important industrial exposition of the year because of the war" is the National Chemical Exposition to be sponsored by the Chicago Section of the AMERICAN CHEMICAL SOCIETY, November 17 to 22 at the Stevens Hotel, Chicago.

More than 60 per cent of the available exhibition space, double the area of the first show held in December 1940, is already under contract with firms throughout the country. According to Victor Conquest, director of research for Armour & Co. and chairman of the show committee, the exposition will utilize the hotel's exhibition hall, which was adequate for the first show, and has contracted for one of the large ballrooms and connecting floor space. Additional exhibition space could not be secured because of the hotel's prior bookings.

Held in conjunction with the exposition this year will be a National Industrial Chemical Conference addressed by leaders in the chemical industry. Many scientific societies are planning to hold their conventions and meetings in Chicago during the same period The show and conference, said Mr. Conquest, will be a patriotic gathering of experts who hold the key to many wartime problems.

Exposition headquarters are located at 110 North Franklin St., Chicago.

Somerville Discusses Sunlight Aging

A. A. SOMERVILLE, vice president of R. T. Vanderbilt Co., discussed weather aging comprehensively at a meeting of the Chicago Rubber Group, A. C. S. Division of Rubber Chemistry, on February 5.

The talk supplemented and brought up to date a paper presented before the meeting of the division at Atlantic City, N. J., in 1929.

In testing, 15 different rubber compounds were subjected to sunlight deterioration, with the samples under stress at elongations from 5 to 50 per cent. The samples, 10-inch loops, were stressed between wooden pegs spaced at different distances on the test board. Five sets of 19 boards were used, with the sets at different locations. One set of samples, which was exposed in the midst of a group of high tension lines, behaved no differently from the others, apparently because the installation was engineered well enough to minimize the formation of free ozone. In general the results confirmed previous observations, showing that maximum deterioration in sunlight takes place at 10 per cent elongation.

Dr. Somerville also discussed other test methods. A stepped cone which was utilized in earlier work accommodates rubber bands for exposure at various elongations. In another test triangular samples are stressed and then fastened along the base and at the apex, which results in less stress at the base than at the apex. A new test machine utilizes Hoover vacuum cleaner rings which are stressed at 10 per cent elongation around rotating sheaves. This machine, in addition to providing uniform exposure for the samples, brings in another factor of deterioration, namely the effect of flexing.



Vanderbilt weather aging machine utilizing vacuum cleaner rings

New Process Introduced for Chlorinating Paper Pulp

A NEW process of bleaching paper pulp stock, which promises to reduce substantially the amount of chlorine needed for this purpose, was described in a paper presented by R. R Fuller, Gulf States Paper Corp., and G. A. Petroe, Mathieson Alkali Works, Inc., at a meeting of the Technical Association of the Pulp and Paper Industry in New York.

The basic principle of the process is to add chlorine to the pulp for bleaching purposes while the pulp is flowing through a piping system and is in a state of turbulence. This method of application, the inventors of the process state, ensures a uniform mixture of chlorine and pulp, so that the pulp is evenly treated and the chlorine is used with maximum efficiency.

An automatic system of chlorinating paper pulp that embodies the new process has been developed by the Mathieson Alkali Works and the Gulf States Paper Corp., working in conjunction. The rate of feeding the chlorine is controlled by an air-operated regulator, which varies the amount of chlorine being added in exact proportion to variations in the amount of pulp flowing through the piping system. The automatic process has been reduced to practice and is now in regular use by the Gulf States Paper Corp.

New Oils for Quick Drying Paint Developed

TWO new oils have been developed which will make it possible for the paint industry to continue the manufacture of quick drying paints and varnishes. With imports of tung oil cut off by war in the Far East, the industry, it was feared, would soon be forced to return to the manufacture of slow drying paints. The new developments, however, will make such a move unnecessary. It is even felt that they may permanently replace China wood oil in this country.

Developed by Spencer Kelloff & Sons, the new oils are known as Kellin and Kellsoy. Basically they are made from linseed oil and soybean oil to which quick hard drying qualities have been imparted by a secret process. Commercial production is getting under way, and the company plans to increase output substantially in coming months.

Most of the principal raw materials, flaxseed and soybeans, are grown in large quantities in this country. More than 50 per cent of all the flaxseed used in this country is domestically grown, with the balance imported from Argentina. All of the soybeans consumed in the United States are grown here. A satisfactory hard drying oil has been made from castor oil by chemical reconstruction of its composition. However, the raw material, castor bean, has to be imported from Brazil.



...use SIMPSON INTENSIVE MIXERS

ANOTHER processing problem finds its solution through the use of Simpson Intensive Mixers! This time it's soap, both bar stock and in powdered form. In both cases, results proved beyond question that the product was produced faster, at less cost, with a higher quality than by using former methods. Thus, Simpson Mixers, with low original cost, will efficiently and economically replace conventional amalgamators and soap mills.

Units for handling soap are equipped with 3,000 lb. mullers, to handle heavy semi-solids efficiently. With a No. 2 unit, tests show that 300 to 400 lb. batches can be turned out every 7 to 12 minutes—*using only 20 H.P.*—just a fraction of the power required with ordinary equipment. In addition, savings in coloring material and perfume are appreciable, due to the thorough distribution assured through the mulling principle of mixing.

Bar soap produced from stock blended in a Simpson Mixer withstood exhaustive washing tests without cracking or checking — ample proof of high quality. Powdered soap, now being produced in quantities with the Simpson Mixer, passes equally high tests. Write for details about Simpson Mixers to meet your needs.

• *Illustrated above is a standard No. 2 — 6 ft. diam. pan Simpson Intensive Mixer. This unit, one of the most efficient production sizes in the National line, has a capacity of 10 to 15 cu. ft. of material. Mixers of this size are being used successfully in hundreds of chemical and process industry plants to increase production, cut costs, and improve product quality.*

SIMPSON

C. S. Examinations Reannounced for Scientists

Scientists have contributed much to public welfare in peacetime. Today they have a vital part in the Nation's defense efforts. The knowledge and technical ability which chemists and physicists possess are in urgent demand in both industry and government service in solving defense problems. In an effort to meet the increasing need, the Civil Service Commission has reannounced, with modified requirements, its examinations for physicist, chemical engineer, and explosives chemist. The salaries range from $2,600 to $5,600 a year. For all, appropriate college study and experience are required. The age limit has been raised to 60 years for regular probational appointment. Provision is also made for the waiver of age and physical requirements for temporary positions connected with the national defense program.

In chemical engineering there is a shortage of qualified people in plant layout, equipment design, market analysis, chemical economics, heavy chemicals, plastics, rubber, agricultural by-products, and strategic materials. Applicants may substitute college teaching in chemical engineering or chemistry for part of the prescribed experience. Copies and application forms may be obtained at first- or second-class post offices or from the U. S. Civil Service Commission, Washington, D. C.

U. S. Treasury Seizes 97 Per Cent of General Aniline Stock

Vesting in the Secretary of the Treasury of 97 per cent of the outstanding shares of General Aniline & Film Corp. of Delaware has been announced by the U. S. Treasury Department. The shares seized were registered in Dutch and German names, and the Treasury said the real interest in all these shares was German. The purpose in vesting the shares was to carry forward recent steps to Americanize the company, better utilize the productive facilities, and protect the investment of American bondholders of the company.

While 95 per cent of the common and preferred stock of the corporation was foreign owned, about the same percentage of outstanding bonds and debentures are held by United States nationals. Outstanding debentures approximating $18,000,000 are guaranteed by the German I. G. Farben. Co. Question of the ultimate disposition of the property is being left open.

Said H. S. Williamson, company vice president, "We've been praying for a long time that someone would act and clear us of uncertainty. It's a pleasure to be working for Uncle Sam."

New Fumigant Kills Insects in Stored Grain and Flour

A new fumigant for grain and flour, highly penetrating and deadly to insects but harmless to humans, is announced by the University of New Hampshire. The compound, chlorinated nitroethane, is a clear liquid with a distinct but not disagreeable odor, stated to be safe to ship in ordinary containers. It evaporates readily on exposure to the air, and the fumes penetrate quickly even into large masses of grain or flour. A simple method of fumigating grain in cars consists of putting the chemical on top of the grain and then sealing the car.



PUBLIC INFORMATION, OTTAWA| WIDE WORLD PHOTO

Camouflaged Laboratory Units

These camouflaged trucks, shown in the English countryside, carry equipment of the No. 1 Canadian Chemical Warfare Defence Laboratory, where chemists and doctors are ready to identify gas the enemy might use and give treatment to casualties. They are completely mechanized, protective units. A feature of the chemical laboratory is the fume cupboard in which lethal chemicals can be examined without danger to workers. Chemical officer is Captain L. B. Macpherson who was in Banting Institute, Toronto, for five years preceding the war. In foreground is a water decontaminator.

Any Questions About

THERMOCOUPLES?

Do you know —

- how to make a thermocouple? See Page 21.*
- where bare thermocouples can, or cannot, be used? See Page 4.*
- what type of protecting tube to use for your application? See Page 14.*
- how to check thermocouples and pyrometers? See Page 22.*

* The above page numbers are from the New Wheelco Thermocouple Data Book and Catalog. Temperature conversion tables, pipe and wire sizes, wire resistances, millivolt tables, decimal equivalents, etc., are also included in this valuable book. Write for your copy TODAY!

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Publication and closing dates of the News Edition

Issue of the 10th closes—
25th of preceding month

Issue of the 25th closes—
10th of the month

BOOKS for Today's Problems

RUBBER, PLASTICS AND RESINS

Chemistry and Technology of Rubber — by Carroll C. Davis and John T. Blake. A. C. S. Monograph $15.00

Science of Rubber — Edited by Prof. Dipl.-Ing K. Memmler — Translated by R. F. Dunbrook & V. N. Morris 15.00

Latex, Its Occurrence, Collection, Properties and Technical Applications — by Ernst A. Hauser 4.00

Polymerization and Its Applications in the Fields of Rubber, Synthetic Resins, and Petroleum — by Robert E. Burk, Howard E. Thompson, Archie J. Weith and Ira Williams. A. C. S. Monograph 7.50

Chemistry of Synthetic Resins — Set in 2 Volumes — by Carleton Ellis 19.50

Chemistry of Synthetic Surface Coatings — by William Krumbhaar 4.00

Plastics and Molded Electrical Insulation — by Emile Hemming 6.00

Casein and Its Industrial Applications — by Edwin Sutermeister and Frederick L. Browne. A. C. S. Monograph 6.50

Systematic Survey of Rubber Chemistry — by Clayton W. Bedford and Herbert A. Winkelmann 8.00

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Volume I $18.00
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Modern Methods of Refining Lubricating Oils — by Vladimir A. Kalichevsky. A. C. S. Monograph 6.00

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Emulsions and Foams — by Sophia Berkman and Gustav Egloff 8.50

METALLURGY

Protective Coatings for Metals — by R. M. Burns and A. E. Schuh. A. C. S. Monograph $6.50

Silver in Industry — Edited by Lawrence Addicks. Sponsored by the Silver Producers' Research Project with the active cooperation of the National Bureau of Standards and many universities and scientific organizations 10.00

Corrosion Resistance of Metals and Alloys — by Robert J. McKay & Robert Worthington. A. C. S. Monograph 7.00

Tin — Its Mining, Production, Technology and Applications — by C. L. Mantell. A. C. S. Monograph 5.25

Beryllium: Its Production and Application — Translated by R. Rimbach & A. J. Michel 10.00

Bearing Metals and Bearings — by W. M. Corse. A. C. S. Monograph 5.25

Sampling and Analysis of Carbon and Alloy Steels. Prepared by The Chemists' Committee of the Subsidiary Companies of the U. S. Steel Corp. 4.50

Sheet Steel & Tin Plate — by R. W. Shannon 5.00

Textbook of Metallography, Chemistry and Physics of the Metals and Their Alloys — Gustav Tammann 7.00

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Zirconium and Its Compounds — by Francis P. Venable. A. C. S. Monograph 3.00

Arsenical and Argentiferous Copper — J. L. Gregg. A. C. S. Monograph 4.00

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FOOD AND NUTRITION

We Need Vitamins — by Walter H. Eddy and G. G. Hawley $1.50

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Minerals in Nutrition — by Z. T. Wirtschafter 1.75

Outlines of Food Technology — by H. W. von Loesecke 7.00

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Comprehensive Survey of Starch Chemistry — by Robert P. Walton 10.00

MISCELLANEOUS

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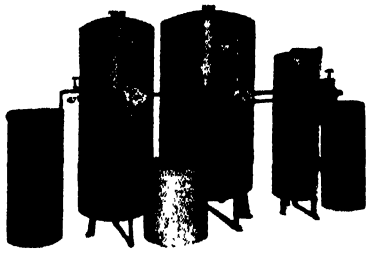
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Business Statistics

WE ARE indebted to the Manufacturing Chemists' Association, 608 Woodward Bldg., Washington, D. C., for the following figures showing business conditions.

Monthly Statistical Report on Business Conditions

	Seasonally Adjusted			Without Adjustment		
	Jan. *1942*	Dec. *1941*	Jan. *1941*	Jan. *1942*	Dec. *1941*	Jan. *1941*
(Base 1935–39 = 100)						
Industrial production[a]	170[b]	167	140	165[b]	163	135
Chemical production	160[b]	152	123	159[b]	153	122
Steel production	208	212	186	208	212	186
Pig iron production	189	190	177	189	190	177
Freight car loadings	140	139	122	129	128	113
(Base 1923–25 = 100)						
Construction contracts, residential	68[b]	69	84	56[b]	59	70
All other	137[b]	167	117	111[b]	130	95
Department store sales, value	138[b]	111	101	108[b]	197	79

	Jan. *1942*	Dec. *1941*	Jan. *1941*
Index of factory employment[c]:			
All manufacturing	132.5[b]	134.3	115.5
Chemicals	186.6[b]	185.9	152.0
Drugs	150.7[b]	149.2	116.1
Fertilizers	120.0[b]	105.8	103.8
Compressed gases	149.0[b]	143.5	124.1
Index of factory pay rolls[c]:			
All manufacturing	173.2[b]	170.2	120.7
Chemicals	280.0[b]	271.6	188.2
Drugs	182.7[b]	184.0	130.9
Fertilizers	118.3[b]	106.2	85.5
Compressed gases	177.8[b]	169.0	136.1
(Base 1926 = 100)			
Wholesale price indexes:			
All products (except farm products and foods)	94.6	93.7	84.3
Chemicals	95.3[d]	88.6	85.6
Drugs and pharmaceuticals	126.3[e]	123.0	96.5
Fertilizer materials	78.6	77.8	70.7
Purchasing power of the dollar:			
All products (except farm products and foods)	$1.058	$1.068	$1.186
Chemicals	1.049	1.129	1.169
Drugs and pharmaceuticals	0.792	0.813	1.037
Fertilizer materials	1.272	1.287	1.415

[a] Source of statistics in first seven items: Federal Reserve Board.
[b] Preliminary figures.
[c] U. S. Department of Labor.
[d] Rise in chemical price index for January is due to increased price ceilings on acetone, denatured alcohol, *N* butyl alcohol, acetic acid, and fats and oils. These increases, announced by OPA during late December and early January, included changes in base prices of acetone from 7 cents to 15.8 cents per pound, *N* butyl alcohol from 10.75 cents to 15.8 cents, SD2B from 24.5 cents to 50 cents per gallon, and an approximate 11 per cent increase in fats and oils prices.
[e] Drug price increase is due principally to camphor (9 per cent rise) and quinine sulfate (6 per cent rise).

Hercules Permits Use of Vinsol in Cement without Royalty

THE series of steps leading to elimination of scaling of concrete highways from freezing and thawing has finally been completed through dedication to public use by Hercules Powder Co., Wilmington, Del., of the patents covering the use of Vinsol resin in cement. This action will make it possible for manufacturers to make the material an ingredient of their cements without payment of royalties.

The resin is used to reduce surface scale and almost completely eliminate progressive scale, the company says. Laboratory and field tests have determined that additions of extremely small quantities of Vinsol in the range of 0.03 to 0.05 per cent to highway cements would produce concrete highly resistant to frost action.

Chemical Manufacturers' Indexes

THE index of the value of chemical manufacturers' inventories for December 1941 was 143.9 compared with 132.0 in November and 117.3 in December 1940, taking 1939 at 100, according to the monthly survey of the U. S. Department of Commerce.

The index of the value of chemical manufacturers' shipments for December 1941 was 170 compared with 176 in November and 124 in December 1940, taking January 1939 at 100, the same tabulation shows.

Chemists Assist in Training Air-Raid Wardens

CHEMISTS generally have been interested in the problem of training air-raid wardens and disseminating information that would be helpful in an air raid.

From San Francisco comes news that Milton J. Polissar has been made director of training of the air-raid warden service and has prepared plans adopted by the civilian defense authorities. The task involves training 3 ,000 wardens, which rests on the simple principle of spreading the necessary work so that a large number of persons may participate. Each will be assigned a task which those competent to judge think he can do best.

Chemists of San Francisco were asked to register with the professional division of the Civilian Defense Volunteer Organization, personnel managers were asked to bring the request to the attention of members of the professional staff including engineers as well as chemists, and members of the AMERICAN CHEMICAL SOCIETY were asked to call the activity to the attention of nonmember chemists and engineers. The 30,000 air-raid wardens are entering their training without delay.

Should others be interested in obtaining full details of this work, Dr. Polissar can be reached at the Civilian Defense Volunteer Headquarters, 532 Market St., San Francisco, Calif.

Hercules Builds Unit for Rubber Reclaiming Materials

DEVELOPMENT of rubber reclaiming solvents, plasticizers, and tackifiers derived from the southern pine will help alleviate a growing shortage of these materials, according to Hercules Powder Co., Wilmington, Del. The company is constructing a new unit at its Brunswick, Ga., naval stores plant for the manufacture of Tarol and Solvenol, rubber solvents and plasticizers. Existing equipment used in production of other naval stores products is being converted to manufacture the materials in anticipation of greater demand for rubber reclaiming materials.

Reclaim production in the United States advanced from 210,000 long tons in 1940 to approximately 280,000 in 1941, and will probably go over 300,000 in the current year. The 1941 output of reclaim amounted to over 25 per cent of the total United States rubber production.

ALTHOUGH Chile has been producing 2,500 metric tons of calcium carbide annually since 1936, imports in fluctuating amounts are reported. For the first eight months of 1939 these were 920 metric tons; of 1940, 1,630 metric tons; and of 1941, 770 tons.



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Beware of sabotage! Remember, in an emergency, your water system may save highly valuable materials, buildings and even lives.

Neglect is almost as destructive as sabotage. If your water supply system is not in tip top order, call in Layne and have necessary repairing and reconditioning done at once. Materials, except for strictly war work, may not be available later. Maintaining present equipment is real conservation.

If you require more water, arrange for additional wells and pumps without delay. Better call in a Layne engineer. He will cooperate with you in planning your additional water supply so as to use the minimum amount of materials essential to war work, yet give you an adequate, efficient and long lived installation. Layne wells and pumps are designed for your requirements regardless of size. They are noted for their high efficiency and trouble free service. They are serving all types of industries, municipalities both large and small, army and navy needs, training camps, flying fields and munitions plants.

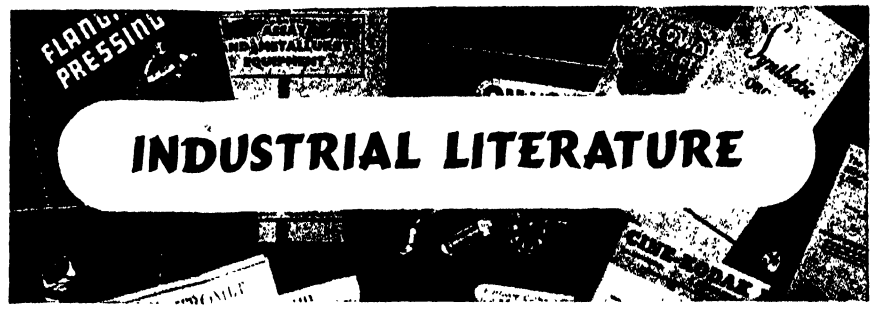
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Layne-Ohio Company	Columbus, Ohio
Layne-Texas Company	Houston, Texas.
Layne-Western Company	Kansas City, Mo.
Layne-Western Co. of Minn.	Minneapolis, Minn.
Layne-Bowler New England Corp.	Boston, Mass.
International Water Supply, Ltd.	London, Ont.



Listed publications should be requested directly from the company concerned. Use business stationery, mention bulletin numbers, and refer to this journal. Publications will be sent free unless otherwise noted.

Air-Conditioning Equipment. A new 12-page catalog describes portable and fixed conditioning units, dehydration, refrigeration, and heating equipment. *Catalog AC-152 IE.* CARRIER CORP., South Geddes St., Syracuse, N. Y.

Ammonia Absorption Systems. A recently introduced absorption refrigeration system is described and shown diagrammatically in this 4-page bulletin. Using low cost heat as a source of energy, this system utilizes a bubble column rectifier that delivers commercially pure anhydrous ammonia to the evaporator. *Bulletin 4140 IE.* YORK ICE MACHINERY CORP., York, Penna.

Automatic Control of Condensate Purity. An 8-page bulletin covers an automatic continuous analyzer of the conductivity of condensate. This instrument assembly consists of a cell mounted in the condensate line and a signalling control. *Catalog N-95-163(1) IE.* LEEDS & NORTHRUP Co., 4907 Stenton Ave., Philadelphia, Penna.

Bearing Covers. A 4-page pamphlet is devoted to standard covers for ball and roller bearings. Flat, medium, and deep covers in two types of fastening flange, lug and round, are described. *Bulletin 11-C IE.* R-S PRODUCTS CORP., 4530 Germantown Ave., Philadelphia, Penna.

Centrifugal Dryers. A continuous feed, mechanical centrifugal dryer, that has been used for many years by the coal industry for the removal of excess surface moisture, has been redesigned and provided with an improved drive and feeding arrangement. This dryer is the subject of a new 4-page bulletin. *Bulletin 741 IE.* MCNALLY PITTSBURGH MFG. CORP., 307 North Michigan Ave., Chicago, Ill.

Condensate Return System. A high-pressure return system is described in this 4-page bulletin. This system is said to assure positive removal of condensate and complete elimination of entrailed air from process equipment. It also permits the return of the condensate to the boiler at close-to-process temperatures. *High-Pressure Return System Bulletin IE.* COCHRANE CORP., Philadelphia, Penna.

Drum and Barrel Carriers. This folder shows the many features of an all-metal barrel and drum carrier. A series of illustrations shows the various ways in which the carrier is used in the plant. Three different sized carriers are described. *Ernst Magic Drum and Barrel Carrier Folder IE.* ERNST MAGIC CARRIER SALES Co., 1456 Jefferson Ave., Buffalo, N. Y.

Feed-Water Treatment. A new organic, protective, and reactive colloidal material is announced in this 4-page folder. This product is used in conjunction with such inorganic chemicals as phosphates or alkalies. *Tanalginate Folder IE.* BIRD-ARCHER CO., LTD., 400 Madison Ave., New York, N. Y.

Flexible Tubing. An 8-page bulletin is devoted to flexible tubing as used in connection with Diesel installations. Tubing is described, and tables of dimensions are given for such products as exhaust pipes, air intakes, and supply lines. This tubing meets specifications of the United States government departments. *Bulletin 71 IE.* PENNSYLVANIA FLEXIBLE METALLIC TUBING CO., 72nd St. and Powers Lane, Philadelphia, Penna.

Gages. A 66-page catalog presents a complete line of gages, recording gages, and testing equipment. Sizes from $2^1/_2$-to 24-inch dial are described. Each gage or tester is illustrated. *Catalog 1000 IE.* ASHCROFT GAUGE DIV., MANNING, MAXWELL & MOORE, INC., Bridgeport, Conn.

Hypochlorination of Water. A series of four bulletins describes units for the automatic injection of sodium hypochlorite directly into the pipe, ahead of the storage tank. These units are made to operate electrically, by gas engines or by coupling to the water meter. *Bulletins DEF, DEL, DU-S, and 116 IE.* % PROPORTIONEERS, INC. %, 9 Codding St., Providence, R. I.

Insulation Materials and Products. A 52-page catalog contains information and recommendations on high- and low-temperature insulations for nearly every industrial need. Included are refractory materials, insulated roofs, electrical panels, flooring, packaging and gaskets, pipe insulation, and many other products. *Form GI-6A IE.* JOHNS-MANVILLE, 22 East 40th St., New York, N. Y.

Lubricant Measuring and Distributing Valves. This bulletin describes a multiple measuring valve which provides positive lubrication to small machines. These valves are in the form of blocks in which are incorporated an indicator and a quantity adjustment for each bearing connected to the system. A series of dimensional drawings is included. *Bulletin 7317 IE.* FARVAL CORP., 3261 East 80th St., Cleveland, Ohio.

Overnight Concrete. This 16-page

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P 2352	Sodium Azide (Pract.)	100 g.	5.00 C

Write for *Eastman Organic Chemicals, List No. 32*

EASTMAN KODAK COMPANY, *CHEMICAL SALES DIVISION*, ROCHESTER, N. Y.

booklet is a new treatise on cement which attains full working strength in less than 24 hours of placing. Information is given on laying concrete in cold weather and placing concrete floors. *Overnight Concrete Booklet IE.* ATLAS LUMNITE CEMENT Co., Chrysler Bldg., New York, N. Y.

Photofluorometer. This instrument, used for assaying B vitamins and other fluorophors, is described in a 4-page illustrated booklet. The instrument is equipped with an electronic amplifier and a wide scale meter calibrated to show full scale linearity. *Bulletin B-103 IE.* COLEMAN ELECTRIC Co., INC., 122 East 42nd St., New York, N. Y.

Pipettor. A 6-page illustrated leaflet describes the Caulfield pipettor and its operation in the laboratory wherever pipets are required for measuring off fluids. *Leaflet IE.* THE CAMPBELL Co., Hammonton, N. J.

Power Pumps. A folder gives data on three 10-inch stroke power pumps which cover a wide range of service in many industries. These pumps are equipped with a totally-enclosed crankcase which houses double-helical gears. Valves are easily accessible. This folder is well illustrated, and contains tables of dimensions and capacity data. *Bulletin W-411-B31 IE.* WORTHINGTON PUMP AND MACHINERY CORP., Harrison, N. J.

Revolving Field Generators. A 4-page bulletin describes a series of alternating-current generators, available in sizes from 7½ to 75 kv.-amp. They are offered for continuous duty in isolated plants or to supplement other available power supply. *BC-A120-80 IE.* CENTURY ELECTRIC Co., 1806 Pine St., St. Louis, Mo.

Shovel-Crane. An 8-page folder is devoted to a machine capable of duty as a shovel, dragline, crane, clamshell, and trench hoe. *Folder 1929 IE.* LINK-BELT SPEEDER CORP., 301 West Pershing Road, Chicago, Ill.

Sodium Tetraphosphate. The many uses for this commercial grade of sodium tetraphosphate are described in an 8-page booklet. Several charts are presented to show its performance as a water treating agent. *Bulletin 64 IE.* RUMFORD CHEMICAL WORKS, Rumford, R. I.

Spray Equipment. This 32-page catalog contains a complete listing and description of paint spray equipment designed for use with low pressure. Five tests are described to show how various factors enter into the economy of paint spraying. *Catalog 70 IE.* ECLIPSE AIR BRUSH Co., INC., Newark, N. J.

Stainless Steel Valves. This 14-page catalog is devoted to stainless steel corrosion-resistant gate, globe and angle, lift check, swing check, and Y valves. Included is a page of information regarding the correct application and use of these valves. *Stainless Steel Valves Catalog IE.* JENKINS BROS., 80 White St., New York, N. Y.

Stroboscopes. This oscillator-controlled neon stroboscope is described in an illustrated folder. Some of the various applications are slow-motion inspection of rapidly moving machinery parts both in research and routine testing, studies of air flow, high-speed photography, and speed measurements. *Form 420-C IE.* GENERAL RADIO Co., Cambridge, Mass.

Tachometers. Industrial tachometers are covered in this 10-page booklet, which contains a series of 17 installation drawings. These centrifugal tachometers, designed with a uniform scale under the entire dial, can be furnished with calibrations in yards or feet per minute, as well as revolutions per minute or per hour. *Jones Tachometers Booklet IE.* JONES MOTROLA, 432 Fairfield Ave., Stamford, Conn.

Vibrating Screens. A bulletin shows the construction of vibrating screens by the transparent-page method. Also included are extensive tables of capacities and photographs of actual installations. *Bulletin 115 IE.* ROBINS CONVEYING BELT Co., Passaic, N. J.

CANADA neither produces commercially nor makes much use commercially of potassium permanganate, beyond some imports by a few firms in that country. Medicinal grades are used to some extent, but statistics are generally lacking.

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NECROLOGY

Fred W. Upson

FRED W. UPSON, dean emeritus of the Graduate College, University of Nebraska, and former chairman of the Department of Chemistry and Chemical Engineering, died February 10 at Lincoln, Nebr. He had been in failing health for the past three years.

Dr. Upson was born in Byron, Ill., in 1883 and received his bachelor's and master's degrees at the University of Nebraska in 1907 and 1908. In 1910 he was awarded his doctor's degree by the University of Chicago. After two years as an instructor in chemistry at the University of Cincinnati and one year at the University of Chicago, Dr. Upson joined the faculty of the University of Nebraska as professor of agricultural chemistry. In 1918 he became chairman of the Department of Chemistry on the city campus, and in 1929 was made dean of the Graduate College. Both of these positions were held until he retired in 1939.

Professor Upson was well known for his numerous researches in carbohydrate chemistry. He had been a member of the AMERICAN CHEMICAL SOCIETY.

Alan G. Wikoff

ALAN G. WIKOFF, editor-in-chief of the General Publicity Department of Union Carbide and Carbon Corp., New York, died February 11 at the age of 46. Mr. Wikoff was graduated from the College of the City of New York with the degree of bachelor of science in chemistry in 1916 and received his master's degree in chemical engineering from Columbia University in 1917. During World War I he was connected with the Chemical Warfare Service for two years. On returning to civilian life he was associated in an editorial capacity with the McGraw-Hill Publishing Co., Inc., for six years. For the past 17 years, he had been associated with Union Carbide and Carbon.

Mr. Wikoff was a member of the AMERICAN CHEMICAL SOCIETY, American Welding Society, and International Acetylene Association.

WE announce with regret the death of the following A. C. S. members:

James J. Conlon, emeritus professor of chemistry, Santa Barbara, Calif. Member since 1913.

H. W. Foote, professor, Yale University, New Haven, Conn. Member since 1908.

Raymond Freas, associate professor of organic chemistry, Tulane University, New Orleans, La. Member since 1934.

R. Clinton Fuller, retired, Providence, R. I. Member since 1902.

John M. Grove, chief chemist, Carlisle Tire & Rubber Co., Lancaster, Penna. Member since 1920.

George B. Heckel, editor and publisher, *Drugs, Oils & Paints,* Philadelphia, Penna. Member since 1909.

John H. P. Ioannu, research chemist, Pennsylvania Salt Manufacturing Co., Philadelphia, Penna. Member since 1927.

Theodore Kipp, vice president, Kipp-Kelly Ltd., Winnipeg, Canada. Member since 1921.

Bradley H. Kirschberg, director of scientific laboratory, New York State Police, Bureau of Criminal Investigation, Schenectady, N. Y. Member since 1941.

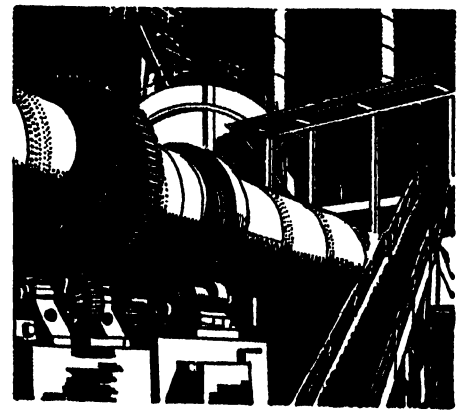
Ludwig Pincussen, research associate, University of Illinois College of Medicine, Chicago, Ill. Member since 1941.

Cooperation for Production

ANOTHER example of American productive ingenuity and the way business is cooperating in the national drive for war production was revealed by the recent action of the Aluminum Co. of America and the Anaconda Wire & Cable Co.

Following the Pearl Harbor attack and the declaration of war upon the Axis, the Aluminum company was faced with the immediate diversion of the major part of its aluminum production to the manufacture of planes. This resulted, among other things, in some idle cabling machinery designed to manufacture electrical wire and cable. At the same time, the Anaconda Wire & Cable Co. found its facilities pushed to the utmost to supply the increased war demand for electrical wires and cables of copper, especially cabling machinery.

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Anhydrous Aluminum Chloride in Organic Chemistry. *Charles Allen Thomas.* A. C. S. Monograph. 972 pages. Reinhold Publishing Corp., 330 West 42nd St., New York, N. Y., 1941. Price, $15.

An inevitable concomitant of war is the need of speed in production and research. The availability of tools is probably the limiting factor in accelerating the tempo of activities. Dr. Thomas in "Anhydrous Aluminum Chloride in Organic Chemistry" has provided a tool of inestimable value to research chemists in the field of organic chemistry.

The book is a timely and strategic contribution to our chemical literature. The present value of the work rests not only on its comprehensiveness and thoroughness, but also on its utility. During the present emergency, when our expanding chemical industry finds it necessary to build and man new plants, this work will expedite the review of the voluminous literature pertaining to the diverse and complex reactions catalyzed by aluminum chloride.

In addition to chapters on the production and purification of aluminum chloride and its physical properties, the book discusses the mechanism and chemistry of the various reactions catalyzed by this chemical. Some of the titles are Alkylation and Arylation Reactions, Ketone Syntheses, Ring Closure, Addition Reactions, Aldehyde Syntheses, Rearrangements and Migrations, and Polymerizations. A recital of chapter headings cannot, however, adequately set forth the comprehensiveness of the work. The tabulated data at the beginning of chapters show the scope of certain reactions and present a bird's-eye view of their possibilities.

The author was confronted with a genuine task relating to chemical nomenclature. The reactions catalyzed by aluminum chloride were to a large extent discovered and reported before there was general agreement on terminology. Frequently identical compounds were reported by three or four different names, and Dr. Thomas and his associates have done a creditable job of bringing order out of chaos.

Progressive chemical organizations will see to it that Thomas' book on "Anhydrous Aluminum Chloride in Organic Chemistry" is made available to their research staffs.

P. H. Groggin

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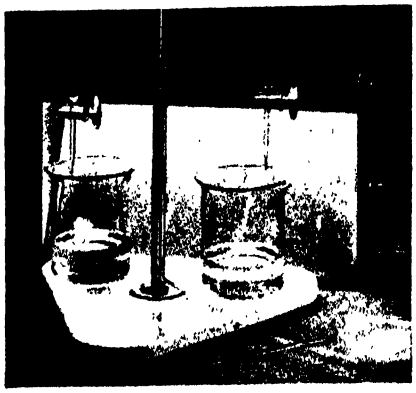
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Solubilities of Organic Compounds. Vol. II. *Atherton Seidell.* 3rd ed. 926 pages. D. Van Nostrand Co., 250 Fourth Ave., New York, N. Y., 1941. Price, $10.

VOLUME I of this set, devoted to quantitative solubility data of inorganic and metal organic compounds was reviewed in the NEWS EDITION [18, 1162 (1940)]. This review may be referred to for a description of the mechanical make-up of the book and the ingenious method in which the material was assembled.

Publication of Volume II, which deals with quantitative solubility data of organic compounds, permits one to compare the compass of the second edition with that of the completed third edition. The latter contains 86 per cent more pages that the former work.

This volume is no mere compilation of solubility tables, for these are supplemented by notes on the technique involved in the determinations. References are given to results obtained by other workers in the field.

Excellent author and name indexes are included, and the method of classification in itself supplies an adequate formula index. References to the original literature are given in the author index.

Considering the invaluable service rendered by the various chemical societies and the International Union of Chemistry in attempting to bring order out of the chaotic condition of chemical nomenclature, spelling, and formulas, the reviewer regrets that the compiler has not conformed to accepted usage in these respects. Hyphens have been omitted in such names as *p*-nitrobenzene. The prefixes chlor and chloro are used interchangeably as in chloracetic acid and chlorobenzene. Spaces have been left between parts of words as in chlor ethane and chlor iodo nitro benzene. The term molecular, not empirical, formula should have been used in the preface. While such criticisms may seem trivial, the reviewer feels strongly that conformity to accepted usage should be observed in chemical publications. However, the usefulness of the compilation is in no way impaired by these meanderings from the straight and narrow path. The balance weighs heavily on the side of the great mass of valuable data which the author has so painstakingly assembled for works in many fields. Congratulations are once more in order.

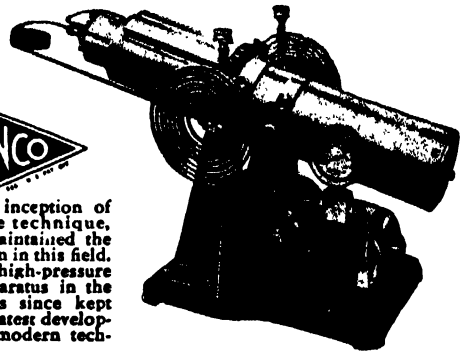
COLIN M. MACKALL

The Men Who Make the Future. *Bruce Bliven.* xiv + 325 pages. Duell, Sloan & Pearce, Inc., 270 Madison Ave., New York, N. Y., 1942. Price, $3.00.

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difficult task, since its intended audience is a very different kind. Mr. Bliven is a journalist of wide experience, and his book presents his views and opinions of science as a moving, vitalising force in our modern world. In assembling the material for the present volume, he has proceeded in a characteristically journalistic manner to collect and collate interviews with many persons in all the principal scientific forefronts. The product is essentially a layman's view of scientific progress and prospects assembled and written in a workmanlike manner. The fields of science explored are many and varied. The style is interesting.

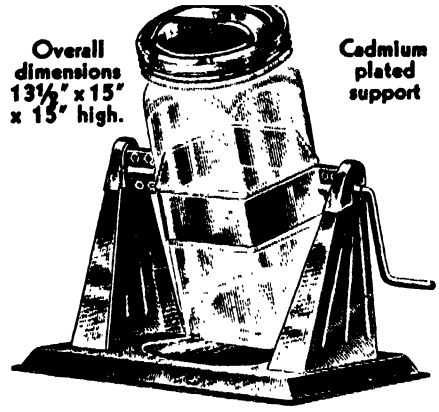
One could easily criticize the title, since the volume is in no sense biographical and direct quotations are more than usually scarce. One might find fault with the relative emphasis placed on various phases of the broad subjects treated. One might even disagree with some of the author's preachments on how scientists should behave toward world affairs and how the world should regard scientists. But those are decidedly minor considerations.

It is healthful and stimulating for scientists to read books like this from time to time. Whether one agrees completely with all of its statements and conclusions is not significant. But it is important that scientists should occasionally see themselves and their activities in the mirror of an intelligent person's thoughts. That the book seems to me to be, and as such it is well worth while.

Inorganic Chemical Technology. W. L. *Badger* and *E. M. Baker*. Chemical Engineering Series. 2nd ed. 238 pages, 6 × 9 inches. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York, N. Y., 1941. Price, $2.50.

THIS very important book has been revised by substitution in many places and hence without any considerable enlargement. It presents the manufacture of important heavy chemicals, such as acids, alkalies and salts, from the viewpoint of the chemical engineer and under American conditions. Various unit operations particularly evaporation and absorption are skillfully and adequately tied in with the manufacturing sequences. To keep within its pages principally up-to-date procedure, older and obsolete processes have been omitted or revised in places.

Both the second and the first editions of this book have impressed the reviewer because of the clarity and skill with which the subjects have been presented. This book is not an all inclusive manual, but anyone interested in salt, alkali, sulfuric,



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nitric, and hydrochloric acids and evaporization should not fail to study the presentation made by Badger and Baker.

As was true in the first edition, the illustrations are unusually well drawn and indeed one third of the present illustrations are new or have been revised. Copious references and problems help adequately to supplement the text. Particularly noteworthy additions involve the concentration of sulfuric acid, contact process, oxidation of ammonia, potash recovery, and soda ash.

R. NORRIS SHREVE

Papers on Organic Analytical Reagents

THE January 1942 issue of *The Virginia Journal of Science* contains reports and papers presented at the Third Symposium on Organic Analytical Reagents held May 2, 1941, at the Richmond meeting of the Virginia Academy of Science. Contents of the January number are:

JOHN H. YOE AND LANDON A. SARVER. Inorganic Analysis with Organic Reagents.

THIRD SYMPOSIUM ON ORGANIC ANALYTICAL REAGENTS

JOHN H. YOE. Introduction.

W. J. FRIERSON AND PALMER M. SIMPSON. Progress Report on Reactions of Organic Compounds with Inorganic Ions.

F. T. LENSE, C. A. GLOVER, AND EDWIN C. MARKHAM. Progress Report on Investigation of Organic Compounds as Reagents in Analytical Chemistry.

LANDON A. SARVER. Salinogenic Organic Reagents.

IRA A. UPDIKE, OSCAR W. CLARKE, JR., AND RICHARD M. IRBY, JR. Progress Report on Studies in Inorganic Analysis with Organic Reagents.

JOHN ROBERT TAYLOR. Progress Report on Studies of Organic Compounds as Analytical Reagents.

JOHN ROBERT TAYLOR. Note on Ferric Ion Phenol Color Reaction.

JAMES W. COLE AND M. BROOKS SHREAVES. Some Complex Compounds of Copper, Silver, and Mercury with Ethanolamines.

E. LOUIS WALLACE AND ALFRED R. ARMSTRONG. Progress Report on Inorganic Analysis with Organic Reagents.

THOMAS B. CRUMPLER AND EARL R. CLAIBORNE. Progress Report: Reaction between Silver and Guanidyl Thiourea Carbonate.

JOHN H. YOE. Selected Bibliography on Organic Analytical Reagents.

A number of chemists who are not members of the Virginia Academy of Science may like to have a copy of the symposium number of the journal. A few extra copies have been printed and can be obtained at 50 cents each while they last. Orders should be sent to Lt.-Col. Robert P. Carroll, Managing Editor, *The Virginia Journal of Science*, Lexington, Va.

Contributions to Chemical Education

THE *Journal of Chemical Education*, Brown University, Providence, R. I., has announced plans to publish a series of "Contributions to Chemical Education". The principal purpose will be to supply students and teachers of chemistry with cheap but authoritative monographs on subjects of interest or importance to them. The first two of the series have already appeared: No. 1, "Acids and Bases"; No. 2, "The Polarographic Method of Analysis". The first is a collection of papers, most of which were previously published in the journal. The second is the reprinted series of articles in the journal by Otto H. Müller. Further contributions will be published from time to time, in the form of either original or reprinted titles. Three others are already in various stages of preparation. They will be inexpensively but attractively printed in a uniform size and format.

It is hoped that this series will aid the journal materially in its primary aim—to provide a living and continuing textbook of chemistry.

National Canners Research Report

THE annual report to the Research Committee of the National Canners Association Research Laboratories, Washington, D. C., has been issued, prepared by E. J. Cameron and J. R. Esty. One of the year's principal activities has been control of spoilage through laboratory examination of ingredients used in canning and by bacteriological surveys during the canning season. The tin conservation project was continued in 1941. Many of the usual functions of the laboratory are said to apply doubly in an emergency, particularly in view of the tremendous demand from war agencies for canned foods.

Articles and Patents on Molecular Distillation

IN CONNECTION with its work on the molecular distillation of the glycerides and minor constituents of soybean oil, the U. S. Regional Soybean Industrial Products Laboratory during the past several years has assembled a file of patents and journal articles dealing with all phases of molecular distillation. Recently the laboratory has made available, in mimeographed form, abstracts of this literature for the use of other workers interested in applying this physicochemical tool to research in other fields of organic chemistry.

Abstracts of nearly 160 patents are included, arranged in groups under parent patents. In addition, mention is made of more than 110 research reports, descriptions of apparatus, reviews, etc. Adequate indexes are provided.

This publication is identified as ACE-115 (RSLM-55), entitled "Abstracts of Articles and Patents on Molecular or Short-Path Distillation", and may be obtained free, as long as the supply lasts, upon request to the U. S. Regional Soybean Laboratory, Urbana, Ill.

Special Subscription Rates to Chemical Society Publications

BY SPECIAL agreement for reciprocal discounts, members of the AMERICAN CHEMICAL SOCIETY may subscribe to publications of The Chemical Society for 1942 at the following rates, including postage.

Journal of The Chemical Society	£2.15.0
Annual Reports on the Progress of Chemistry for 1941, Volume XXXVIII	12.6
British Chemical and Physiological Abstracts	
Section AI (General, Physical, and Inorganic Chemistry)	2.10.0
Section AII (Organic Chemistry)	2.10.0
Section AIII (Physiological and Biochemistry)	4.10.0
Sections AI and AII together	4.10.0
Sections AI and AIII, or AII and AIII together	6.0.0
Sections AI, AII, and AIII together	7.10.0

Application for these publications should be made to the General Secretary, The Chemical Society, Burlington House, Piccadilly, London, W. 1, England.

Booklets on Civilian Defense

IN CHEMICAL AND ENGINEERING NEWS for January 25, page 125, we suggested that chemists and chemical engineers equip themselves with copies of texts issued by the Office of Civilian Defense: "Protection against Gas", "First Aid in the Prevention and Treatment of Chemical Casualties", "Training Guide for Decontamination Squads", and "Handbook for Decontamination Squads".

These publications are distributed by the Office of Civilian Defense, the Washington address of which is DuPont Circle Apartments, and by its local offices throughout the country. Inquiries should not be sent to the Chemical Warfare Service.

Report on Glues, Gelatins Available

GLUES, Gelatins, and Related Products", issued by the U. S. Tariff Commission in 1940, comes into prominence in the present war situation. The publication details data pertinent to industrial capacities, production, uses, substitution, and trade. It indicates both the extent to which the United States is dependent on foreign sources for raw materials consumed in the output of some of the products, as well as the ability of the country to produce its total requirements of others from domestic raw materials. The report illustrates the importance of the finished products to the defense program.

The report may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 25 cents per copy.

THE WALL STREET OF CHEMISTRY

	Annual Earnings		Per Common Share	
	1940	*1941*	*1940*	*1941*
Blaw-Knox Co.	$ 1,360,747	$ 1,668,311	$ 1 02	$ 1.25
Commercial Solvents Corp.	2,387,321	2,615,453	0.91	0.99
Dayton Rubber Mfg. Co.	518,897	710,291	2.41	3 50
Industrial Rayon Corp.	2,392,477	2,311,711	3.15	3.04
Johns-Manville Corp.	5,882,071	5,967,145	6 35	6.66
Mathieson Alkali Works	1,587,812	1,743,628	1.72	1.90
New Jersey Zinc Co.	8,236,815	9,592,871	4 19	4.88
Owens-Illinois Glass Co.	7,223,034	9,040,148	2.71	3.40
Pennsylvania Salt Mfg. Co.	1,701,333	1,688,457	11.34	11.26
Sylvania Industrial Corp.	1,148,602	1,150,650	2 72	2.75
U. S. Rubber Co.	11,425,241	13,662,658	3 58	4 86

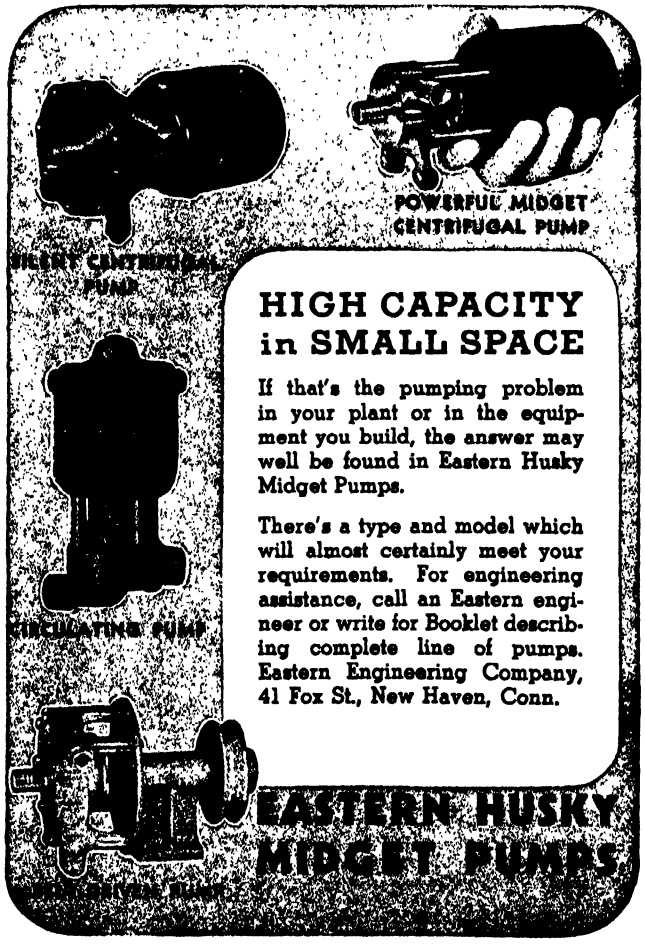
The **Commercial Solvents Corp.** in its report for the year ending December 31, 1941, states that throughout the year sales were limited only by capacity to produce. Net sales for 1941 were $24,664,166, compared with $15,844,930 for 1940. Federal income and excess profits taxes for 1941 were $2,728,296, compared with $691,168 in 1940. The ratio of current assets to current liabilities on December 31, 1941, was 6.1 to 1, compared with 8.9 to 1 on December 31, 1940. During the year $554,090 was invested in new facilities, the major item being $197,710 for a new building at Terre Haute to house the Research Department.

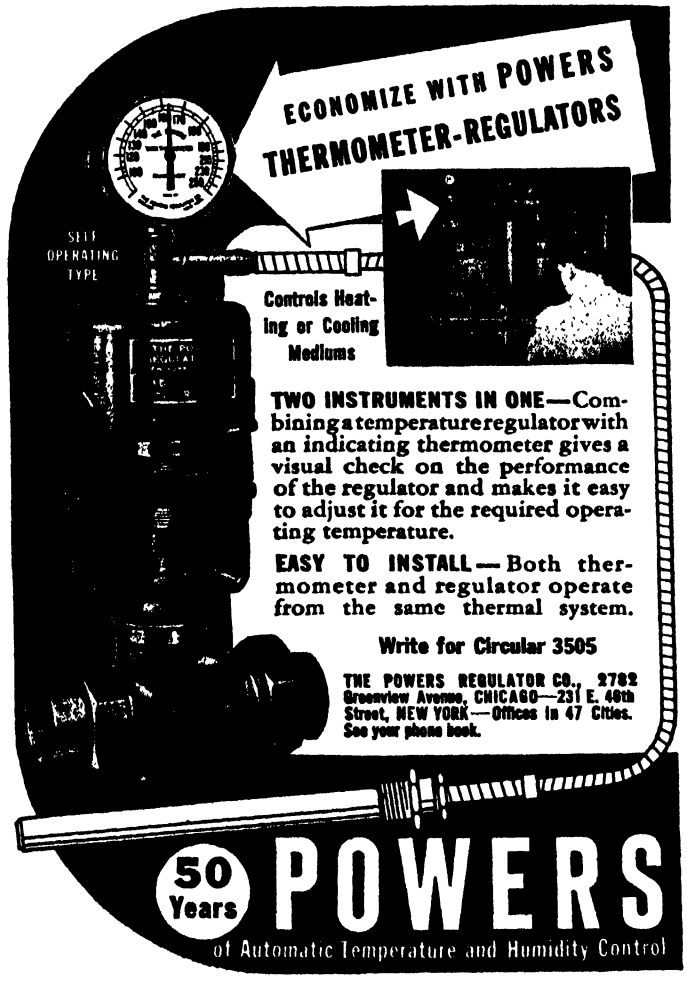
E. I. du Pont de Nemours & Co., Inc., expended $50,600,000 for plant construction in 1941. The much lower figure of $50,600 for du Pont construction, as reported in Chemical and Engineering News for February 25, page 302, was brought about by an error of the journal's staff rather than by any change in du Pont policy.

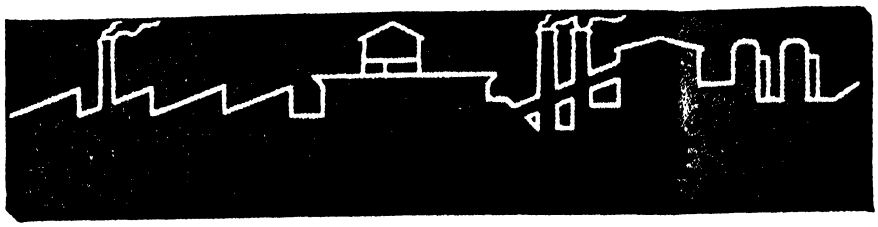
The **Industrial Rayon Corp.** in 1941 reported earnings only slightly under those for 1940, in spite of increased taxes amounting to $3,395,081. Capacity operations at the Painesville plant, together with an increase in prices in the fall, are said to be responsible for the favorable showing. As a result of the expansion at Painesville, output of yarn there has increased 8,000,000 pounds a year.

The **Liquid Carbonic Corp.** has filed with the SEC a registration statement covering 30,000 shares of cumulative preferred stock, series A, $100 par value. Proceeds are to be used to make a partial prepayment of $700,000 on a promissory note due in 1948 and to add to the general funds of the company.

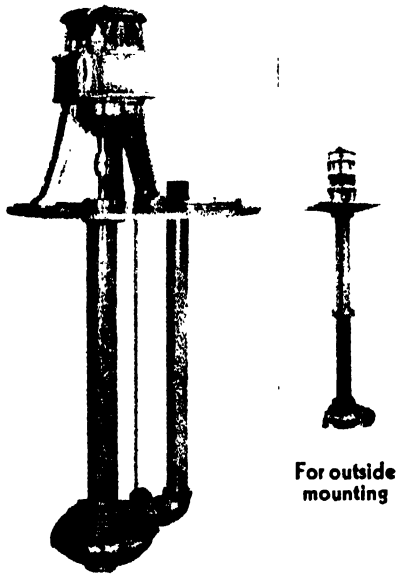
The **U. S. Rubber Co.** reports that net sales in 1941 established a new record at $315,300,000 and were 38 per cent higher than in 1940. The previous peak was $256,100,000 in 1920. Taxes amounted to $18,800,000 in 1941, almost three times those for 1940. The spread of war to the company's plantations was responsible for a charge of $1,400,000 against earnings in 1941, as a reserve for estimated war losses in Malaya, the Philippines, and elsewhere in the Far East. Facilities for the production and use of reclaimed rubber have been increased, and a large plant for production of synthetic rubber is being constructed under contract with the Defense Plant Corporation.







Vertical Acid and Chemical Pumps



For outside mounting

Pump for inside mounting

VERTICAL acid and chemical pumps, built by the Lawrence Machine and Pump Corp., Lawrence, Mass., to pump various acids and in sizes from 1 to 6 inches, depending on capacity, may be mounted either inside or outside of tank. A considerable number have been furnished to ordnance and explosives plants.

International Filter Selects New Name

AFTER 48 years, International Filter Co., Chicago, has changed its name to Infilco, Inc. The name was an obvious selection, says P. N. Engel, president. Infilco, an abbreviation of the old name, was adopted as the registered trade mark more than 10 years ago. To new acquaintances, the name Infilco avoids the untrue inference of the old name—that the company's principal product is filters—and to old friends, Infilco is a streamlined version of a name associated during the past half century with new developments in chemical precipitation, coagulation and clarification, silica gels, as well as water-conditioning equipment.

Carrier Organizes New Marketing Plan

A MARKETING plan to expedite the handling of war business, to simplify field operations, and to bring closer cooperation between dealers and branches is announced by Carrier Corp., Syracuse, N. Y. The United States east of the Rocky Mountains is divided into three districts—Eastern, Western, and Southern. James A. Bentley, vice president of Carrier, becomes head of the Eastern Region; Arthur P. Shanklin, recently elected vice president, heads the Western Region; and O. W. Bynum, until recently southwestern district manager, has charge of the Southern Region.

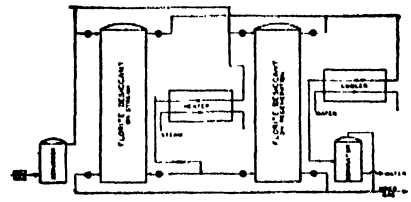
Headquarters for the Eastern Region will be New York; the Central Region, Chicago; and the Southern Region, Dallas. Each regional executive will be responsible for all operations in his area and together the regional heads will form an advisory council to E. T. Murphy, vice president in charge of marketing.

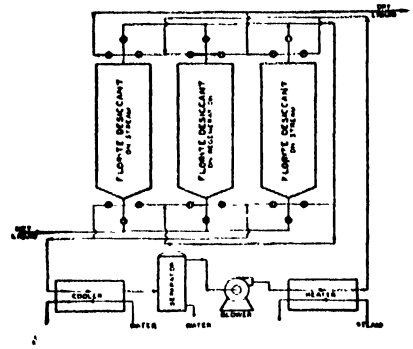
Repeating Cycle Timer

THE periodic purging of condensate from certain types of curing or molding equipment is also beneficial in creating adequate heat distribution. Mechanical and thermostatic traps often fail to set up the steam circulation necessary. To handle effectively this purging, a Taylor repeating cycle timer has been developed by the Taylor Instrument Cos., Rochester, N. Y.

This unit, also known as the blow-down timer, is used in conjunction with a diaphragm motor-operated reverse-acting condensate valve. With suitable temperature or pressure control on the application, it permits the admission of fresh steam without affecting an appreciable pressure change within the apparatus.

Granular Drying Agent





Above. Dehydration plant for gases.
Below. Dehydration plant for liquids.

FLORITE desiccant, a new granular drying agent for gases and liquids, has recently been placed on the market by the Floridin Co., 159 Liberty St., Warren, Penna.

Its outstanding characteristic is ability to maintain a high drying efficiency under difficult conditions. It adsorbs water instantly and will not swell, disintegrate, or appear wet at the end of an adsorption cycle. It is hard, stable, noncorrosive, and nonpoisonous.

Pomona Pump Co. Acquires Westco

POMONA PUMP CO. announces the acquirement, as of February 1, of Micro-Westco, Inc., Bettendorf, Iowa. Plant equipment and personnel will be transferred to Pomona's No. 2 plant at St. Louis, where the manufacture of the entire line of Westco pumps will be continued. Distribution will be through the same national organization that has carefully been built up by Micro-Westco during the past 20 years.

CONTINUED ON PAGE 359

WANTED

CHEMISTS AND CHEMICAL ENGINEERS

To Register in the Employment Clearing House

Time—April 19-24, 1942 ***Place—Memphis, Tennessee***

Open only to members and paid student affiliates of the American Chemical Society registered at the meeting. Request forms from the AMERICAN CHEMICAL SOCIETY, 1155-16th Street, N. W., Washington, D. C.

For further details, see CHEMICAL AND ENGINEERING NEWS, January 10, page 36.

CHEMICAL MARKET PRICES

February 27, 1942

Compiled from weekly current price listings in the *Oil, Paint and Drug Reporter*, with permission of the publisher under its copyright. These prices, unless otherwise specified, are those prevailing in the New York market for technical grades in usual large commercial quantities.

Acetaldehyde, drums, c/l., wks.	lb.	.11
Acetamide, tech., kegs, 500-lb. lots, works	lb.	.30
Acetanilide, tech., powd., bbls.	lb.	.27
Acetic anhydride, drums, c/l., frt. allowed	lb.	.11½
Acetone, C. P., drums, c/l., dlvd.	lb.	.08½
Acetophenetidin, bbls., 1000 lbs.	lb.	1.00
Acetophenone, drums, 100 lbs.	lb.	1.55
Acid, abietic, drums, c/l.	lb.	.08¾
Acetic, 28%, bbls., c/l.	100 lbs.	3.38
56%, bbls., c/l.	100 lbs.	5.58
Glacial, synth., drums, c/l.	100 lbs	9.15
Glacial, U. S. P., drums, c/l.	100 lbs.	10.95
Acetylsalicylic, U. S. P., bbls.	lb.	.40
Anthranilic, tech., bbls.	lb.	.75
Battery, cbys., c/l., E. wks.	100 lbs.	1.60
Benzoic, tech., bbls.	lb.	.43
Boric, tech., gran., bags	ton	99.00
Butyric (99%), drums, c/l, wks.	lb.	.22
Chloroacetic, mono-, tech., bbls. wks	lb.	.17
Chlorosulfonic, drums, c/l., wks.	lb.	.03
Chromic, 99%, drums	lb.	.16¼
Cinnamic bottles	lb.	3.50*
Citric, cryst., bbls., c/l.	lb.	.20
Cresylic, H. B., 210–215°, drums, c/l, wks., frt. equal	gal.	.81
Formic, 90%, cbys., f. o. b. works, c/l.	lb.	.10½
Gallic, tech., bbls.	lb.	1.10
Hydriodic, 57%, 5-lb. bot.	lb.	2.90
Hydrobromic, 34%, cbys.	lb.	.35
Hydrochloric, 20°, tanks, wks.	100 lbs.	1.15
Hydrofluoric, 30%, bbls., wks.	lb.	.06
60%, lead cbys.	lb.	.14
Hydrofluosilicic, 30%, bbls., wks.	lb.	.09
Hypophosphorus, U. S. P., 30%, 5-gal demis	lb.	.75
Lactic, dark, 22%, bbls.	100 lbs.	2.90
Light, 22%, bbls., wks.	100 lbs.	3.90
Maleic, powd., drums	lb	.30
Mixed, tanks, wks.	N unit. lb.	.05
	S unit. lb.	.0085
Naphthenic, 220–230, drums	lb.	.10
Nitric, C. P., cbys.	lb.	.13
36° cbys., c/l., wks.	100 lbs.	5.00
Oxalic, bbls., wks.	lb.	.11¼
Phosphoric, U. S. P., 50%	lb.	.10½
Picramic, kegs	lb.	.65
Picric, bbls	lb.	.35
Pyrogallic, tech., bbls.	lb.	1.45
Salicylic, tech., bbls.	lb.	.33
Stearic, distilled, d. p., bags, dlvd.	lb.	.15
Sulfanilic, tech., 250-lb. bbls.	lb.	.17
Sulfuric, 66°, cbys., c/l., E. wks.	100 lbs.	1.50
66°, tanks, E. wks.	ton	16.50
60°, tanks, E. wks.	ton	13.00
Oleum, 20%, tanks, E. wks.	ton	19.50
Tannic, tech., bbls.	lb.	.71
Tartaric, U S P., cryst., bbls.	lb.	.70½
Tungstic, pure, 100-lb. pkg	lb.	2.86
Alcohol, ethyl, 190 proof, from molasses, drums, c/l.	gal.	8.19
Amyl, from pentane, tanks	lb.	.131
Butyl, normal, tanks, frt. allowed.	lb.	.12½
Cinnamic, bottles	lb.	3.00
Denatured, C. D. 14, drums, c/l., wks., E.	gal	.65
Diacetone, tech., drums, c/l.	lb.	.11
Furfuryl, tech, drums, c/l., wks.	lb.	.20
Isobutyl, ref., drums, works	lb.	.0860
Alcohol, isopropyl, ref., 91%, drums, c/l., f. o. b. dest.	gal.	.40½
Wood, *see* Methanol		
Aldol, 95%, drums, c/l., wks.	lb.	.12
Alpha-naphthol, bbls.	lb.	.52
Alpha-naphthylamine, bbls.	lb.	.32
Alum, ammonia, lump, bbls., wks.	100 lbs.	4.25
Chrome, bbls.	lb.	.12½
Potash, lump, bbls., wks.	100 lbs.	4.50
Soda, bbls., wks.	100 lbs.	3.25
Aluminum, metal, 98–99%, drums, c/l.	lb.	.15
Chloride, anhyd., commercial, drums extra, c/l., wks.	lb.	.08
Stearate, bbls., c/l.	lb.	.23
Sulfate, comm'l, bags, c/l., wks. frt. equal	100 lbs	1.15
Iron-free, bags, wks.	100 lbs.	1.75
Ammonia, anhydrous, fertiliser, f. o. b. wks., frt. equalized	ton	90.00
Pure, cyls.	lb.	.16
Ammonia, aqua, 26°, tanks (on NH_3 content), f. o. b. wks.	lb.	.04
Ammonium bicarbonate, drums	lb.	.0564
Bifluoride, bbls.	lb.	.15½
Bromide, bbls.	lb.	.31
Carbonate, tech., bbls.	lb.	.08¼
Chloride, gray, bbls.	100 lbs.	5.50
U S. P. gran., bbls.	lb.	.12
Iodide, 25-lb jars	lb.	3 65
Linoleate, 80%, anhyd., bbls.	lb.	.12
Nitrate, tech., bags, c/l., wks.	100 lbs.	4.35
Oleate, bbls.	lb.	.14
Oxalate, kegs	lb.	.23
Persulfate, cases	lb.	.21
Phosphate, dibasic, tech., bbls.	lb	.07¼
Sulfate, bulk, c/l., f. o. b. cars, ports contract	ton	29.00
Sulfide, liq 40–45%, basis 100%, tanks, dlvd.	lb.	.07½
Amyl acetate, from pentane, tanks, frt allowed	lb.	.14½
Chloride, mixed, tanks, wks.	lb.	.06
Mercaptan, drums, l. c. l., wks.	lb.	1.10
Oleate, drums, l. c. l., wks.	lb.	.31
Stearate, drums, l. c. l., wks.	lb.	.32½
Amylene, tanks, wks.	lb.	.09
Anilin oil, drums	lb.	.15
Anthraquinone, subl., bbls.	lb.	.70
Antimony, chloride, soln., cbys.	lb	.17
Needle, Bolivian, 67%	lb.	.18½
Oxide, bags, c/l.	lb.	.15
Salts, 65%, bbls.	lb.	.34
Argols, test 75–80%, basis 100%, f. o. b. Spanish ports	100 kilos	105.00
Arsenic, metal, kegs	lb.	No prices
White, c/l., kegs	lb	04
Arsenous chloride, cans	lb.	4.85
Barium carbonate, natural, 99%–200 mesh, bags, c/l., wks.	ton	43.00
Chloride, tech., cryst., bgs., c/l.	ton	77.00
Dioxide, drums, wks.	lb.	.10
Hydroxide, bbls., wks.	lb.	.06
Nitrate, casks	lb.	.10½
Barytes, floated, 350-lb. bbls., wks.	ton	27.65
Benzaldehyde, tech., drums	lb.	.45
Benzidine base, bbls.	lb.	.70
Benzol, tanks, frt. allowed E. of Omaha	gal.	.15
Benzoyl chloride, carboys	lb.	.23
Benzyl acetate, F. F C., drums	lb.	.55*
Beta-naphthol, tech., bbls.	lb.	.23
Beta-naphthylamine, tech., kegs	lb.	.51
Bismuth, metal, ton lots	lb.	1.25
Bismuth nitrate, cans	lb.	1.30
Oxychloride, kegs	lb.	3.10
Subnitrate, powd., barrels	lb.	1 20
Blanc fixe, dry, bags, c/l.	ton	60.00
Bleaching powder, drums, wks.	100 lbs.	2.25
Bone black, 4, bbls., c/l., frt. allowed E.	lb.	.11
Borax, tech., gran., bulk, c/l., frt. allowed	ton	41.50
Bordeaux mixture, drums	lb.	.11
Bromine, cases	lb.	.25
Bromoform, cbys.	lb.	1.42
Butyl acetate, drums, c/l., frt. allowed	lb.	.14½
Aldehyde, drums, l. c. l.	lb.	.16½
Lactate, drums	lb.	.26½
Stearate, drums	lb.	.31
Cadmium, metal, ingots, cases	lb.	.90
Bromide, 25-lb. jars	lb.	1.65
Sulfide, boxes	lb.	1.35
Caffeine, 100-lb. drums, 10,000 lbs. or more	lb.	2.60
Calcium acetate, bags	100 lbs.	3.00
Arsenate, bgs., c/l.	lb.	.07
Carbonate, precip., bags, 50 lbs., c/l., wks.	lb.	.02½
Chloride, bags, flake, c/l., dlvd	ton	18.50
Gluconate, U. S. P., bbls.	150 lbs. lb.	.52
Phosphate, dibasic, 38 40% P_2O_5, bags, Atlan. pts.	unit-ton	No prices
Tribas., bbls	lb.	.0635
Calomel, bbls., kegs, 50 lbs. or more	lb.	2.95
Camphor, synthetic, gran., powd., drums, ton lots	lb.	.42
Carbasole, 95%, drums, ton lots, wks	lb.	.70
Carbon bisulfide, drums, c/l.	lb.	.05
Black, reg., uncomp., bgs., c/l., works	lb.	.03625
Dioxide, liq., cyl.	lb.	.06
Tetrachloride, drums, c/l., frt. allowed	gal.	.73
Casein, dom., 20–30 mesh, bags, c/l.	lb.	.27
Cerium oxalate, bbls., wks.	lb.	.35
Charcoal, willow, powd., bbls.	lb.	.06
China clay, bulk, c/l., wks.	ton	7.60
Chloral hydrate, drums	lb.	.90
Chlorine, liq., c/l., cyl., dlvd.	lb.	.05¼
Tanks, wks., frt. equal	100 lbs.	1.75
Chlorobenzene, mono-, drums	lb.	.07
Chloroform, tech., drums	lb.	.20
Chromium acetate, 24%, powd., bbls.	lb.	.22
Sulphate, pearls, dms.	lb.	.40
Coal tar, crude, bbls., c/l., wks.	bbl.	7.50
Cobalt oxide, black, kegs	lb.	1.84
Copper carbonate, 52–54%, bbls.	lb.	.18
Chloride, bbls.	lb.	.20½
Cyanide tech., bbls.	lb.	.34
Metal, elec.	lb.	.12
Oxide, black, bbls., tons, wks.	lb.	.19½
Sulfate, bbls., c/l., wks.	100 lbs.	5.15
Copperas, cryst., bulk, c/l., wks.	ton	14.00
Cream of tartar, bbls.	lb.	.57½
Cresol, U. S. P., drums, c/l., wks.	lb.	.11
Crotonaldehyde, 97%, c/l., wks.	lb.	.15
Cyanamide, 22% N, pulvd., dlvd., contracts	Nitrogen unit	No prices
Diamylamine, drums, c/l., wks.	lb.	.61
Diamylene, tanks, wks.	lb.	.09½
Diamyl phthalate, tanks	lb.	.21
Diatomaceous earth, dom., bags, c/l., Pacific Cst.	ton	22.00

Dibutylamine, drums, l. c. l., wks.	lb.	.64
Dibutylphthalate, drums, c/l., dlvd.	lb.	.21
Tartrate, drums	lb.	.87
Dichloroethyl ether, drums, c/l., wks	lb.	.15
Diethanolamine, drums, c/l., wks.	lb.	.23½
Diethylaniline, drums	lb.	.40
Diethylene glycol, drums, c/l., wks.	lb.	.14
Monobutyl ether, drums, wks.	lb.	.22½
Monoethylether, drums, c/l., wks.	lb.	.14½
Diethyl phthalate, drums, c/l.	lb.	.21½
Sulfate, tech., drums, wks.	lb.	.13
Diglycol oleate, light, bbls.	lb.	.17
Dimethylaniline, drums	lb.	.23
Dimethyl phthalate, drums, c/l., dlvd	lb.	.20
Dinitrobenzene, tech., drums	lb.	.18
Dinitrochlorobenzene, bbls.	lb.	.14
Dinitronaphthalene, bbls.	lb.	.35
Dinitrophenol, bbls.	lb.	.22
Diphenyl, bbls., c/l., wks.	lb.	.15
Diphenylamine, bbls.	lb.	.25
Diphenylguanidine, bbls.	lb.	.35
Epsom salt, tech., bags	100 lbs.	1.80
Ether, cone., drums	lb.	.11
Nitrous, bots., 100 lbs.	lb.	.73
Ethyl acetate, 85-90%, tanks, frt. allowed	lb.	.11
Acetoacetate, drums, c/l., wks.	lb.	.37½
Bromide, drums	lb.	.50
Chloride, drums	lb.	.18
Formate, drums	lb.	.27¾
Methyl ketone, drums	lb.	.09
Ethylene dichloride, drums, c/l., wks., frt. allowed	lb.	.0742
Glycol, drums, c/l.	lb.	.14½
Monobutyl ether, drums, wks.	lb.	.16½
Monoethyl ether, drums, wks.	lb.	.14½
Monoethyl ether acetate, drums, wks.	lb.	.11½
Monomethyl ether, drums, wks.	lb.	.15½
Feldspar, 20 mesh, bulk, wks.	ton	9.75
Film scrap colors, dk., cs., 1000 lbs., E. wks.	lb.	.14
Fluorspar, 95%, bags, f. o. b. mines	ton	32.00
Formaldehyde, bbls., c/l.	lb.	.05½
Fuller's earth, bags, c/l., mines	ton	8.50
Furfural, tech., drums, contract, works	lb.	.10
Glauber's salt, bbls., c/l.	100 lbs.	1.05
Glycol phthalate, drums	lb.	.38
Stearate, drums	lb.	.26
Hexamethylenetetramine tech., drums	lb.	.32
Hydrogen peroxide, 100 vol., cbys., c/l.	lb.	.16
Hydroquinone, kegs	lb.	.90
Indigo, synth., liq., bbls.	lb.	.16½
Iodine, resubl., jars	lb.	2.00
Iodoform, drums, 100 lbs.	lb.	3.95
Iron acetate, N. F. IV, cbys.	lb.	.15
Iron chloride, tech., cryst., bbls., wks., frt. allowed	lb.	.05
Isopropyl acetate, tanks, frt. allowed	lb.	.07½
Lead acetate, white, broken	lb.	.12
Arsenate, bbls.	lb.	.11
Metal, N. Y.	1 lb.	.0650
Oxide, litharge, bbls., 20-ton lots	lb.	.0790
Peroxide, powd., tech	lb.	.23
Red, bbls., 20-ton lots	lb.	.09
Sulfate, bbls.	lb.	.0725
White, basic carb., bbls.	lb.	.0825
Lecithin, edible, grade 1, drums, c/l.	lb.	.45
Tech., Grade 1, dms., c. l.	lb.	.35
Lime, live, chemical, bulk, wks.	ton	7.00
Lime-sulfur, dry, bags, c/l.	lb.	No prices
Lithopone, ordinary, bbls.	lb.	.04½
Magnesite, calcined, dom., bags.	ton	80.00
Magnesium carbonate, tech., bags, c/l.	lb.	.06¼
Chloride, drums	ton	32.00
Fluosilicate, cryst., bbls.	lb.	.20
Oxide, light, bbls.	lb.	.26
Manganese chloride, bbls.	lb.	.14*
Dioxide, 85-90%, bbls., c/l., wks.	ton	74.00
Sulfate, anhyd., bbls., wks.	lb.	.10½
Mannitol, commercial, bbls., wks.	lb.	.35
Menthol, nat., cans	lb.	13.00
Mercury bichloride, cryst., drums, 50 lbs. or more	lb.	2.39
Mercury, flasks, 76 lbs., mines	flask	191.00
Meta-phenylenediamine, kegs	lb.	.65
Meta-toluylenediamine, kegs	lb.	.70
Methanol, synthetic, drums, frt. allowed, c/l	gal.	.34½
Tanks, frt. allowed	gal.	.28
Methyl acetate, 97-99%, tanks	gal.	.09½
Chloride, cylinders	lb.	.32
Formate, l. c. l., drums	lb.	.89
Hexylketone, drums, tech., wks.	lb.	.60
Salicylate, drums	lb.	.35
Monoamylamine, drums, c/l., wks.	lb.	.61
Monobutylamine, drums, l. c. l., wks.	lb.	.51
Monoethanolamine, drums, wks.	lb.	.24
Naphthalene, crude, dom., 74 deg., bags, c/l., wks.	100 lbs.	2.50
Nickel salt, single, bbls.	lb.	.13
Niter cake, bulk	ton	16.00
Nitrobenzene, drums	lb.	.08
Nitrocellulose, alcohol-sol., bbls., wks.	lb.	.28
Nitrogen solution	unit	1.2158
Octanol, normal, drums	lb.	.85
Oil, castor, No. 3, tanks	lb.	.12¾
China wood, dms.	lb.	.40½*
Coconut, crude, tanks	lb.	No prices
Cod, Newf., bbls.	gal.	.85
Corn, crude, tanks, mills	lb.	.12¾*
Cottonseed, cooking, bbls.	lb.	.16¾
Linseed, raw, tanks	lb.	.1100
Menhaden, crude, tanks, f. o. b. Baltimore	gal.	.6660
Neat's-foot, pure, bbls.	lb.	.17¾
Oiticica, bbls.	lb.	.25½*
Oleo, No. 1, bbls.	lb.	.13¼
Olive oil, denat., bbls.	gal.	4.40
Edible, Calif., drums	gal.	5.00
Palm, Niger, bbls.	lb.	.09¼*
Sumatra, bulk	lb.	No prices
Peanut, crude, tanks	lb.	.13*
Perilla, drums	lb.	.2460
Rapeseed, tax incl., bbls.	gal.	.15½*
Red, bbls.	lb.	.12¾
Soy bean, crude, tanks	lb.	.12¼*
Sperm, 38°, bbls.	lb.	.1301
Whale, bbls., natural, refined	lb.	.1070*
Ortho-dichlorobenzene, drums	lb.	.06
Ortho-nitrochlorobenzene, kegs	lb.	.15
Ortho-nitrotoluene, drums	lb.	.09
Ortho-toluidine, bbls.	lb.	.19
Para dichlorobenzene, drums, c/l.	lb.	.11
Para-formaldehyde, drums	lb.	.23
Paraldehyde, tech., drums	lb.	.12
Para-nitraniline, drums	lb.	.45
Para-nitrochlorobenzene, drums	lb.	.15
Para-nitrotoluene, bbls.	lb.	.30
Para-phenylenediamine, bbls.	lb.	1.25
Para-toluidine, bbls.	lb.	.48
Paris Green, 250-lb. kegs	lb.	.24
Perchlorethylene, drums, c/l., wks.	lb.	.08
Phenol, drums, c/l., wks.	lb.	.12½
Phenolphthalein, yellow, drums, ton lots	lb.	.80
Phenylethyl alcohol, bottles	lb.	2.10
Phloroglucinol, tech., tins, wks.	lb.	15.00
C. P., tins, wks.	lb.	20.00
Phosphorus, red, cases	lb.	.40
Oxychloride, 175-lb. cylinders	lb.	.15
Trichloride, cyl.	lb.	.15
Phthalic anhydride, bbls., c/l.	lb.	.14½
Platinum, metal, solid	os.	36.00
Potash, caustic, solid, drums	lb.	.06¼
Potassium acetate, tech., bbls.	lb.	.28
Bicarbonate, gran., bbls.	lb.	.14
Bichromate, casks, c/l., wks.	lb.	.09½
Bromide, U. S. P., gran., bbls.	lb.	.27
Carbonate, 80-85%, calc., casks.	lb.	.06½
Chlorate, cryst., kegs	lb.	.11*
Chloride, tech., cryst., bgs.	lb.	.08*
Cyanide, drums	lb.	.55
Meta-bisulfite, bbls.	lb.	.18
Muriate, fert., bulk	K_2O unit	.53½
Permanganate, tech., drums	lb.	.19¾
Prussiate, red, casks	lb.	No prices
Yellow, casks	lb.	.17
Pyridine, denat., drums	gal.	1.71
Pyrocatechin, C. P., drums	lb.	2.15
Quinine, 100-os. cans	os.	.97½
Resorcinol, tech., kegs	lb.	.68
Rochelle salt, powd., bbls.	lb.	.43½
Saccharin, drums	lb.	1.45
Salt cake, bulk, wks.	ton	15.00
Saltpeter, gran., bbls.	100 lbs.	8.20
Silica, amorph., 96%, 325 mesh, bags, c/l., wks.	ton	20.00
Silver nitrate, vials	os.	.26¾
Soda, ash, 58%, light, paper bags, contract, wks.	100 lbs.	1.05
Caustic, 76%, solid, drums, contract, wks.	100 lbs.	2.30
Sodium acetate, flake, 60%, bbls.	lb.	.05
Alginate, drums	lb.	.69
Antimoniate, bbls.	lb.	.15
Benzoate, U. S. P., bbls.	lb.	.46
Bicarbonate, U. S. P., powd., bbls., c/l., wks.	100 lbs.	1.85
Bichromate, c/l., wks.	lb.	.07¾
Bisulfite, bbls.	100 lbs.	3.00
Bromide, U. S. P., bbls.	lb.	.27
Chlorate, cryst., bags	lb.	.06¼
Chloride, bags	ton	15.70
Cyanide, 96-98%, dom., drums.	lb.	.14
Fluoride, white, 90%, bbls., c/l., frt. alld.	lb.	.08
Metallic, untrimmed bricks, drums, f. o. b. Niagara Falls	lb.	.15½
Metasilicate, gran., bbls.	100 lbs.	2.50
Naphthionate, bbls.	lb.	.50
Nitrate, crude, bulk	ton	27.00
Nitrite, bbls.	lb.	.06¾
Perborate, bbls.	lb.	.14¾
Phosphate, disodium, cryst., bags, c/l., wks.	100 lbs.	2.55
Phosphate, trisodium, bags, c/l., wks.	100 lbs.	2.70
Picramate, kegs	lb.	.65
Prussiate, yellow, bbls.	lb.	.11
Silicate, drums, c/l., 40°	100 lbs.	.80
Silicofluoride, dom., bbls.	lb.	.12
Stannate, drums	lb.	.33½
Sulfate, anhyd., bags	100 lbs.	1.70
Sulfide, cryst., bbls.	100 lbs.	2.40
Solid, 60%	100 lbs.	3.15
Sulfocyanide, C. P., bbls.	lb.	.55
Thiosulfate, reg., cryst., bgs.	100 lbs.	2.25
Tungstate, tech., kegs	lb.	No prices
Strontium carbonate, tech., bbls.	lb.	.23*
Nitrate, bbls.	lb.	.07¾
Sulfur, bulk, mines	ton	16.00
Chloride, drums	lb.	.03
Dioxide, commercial, cyl., wks.	lb.	.07
Tetrachloroethane, 50-gal. drums.	lb.	.08
Thiocarbanilid, bbls.	lb.	.24
Tin, Straits	lb.	.52
Crystals, bbls.	lb.	.39
Oxide, bbls.	lb	.55
Tetrachloride, anhydrous, drums, bbls.	lb.	No prices
Titanium dioxide, bags	lb.	.14¾
Toluene, tanks	gal.	.28
Triamylamine, drums, c/l., wks.	lb.	.98
Triamylborate, drums, l. c. l., wks.	lb.	.33
Tributylamine, drums, c/l., wks.	lb.	.78
Trichloroethylene, drums, wks., frt. allowed	lb.	.08
Tricresyl phosphate, tech., drums.	lb.	.25
Triethanolamine, drums, c/l., wks.	lb.	.19
Triphenyl phosphate, drums.	lb.	.88
Tungsten, tech., powder	lb.	2.60
Urea, dom., 46 + % N., bags, f. o. b. wks. or seaboard	ton	80.00
Vanillin, 25-lb. tins	lb.	2.35
Whiting, comm., dry-grd., bags, c/l., wks.	ton	18.00
Xylene, 10°, tanks	gal.	.30
Xylidine, drums	lb.	.35
Zinc ammonium chloride, bbls.	lb.	.0565
Chloride, tech., fused, drums	lb.	.05
Dust, bbls., c/l.	lb.	.1035
Metal slabs, at N. Y.	lb.	.0865
Oxide, Amer., bags	lb.	.0725
Stearate, tech., bbls.	lb.	.30
Sulfate, cryst., bgs., c/l., wks.	100 lbs.	3.40

* Nominal.

EMPLOYMENT INFORMATION

RATES to be paid in advance. Standard setting 5c a word, minimum charge $2.00 each; include 8 words for box address. Exceptions see ⟶ Display, $10.00 per column inch. 2 inches maximum, larger units at regular display unit rates. No discounts or allowances.
SEND advertisements with remittance to INDUSTRIAL AND ENGINEERING CHEMISTRY, 332 West 42nd St., New York, N. Y., to reach there not later than 10:00 A.M. on the 10th and 25th, closing dates for NEWS EDITIONS of the 25th and 10th, respectively. Insertions made in order of receipt provided necessary remittances are complete.
Employers are requested to mention in their announcements the section of the country in which the open position is located to ensure replies only from those who are geographically available.
In printing these advertisements the SOCIETY assumes no obligations as to qualifications of prospective employees or responsibility of employers.

Unemployed members of the AMERICAN CHEMICAL SOCIETY seeking employment for themselves are allowed in one calendar year 3 free announcements, one per issue, set in standard style and limited to 50 words each, including 8-word box address. Excess words 5c each. Additional standard announcements 50% of regular rate.

Employed members of the AMERICAN CHEMICAL SOCIETY seeking new positions are permitted 3 standard announcements during the calendar year at 50% of the regular rate—include 8 words for box address.

Employers seeking chemists and chemical engineers are permitted 3 standard announcements, not to exceed 50 words each including box address and not more than one per issue, during the calendar year without charge, provided they agree in writing to acknowledge all replies (excess words 5c each), otherwise full rate applies.

The AMERICAN CHEMICAL SOCIETY is vitally interested in the welfare of its members and in seeing that the chemical industry is manned with competent chemists and chemical engineers. These pages are part of our service in that connection. In addition most of the larger sections of the AMERICAN CHEMICAL SOCIETY and several of the smaller ones have active employment committees. Local section secretaries in your area will inform you as to any employment aids that may be available locally.

An Employment Clearinghouse is operated at each national meeting of the SOCIETY for the purpose of bringing together representatives of industry looking for chemists and members and student affiliates in attendance wishing to make such contacts. For further details, consult the preliminary and final programs as printed in the NEWS EDITION prior to each meeting.

In the New York area, special employment facilities are offered by the Employment Bureau of the Chemists' Club, 52 East 41st St., New York, N. Y. In the Chicago area, the Chicago Section maintains an employment service at 413 Stevens Hotel, Chicago, Ill.

Those replying to announcements should be careful to send copies and not original documents. Advertising circulars will not be forwarded and to that end all letters will be opened at the forwarding office.

SITUATIONS OPEN

Those announcements in which the letter "P" is part of the address key have paid in full and are not committed to acknowledge replies. The Society regards acknowledgment by employers of all applications as an act of common courtesy but can assume no responsibility for their failure to do so.

EXECUTIVES, CHEMICAL ENGINEERS AND CHEMISTS with exceptional backgrounds of experience should use our confidential and individual method of contacting responsible employers. No limit to territory. We negotiate all overtures. Established 1915. The National Business Bourse, 20 W. Jackson Blvd., Chicago, Ill.

GRADUATE ASSISTANTSHIPS at the University of Maine. Applicants may work half time toward the master's degree in chemistry or chemical engineering. Remuneration $500 plus tuition for twelve hours' laboratory instruction per week for the school year. Applicants should be in the upper quarter of graduating class. All applications must be received before March 15 and should include complete personal data, photograph, official transcript, preferred research field and three reference letters.
Box 11-N-2, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST. With advanced degree and 3 years' experience in biochemical field. Experience with tobacco analysis highly desirable but not essential. Give personal data, qualifications, salary expected and enclose photograph in first letter.
Box 30-N-2, Ind. & Eng. Chem., Easton, Pa.

WANTED IMMEDIATELY, Chemical Engineer or Mechanical Engineer with working knowledge of inorganic chemistry, as assistant in directing operations. Experience in leaching, evaporation, and electrodeposition desirable but not essential. Location near Pittsburgh, Pa. Send full particulars and photograph with first letter.
Box 17-T-2, Ind. & Eng. Chem., Easton, Pa.

BACTERIOLOGIST, M.S. or Ph.D., with 3-5 years' applied experience in the field of sanitation and disinfection wanted by prominent eastern manufacturer for research and development work. Creative ability must be established. Consideration will be given only to those who fully meet the above requirements. In replying give full academic industrial and personal background. Transcript of academic record, scientific and personal references, and recent photograph will be requested.
Box 25-TP-2, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER with at least five years' commercial experience to work in plastic field, principally in production but also in design of equipment for plastic operations. Plant located in the Midwest. Sound training and experience required. State qualifications, salary expected and recent photograph.
Box 59-TP-2, Ind. & Eng. Chem., Easton, Pa.

THREE ORGANIC Chemists M.A. degree 1941 or 1942 preferred wanted for organic research developing new uses and products for organic chemical manufacturer. Submit full details concerning education, scholarship, experience, personal data, references, draft status, and recent photo. State salary desired. Address Post Office Box 460, Niagara Falls, N. Y.

RESEARCH FELLOWSHIPS in Wood chemistry available September 1942 for M.S. candidate. Full time research and study. Stipend $50 per month for nine months. Bachelor degree in chemistry or chemical engineering required. Address applications to Dean D. S. Jeffers, University of Idaho, Moscow, Idaho.

PHYSICAL CHEMIST. Eastern A. C. S. approved college with modern well equipped laboratory and library needs instructor for next academic year. Candidate should be less than 28 years old, preferably single, with a Ph.D. from leading university. Instructor will have light teaching load, and plenty of opportunity for research.
Box 103-T-2, Ind. & Eng. Chem., Easton, Pa.

TEACHING FELLOWSHIPS in chemistry, State College of Washington; master's and doctor's programs in organic, inorganic, analytical, physical, and physiological chemistry. One-half time assisting, stipend $450, plus out-of-state tuition.
Box 104-T-2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST B.S., knowledge of spectroscopy. Woman preferred. Experience preferred but not essential. Give complete details of age, race, religion, education, experience, and salary expected. Send picture. Eastern central location.
Box 14-N-3, Ind. & Eng. Chem., Easton, Pa.

CHEMIST for RESEARCH and development, Bachelor or Master's degree, several years' general practical experience required. Applicants should give personal record, draft rating, and salary expected. Only men with outstanding records need apply. Location middle west. Our employees notified of this ad.
Box 17-N-3, Ind. & Eng. Chem., Easton, Pa.

GRADUATE ASSISTANTS immediately and in September, at Middlebury College, Middlebury, Vermont. Remuneration, $600 plus tuition and fees for half time assisting and half-time work towards advanced degree in Chemistry. Include transcript, photograph and references in application.
Box 18-N-3, Ind. & Eng. Chem., Easton, Pa.

ASST. to CHIEF of Laboratories. Technical graduate, married. Laboratories perform metal and inorganic analyses, metallurgical problems, physical testing, spectrographic analyses, water treatment, fuels, etc. State qualifications and experience from graduation, salary expected, etc. Location Philadelphia.
Box 20-N-3, Ind. & Eng. Chem., Easton, Pa.

WE have POSITIONS for all types of Chemical Engineers and Chemists and would be glad to receive applications from those who are being displaced because they are in non-essential industries, or for any other reason wish to make a change.
Box 26-NP-3, Ind. & Eng. Chem , Easton, Pa.

WE have POSITIONS for women who have majored in Chemistry and would be interested in receiving applications from those who are now graduating or who have received their degrees within the last five years.
Box 27-NP-3, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST. With broad experience in industrial analysis for development of analytical apparatus. In reply give complete details of education, personal history, experience, salary desired, references, and send recent photograph. Location—Western Pennsylvania.
Box 34-NP-3, Ind. & Eng. Chem., Easton, Pa.

GRADUATE ASSISTANTSHIPS, Chemistry, University of Florida. Stipend $50.00 per month. 14 hours assisting per week. No tuition for Graduate Assistants but a fee of $21.25 per semester. For Application blank address, Dr. C. B. Pollard, Department of Chemistry, Gainesville, Florida

CHEMICAL ENGINEER, assistant to plant superintendent in organic chemical manufacturing, principally pharmaceuticals. Location—New Jersey. Age preferred—30 to 35 yrs., with 10 years' experience in production work. Furnish photograph, complete personal data including draft status, nationality, experience, education, and several references.
Box 42-N-3, Ind. & Eng. Chem., Easton, Pa.

CHEMIST or CHEMICAL engineer wanted by research laboratories of large eastern manufacturer. Fairly recent graduate with one or two years of paint and varnish experience preferred. In reply include information on education, experience and salary desired.
Box 43-N-3, Ind. & Eng. Chem., Easton, Pa.

DYE CHEMIST with several years' experience in the synthesis of dyestuffs in production to supervise technical phases of such operations. Excellent position. Give complete information on self and experience, including photograph and references.
Box 45-NP-3, Ind. & Eng. Chem., Easton, Pa.

CHEMIST or CHEMICAL engineer—mechanically inclined with one or two years' industrial experience plant & laboratory control. Metallurgical background desirable. Philadelphia area.
Box 48-NP-3, Ind. & Eng. Chem., Easton, Pa.

LIBRARY ASSISTANT who has a Ph.D. or its equivalent in chemistry and can handle languages other than French and German. Income will depend on language qualifications and ability to work with chemical literature. Hooker Scientific Library, Central College, Fayette, Missouri.

TEACHING POSITION for Ph.D. organic chemist (man or woman). Position may include summer session beginning June 1, 1942. Give detailed information on education (including language fluency), experience, and personal (including photo). Reply to Neil E. Gordon, Central College, Fayette, Missouri.

SEVERAL ENGINEERS with chemical, mechanical, or electrical training, and a physicist required at once for expanded development program by well-known group of associated companies manufacturing lumber, plywood, fibrous products and defense materials. Location Middle West or West Coast. Recent graduates, several years' experience, preferred. Submit details, education, experience, references, salary requirement, photograph, draft classification.
Box 57-N-3, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER to direct pilot plant and full scale development. Permanent position, large company, southern Louisiana. Require graduate training and several years' experience, preferably in oil refining or heavy chemicals. Replies treated confidentially. Give personal data, education, experience, salary expected, references, draft status, recent informal photograph.
Box 58-N-3, Ind. & Eng. Chem., Easton, Pa.

CHEMIST for CONTROL and analytical work in the laboratory of a plant manufacturing fatty acids and allied products. Location, near Newark, New Jersey. State training, experience, personal data, and salary expected.
Box 62-N-3, Ind. & Eng. Chem., Easton, Pa.

MIDWEST DISTILLERY desires to employ Ph.D. chemical engineer or equivalent by experience for research position in unit processes. Plant manufactures whiskey also alcohol for government.
Box 67-NP-3, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 358)

Address communications to the box number indicated and Mail to Easton, Penna.

The American Chemical Society has no information concerning the position advertised—or in regard to those seeking employment.

(Situations Open Continued)

TECHNICAL ORGANIZATION located in southwest wishes to employ a chief draftsman and a number of senior draftsmen familiar with general petroleum and chemical plant design. Give complete details of personal qualifications, technical training, experience, references, and salary desired. Include a recent photograph.
Box 73-NP-3, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL or INDUSTRIAL Engineer, Insecticide Industry near Buffalo. Recent graduate not subject to draft in near future. Will be given training in laboratory, engineering production and time study work. Later to be assigned to special production problems. Include photograph with application. Give nationality and state salary expected.
Box 78-NP-3, Ind. & Eng. Chem., Easton, Pa.

CHEMIST-TECHNICIAN

for

Head of Sample and Development Laboratory

of

Prominent Paint Manufacturer

Under 45 years
Salary—$4000-$6000
Must be thoroughly experienced and have outstanding record.
State age, education, and draft status.
Submit a detailed record of experience.
An unusual opportunity for the man qualified.

PERSONNEL ADVANCEMENT BUREAU
Grant Building **Pittsburgh, Pa.**

PLANT CHEMIST wanted: Graduate chemist with plant experience in the manufacture of organic dyestuffs or dyestuff intermediates. Location, northern New Jersey. In first letter of application, state experience, education, marital and draft status, age, and give references.
Box 81-N-3, Ind. & Eng. Chem., Easton, Pa.

OPENING for CHEMIST, M.S. or Ph.D. Degree desired. Agricultural Research, Minor Element Investigations in Soils, Plants and Animals. Salary commensurate with training and experience.
Box 83-N-3, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMISTS, Ph.D's., with thorough training in laboratory research methods as well as in the fundamentals of organic or physical chemistry for positions as project leaders in research laboratory of major petroleum company of southwest. Recent graduates preferred. Give personal data and details as to scholastic training, salary expected, and references. Enclose recent photo. Advise if plan to attend Memphis meeting of A. C. S.
Box 86-NP 3, Ind. & Eng. Chem , Easton, Pa.

TEACHING FELLOWSHIP or full time assistantship in chemistry at Smith College. Teaching fellowship for graduate student, $600 for half-time; or full time assistantship $1200. Send complete personal data, including photograph and letters of recommendation to Chairman, Department of Chemistry, Smith College, Northampton, Mass.

INORGANIC CHEMIST, for research and development of inorganic heavy chemicals with well-known progressive up state New York concern. Submit full details of education, experience and complete personal data. Recent photograph desirable.
Box 89-NP-3, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST, wanted by progressive upstate New York manufacturer. Recent or June graduate with advanced degree in Analytical Chemistry preferred. Submit full details of education, experience and complete personal data. Recent photograph desirable.
Box 90-NP-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, for research work by progressive upstate New York manufacturer. Recent or June Ph.D. preferred. Submit full details of education, experience and complete personal data. Recent photograph desirable.
Box 91-NP 3, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(A.C.S. MEMBERS)

CHEMICAL ENGINEER, D. Eng., 13 years' experience in plant research, development and control including construction, installation, maintenance, operation in the oil refining industry, age 38, married. Desires new connection where his abilities can be utilized fully.
Box 49-N-2, Ind & Eng. Chem., Easton, Pa.

PRODUCTION CHEMIST. Graduate chemical engineer with twenty years' experience in heavy chemicals, acids, purified cellulose fibre, nitrocellulose, viscose-cellulose film, paper coatings, lacquer formulation. Positions held: chief chemist, development engineer, production department head, plant superintendent. Primary interest: production supervision.
Box 74-N-2, Ind & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, M.S., with Ph.D. in agricultural biochemistry. Graduate training includes work in chemical engineering, organic chemistry, biochemistry, and bacteriology. Five years' experience in food industry. Sigma Xi, Phi Lambda Upsilon. Desires position in the Middle or Far West.
Box 43-T-2, Ind. & Eng. Chem., Easton, Pa.

COLLEGE or UNIVERSITY Professorship. Ph.D. from leading university, experienced teacher general and organic chemistry. Research, publications, administrative and industrial experience. Interested also in high-type course for non-chemistry majors. Married.
Box 49-T-2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST: will complete work for Ph.D. 1942. Major inorganic and analytical. Good training in organic. Desire position doing research. Preferably New York City or vicinity. 18 years' practical experience. Publications. Available immediately.
Box 61-T-2, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. 1928, minor physics, 13 years' experience synthesis, aliphatic, aromatic, heterocyclic compounds, also enzymes, vitamins, coal tar products and plasticisers; familiar with physico-chemical methods. Want responsible position in organic research, preferably with biochemical applications. North or South America.
Box 65-T-2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, Organic Ph.D. Teaching or research. Twenty years' College Professor. Agricultural Experiment Station Research Experience. Protestant. Married. Location immaterial. Now employed, but desires change. July 1, 1942.
Box 90-T-2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.A., sixteen years' experience in research, production, and control especially in foods, bacteriology, and biochemistry. A good plant manager and superintendent; successful research and sales experience. Can get things done and usually make money for employers. Age 39, married, Protestant.
Box 92-T-2, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, B.Ch.E., 1940, Tau Beta Pi. Single, 23, 3A draft. Two years' experience development synthetic resins and plastics, mainly laminated phenolics. Desire any position in plastics industry. Metropolitan area preferred, but will consider anywhere. Available immediately.
Box 100-T-2, Ind. & Eng. Chem., Easton, Pa.

EXPLOSIVES CHEMIST. 1½ years' dynamite plant; analysis, testing of powder, mixed acid and nitroglycerin Explosives laboratory; some plant operation. Graduate ESMDT course powder and explosives. Desire explosives development or inspection. Cal. Tech. Publication. Inorganic analysis. 2-B deferred. 23, single. Anywhere.
Box 101-T-2, Ind. & Eng. Chem., Easton, Pa.

ORGANIC BIOCHEMIST, Ph.D., 1942. Available immediately. Research experience in organic syntheses and enzyme chemistry. Interested in organic, biochemical or drug research. Age 24, single, draft deferred. East preferred. Member Phi Beta Kappa, Phi Lambda Upsilon, Sigma Xi.
Box 102-T-2, Ind. & Eng. Chem., Easton, Pa.

COLLEGE TEACHING or research. Ph.D. this June. Organic major. Protestant, male, age 27, Phi Beta Kappa, Phi Lambda Upsilon, Sigma Xi. Graduate assistant and Fellow in organic chemistry for three years. Desire instructorship in organic chemistry. Location immaterial. Available in June.
Box 10-N-3, Ind. & Eng. Chem., Easton, Pa.

CHEMIST and CHEMICAL Engineer with exceptional background of industrial and teaching experience. Successful record of process development, production supervision, research in cosmetic preparations, water treatment, metallurgy, fertilizers. Publications. Interested in management, development, research, teaching. Location immaterial. Married, children, 34.
Box 12-N-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. June 1942, desires position in research, development or production. Broad experience in organic synthesis. Minor in physical chemistry. Sigma Xi, fellowship. Single, draft 2A, Jewish. Available June. Eastern location preferred but not essential.
Box 13-N-3, Ind. & Eng. Chem., Easton, Pa.

WOMAN Ph.D. (Physical) with eight years' successful teaching experience in General, Analytical, Organic, and Biochemistry. Desires responsible teaching or industrial position. Now teaching. Excellent references. Interviews at Memphis meeting.
Box 15-N-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST. Two years' toward Ph.D. Industrial experience. Excellent academic record. Sigma Xi, Tau Beta Pi. Has surpassed requirements of present position. Desire research position in midwest or east.
Box 16-N-3, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST. Chemical Engineer. Eight years' teaching chemistry and chemical engineering. Six years' varied industrial experience in responsible positions. A.I.Ch.E. Desire teaching position — chemistry.
Box 19-N-3, Ind. & Eng. Chem., Easton, Pa.

CHEMIST B Sc. 1940 from Philadelphia College of Pharmacy and Science, desires research position in plant, manufacturing phthalic anhydride by the catalytic oxidation of naphthalene. Age 26.
Box 21-N-3, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER — Chemist, M.S., broad experience in sales, manufacturing and research and development; excellent record; sound knowledge of and experienced in patent law; law graduate; desire supervisory or management work in petroleum or chemical industry.
Box 22-N-3, Ind. & Eng. Chem., Easton, Pa.

CHEMIST Ph.D. 1933. Eight years' experience in physical, biological and rubber chemistry. Position desired which offers greater opportunities. Rocky Mountain or Pacific area preferred but not essential.
Box 23-N-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC Ph.D. '40. Physics minor. Two years' research experience. Three publications. Sigma Xi, Phi Lambda Upsilon. Desires research position in Niagara Frontier area. Protestant. Class 3 draft. Employed. Available on reasonable notice.
Box 24-N-3, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, 16 years' experience in plant research, development and control including construction, installation maintenance especially in the pharmaceutical and synthetic organic chemistry. Desires connection where his abilities can be utilized fully.
Box 25-N-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, B.S. 1939. Additional graduate training. Two years' experience in organic research and development. Young, responsible, good personality, single, draft deferred. Desires organic research position in metropolitan area. Presently employed.
Box 30-N-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., with some engineering training, age 35, married, Protestant, Anglo Saxon, 10 years' research experience, naval stores, terpenes, resin acids, olefin polymerisation and hydration, catalytic vapor phase oxidation. Wishes position teaching, research, development, plant operation.
Box 33-N-3, Ind. & Eng. Chem., Easton, Pa.

TEACHING POSITION, College or University. Ph.D. Johns Hopkins, 1931. Nine years' teaching experience, broad background, genuine interest in teaching. Married, Methodist, age 39. Available July 1. Have permanent, responsible position with a scientific agency of the Government but wish to return to teaching.
Box 37-N-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., 27, married, now teaching in a large N. Y. college. Desires part-time work in synthetic organic research and for full-time summer employment in N. Y. C. area. Excellent training and experience. Particular desire to assist in war effort.
Box 38-N-3, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL CHEMIST, B.A. 1932 Production and research experience in diversified fields. Employed. Desires responsible position with manufacturing company. Details forwarded by air-mail, on request.
Box 39-N-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, B.S. 1941, M.I.T., over 100 semester hours chemistry. 6 months' experience plastics research. Now employed. Desire position with greater opportunity. Research, development, or production. Available on short notice. Prefer Middle Atlantic or Middle West. Age 22, single, Class 1B. Excellent references.
Box 40-N-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., M.I.T., 1938. Research experience in synthetic organic, electroorganic, sterols, vitamin D. Industrial research or development desired; also teaching. Employed, but available immediately. Deferred 2A.
Box 41-N-3, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, Ph.D. specialising in surface chemistry, emulsions, catalysis, corrosion, powder-metallurgy. Desires research or teaching position.
Box 44-N-3, Ind. & Eng. Chem., Easton, Pa.

INORGANIC and PHYSICAL Ph.D. desires position with more promising future. 3 years' xperience at A.C.S. accredited colleges teaching qualitative, quantitative and general chemistry. Research publications. Age 27, Protestant, married. Available in late May for academic or industrial position.
Box 51-N-3, Ind. & Eng. Chem., Easton, Pa.

CHEMIST — PLANT Executive. 25 years' experience. Full responsibility for plant operation, maintenance, chemical control and pilot plant development. Experience covers wide variety of chemical processes and equipment. Developed two new products now being marketed. Expert analytical chemist. Interested in supervision of manufacture or laboratory.
Box 52-N-3, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, M.A. 1941 from leading A.C.S. approved university. Age 24, single, good health. Thorough training in all branches of chemistry. Prefer far West, but available anywhere immediately. Mechanically inclined. Desire research or development position. Hope to attend Memphis meeting.
Box 53-N-3, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 359)

(Situations Wanted Continued)

PRIVATE RESEARCH assistant in large Eastern university. Organic chemist, Ph.D. 1941. Undergraduate major — Bio-chemistry. Research on amines, amino acids, unsaturation, organic synthesis. Publications. Graduate assistant in organic 4 yrs. Desire research or teaching position. Draft deferred, 27, single, available immediately.
Box 54–N–3, Ind. & Eng. Chem., Easton, Pa.

GRADUATE STUDENT M.A. With one year of course work on Ph.D., desires instructorship, whole or part time, with opportunity to do research for doctorate. Would also consider college teaching position. Thorough training and good record in Physical and Organic Chemistry, Physics and Mathematics.
Box 59–N–3, Ind. & Eng. Chem., Easton, Pa.

EXPERIENCED REFINER of corn starch, corn syrup and by-products, seeks position as director of research, chief chemist, assistant shift superintendent or general superintendent.
Box 60–N–3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. candidate (June) from large eastern university desires industrial research position after June 1. Thesis in synthetic organic chemistry. Well grounded in physical, analytical, and biochemistry. Four years' teaching experience. Age 25, single, American. Phi Lambda Upsilon, Sigma Xi.
Box 61–N–3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Austrian Ph.D. 1933, post graduate work, 8 years' industrial experience, 2½ years in synthetic resins and waxes, emulsions, surface active agents, oils and fats, Literature research in French, Italian, German, 3 years' in U. S. A. and here employed. First citizenship papers, age 33, married, references.
Box 63–N–3, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, M.A., 1942, desires position research or development. Preferably in New York City or vicinity. Age 31, draft deferred, single, Phi Beta Kappa.
Box 64–N–3, Ind. & Eng. Chem., Easton, Pa.

PLANT MANAGER or Superintendent. Accustomed full responsibility. Chemist and chemical engineer. Plant design, pilot, layout, development; operation, maintenance, production planning, costs, chemical economics, personnel and sales relations. Synthetics, solvents, plastics, extracts, oils, alkaloids. Distillation (including vacuum), alcohol recovery. Age forty, married, American ancestry, Protestant, consulting experience, patents, publications, references. Available short notice. Reasonable salary.
Box 65–N–3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC and PHYSICAL Chemist, M.S. Chem., two years' research experience, two years' college teaching, thoroughly experienced various aspects of organic chemical techniques and physico-organic methods. Research and development preferred. Eastern location.
Box 66–N–3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. 1939. Desires research position in the middle-west, in the field of synthetic organic chemistry. Resin experience. Presently employed, available within reasonable time. Draft deferred. Single.
Box 68–N–3, Ind. & Eng. Chem., Easton, Pa.

COLLEGE TEACHING or research, Ph.D., 1928, with ten years' experience in teaching general, inorganic, analytical chemistry. Publications. Abstractor for the encyclopedia of chemical reactions. First rate references. Age 37, single. Ex-Austrian. Employed. Available within reasonable notice. Location immaterial.
Box 69–N–3, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, M.S., A. C. S. approved college. Two years' industrial experience special methods of analysis. Desires research and development or production position contributing to "all out" emergency effort. Prefers East, Middle East. Married, 26. Draft 3A.
Box 70–N–3, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST, M.Sc. 1940 with 1 year of industrial experience desires employment in any of the Defense Industries, in control or in production. Also desires position as an Assistant Spectrographer. Eastern location preferable but not essential.
Box 71–N–3, Ind. & Eng. Chem., Easton, Pa

ORGANIC CHEMIST, Ph.D. 1929. Now employed. Sigma Xi, Alpha Chi Sigma. Publications. Age 45, Protestant, married. South preferred but not essential.
Box 72–N–3, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Ph.D., 9 years' research in proteins and pharmaceuticals. Development of processes for biologicals, vitamins. Broad biochemical training. 3A deferred.
Box 74–N–3, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL CHEMIST & Chemical Engineer: Extensive experience production, research, development, control work, specification writing. Employed by Government and industrial companies. Experience in food, fuel and building materials industries. Good references. Employed, available on short notice.
Box 75–N–3, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL and INORGANIC Chemist, Ph.D. Cornell, with five years' of teaching experience in general chemistry, and about ten years of research in insecticides and fertilizers, with publications and patents and experience translating and abstracting, desires teaching or research position.
Box 76–N–3, Ind. & Eng. Chem., Easton, Pa.

CHEMIST DRUGS, B.S., M.S. with fifteen years' of wide and varied experience in research, control, and manufacturing. Author of numerous publications and also books. Seeks responsible position in research, control, and manufacturing. Age 40, married, employed.
Box 77–N–3, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, M.S. 1939, excellent educational background in organic, physical chemistry; two years' experience responsible development work on synthetic resin and water soluble coatings; presently employed; desires research or development position in expanding industry.
Box 80–N–3, Ind. & Eng. Chem., Easton, Pa.

ATTENTION MANUFACTURERS contemplating production of Synthetic Phenol by the sulfonation process. An Industrial research chemist with twelve years' successful organic research experience including extraordinary achievement in research, development and operation of synthetic phenol plant is available for responsible position supervising development and operation of this process. A. C. S. Member. Married. Advanced degree. Excellent recommendations. For complete details write R. W. Bixby, Inc., 443 Delaware Ave., Buffalo, N. Y. Reference 8106.

CHEMICAL ENGINEER B.S. in Ch.E. 1939. Experienced in research and development work. Desire development work or position giving technical service or assistance to production department. Will work anywhere under any conditions provided pay is commensurate. Company must be eligible to request continuance of 2-B draft classification.
Box 88–N–3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. 1938 from large mid-western university; wide synthetic experience. Employed directing own research program. Desires position with opportunity for advancement. Resourceful, responsible. Age 29, draft 3A. Middle-west, East preferred. Available reasonable notice.
Box 93–N–3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Research and Development. Ph.D. chemistry. Thoroughly trained and capable of organizing and directing research. Wide experience in synthetics over a period of nine years. Special experience in the development of chemical products from hydrocarbons. Employed.
Box 96–N–3, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, M.S., professor, desires change Six years' industrial and thirteen years' teaching experience. Specialties: unit operations, heat transfer, pilot plant equipment, engineering chemistry. Both lecture and laboratory work. Successful industrial research and teaching record. Age 39, Protestant, married. Prefer teaching position in the fields stated. Available June.
Box 98–N–3, Ind. & Eng. Chem., Easton, Pa.

WOMEN CHEMIST, Ph.D. 7 years' experience in organic, physiological, analytical chemistry and bacteriology. Fluently German, French, Italian, reads Spanish. Desires research, analytical or literature position. Preferably in East.
Box 100–N–3, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED (NONMEMBERS)

RESIN and VARNISH Chemist with experience in research and production of Phenolic, Alkyd and Maleic Resins and substitutes from available materials, and use of resins in all types of varnishes. Familiar with Government specifications, Technical Sales, Publications. Location immaterial. Draft class 3A. Available immediately.
Box 28–N–3, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST. Ph.D. several years' experience in industrial research desires comparable position in south or southeast. Varied experience. Excellent training. Publications. Phi Beta Kappa, Sigma Xi.
Box 47–N–3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D Age 27, single, 4C draft. Good basic background; experienced in synthesis and research work. Desires position in or near New York City.
Box 84–N–3, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, eight years' experience in research, development, specification, applications of vinyl type resins and coatings. Interested in plastics or synthetic rubber. B.Ch.E., M.Sc., age 31, married, Protestant, class 3-A, employed non-defense.
Box 85–N–3, Ind. & Eng. Chem., Easton, Pa.

FOOD CHEMIST, 25, seeks position with manufacturer of extracts, preserves, baker's supplies or similar products. Two years' experience with development and control. Has good knowledge of food materials and processing equipment. Three years' college chemistry. Military service deferred.
Box 92–N–3, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, Ph.D., wide experience chemical patents. Desires position with patent department or patent law firm.
Box 94–N–3, Ind. & Eng. Chem., Easton, Pa.

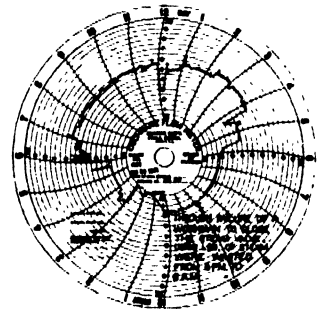
CHEMICAL ENGINEER, B.S., M.S. Eleven years' design, installation, operation plants manufacturing synthetic organic chemicals. All types distillation, catalytic hydrogenation, dehydrogenation, development, process design, project engineering. Desire permanent position in supervisory capacity—production, plant engineering or design. Employed. Married.
Box 95–N–3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.S. Research experience; phenols, sterils, vitamins. Organic micro-analysis. Publications. Draft deferred. Desires position in organic research.
Box 97–N–3, Ind. & Eng. Chem., Easton, Pa.

Industrial News

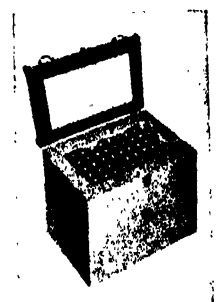
CONTINUED FROM PAGE 354

Flowmeter Record Discloses Waste of Steam



THIS chart, a 24-hour record of steam consumption in the hog-killing department of a Chicago plant, shows a consumption of steam from 6 P. M. to 6 A. M., when the department should not have used steam. Investigation disclosed that steam had been permitted to leak into the hot water heater all night. The loss was 111,600 pounds of steam, costing $33. This is one illustration of the value of departmental steam flowmeters, made by Cochrane Corp., Philadelphia.

Subzero Refrigerator



NEW industrial type subzero Cold Treater refrigerators maintaining temperatures down to −35° F. for laboratory research and testing, and production processing, aging, manufacturing, and assembly are announced by The Jewett Refrigerator Co., Inc., Buffalo, N. Y. These refrigerators are built in 3- and 6-cubic foot capacities, equipped with self-contained, trouble-free sealed condensing unit ready to plug in and use.

Standard control maintains temperatures from +5° F. down to −10° F. Special control gives temperatures from +20° to −35° F.

MISCELLANEOUS

BUSINESS OPPORTUNITIES • FOR SALE • WANTED • ETC.

Five cents a word, minimum charge $2.00; display available at $7.50 per inch; in advance. No discounts or allowances

MICRO-ELEMENTARY ANALYSES: C, H, N, S, P, Halogens, Methoxyl, Mol. wt., etc., U.S.P. and other official tests, Purity tests, Microinorganic assays, Spot tests, Micro-distillations, Toxicological investigations, and typical micro-chemical research work. Dr. Carl Tiedcke, 366 Fifth Avenue, New York, N. Y.

LONG ESTABLISHED reliable concern with finances and manufacturing equipment wishes to produce chemicals of unusual nature for defense. Willing to develop promising process.
Box 49-N-3, Ind. & Eng. Chem., Easton, Pa.

WANTED to BUY: manufacturing process for Diphenylamine. Offers
Box 70-N-2, Ind. & Eng. Chem., Easton, Pa.

WANTED: Quotations on Bilstein "Handbuch der Organischen Chemie," 4th edition and 4th supplementary complete or in parts; Gmelin 8th edition; Berichte 49, Nos. 8-12; 61, No. 8; 64, No. 1.
Box 67-T-2, Ind. & Eng. Chem., Easton, Pa.

WANTED: Subcontractor with equipment to carry out Hydrogenations on several products on a profitable custom basis. If you have surplus capacity for this type of operation write at once to Box 36-N-3, Ind. & Eng. Chem., Easton, Pa.

WANTED: "Journal of Physical Chemistry"; Vol. 23 (1919) nos. 1, 2, paying $3. each; Vol. 25 (1921) complete, paying $12. "Rubber Chemistry and Technology"; Vols. 2, 3, 4 (1928-1930), paying $5. each. Foreign chemical journals wanted for private library. Dr. G. H. Franzius, 201 East 82nd Street, New York, N. Y.

FOR SALE: Ullmann, 1st edition; Journal of the American Chemical Society 1901-1940, also 1908 to 1933, 1922 to 1933, and Collective Index to volumes 1-20; Industrial and Engineering Chemistry complete.
Box 11-N-3, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Abbe refractometer, Model I, Zeiss Jena, with thermometer and other accessories, description and dispersion tables, in wooden case, scarcely used, perfect condition.
Box 29-N-3, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Journals. Society Chemical Industry 1907-1923. Industrial & Engineering Chemistry 1924-1935. American Phar. Assoc. YearBooks 1912-1933. Proceedings 1899-1911. Collective Index 1903-1925. Chemical Engineer 1905-1915.
Box 31-N-3, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: J. Chem. Education, Volumes 1-17, excellent condition, unbound, $75.00 f.o.b. Wilmington. M. W. Grafflin, Hercules Powder Co., Wilmington, Delaware.

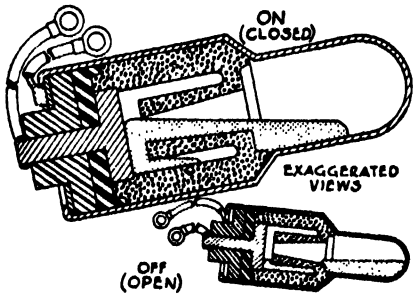
FOR SALE — 2000 lbs Cerium Chloride Tech — 1000 lbs Maleic Anhydride — 1000 lbs iron Carbonyl — 1000 lbs Zirconium metal powder — 1000 lbs Titanium Carbide — 1000 lbs Tungsten Trioxide — 5 lbs Yttrium Oxide CP — 1000 lbs Marcasite crystals — ton yellow arsenic.
Box 46-N-3, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Bausch & Lomb photomicrographic equipment includes GBVPAA camera with supporting stand, microscope, lenses and accessories. Further information given upon request. Bona Allen, Inc., Buford, Georgia.

FOR SALE: 100 Grams Calciferel, 100 kilos Podophylin, 3 kilos Cysteine Hydrochloride, 5 lbs. Quinine Bismuth Iodide, 100 lbs. Calcium Glucoheptonate, 2 kilos Histidine Monohydrochloride, 10 grams Glutathione.

Box 99-N-3, Ind. & Eng. Chem., Easton, Pa.

Double Flow Mercury Switching



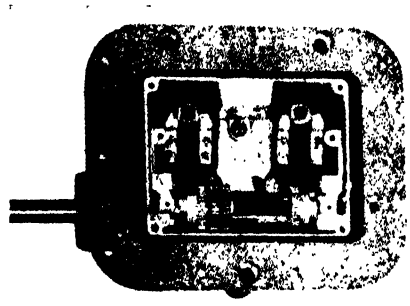
IN THE apparatus developed by Durakool, Inc., 1029 North Main St., Elkhart, Ind., two tails of mercury pulling in opposite directions over a ceramic barrier until severed prevent double contacting where vibrations exist. When closing, the two approaching bodies of mercury pile up a double-thick electrical conductor. Double flow operates either as a slow rolling motion or on a very high speed mechanical snap action.

Feeders with Fluid Sealed Yoke

A NEW series of Adjust-o-feeders has been developed by %Proportioneers, Inc.%, Providence, R. I., equipped with cylinder support frames carrying the new fluid sealed yoke and incorporating other improvements. The yoke permits the use of an enclosing fluid around the plunger and stuffing gland, sealing these parts from contact with the air and preventing damage from corrosive liquids or build-up on the plunger from liquids carrying suspended solids.

SALES and production problems brought about by the tremendous war requirements for transmission products came in for careful study at a two-day conference of the W. A. Jones Foundry & Machine Co. national sales force and factory executives, held in Chicago on January 15 and 16.

Rotating-Type Limit Switches



G. E. watertight limit switch

THE General Electric Co., Schenectady, N. Y., has announced the addition of two new forms to its line of CR9441-C2 rotating-type limit switches. One form is for Class I, Group D, hazardous gas locations and the other is for applications requiring a water-tight switch. The new switches both are housed in heavy, flanged, cast-iron enclosures.

Cement for Laying Insulating Firebrick

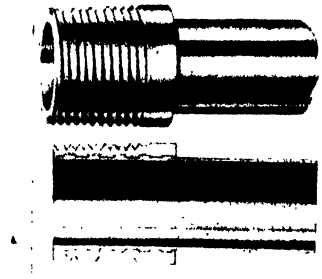
A CEMENT for use in laying insulating firebrick has been introduced after an extensive development program by the Building Materials Division of the Armstrong Cork Co., Lancaster, Penna. Known as Armstrong's No. 2500 cement, the new product is designed especially for use in laying the company's A-16, A-20, and A-25 insulating firebrick.

Because the cement is made of high-grade refractory clays and grog, it is said to provide a coefficient of expansion of the dried cement virtually the same as the brick with which it is used, eliminating cracking and peeling caused by differential expansion. No. 2500 cement is particularly suitable for use directly exposed to furnace temperatures over 1800° F.

Current Saving with Fluorescent Lights

POINTING out fluorescent as "victory light", the Lighting Engineering Division of W. H. Long Co., 425 North Clark St., Chicago, urges plant operators, store proprietors, etc., to cut their light load now. According to the company, fluorescent lighting can duplicate incandescent light and save about half the current, or it can cut the load about 40 per cent while increasing light about 25 per cent. The company offers its services without charge in estimating improved lighting efficiency and current saving to any concern applying for this help on business stationery.

Wallace Joint to Save Metals Needed for Defense



THE Tri-Clover Machine Co., Kenosha, Wis., is offering a new type joint that saves stainless steel. The Wallace joint permits the use of thin-wall tubing in connection with standard threaded iron pipe size fittings of all kinds. This joint consists of special threaded and enlarging ferrule inseparably joined to a length of stainless tubing through the medium of expansion. The company claims that, by use of the Wallace method, dead weight can be eliminated, with a resultant saving of approximately 65 per cent in material and without loss of effectiveness.

CHEMICAL AND ENGINEERING NEWS

HARRISON E. HOWE, Editor

PUBLISHED BY THE AMERICAN CHEMICAL SOCIETY

VOLUME 20 MARCH 25, 1942 NUMBER 6

Industrial Memphis

MEMPHIS industry reflects her agricultural environment. Situated in the heart of the cotton country with the rich alluvial delta lands of Mississippi and Arkansas just down the river, Memphis is the world's largest cotton market and manufacturer of cottonseed products. As a result, the many cottonseed mills whose by-product meal and cake are valuable as animal foods, together with the several manufacturers of mixed feeds, make the city the South's largest producer of livestock feeds, an important livestock market, and, despite the claims of Missouri, the largest mule market in the world. It is the world's largest hardwood lumber market and the South's largest producer and distributer of chemicals and drugs.

Located on the Mississippi River half way between Chicago and New Orleans, Memphis enjoys unique distribution advantages as a chief port on the Nation's inland water routes and the focal point of 10 major railroad systems. Many large industrial companies have recognized these advantages and in the recent trends toward decentralization have established branch plants or distribution headquarters in Memphis. This trend has made Memphis the largest nonproducing steel distributer in the Nation.

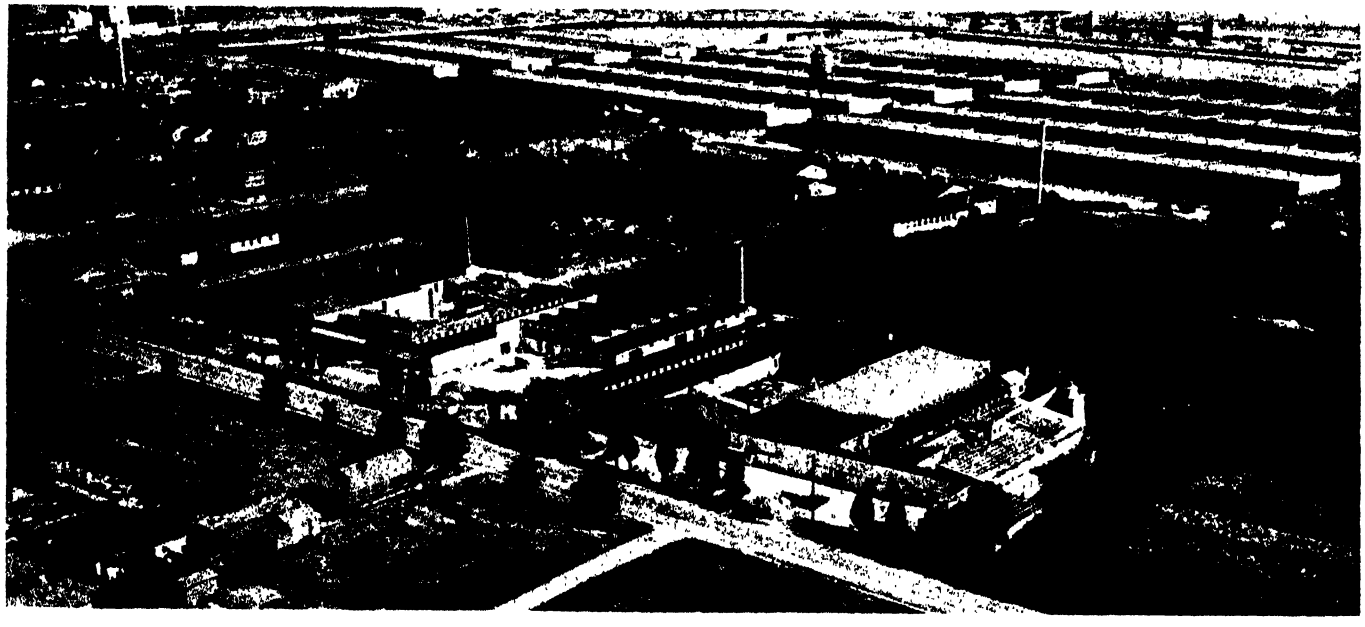
Many of the largest steel companies of the North and East have private barge shipping operations to warehouses here. Among these are Jones-Laughlin Steel Corp., Wheeling Steel Corp., Youngstown Steel Corp., and Carnegie-Illinois Steel Corp. Bethlehem Steel Corp. and several others maintain district sales offices in Memphis, ranking it among the first 20 cities of the Nation as a wholesale center. The oldest steel fabricating plant in the city, the Virginia Bridge Co., subsidiary of the United States Steel Corp., distributes its products from Memphis to 20 states including California and the Pacific Northwest.

In the past year, many industrial concerns in Memphis have seen increasing amounts of their output directed to national defense. Some plants have entirely changed their schedule of production, and a number of new industries have been located in Memphis as a direct result of the defense program.

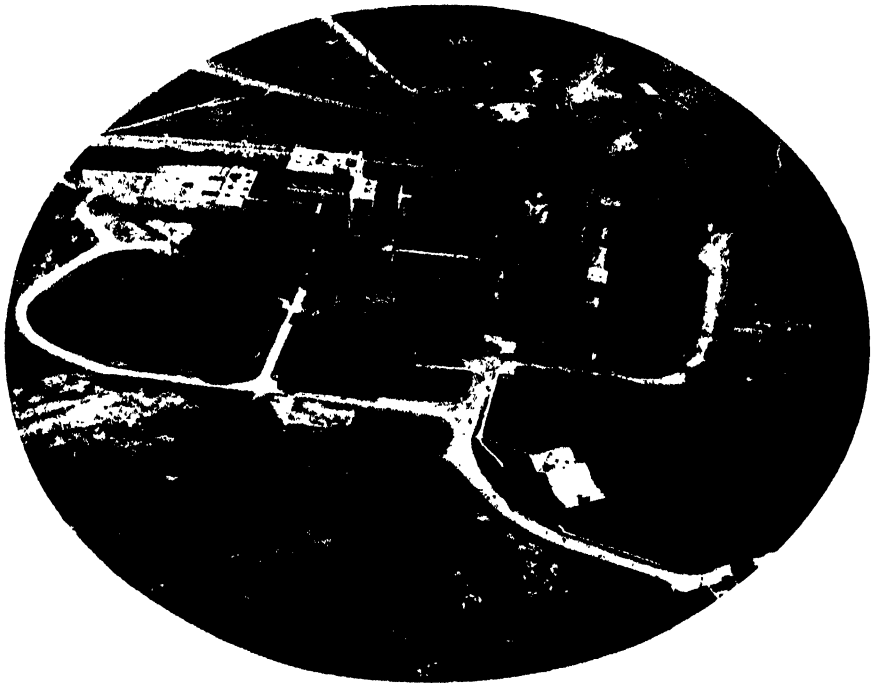
Cottonseed products comprise the largest group of manufacturers in Memphis, with eight oil mills crushing cottonseed, four refineries, three hydrogenation plants, and one pulp plant purifying cotton linters.

The Southern Cotton Oil Co., first large cotton oil plant to be established here, is a subsidiary of Wesson Oil and Snowdrift Co. Three main divisions of the plant consist of a crude oil mill, a refinery, and a shortening plant. In refining crude cottonseed oil, it is first treated with dilute caustic to remove free fatty acids, bleached with an absorbent earth, and sent to the shortening plant to be finished in any of several ways.

By mere chilling and filtering off the saturated glycerides that are thereby solidified, a pure salad oil is obtained. Or the bleached oil may be mixed with either hardened vegetable oil or animal fats to make compound shortening, sometimes called compound lard. Hardened vegetable oil is a completely hydrogenated cottonseed oil. In this form the product is fully saturated and approaches the hardness of stone. Partial hydrogenation of cottonseed oil, however, gives the most desirable type of vegetable shortening.



Aerial view of McCallum Robinson and the Federal Compress and Storage Co.



Southern Cotton Oil Co.

Many brands of this product are on the market and they are customarily packed in sealed cans, while the more perishable compound shortening is usually put up in waxed paper boxes.

As the final treatment, all forms of vegetable shortening and salad oil are deodorized by blowing through with steam.

There are two other hydrogenation plants in Memphis. Cudahy's Leewood Refinery is the largest of the several refineries operated by this company in the country. Humko is a Memphis-owned plant of about the same size. These latter plants manufacture their hydrogen by the well-known iron-steam process, whereas Southern Cotton Oil Co. uses electrolysis. All three plants make all of the above-mentioned types of shortening.

Swift & Co. has a cottonseed oil mill and a refinery in Memphis, but does not hydrogenate there. Its hardened oil is brought in to make compound shortening Armour operates the Memphis Cotton Oil Mill. The Perkins Oil Co. has two seed-crushing mills, one in Memphis and the other across the river in West Memphis, Ark. Aside from the cotton oil mill and the pulp plant, the Buckeye Cotton Oil Co. also operates a mill crushing soybeans.

Necessary adjuncts to cottonseed processing are the laboratories for grading seed, oil, and lint purchases and the control of the manufactured products. Many plants maintain their own facilities, but besides these are the vitally important commercial laboratories which do official cottonseed grading under government license. There are two such laboratories in Memphis, both in the heart of the business district on "Cotton Row", as that section of Front Street is sometimes called.

Woodson-Tenant Laboratories, Inc., is devoted exclusively to cottonseed, soybeans, and their products. This includes the analysis and grading of cottonseed, analysis of cake and meal for protein, of vegetable oils for fatty acids, and refining yield and cotton linters for alpha cellulose.

Founded in 1917, Barrow-Agee Laboratories, Inc., is the largest commercial laboratory in the South. An interesting feature of the laboratory is the unique calculating table where space is provided for eight people to figure yields and analyses of cottonseed from the experimental data. During the rush season from September through December, several thousand individual analyses per day are cleared over this table.

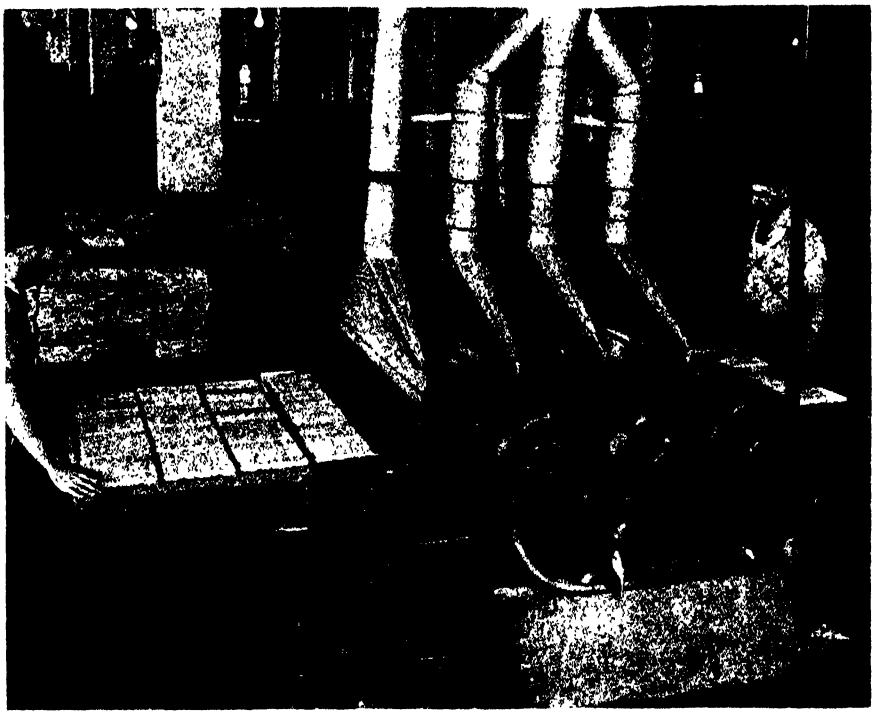
In addition to cottonseed and soybean products, this laboratory maintains an engineering department for the testing of materials used in construction. Besides its main laboratory in Memphis, Barrow-Agee has branch laboratories in Shreveport, La., Jackson and Leland, Miss., and Cairo, Ill.

Rounding out the cotton picture are the Bemis Bag Co., makers of burlap, cotton, and paper bags, and the American Finishing Co., dyers and finishers of cotton cloth. Cotton damaged by fire and water is salvaged by McCallum & Robinson, Inc. The damaged materials are separated from the good which are cleaned, spun into yarn, and made into blankets, mops, and rugs.



Calculating table at Barrow-Agee Laboratories, Inc.

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At E. L. Bruce Co., manufacturer of wood floor blocks

Agricultural insecticides are manufactured in Memphis by the Commercial Chemical Co. An entirely seasonal business with the demand dictated by the whims of the weather and insect cycles, this company operates during the growing season from March to November in a model plant where even the shipping drums are fabricated in its own shop. The world's largest producer exclusively of calcium arsenate, the company distributes its product wherever cotton is grown, including Peru, India, and Australia.

The Virginia-Carolina Chemical Corp., first to produce phosphate fertilizers, has 42 factories throughout the North, East, and South. Built before the turn of the century, the Memphis plant makes sulfuric acid by the lead chamber process for the production of superphosphates. Occupying a central position in regard to raw materials, this plant brings together Texas sulfur and phosphate rock from Middle Tennessee with smaller amounts of Chilean nitrate and potash from New Mexico.

Three of the four leading meat packers of the Nation have abattoirs at the Memphis stockyards. Swift and Cudahy operate plants under their own names, while Armour operates the Memphis Packing Co. as a subsidiary.

Closely allied to the meat packing industry is the Tennessee Soap Co., manufacturing yellow laundry soap from tallow, brown grease, and rosin, while cottonseed foots are utilized to make washing powder. By-product glycerol is sold to the plastics industry. Built eight years ago by the Humko Co. as an experimental plant handling only refinery foots, the plant is now independent and is the only soap factory in the State of Tennessee.

Practically all known wood products are manufactured in the State, upholding a tradition of wood utilization established since the War between the States. They include hardwood flooring, fine veneers and paneling, oak whisky casks, golf shafts and blocks, battery separators, caskets, furniture dimension stock, lawn furniture, handles for agricultural tools, and shuttles for cotton mills. Leaders in this industry in Memphis are Nickey Bros., established three generations ago as the first commercial user of gum timber in the Nation, Chickasaw Cooperage Co., makers of barrels with five branch plants and many lumber mills throughout the country, and E. L. Bruce Co. which recently dramatized the beauty and permanency of wooden floor blocks by selling 7,000,000 square feet of hardwood blocks used in the vast new construction of Parkchester residential group in New York City.

Representing the chemical industry in the hardwood development of Memphis is the Forest Products Chemical Co., wood distillers making acetic acid, methyl alcohol, and many by-products and derivatives. Using the Suida process of vapor-phase extraction, the company was a pioneer in the use of direct methods for the production of acetic acid. It has continued to keep pace with modern developments and now uses an azeotropic distillation with ethyl acetate to produce anhydrous acetic acid. In the utilization of by-products, Forest Products was the first to develop the commercial idea of



Giant recovery towers in arsenic acid plant of Commercial Chemical Co.



Bottling and finishing line at J. R. Watkins Co.

sacking and distributing charcoal for domestic use in the South.

Associated with Forest Products Chemical Co. is the Crossett Chemical Co. of Crossett, Ark., some 200 miles southwest of Memphis. This plant grew out of the experience gained at Forest Products and uses the same processes. Its capacity of 100 cords of wood per day is slightly higher than that of the Memphis plant, but it sends its crude alcohol there for refining.

Although not directly a defense industry, acetic acid, wood alcohol, and charcoal are under mandatory control, and the current ouput is not sufficient to supply the demand. As a result, a number of the smaller wood distillers that were forced out of business by competition from synthetic acetic acid and methanol during the depression years are reopening. Forest Products Chemical Co., however, as one of the larger wood distillers of this country, has been in continuous operation for over 30 years.

Among the large manufacturers of pharmaceuticals and proprietaries in Memphis is the Van Vleet-Ellis Division of McKesson-Robbins, largest wholesale drug concern in the Nation. This division puts on its own line of drugs in addition to those with the McKesson-Robbins label and is one of the five manufacturing plants in the company with a complete system of laboratory control. Plough, Inc., is one of the few manufacturers of proprietaries operating a pharmacological laboratory. The main plant is in Memphis with branches in South and Central America. J. R. Watkins is the largest producer in the world of vanilla and pepper, and its line of insecticides is growing rapidly. Its experimental farm just outside the city has recently been closed to visitors for the duration. The shortage of tin is being felt by the Wm. A. Webster Co. Its shaving and dental creams are now put up in collapsible tubes of substitute material. Compressed tablets and coated pills are also included in the products manufactured by this company.

The paint and varnish industry is represented in the Memphis district by three manufacturers, the DeSoto Paint & Varnish Co., True Tagg Paint Co., and Southern Shellac Manufacturing Co.

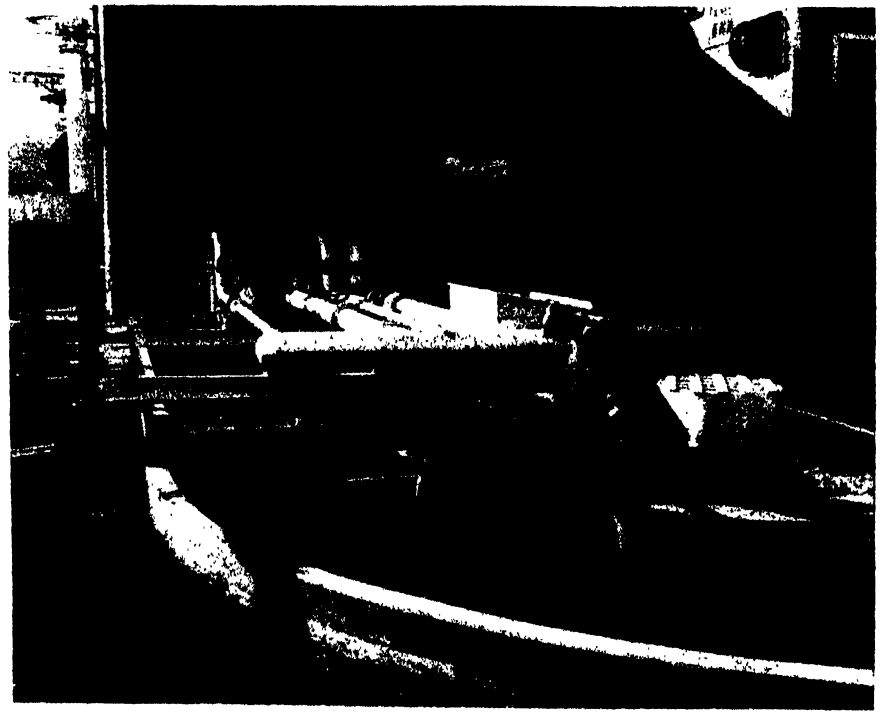
The DeSoto Paint & Varnish Co., manufacturing a complete line of paints for Sears, Roebuck & Co. in the South and Southwestern territories, operates one of the South's largest and most completely equipped paint and varnish manufacturing plants. It also manufactures a complete line of paints and varnishes for its own sales.

True Tagg Paint Co. also manufacturers a complete line of paint and varnish products, both for industry and consumers' use.

The Southern Shellac Manufacturing Co. is the only importer and bleacher of shellac in the South. It is also the only shellac manufacturer in the country able to produce bleached shellac in a continuous process, this position having been attained through the building and installation of a unique modification of the flash drying system for drying heat-sensitive products.

Recent development of the Yazoo oil fields in Mississippi has resulted in the establishment of the Delta Refining Co. in Memphis, the first complete oil refinery in the State of Tennessee. The plant was built in 1941 to produce asphalt, but since the demand has been greater for some of the lighter fractions, a cracking unit has been added.

Among decentralized industries established in Memphis, the foremost are the Firestone Tire & Rubber Co. which opened its plant there in 1937 and the duPont company which started the production of smokeless powder there late in 1940. Another is Globe-Union, branch of the Milwaukee firm manufacturing storage batteries. Savings of 50 per cent are made in transportation costs of the heavy materials to be made into batteries for distribution in the South.



Exterior view of the testing laboratory of Layne & Bowler, Inc., in Memphis, showing rectangular wier, wier pond, and play pipes with venturi throats. Both methods of measuring water are used simultaneously, and each serves as a check on the other.



Operations in the closing and packaging of collapsible tubes containing shaving cream at the Wm. A. Webster Co.

Foremost among machine products manufactured in Memphis are the vertical turbine pumps made by Layne & Bowler, Inc. These pumps are used in municipal, industrial, and agricultural well installations and as booster pumps for fire or other services requiring high pressures. The extremely limited space available for the operation of a turbine pump in well casings complicates the problem of design and manufacture. These are closely controlled by performing all operations at the Memphis shops, from the arrival of the raw metals to shipping the finished pumps. Starting with the engineering and design department, the plant comprises a pattern shop, complete foundry and core-making shop, machine shop, and hydraulic testing laboratory.

One of the oldest industries in Memphis is also one of its largest. Established in 1872, the American Snuff Co. is one of the world's largest producers of snuff. Using only domestic leaf, the Memphis plant employs modern equipment for its many operations including cutting and grinding the tobacco, making tin cans, and packaging the finished product.

Concluding the long list of products manufactured there that contribute to the important and stabilizing influence of a diversified industry in Memphis are railroad brake shoes and switches, automobile lifts, metal drums and cans, lamp chimneys and hand-blown glass bottles, waxed paper, shoe polish, and beer.

More information about the industries of Memphis will be published for CHEMICAL AND ENGINEERING NEWS readers in the April 10 issue.

APRIL 20–23
MEMPHIS

KEEP ABREAST OF YOUR A.C.S.



Pouring a pump head casting at the Layne & Bowler foundry in Memphis, scene of the approaching A. C. S. meeting.

Walte E. Chandler, Mayor of Memphis



TOOLEY-MYRON STUDIOS

MAYOR Walter E. Chandler will welcome the AMERICAN CHEMICAL SOCIETY to Memphis on the opening day of its meeting, April 20. This welcome from the Mayor of our host city carries special significance. Mr. Chandler, at the request of the AMERICAN CHEMICAL SOCIETY, through the good offices of G. Worthen Agee, introduced House Bill No. 7709 in the 1st Session of the 75th Congress, and this bill gave national incorporation to the AMERICAN CHEMICAL SOCIETY. An identical bill was introduced at the same time by Senator Walter F. George as Senate Bill No. 2633. Both bills were considered by appropriate committees, Mr. Chandler himself being a member of the Judiciary Committee of the House to which his bill was referred. With the aid of recommendations from the War Department, Navy Department, Department of Commerce, Department of the Interior, and Department of Agriculture, the bills were passed by the House and Senate, the first known as the Chandler Bill and the second as the George Bill. On the final day of the session, the Chandler Bill was, by unanimous consent, substituted for the George Bill in the Senate and was passed by Congress and then signed by the President on August 25, 1937. Thus, it was the Chandler Bill, substituted for the identical George Bill, which gave the AMERICAN CHEMICAL SOCIETY the privileges it now possesses and which have added much to its opportunities for usefulness. The gratitude of the AMERICAN CHEMICAL SOCIETY to both Congressman Chandler and Senator George, and to others of the Judiciary Committee who aided in its passage, has often been expressed, but it is again emphasized as Mr. Chandler himself will welcome us to Memphis.

CHARLES L. PARSONS, *Secretary*

Borden Award Goes to Holm



George E. Holm

THE $1,000 Borden Co. Award for Research in the Chemistry of Milk for 1942 will be presented to George E. Holm, senior chemist, Research Laboratory, Bureau of Dairy Industry, U. S. Department of Agriculture, at the general meeting of the AMERICAN CHEMICAL SOCIETY in Memphis, April 20. This award is made to Dr. Holm in recognition of his contributions to the understanding of the basic causes and the control of oxidative deterioration of fats and oils, and to the prevention of spoilage of dairy products caused by oxidation of milk fat; and because of the broad scope and important applications of his researches on the constitution and reactivity of fats and of other compounds of milk.

Evans to Receive Eli Lilly and Company Award



UNDERWOOD & UNDERWOOD

Earl A. Evans, Jr.

THE 1942 Eli Lilly and Company Award in Biological Chemistry is to be awarded to Earl Alison Evans, Jr., Department of Biochemistry, University of Chicago, at the general meeting of the AMERICAN CHEMICAL SOCIETY in Memphis, April 20.

Dr. Evans' work falls primarily into three groups:

The first is concerned with the chemistry of insulin with Dr. Jensen, and the mechanism of the action of toxins with the late J. J. Abel. This was followed by a period during which he worked with the late Rudolf Schoenheimer on the chemistry of sterols and fat metabolism in which deuterium was used as an indicator.

Dr. Evans then entered the field of biological oxidations and intermediary carbohydrate metabolism—a field in which his contributions have been outstanding. Of particular importance has been his study in recent years of the role played by carbon dioxide in the synthesis of alpha-ketoglutaric acid from pyruvic acid in vitro. In this work he has utilized the shortlived radioactive carbon isotope, carbon 11. He has demonstrated quantitatively that carbon dioxide assimilation in pigeon liver is an enzymatic reaction. This work quite revolutionizes our thinking about the role of carbon dioxide in the animal economy.

It is in recognition of his contributions to those fields of endeavor that Dr. Evans has been selected to receive the award.

Web Jones

Tune—"Comin' through the Rye"

We'd like to sing a little thing
It's called biography
In sweetest tones we page Web Jones
Who comes from Car-ne-gie.
'Tis told in tales of far-off Wales
The Joneses were prolific
We'd like to sing of one of them —
Web Jones—to be specific.

Now here's his history
As briefly as can be
Of our guest of tonight
A few facts of his life, of his life.

Have you ever seen a Missouri coal mine?
Not I! Nor have I.
Web dug one out in his prime.
He did? That's no lie.
He and his mule would dig the fuel
In tunnels dark they'd creep
He learned a-plenty from
that mule
Oh, his studies went down
deep.

And he lives down in our
alley.

He learned a great deal 'bout
human nature—
Who from? From the mule!
That's why he's such a
human creature
Web Jones is no fool.
He'll talk with you, he'll
laugh with you,
In poker he'll take all your
dough,
For when he turns his hole
card up—
Five aces in a row.

That only goes to show—
(And this we should repeat)
That Webster here is un-
abridged—
He can't be beat.

He's saved many men from
unemployment—
He has? Yes, indeed.
And that's where he gets his enjoyment—
Yes, sir, that's his speed.
In teaching he can inspire the slow
In practice he has no peer
He's an ace in the deck of Carnegie Tech
And a helluva engineer.

A helluva good engineer
He works without favor or fear
And when he gets up on his feet tonight
What he says will be something to hear.

He's a man among men,
Good with arm, tongue, and pen,
And that is the reason, the reason why

He's given the Pittsburgh Award.

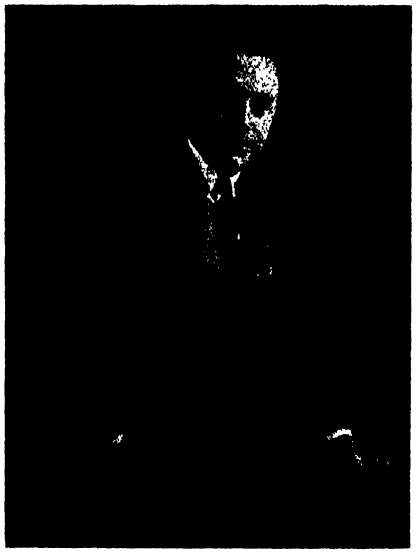
Hillebrand Prize Awarded to M. X. Sullivan

THE Hillebrand Award of the Chemical Society of Washington has been won this year by Michael Xavier Sullivan, director of the Chemo-Medical Research Institute of Georgetown University. This award, named for the scholarly and distinguished chemist, William Francis Hillebrand, long chief chemist of the National Bureau of Standards, is given each year by the Washington Section of the AMERICAN CHEMICAL SOCIETY to a member of that section for an outstanding original contribution to the science of chemistry during the three preceding years. Although Dr. Sullivan's research work has been extensive in biological chemistry, the award was made for his work on the development and quantitative application of highly specific tests for important constituents of plants and animals, especially for valuable contributions to the biochemistry of sulfur with special reference to the quantitative determination of biologically important compounds. The presentation of the award was made the Cosmos Club on March 12.

The award was accepted by Dr. Sullivan for himself and his associates as a mark of appreciation that biochemical tests,



Webster N. Jones (*left*) receives the Pittsburgh Award from J. C. Warner, Chairman of the Pittsburgh Section of the AMERICAN CHEMICAL SOCIETY, donor of the tribute, at a special dinner meeting of the section in the University Club, February 19. Dr. Jones is director of the College of Engineering, Carnegie Institute of Technology.



UNDERWOOD & UNDERWOOD

M. X. Sullivan

despite the great complexity of the biochemical field, can be made as exact as tests in other fields of chemistry.

The award was made for 17 papers published in the *American Journal of Surgery, Journal of Biological Chemistry, Journal of the Washington Academy of Sciences, Journal of Agricultural Research,* the *Proceedings of the Society for Experimental Biology and Medicine,* and the *Journal of the American Chemical Society.*

E. J. Barth, petroleum technologist, has recently joined the research and development staff of the National Oil Products Co., Harrison, N. J.

Sets of Abstracts

As usual, sets of abstracts of meeting papers in planographed book form will be supplied by the A. C. S. News Service, 1155 16th St., N. W., Washington, D. C. Sets are not guaranteed to be complete, but contain abstracts from all divisions as submitted by authors. The abstracts will be mailed as soon as possible after receipt of order, beginning about April 15, and will also be on sale at Memphis, Tenn.

This enterprise is undertaken in a spirit of service and not for profit. Sets are offered on the following terms:

To members of divisions who forward receipt for divisional dues with remittance and order, 50 cents.

To those without receipt for divisional dues, who remit with order, $1.00.

To those who fail to enclose remittance with order, necessitating correspondence, $1.25.

To those who require bills to be rendered, $1.50.

The L. S. O. G. Exchange

Edited by A. A. Ashdown, Ed. F. Degering, J. E. Hawkins, and S. L. Redman

Send items to Ed. F. Degering, Department of Chemistry, Purdue University, Lafayette, Ind.

The Western New York Section of the American Chemical Society has for its objectives increasing interest in chemistry by providing opportunities for its members to meet together to discuss subjects of chemical interest; by encouraging the dissemination of general chemical knowledge within its boundaries; by cooperating in a professional advisory capacity with local civil officers and civic bodies, when desired; and by always promoting the interest of the A. C. S.

Although more than 500 members come from Buffalo and Niagara Falls, N. Y., chemists in Erie and Niagara Counties of New York State and the County of Welland in the Province of Ontario, Canada, are eligible to membership. Membership is made up of members, associate members, and student members. There are very few associates, however.

The organization of the section is as follows, and, unless otherwise noted, officers serve one year (September to September): a chairman; a vice chairman from the Buffalo district; a vice chairman from the Niagara Falls district; a treasurer (two years); a secretary (two years); councilors (January to January); an editor for the self-supporting section publication; a business manager for this publication; and a board of trustees for the endowment fund.

All business of the section is conducted by the executive committee, which is made up largely of officers and committee chairmen. The appointed committees include: program, arrangements, membership, publicity, public relations, education, auditing, and nominating.

The membership is kept vitalized by:

Publicity given in the section publication, *Double-Bond,* which outlines the many advantages of membership in the A. C. S.

Public announcement made at each November meeting covering the desirability of starting all memberships in January.

Key men appointed as contacts in every academic and industrial institution in the section to "spot" likely candidates.

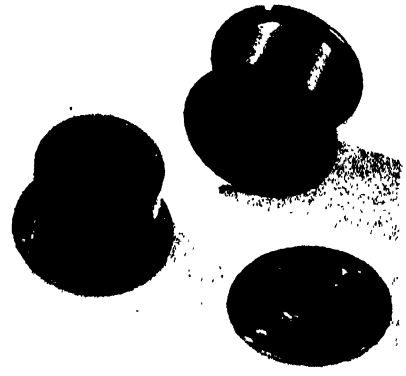
The chairman of the membership committee maintaining an accurate, up-to-date record of the affiliation of each member, as well as his or her correct address.

Publication of a list showing the membership at each industrial or academic institution.

Meetings, preceded by a dinner, are held monthly, except during June, July, and August. Generally a guest dinner speaker is provided from an abundance of local talent. He briefly covers some non-chemical subject of general interest. This feature tends to increase the attendance at the dinners. The speakers at the meetings which follow are largely nationally known chemists or other scientists, and the program committee expenditures approximate $250 a year. This section does not usually rely upon the home office to supply speakers. The average attendance approximates 300. The local membership of the American Electro-Chemical Society quite often meets with the section, and contributes to its financial support.

Certain special features in the Western New York Section are worthy of mention:

1. A gold medal has been presented by this section to some distinguished citizen each year since its founding in 1930. A fund was made available by Jacob F. Schoellkopf, Sr., which has provided an income sufficient to cover the cost of the presentation of such a medal each year since that date.
2. A substantial permanent endowment fund is maintained by the section and administered by three trustees, elected to office. This fund is totally separated from all other money.
3. For several years the section has been invited to hold its March meeting at Niagara University, where a capacity attendance is always assured because of the generous hospitality shown the section by this institution.
4. An important feature of this section is its publication, the *Double-Bond.* This has been recognized for years as one of the outstanding monthly bulletins published by any local section, and the contributions made by the graphic editors particularly have received much favorable comment.—Albert E. Jennings, *Western New York Section.*



Spool for Tungsten Wire

A plastic application which helps to conserve aluminum for other essential uses is the new tungsten wire spool developed by Callite-Tungsten Corp., Union City, N. J. The spool is molded by Universal Plastics Corp. from Bakelite phenolic material in two sections at a 20 per cent reduction in cost. The two tight-fitting halves are cemented to ensure a permanent bond.

THE CHEMIST'S CHANCE

OTTO EISENSCHIML, The Scientific Oil Compounding Co., 1637-55 South Kilbourn Ave., Chicago, Ill.

Editor's Note. We are privileged to reprint from the *Chemical Bulletin* the following discussion by Otto Eisenschiml, "The Chemist's Chance". We do this because we consider the topic a timely one, out of which the greatest good can be obtained by a thorough-going discussion. Brief comments are invited, and though we cannot promise in advance to devote the space that might be required to print in full all opinions received, we will do what we can to place before our readers the best that may be stimulated in the minds of chemists on what is to most of us a most interesting question.

WHEN the first World War got into its stride, America discovered that it had in its midst a professional class known as chemists. A hazy idea that such people existed had been in the popular mind before, but to the average man a chemist was just a bewhiskered old man holding a test tube against the light or carrying on distillations from medieval-looking retorts for no apparent reason. Now it developed that chemists made food products, aniline dyes, ammunition, and poison gases. Ignorance changed to curiosity, curiosity to respect. The day of awakening had come.

Soon after we entered the war, the relative value of men to the community at large became more closely defined. Obviously, our human society consisted of people who produced and people who talked. Talk would win no wars; what the country needed was production, more production, better production. The genius of the chemist was requisitioned for both quantity and quality of output, for innovations, for improvements. America at war could get along without salesmen, brokers, advertising men, even without lawyers; but it could not get along without chemists. The vital functions of the national body were thus quickly divided from the superstructure of nonessentials. Chemists were not permitted to go to the front, regardless of their wishes, because they were doing vital duty on the home front. The forgotten men suddenly found themselves marching at the head of the procession.

By the time the war ended America had learned the value of research chemistry. However, lasting gain came to chemistry rather than to chemists, for with the advent of peace the noncreative members of society quickly resumed their former position of prominence. The wide acclaim of what chemistry meant for progress had not redounded permanently to the benefit of the profession, certainly not to its financial benefit; had it done so, the AMERICAN CHEMICAL SOCIETY would not find it necessary to take a stand on unionism and to sponsor a census of remunerations paid to its members.

In my opinion the monetary rewards of professional men go hand in hand with the respect in which they are being held. The two factors are inextricably interwoven. If we are to raise the pecuniary standard of chemists, we must also raise their social standing. The highest paid chemists employed by state governments receive about one fourth of the salary paid to a chief justice. This ratio holds also for the Federal Government. It evidently represents the relative esteem with which the public regards the legal and the chemical professions. So long as this ratio prevails, efforts to better the status of chemists are not likely to be uniformly successful.

Big brains are attracted by big incomes; men of caliber will go where they find the best market for their talents. In achieving a higher financial status for chemists we are doing more than raise their income; we are also raising the living standing of the Nation. With all due respect to lawyers, no one but the contestants cares who wins the lawsuit of Jones *vs.* Smith; and if some legal star keeps murderers from the gallows, the community owes him no thanks. If clever advertising makes Black's pain killer sell better than White's, it is of interest only to Mr. Black and Mr. White. But if a chemist, in the ordinary course of duty and without altruistic thoughts in his mind, works out improvements and savings, or adds to our health, wealth, and comfort, he contributes something of value to the entire world. Hence, the desirability of attracting big brains to the study of chemistry rather than to the study of law or other noncreative occupations.

I believe that in any consideration for fair compensation, routine analytical chemists should be classed by themselves. Routine analytical work can be done by technicians; that many college graduates are doing it now proves only that employers are not so well informed as they should be and that chief chemists, perhaps prompted by an esprit de corps, are doing nothing to enlighten the front office The passing on of routine analytical work to skilled artisans is an inevitable economic development which the profession should face squarely and which should also be considered in the curricula. When I think of the number of hours I spent in the analytical laboratory during my student years, I could weep. The entire field of routine analysis should be left to technicians, much as the temperature of patients is taken by nurses and not by surgeons.

So far as routine analysts are concerned, I see no objection to an endeavor to establish minimum salaries by law. I do not think the plan will work, for if the supply of chemists continues to exceed the demand, as has happened frequently in the past, all artificial props will sooner or later give way. Even the strongest unions could not control wages during the depression, when there was not enough work to go around. That human laws are only on safe ground if they conform to economic laws is a truism which it might be well for us to heed.

Our principal efforts should be directed towards more equitable compensation for the main body of chemists, for research workers, industrial chemists, teachers, chemists in business for themselves. In line with the thought previously expressed, I would like to see a sensible regulation of the supply of chemical students; not through legal means, but through a campaign of education. Scarcely one chemical student in a hundred knows what he is letting himself in for when he enters college; nor does he know how to gather relevant information. Most prospective chemists are like men who, sight unseen, buy a farm in a distant part of the country without knowing what the farm will produce, and whether its products can be advantageously sold. The price students pay for this education is several of the best years of their lives. I have advocated before, and I advocate now, lectures to chemical classes on the business side of chemistry. These lectures should not be delivered by teachers, but by practicing chemists who had best be chosen by the students themselves. I would suggest straight-from-the-shoulder discourses by chemists of all types, old and young, successful and otherwise. After listening to the voice of experience, let the would-be chemists form their own opinions whether they want to go into chemistry or not.

With production again under the lash of urgent necessity, chemists will do wonders once more. They will improve products and find substitutes. This progress should now be dramatized and brought before the public, not in chemical journals but on the front page of newspapers. Let the AMERICAN CHEMICAL SOCIETY use its News Service as it never has used it before. A victory on the production front is headline news to every American. If this publicity is handled with skill, the interest in chemists and in what they do should carry through into peace times and help create a better understanding and a stronger demand for creative chemical services.

The financial status of the profession

in the immediate future need not cause anyone great worry. So long as the war lasts, chemists will be in demand and remunerations will run high. Now is the time, however, to raise their social status.

Lest anyone should doubt that we are still unknown soldiers, let him ask any of his friends how many chemists he knows; if he can name three, I shall be greatly astonished. Let him look over the lists of prominent men being polled by newspapers on questions of the day; how many chemists will he find? Who knows or cares to know who gave to the world aspirin, ethyl gas, or concrete? People talk glibly about insulin and sulfa-compounds, vitamins, and plastics, but they never inquire who the chemists are who originated these products, nor do I remember seeing their pictures in any advertising literature. If history repeats itself and chemists come again to the fore in this war, I hope the AMERICAN CHEMICAL SOCIETY will do its utmost, not only to emphasize chemical achievements, but also to publicize the names of the men behind them. Perhaps we shall yet see the day when schools, parks, or streets are named after chemists rather than after dead real estate speculators.

If we chemists wish to better our lot, we must dig down to the roots of whatever evils we are afflicted with. Unless we do so, we shall continue to harvest sour fruits. Above all, we should at last be recognized, socially and financially, as one of the highest rating professions in our present social order. If we slip up on our chance this time, we shall have no one to blame but ourselves. We may not be given another chance like this in our generation.

Magnesium from Dolomite by Ferrosilicon Reduction

D. H. Killeffer, Contributing Editor, 60 East 42nd St., New York, N. Y.

MOUNTING demands for magnesium for war purposes continue to emphasize interest in new processes for its production. Latest of these employs ferrosilicon to reduce calcined dolomite to free metallic magnesium which is then distilled from the reacting mass. Production of the light metal in the United States has so far been limited to the electrolysis of magnesium chloride obtained from natural brines and from sea water [NEWS EDITION, 19, 1189 (Nov. 10, 1941)] together with small amounts from the Hansgirg process based on the reduction of calcined magnesite with carbon [NEWS EDITION, 19, 839 (Aug. 10, 1941)].

A new ferrosilicon process has been developed by L. M. Pidgeon, of the Canadian National Research Council. Pidgeon found that the reaction between ferrosilicon and magnesium oxide proceeds smoothly at practicable temperatures under vacuum in the presence of calcium oxide. Metallic magnesium distills readily at the reaction temperature and condenses in extraordinary purity as a crystalline lining in a condenser tube connected with the reaction retort.

The process consists of briquetting ground ferrosilicon (75 per cent or higher silicon content is preferred) with dead burnt dolomite and heating these briquets in an alloy steel retort to about 1,150° C. The retort is constructed with an integral condenser tube into which a removable, tubular steel lining fits. The retort and condenser are evacuated to low pressure (a fraction of a millimeter), and as the reaction proceeds, pure metallic magnesium condenses in the lining of the condenser. At the end of the run—including time for evacuation, the cycle is about 6 hours—the condenser liner is removed with its accumulated magnesium. Differential contraction of the steel and magnesium breaks the two apart and the magnesium "pipe" is ready to go to the foundry without further purification or treatment. The retorts used resemble those of the zinc industry and can be heated in any convenient manner, using gas, coal, or electric heat.

The advantages claimed for this process are several. The process equipment is comparatively simple: cast alloy steel retorts which embody a minimum of machine finishing, furnaces for heating the retorts, and vacuum pumps to evacuate them. Dolomite is plentiful and easily calcined in standard lime-kiln equipment. Ferrosilicon is made in this country on a huge scale in standard electric furnace equipment from plentiful raw materials. The reaction proceeds smoothly without hazard. No evolution or handling of gases is involved, and when the retorts are opened, the magnesium is in solid massive form precluding the possibility of explosion or fire. Special emphasis is placed on the relatively low investment in plant required and on the speed with which units can be built in the present emergency. Furthermore, pilot plant operation to date has amply proved the process, and construction of production plants is already under way.

Several companies have become actively interested in putting this process to work. In Canada, Dominion Magnesium, Ltd., is operating a pilot-scale plant. This operation is in process of being enlarged to 10 tons per day. The process depends on the simple reaction between magnesium oxide and elementary silicon contained in ferrosilicon:

$$2MgO + Si = 2Mg + SiO_2$$

Subsequent reaction between the SiO_2 formed and the calcium oxide of the charge forms infusible dicalcium silicate that can be easily removed from the retort at the end of the run without slagging. No gas is evolved or involved in the process. Based on this reaction, each pound of silicon in the charge should theoretically produce 1.73 pounds of metallic magnesium. In terms of 75 per cent ferrosilicon, each pound of magnesium produced requires practically 1 pound of alloy

The simplicity of the operation depends further on the fact that a powerful reducing agent, ferrosilicon, is supplied to the process. This must be manufactured elsewhere, and although the raw materials required for it are plentiful, the energy needed is high and the demand for the product by the steel industry is great. Production of ferrosilicon of all grades in the United States in 1940 was 406,699 net tons. The average silicon content of this entire output was 28 per cent. Included in the total are alloys containing as little as 7 per cent and as much as 95 per cent elementary silicon. The lower grades were produced in blast furnaces, whose total output was 190,310 tons. Electric furnace operation supplied 219,141 tons of higher concentration alloys and 248 tons were produced as a by-product of electric furnace abrasives. Present rate of production is over 700,000 tons per annum.

Because of the need for ferrosilicon in war work, the present fixed price ceiling for the 75 per cent grade is $135 per net ton. On this basis and assuming that ferrosilicon of the required grade is available in sufficient quantity, the cost of magnesium by the Pidgeon process should be well below the present market price of 22.5 cents per pound.

When these facts are considered with the obvious advantages of the process and the further consideration that the operation can be carried out in relatively small and widely distributed units, the desirability of utilizing ferrosilicon as a reducing agent with dolomite in the expanded magnesium program at once becomes patent.



Furst Retires after Serving 49 Years

Edward W. Furst (*center*), general manager, Grasselli Chemicals Department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., will retire April 1 after 49 years of service. Mr. Furst was vice president and member of the Executive Committee and Board of Directors of the Grasselli company when it was acquired by du Pont in 1928. In 1936 he was elected president and shortly thereafter received appointment as department general manager upon the Grasselli Chemical Co.'s reorganization as a du Pont manufacturing unit. Emmet C. Thompson (*left*), present assistant general manager, will succeed to the general managership. Clark W. Davis (*right*), manager of the du Pont Military Explosives Division, is to become assistant general manager.

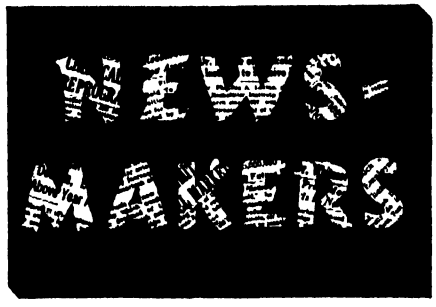
1942 Phillips Medalist Named

THE 25th annual award of the Francis C. Phillips Medal in Chemistry at the University of Pittsburgh was made to Hershel Markovitz on March 4 for highest honors in the course leading to the bachelor of science degree in chemistry.

Mr. Markovitz graduated from McKeesport Technical High School in 1938 with first honors and was awarded the Rensselaer Polytechnic Institute Medal and an honor scholarship for the University of Pittsburgh, which he entered in the fall of 1938. In his freshman year he was elected a member of Phi Eta Sigma, honorary men's freshman scholastic fraternity. At the end of the sophomore year he received the Phi Lambda Upsilon Prize in chemistry. At the end of the junior year he was granted a membership in the AMERICAN CHEMICAL SOCIETY for highest honors in the first three years of his course. He is also a member of Sigma Pi Sigma, honorary physics society; Phi Lambda Upsilon, honorary chemistry society; and Pi Tau Phi, honorary scholastic fraternity. He is president of the University of Pittsburgh Student Affiliate chapter of the AMERICAN CHEMICAL SOCIETY.

Mr. Markovitz has just been awarded a Charles A. Coffin Foundation Fellowship for study in Columbia University.

C. E. Watts, formerly research analyst with the Commercial Solvents Corp., Terre Haute, Ind., who is a reserve officer on active duty with the Ordnance Department, has been promoted to the rank of lieutenant colonel. Colonel Watts is chief of the Artillery Ammunition Branch, Inspection Section, Ammunition Division, Social Security Building,. Washington, D. C.



Elton R. Allison has been appointed to the chemical staff, Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C., in charge of matters pertaining to inorganic chemicals. He was formerly a member of the research staff, Lion Oil Refining Co., El Dorado, Ark.

Ralph W. Berger has resigned from the Delco-Remy Division of the General Motors Corp., Anderson, Ind., to become a research chemist in du Pont's Pioneering Research Section, Technical Division, Rayon Department, at Buffalo, N. Y.

Jerome L. Boyer has been appointed director of technical sales of Newport Industries, Inc., succeeding **E. V. Romaine.** Mr. Boyer has been on the technical staff of Newport Industries and associated companies since 1929.

B. T. Brooks has been appointed to assist **Morris L. Cooke** in the settlement of the dispute between the Mexican Government and American oil interests in Mexico. Mr. Cooke was appointed by President Roosevelt, and the President of Mexico has also appointed a representative to serve for the Mexican Government. The committee is meeting in Mexico City during March.

Claude F. Davis has been added as chief chemist to the staff of Schwarz Laboratories, Inc., 202 East 44th St., New York. Mr. Davis was recently associated with the Michigan Bakeries, Grand Rapids, Mich.

John A. Finley, formerly associated with the Carnegie-Illinois Steel Co., has been named a research engineer on the technical staff of the Battelle Memorial Institute, Columbus, Ohio, and has been assigned to research in metallurgy.

Harold A. Frediani has been transferred from the Development Laboratory of the Fisher Scientific Co. to its affiliated organization, Eimer and Amend, New York, N. Y., as chief chemist in charge of research, control, and production.

William B. Fulton, senior surgeon in the U. S. Public Health Service Reserve and a former director of the Bureau of Industrial Hygiene of the Pennsylvania Department of Health, has been appointed chief of the Health Division, U. S. Bureau of Mines. Dr. Fulton will direct the expanding activities in safeguarding the physical welfare of workers in the Nation's mineral industries.

Gordon L. Goerner, formerly on the staff of Defiance College, Defiance, Ohio, will take over new duties as instructor of chemistry at Michigan State College, East Lansing, Mich., on April 1.

Louis M. Heil, research associate in science at the University of Chicago, has been appointed to head the department of physics at Cooper Union, New York, N. Y., with the rank of full professor. Dr. Heil will succeed **Albert Ball,** who retires on June 30, after 37 years of service.

Francis B. Hillhouse, employed by the National Aniline and Chemical Co. since 1927, has been appointed to the Chemicals Staff of the Bureau of Foreign and Domestic Commerce. He will be associated with J. N. Taylor in the Organic Chemical Section and will serve under C. C. Concannon, chief of the Chemicals Staff and industrial consultant on chemicals.

Ernest E. Hubert, since 1935 research pathologist for the Western Pine Association, Portland, Ore., has been appointed to the research staff of I. F. Laucks, Inc., manufacturing chemists, Seattle. He assumed his new duties March 16 at the Seattle headquarters of the company where he will work in a new laboratory confined to problems of wood preservation and wood utilization. Dr. Hubert is chairman of the Pre-

servative Standards Committee of the National Door Manufacturers Association, and has been responsible for the development of basic testing methods for water-repellent solutions and the establishment of toxic standards for wood.

Nicholas L. Kalman, formerly with Arthur D. Little, Inc., joined the staff of Ridbo Laboratories, Inc., 113 East Centre St., Nutley, N. J., as director of organic research.

Paul Keller has been appointed to manage the sales of tool, stainless, and special steels for the Copperweld Steel Co., Warren, Ohio.

Lieutenant Allen R. Kittleson, a personnel officer with the Supply Battalion, Sixth Armored Division, formerly at Fort Knox, Ky., has been at Camp Chaffee, Ark., since March 15.

Mark F. Litteken has been appointed a junior engineer at the Aberdeen Proving Ground, Aberdeen, Md., to serve in the capacity of proof director.

George L. Parkhurst has recently resigned as Chairman and Councilor of the Chicago Section, AMERICAN CHEMICAL SOCIETY, because of his appointment to the Office of Petroleum Coordinator for National Defense. He is on leave of absence from his duties as senior attorney in the Patent and Development Department, Standard Oil Co. (Indiana). **Warren C. Johnson,** University of Chicago, has assumed the chairmanship of the section.

Bryant W. Pocock, formerly chemical research engineer for the Michigan State Highway Department, has accepted the position of chief chemist for the Nash-Kelvinator Corp., Propeller Division, Lansing, Mich.

John A. Riddick and **George E. Hines** of the Commercial Solvents Research Department recently reported for active duty with the Army.

Daniel B. C. Rivkin has been made professor of chemistry and pharmacy and appointed head of the School of Pharmacy, Southwestern Institute of Technology, Weatherford, Okla. The school will occupy the second floor of the new administration building, which is to be completed June 15.

Ludwig Rosenstein, formerly of the Shell Chemical Co., is now associated with the General Chemical Co.

John S. Rovey, formerly of Ingram & Bell, Ltd., Montreal, Canada, has become associated with Arthur S. LaPine & Co., Chicago, Ill.

Bernard Gary Silvers, B.S. 1941, Illinois Institute of Technology, has recently joined the Edwal Laboratories staff, Chicago, Ill.

Sol Smith has accepted a position as assistant chemical engineer with the Chemical Warfare Service and is located at Huntsville Arsenal, Huntsville, Ala. He formerly was district engineer with the Railroad Commission, Wichita Falls, Tex.

C. G. Storm, for many years chief of the Explosives Section, Ordnance Department, Washington, D. C., has been released by the War Department to become technical assistant to the vice president and general manager of National Fireworks, Inc., West Hanover, Mass. This company is now engaged in the manufacture of munitions on a large and imposing scale. It was deemed that Dr. Storm was needed more for this particular job than in the work in the Ordnance Department in which he has been engaged for many years.

Columbia Receives Grant from Swift

COLUMBIA UNIVERSITY has received from Swift & Co., Chicago, a grant to be used to carry on fundamental studies on protein enrichment of the dietary as related to phosphorus and riboflavin requirements. This work will be carried on by H. C. Sherman, A. W. Thomas, and M. L. Caldwell, all of the Department of Chemistry. Dr. Sherman is an authority in nutrition and has done considerable work on vitamins and minerals in nutrition. The proposed studies will involve determination of the effect in the diet of additional amounts of protein, phosphorus, and riboflavin, separately and together, on rates of growth, adult physique and vitality, and composition of body tissues.

Officers of Nutrition Foundation Chosen

GEORGE A. SLOAN, Commissioner of Commerce of New York City and former president of the Cotton Textile Institute, has been named president of the Nutrition Foundation, Inc., recently founded by a group of food industries to develop and apply the science of nutrition for the improvement of the diet and health of the American people. Charles G. King, of the University of Pittsburgh, has been made scientific director in charge of research. Karl T. Compton, president of the Massachusetts Institute of Technology, is chairman of the board of directors. Ole Salthe has been appointed executive secretary. Mr. Salthe resigned his position as consultant of the Food and Drug Administration to accept appointment with the foundation.

Sixteen food companies have subscribed $800,000 for the work of the new organization.

Texas Division of Monsanto

FORMATION of the Texas Division of the Monsanto Chemical Co. has been announced. The division will have under its jurisdiction a plant to be operated for the Ordnance Department of the United States Army, and a plant to be operated for the Rubber Reserve Co., a federal agency. Under war censorship, locations of the plants cannot be given.

Osborne Bezanson, Woburn, Mass., has been appointed general manager of the division with temporary headquarters in St. Louis.

David L. Eynon, Jr., of Boston, has been named resident manager of the Ordnance plant, and Ralph W. Booker, formerly in charge of construction at Trenton, Mich., has been appointed project manager in charge of construction of the Rubber Reserve plant.



David L. Eynon, Osborne Bezanson, and Ralph W. Booker

NECROLOGY

Thomas Warren Bollinger

THOMAS WARREN BOLLINGER, M.A., died July 31, 1941, after four and one-half months' illness of *Streptococcus viridans* infection, which went from throat to blood stream, causing endocarditis. He was 24 years old. He was educated at Swarthmore College, the University of Louisville, and Indiana University, doing his graduate work at the last named. He majored in mathematics and chemistry. He was first employed by DeVoe Raynolds, and later by Corhart Refractories Co., in Louisville, Ky., by the latter at time of his death, as a chemist.

Robert Bosch

ROBERT BOSCH, inventor of the Bosch magneto, died in Stuttgart on March 12, at the age of 81.

Dr. Bosch received his initial technical training in the United States, then went to England, where he was employed at the Siemens works at Woolwich. At the age of 25 he opened his own workshop in Stuttgart, and in 1901 developed the Bosch magneto and Bosch lamp, which were the foundation of his fame. His company came to have branches all over the world and before the outbreak of the present war employed 25,000 workers in his German plants.

Sir William Bragg

SIR WILLIAM HENRY BRAGG, corecipient with his son, William Lawrence Bragg, of the Nobel Prize in 1915 for work on x-rays and crystals, died March 12 in London at the age of 79.

Sir William was born July 2, 1862, at Wigton, Cumberland, England, and attended King Williams's College, Isle of Man, and Trinity College, Cambridge. He became professor of mathematics and physics at Adelaide, South Australia, in 1886, Cavendish professor at Leeds in 1909, and Quain professor of physics in the University of London in 1915. In 1920 he was created K. B. E. and was elected honorary fellow of Trinity College, Cambridge. In 1923 he was appointed Fullerian professor of chemistry at the Royal Institution and director of the Davy-Faraday research laboratory.

In 1915, the year in which he and his son received the Nobel Prize, he was also awarded the Barnard Medal by Columbia University. During the first World War he acted as adviser to the British admiralty, especially on submarine detection. During the present conflict he had served as chairman of a scientific food committee and was a member of the scientific advisory committee to bring to the attention of the British Government new developments in the field of science.

Sir William was the author of numerous scientific works, and was probably best known for his work in popularizing science. With his son he shared in the development of the x-ray spectrometer, which aided in elucidating the arrangements of atoms and crystals.

He had been president of the Physical Society of London and the British Association for the Advancement of Science. In 1930 an honorary membership in the New York Meteorological Society was presented to him.

Jesse Raymond Harrod

JESSE RAYMOND HARROD, professor and head of the Chemistry Department, Ohio Northern University, Ada, Ohio, died February 24, at the Lima (Ohio) Memorial Hospital. He was 56 years old.

Dr. Harrod was born in Allen County, Ohio. He received the B.S. degree from the Ohio Northern University in 1919, the M.S. degree in 1925 and the Ph.D. degree in 1933 both from the Ohio State University. He became a member of the Chemistry Faculty at the Ohio Northern University in 1921 and was promoted to chairman of the Chemistry Department and head of the Division of Science in 1930.

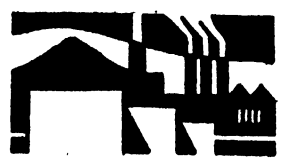
He was a member of the AMERICAN CHEMICAL SOCIETY for many years, of Sigma Xi, and the International Association of Torch Clubs. He was joint author of the "Outline of Organic Chemistry". Dr. Harrod was very active in community and university affairs. He was president of the Ohio Northern Choral Society for many years and took an active part in musical events.

Abraham B. Miller

ABRAHAM B. MILLER, naval stores development chemist with the Hercules Powder Co., died in Tuscaloosa, Ala., on February 19.

Mr. Miller, a graduate of Franklin and Marshall College in 1922, did graduate work at Columbia University and the University of Texas, and started work with the Armstrong Cork Co. Later he joined the staff of the Paraffine Companies, and in 1927 went to the Hercules Powder Co. At the time of his death he was employed at the experiment station in Hattiesburg, Ala.

He had been a member of the AMERICAN CHEMICAL SOCIETY since 1926.



Carl Pfanstiehl

CARL PFANSTIEHL, founder of the Pfanstiehl Chemical Co., died March 1 in Chicago at the age of 54.

Mr. Pfanstiehl was born in Columbia, Mo., September 17, 1888, and studied at the Armour Institute of Technology. While still in college he organized the Pfanstiehl Electrical Laboratory to manufacture gas engine ignition coils and x-ray apparatus on the basis of several patents. The company is now the Fansteel Metallurgical Corp. In 1918 he resigned to devote himself to research as head of the Special Chemical Co., of which the Pfanstiehl Radio Co. was a division. At the time of his death he was vice president and director of research of the Pfanstiehl Chemical Co. He had been granted about 130 patents on electrical, chemical, radio, and metallurgical inventions.

During the World War he did special research work for the War and Medical Departments of the Government, and in the present war had been conducting research for the Government at the Illinois Institute of Technology. He was the author of numerous scientific articles. In 1940 he received the Modern Pioneer Award of the National Manufacturers Association.

He was a member of the AMERICAN CHEMICAL SOCIETY, which he joined in 1914, Electrochemical Society, American Association for the Advancement of Science, American Physical Society, American Institute of Mining and Metallurgical Engineers, American Society for Metals, and an associate member of the Optical Society of America.

W. L. Scoville

W. L. SCOVILLE, head of the analytical department of Parke, Davis and Co., Detroit, until his retirement in 1934, died in Gainesville, Fla., March 10, at the age of 77. He was born in Bridgeport, Conn., where he began his pharmaceutical career in a drugstore. Later he entered the Massachusetts College of Pharmacy and received the degree of Ph.G. in 1889. He was professor of pharmacy at the same institution from 1891 to 1904. He was an analytical chemist in Boston from 1904 to 1907 when he went with Parke, Davis.

Dr. Scoville, was a member of the Revision Committee of the U. S. Pharmacopoeia from 1900 to 1940, and served as vice chairman of that committee in 1920–30. He was a member of the Committee of Revision of the National Formulary for the third, fourth, fifth, and sixth editions, being chairman of the fourth and fifth revisions.

Dr. Scoville was awarded many honors, including the honorary doctor of science degree from the Massachusetts College of Pharmacy in 1927, the honorary master

of pharmacy degree from the Philadelphia College of Pharmacy in 1929, the Ebert Prize in 1923, and the Remington Medal in 1929. He was an honorary member of the Pennsylvania Pharmaceutical Association and the Michigan Pharmaceutical Association. He had belonged to the AMERICAN CHEMICAL SOCIETY since 1905 and was also a member of the American Association for the Advancement of Science, and the American Pharmaceutical Association with which he was associated for more than 50 years. Dr. Scoville was the author of a widely used pharmaceutical textbook on the art of compounding.

Summer Variety in Pittsburgh

THE University of Pittsburgh will offer a variety of chemistry courses as to time required and credits offered. The purpose is to afford a speed-up and make chemists available for government service earlier than regular curricula permit. The plan includes:

Regular semester courses during the summer trimester of 16 weeks beginning June 5 in all branches of chemistry. The student may carry a full curriculum.

Twelve-week courses in elementary inorganic, organic, analytical, and physical chemistry beginning June 29. These cover an entire year's course in chemistry. Credit can be obtained for the full year or half credit during six weeks. The student may schedule one chemistry course and a nonchemistry course.

Eight-week courses in elementary inorganic and organic chemistry beginning June 29. These carry credit for a full-year course, and half credit may be obtained during four weeks. The student is limited to one course under this plan.

Kansas State College Offers Research Fellowships

THE Kansas State College is offering two research fellowships in chemical engineering for the fiscal year beginning July 1, 1942. The fellowships are for 12 months with one month's vacation, and carry a stipend of $750. Fellows must pay certain college fees amounting to about $75 for the year. Applications should be submitted before April 15 to W. L. Faith, Head, Department of Chemical Engineering, Kansas State College, Manhattan, Kans.

ESMDT Powder Metallurgy Course Offered

ANOTHER powder metallurgy course by W. J. Baăza under direction of Engineering, Science, and Defense Management Training will be given early in April at the College of the City of New York. The course will run for 10 weeks, two nights a week, probably Wednesday and Thursday, from 7:00 to 10:30 P. M. No tuition or other fees will be required of students. Early application should be made to the Director of ESMDT, College of the City of New York, 140th Street and Convent Avenue, New York.

Summer Courses at Michigan

MICHIGAN College of Mining and Technology, in line with a number of other colleges and universities, is announcing an expanded summer school program. More than 100 courses will be offered this summer designed to contribute to the victory effort. Virtually all departments will give work, and more than two thirds of the faculty members will be teaching. The session begins June 15 and ends September 4. Most courses run for twelve weeks, several for six, a few for other periods.

Prospective students are asked to write at once to the registrar of the Michigan College of Mining and Technology, Houghton. A formal bulletin will be published soon, giving details with regard to each course, fees, living facilities, and the Michigan Tech summer school faculty.

Penn State Turns to Harvard for Processing Plant Extracts

R. E. MARKER, Pennsylvania State College, collected some three tons of material on a recent trip to Mexico and Central America, returning it to State College for processing. The volume of material was such that large-scale methods of treatment were devised, as indicated by these illustrations. Remembering Dean Whitmore's background, it is not surprising to find a certain brand of garbage can employed, with two reflux condensers. The battery shows one quarter of the equipment required for the concentration of the plant extracts which had to be processed without loss of time.

Metallurgists Needed by Government

THE Civil Service Commission is seeking metallurgists for work in navy yards, arsenals, and other war agencies, in positions paying from $2000 to $5600 a year. Experience in metal-working industries with fabrication processes such as welding, die-casting, heat-treating, x-ray testing, and metallographic work is particularly desired.

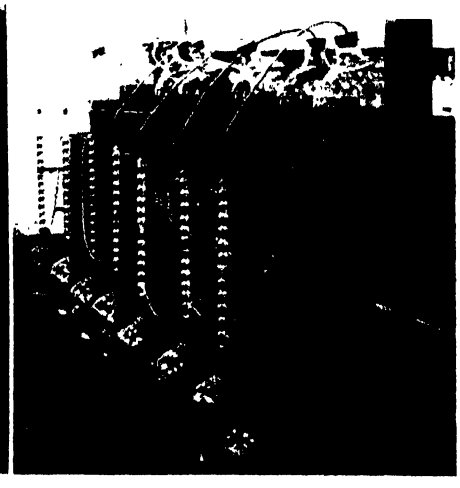
Applications will be accepted continuously until further notice. The necessary forms may be obtained from the Secretary, Board of United States Civil Service Examiners, at any first- or second-class post office, from Civil Service District Offices, or from the United States Civil Service Commission, Washington, D. C.

100 Per Cent Pure Nitrogen Gas Flows from Well in Eastern Wyoming

PURE nitrogen gas flows from a recently drilled well in an eastern Wyoming ranch, Harold Cook, consulting geologist of Agate, Nebr., reports in *Science*. This is believed to be the first nitrogen gas well ever struck. The well was being drilled for water, Mr. Cook says, when it began to yield gas at a considerable pressure at a depth of only 156 feet. A sample sent to the laboratory of the U. S. Geological Survey at Casper, Wyo., for analysis was found to be 100 per cent nitrogen by J. G. Crawford, chemist of the laboratory.

Since an apparently large supply of pure nitrogen, all ready to use, may have value in the present war emergency, the new-found well has been shut down to conserve the gas until the best possible uses are developed.





Left. **A special reflux extractor for plant products at R. E. Marker's laboratory at Pennsylvania State College.** ***Below.*** **One quarter of the battery of concentrators for the plant extracts.**

POTOMAC POSTSCRIPTS

Allocations and WPB Actions

Aluminum Pigment and Aluminum Paint have been placed under a complete allocation system by the Director of Industry Operations, WPB. Order M-1-g requires specific authorization for the manufacture, use, or sale of aluminum pigment and aluminum paint, except in retail distribution to the ultimate consumer. Form PD-312 is provided for applications for use of aluminum pigment or paint, and manufacturers and jobbers are required to report stocks on hand monthly on Form PD-313.

Chlorinated Solvents. Fabricators of metals have been warned by the Chemicals Branch to investigate every possible cleaning method other than chlorinated solvents. A shortage in chlorinated solvents already exists, caused by the vast increase in metal fabricating, and the situation will grow worse. Manufacturers with war contracts will be affected as well as others, the branch pointed out, and continued extension of the use of chlorinated solvents will not be possible.

At least 30 per cent of the cleaning operations in the metals industry now being done with chlorinated solvents can be accomplished by the use of other materials, such as mineral spirits, nonchlorinated solvent–water emulsions, and alkalies.

Chlorine. Drastic restrictions on the use of chlorine have been imposed in an amendment to Order M-19, effective April 1. The order prohibits the use of chlorine or products containing available chlorine in the bleaching of foodstuffs, bleaching of wiping rags and waste, and the manufacture of cosmetics and toilet preparations. The amounts used in bleaching of textiles, shellac processing, laundry operations, manufacture of home bleaching preparations, and sanitation of private swimming pools are curtailed. Pulp and paper manufacturers are subject to the same regulations of Order L-11 under which they have been operating.

Producers of chlorine are instructed to make deliveries only on specific authorization of the Director of Industry Operations, with the exception of chlorine for water and sewage treatment.

They are required to set aside from each month's production 5 per cent for delivery on specific instructions and enough additional to meet their regular water and sewage treatment demands. Supplies for water and sewage treatment can be obtained in the same manner as in normal times. All other requests for delivery must be scheduled monthly and submitted to WPB for action.

Gas Masks. Manufacture or sale of gas masks and antigas devices for protection against enemy attack has been banned, unless the masks and devices are actually on order by agencies of the Government, including the Office of Civilian Defense, and are built to Army Chemical Warfare Service specifications. Limitation Order L-57, issued after consultation with the Chemical Warfare Service and OCD, is designed to halt a fast-growing sale of unapproved gas masks to the civilian population and to affect the most complete standardization possible. The order also prohibits delivery or sale of any laminated cloth, laminated glass or plastic lenses, metal buckles or buttons, primary or activated charcoal, rubber, synthetic rubber, or webbing, for use in unapproved masks. Masks manufactured for fire-fighting, mining, industrial, scientific, and similar nonmilitary purposes are not affected.

Producers who have manufactured or sold any unapproved gas masks or devices since January 1, or who had in their possession or under their control more than 10 such masks or devices on March 3 are required to report to WPB on Form PD-328.

The formula for the Chemical Warfare approved mask is confidential, and cannot be distributed through the industry, nor could private manufacturers obtain the requisite amounts of activated charcoal. The Government controls the principal supply for military needs.

Laboratory Equipment and Reagent Chemicals. Preference Rating Order P-62, designed to facilitate acquisition of material for production of laboratory equipment and reagent chemicals, has been extended to June 30. The order was scheduled to expire March 31. According to WPB's Safety and Technical Equipment Branch, further amendments to the order will be announced shortly.

Nonmetal Containers. Preference Rating Order P-79, designed to encourage use of nonmetal containers, has been revised and extended until June 30. The revised form brings paper containers within the order and permits producers of nonmetal containers to apply the ratings to obtain materials which can then be transferred to packers for assembly of knocked-down or unassembled containers. The order continues to aid operations of the cooperage, wooden container, and paperboard container industries. All of the nonmetal containers groups covered by the order may also use the A-5 rating to obtain tools used up in production, such as saws, bits, drills, and knives.

A rating of A-5, as in the original order, is assigned to deliveries of ferrous material, defined as products made principally from iron or steel, except wire, to which a rating of A-7 is now applicable. Under terms of the original order, deliveries of wire had only an A-8 rating. Producers are restricted in the application of the ratings to those quantities and kinds of ferrous materials specifically authorized for rating by the Director of Industry Operations on Form PD-82.

Operating Supplies to which a preference rating may be applied under the terms of Preference Rating Order P-89, covering maintenance, repair, and operating supplies for the chemical industry, have been redefined by an amendment to the order.

Ratings under P-89 may be applied only by firms which are given specific authorization with a serial number. Up to the present time no company has received permission to operate under terms of the order because applications so far received indicate that the order as originally issued was too broad in its coverage.

As defined in the amended order, operating supplies means any material which is essential to the operation of the producer's plant including, but not limited to, lubricants, fuels, catalysts, and small perishable tools. Specifically excluded are materials physically or chemically incorporated into the producer's products, and material other than catalysts which enters into the chemical reaction necessary to the manufacture of the producer's products. Washes, solvents, extractions, etc., are also excluded.

Rhodium. Because rhodium, one of the platinum metals, is needed to coat reflectors in antiaircraft searchlights, the Director of Industry Operations, WPB, has decreed it must come off jewelry. Order M-95 provides that rhodium, used to impart a nontarnishable finish to such articles as compacts and cigaret cases, may not be used from now on for that purpose, but an accompanying letter from the Director of Industry Operations authorizes jewelers to use up present stocks. Stocks must not be replenished

Price Regulations

Copper Scrap. Harshaw Chemical Co. has been authorized by OPA to pay 11.25 cents per pound, f. o. b. shipping points, for such special purpose copper scrap as it requires, according to an announcement issued in conjunction with an order under Revised Price Schedule 20. This is the fourth permission granted to purchasers of special purpose copper scrap. The other three are Metals Refining Co., Sherwin-Williams Co., and Superior Copper Products Co.

Originally the companies were authorised to pay the premium price for monthly amounts of scrap not in excess of their average monthly purchases during the preceding 12 months. Since WPB now is allocating copper scrap, the new order permits the companies to purchase in any month at the premium price an amount not in excess of the allocation granted them by WPB.

Lithopone. Permission to fulfill certain contracts at higher than established maximum prices for lithopone is granted in amendment 1 to Price Schedule 80. The amendment affects only lithopone in the hands of exporters and dealers or in the hands of a carrier or warehouse (owned or controlled by others than the person from whom it was purchased) prior to February 2 to meet contracts made by such dealers and exporters prior to February 2, the effective date of the lithopone price schedule.

Mercurial Compounds. Producers of mercurial compounds used in pharmaceuticals, explosives, germicides, paints, insecticides, and other products, have been asked by Price Administrator Leon Henderson in telegrams to maintain for 60 days prices in effect on February 25. The request also covered distilled and redistilled mercury.

Titanium Pigments. Amendment 1 to Revised Price Schedule 98, effective March 1, permits the American Zirconium Corp., Baltimore, one of five major producers of titanium pigments, to charge 1.5 cents per pound above the maximum price until May 2. The company produces various grades of titanium dioxide from ilmenite obtained from India. To obtain a necessary supply, it must pay $31.50 per ton for this ore. The company is developing a domestic source of supply, however, and the amendment permits the additional charge only until the domestic supply is available.

WPB Issues Report on Scarcity of Materials

THE first of a periodic series of provisional reports on the relative scarcity of certain materials has been issued by the Conservation and Substitution Branch of the Bureau of Industrial Conservation, WPB. Since the status of the listed materials and others as well is constantly changing in relation to supply and demand, similar reports will be issued at regular intervals.

The first group is made up of materials that generally are critically essential for the prosecution of the war. For these materials civilian industry must largely find substitutions.

Materials listed in the second group are also necessary for war production and essential industrial activity, but the supply picture is not so tight. Necessary civilian industry may obtain limited supplies from this group to replace unavailable materials, when specific cases are considered sufficiently important.

The third group includes materials that are more available for substitutions, although in no case can the supply be considered unlimited, since other factors than the material itself may determine the amount available.

Group I

Metals

Alloy steel
Iron alloys
Alloy steel
Wrought iron
Aluminum
Aluminum scrap
Cadmium
Calcium-silicon
Chromium
Cobalt
Copper
Copper scrap
Iridium
Lead
Magnesium
Nickel
Tin
Tinplate and terneplate
Tungsten
Tungsten (high-speed tools)
Vanadium

Chemicals

Alcohol, methyl
Chlorinated hydrocarbon refrigerants
Chlorinated hydrocarbon solvents
Chlorine
Diphenylamine
Formaldehyde
Paraformaldehyde
Hexamethylenetetramine
Synthetic resins therefrom
Phenols
Polyvinyl chloride
Sodium nitrate (pure)
Toluene

Miscellaneous

Agar
Asbestos (long fiber)
Burlap and burlap products
Cashew nut shell oil
Corundum
Cotton linters
Graphite (Madagascar)
Hemp seed
Jewel bearings
Kapok
Manila fiber and cordage
Pig and hog bristles
Rubber, crude, and latex
Chlorinated
Synthetic
Shearlings
Silk
Silk waste
Silk noils
Garnetted
Reclaimed silk fiber
Sperm oil
Tin cans
Titanium pigments
Tung oil

Group II

Acetone
Ammonia (anhydrous)
Antimony
Arsenic
Barium carbonate
Beryllium - copper alloys
Borax
Calcium
Carbon tetrachloride
Camphor
Casein
Glascine
Kraft paper
Citric acid
Coconut oil
Cork
Cotton duck
Cryolite
Diamond (industrial)
Diamond dies
Flax
Fish liver oils
Glycerol
Hides and leather
Iodine
Jute and products
Linseed oil
Manganese
Mercury
Mica splittings
Molasses
Molybdenum
Natural gas
Natural resins
Nylon
Parchment paper
Palm oil
Phosphorus
Platinum
Potassium perchlorate
Potassium permanganate
Quarts crystals
Quinine
Rape seed oil
Rayon
Rhodium
Rubber (reclaimed)
Shellacs
Sisal
Steel, carbon
Scrap
Spirits, distilled
Sugar
Tanning materials
Teak
Tetraethyllead
Titanium pigment
Vitamin A products
Wool
Zinc (all grades)

Group III

Substitute Materials

Asbestos (common)
Asphalt
Brick and tile
Cement
Ceramics
Clay
Coal and coke
Concrete
Cotton
Feldspar
Glass
Gold
Iridium (plating)
Lignin
Limestone and marble
Lumber and millwork
Mineral wool
Paper (except items (under II)
Paperboard
Plywood
Salt
Silver
Slate
Sulfur
Wall board
Wood and products
Wood flour
Wood fibers
Wood pulp

Materials Available in Varying Amounts for Substitutions

Ammonia (aqueous)
Bismuth
Cellophane
Cottonseed oil
Gypsum and products
Hair (cow, horse)
Palladium
Petroleum products
Crude oil
Gasoline
Lubricating oil
Paraffin
Plastics (cellulose, acetate, butyrate)
Rosin
Ruthenium
Silicon and alloys
Soybeans and products
Protein
Oil
Turpentine
Uranium

War Materials Presently Available for Substitution in Critical Civilian Industry

Basic low-carbon steel
Bessemer steel
Gray cast iron
Malleable iron

Managing Directors of General Aniline Appointed

ROBERT E. McCONNELL, Robert E. Wilson, George Moffett, and A. E. Marshall have been selected by the Secretary of the Treasury as managing directors of General Aniline & Film Corp. Mr. McConnell will act as president of the corporation and chairman of the new four-man board. He is the chairman of the Engineers Defense Board, and consulting engineer to the War Production Board.

Robert E. Wilson, president of the Pan American Petroleum and Transport Co., was formerly petroleum consultant to OPM and is now both chairman of the Committee on Petroleum Economics of the Petroleum Industry War Council and consultant to the National Defense Research Committee. A. E. Marshall, president of the Rumford Chemical Works, Rumford, R. I., has been connected with the manufacture of chemicals for the past 30 years. George Moffett, chairman of the Board of Corn Products Refining Co.,

has for some time assisted the Reconstruction Finance Corporation.

General Aniline & Film Corp. has been under supervision of the Treasury Department for several months. On February 17 the department took title to 97 per cent of the stock which was registered in the name of foreign nationals. General Aniline had previously been under German domination.

Alien Property Custodian Appointed

CONTROL of alien property in the United States has been given by President Roosevelt to Leo T. Crowley, chairman of the Federal Deposit Insurance Corp. Mr. Crowley will set up an office within the Office for Emergency Management. He will serve without compensation and retain his post with FDIC. The executive order leaves nominal control of the freezing of foreign funds with the Treasury Department, which had immobilized some $7,000,000,000 of such assets. The Treasury, however, will release foreign properties to the custodian on his request and their frozen funds will go with them.

The Alien Property Division of the Department of Justice will soon be transferred to the Office of the Alien Property Custodian. The division has been administering alien property seized by the Federal Government during the last war. A total of $69,000,000 worth of such property, including a $55,000,000 German special deposit account in the Treasury, is still being administered. In announcing the coming transfer of the Alien Property Division, Attorney General Biddle also said that the Department of Justice will assist the new alien property custodian in setting up his organization and in selecting a legal staff. Investigative work for the alien property custodian will be conducted by the Federal Bureau of Investigation, and the Department of Justice itself will assist Mr. Crowley in an advisory capacity on legal matters.

Alien property in care of the custodian during World War I totaled $500,000,000. Today it is 14 times that figure.

Production, Shipments, Stocks of Manganese Ore Gain

DOMESTIC production of manganese ore containing 35 per cent or more manganese (natural) during January 1942 was 11,700 long tons, shipments were 11,700 tons, and producers' stocks at the end of the month were 1,400 tons, according to the U. S. Bureau of Mines. In December 1941 production was 10,100 long tons, shipments were 9,700 tons, and producers' stocks at the end of the month were 1,400 tons.

Shipments in 1941 totaled 76,000 long tons, an average of about 6,300 tons per month. The rate of shipments averaged 3,344 tons monthly in 1940, when the total amounted to 40,123 tons.

Patents

A LARGE number of applications are being examined each week by the Patent Office Defense Committee. This committee examines the applications for patents which have been selected by the patent examiners as being of interest in national defense. The examiners are guided in their selection by information furnished them by the committee as to general fields in which national defense may be involved. It is desirable that secrecy orders should be placed on certain applications for patents and this is done by the Commissioner of Patents.

Inventors or their attorneys may notify the Commissioner of Patents of potential defense value of an application. This information will be considered by the Patent Office Defense Committee and will cause such applications to be given prompt examination by the committee. Such information is of considerable value in certain chemical cases where the potential war uses of a chemical are not disclosed in the application.

Inventors are urged to use due precaution in disclosing material pertaining to applications for patents now in the Patent Office as secrecy orders may be placed upon the application at a later date. This applies to company publications, scientific publications, etc.

Process to Slow Rubber Aging Patented

NEWEST result in the efforts to prevent aging in rubber is a process patented by Joseph R. Ingram, Monsanto Chemical Co., Nitro, W. Va., in which a coal-tar derivative, indene, plays the principal part. Indene, in the form of compounds with formaldehyde and related chemicals, is claimed to be a superior antioxidant. Mr. Ingram has been granted two patents, 2,274,367 and 2,274,368, on his process and its products. Rights have been assigned to Monsanto.

Patent for Sulfapyridine Assigned

U. S. PATENT NO. 2,275,354 on sulfapyridine (2-sulfanilyl aminopyridine) was issued to Arthur J. Ewins and Montague A. Phillips, as assignors to May & Baker, Ltd., of London, England, on March 3, 1942.

The chemical researches of Doctors Ewins and Phillips, working in the laboratories of May & Baker, Ltd., at Dagenham, England, led to the discovery of the remarkable antipneumococcic properties of 2-sulfanilyl aminopyridine, announced by Whitby in the May 28, 1938, issue of the *Lancet*. (For the sake of brevity, Whitby referred to the drug by its serial number, "M. & B. 693". Later it was officially designated as sulfapyridine.)

May & Baker were the first to make the now famous drug available to physicians in England, in 1938, and in the same year Merck & Co., Inc., Rahway, N. J., was licensed by the originators to manufacture and market the drug in the United States. During the succeeding period of clinical investigation, Merck & Co., Inc., was privileged to contribute sufficient quantities of sulfapyridine to clinicians throughout the United States to enable them to treat nearly 20,000 cases of pneumonia.

Drug Substitutes Authorized to Fill Gaps in Imports

FIRST substitution of a domestic medicinal drug for one imported before the war has been authorized by the National Formulary and the U. S. Pharmacopoeia. The National Formulary authorized substitution of extract of stramonium for extract of belladonna in compound pills of cascara. The chief source of supply of belladonna was Belgium. Other alterations in drug preparations by the Formulary have so far been of a non-medicinal character. Permission is given to omit rose water, once imported from France, from cold cream. Use of distilled water in cold cream instead of rose water and persic oil, made from peach and almond kernels, in place of almond oil, is also permissible.

As a result of the shortage of oil of lavender, the U. S. Pharmacopoeia has authorized its omission in aromatic spirit of ammonia and substitution of oil of cedar leaf for oil of lavender in tincture of green soap. Because of scarcity of Mediterranean squill, an expectorant used in cough medicine, the Pharmacopoeia has recognized a variety of this drug which can be imported from India, *Unginea indica Kunth.*

Ergot, which comes from Russia and Spain, may be imported under less rigid packaging requirements, provided it is dried, assayed, and repackaged immediately after entry. Amaranth, a red coloring derived from coal tar, may be substituted for tincture of cudbear, standard red coloring once imported from Holland. Benzaldehyde is authorized by the Formulary as a substitute for oil of bitter almond as a flavoring agent in official preparations.

SODIUM sulfate production in Canada jumped from 1940's figure of 94,260 tons, valued at $829,589, to 124,762 tons, worth $924,000, last year, according to preliminary Canadian figures.

THE Cape Province of the Union of South Africa is the principal user of guano as fertilizer. Of a total distribution in all provinces of 52,846 bags, 49,813 bags were distributed there.

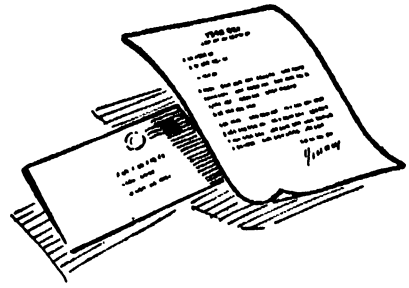
Welcome!



Memphis, Tenn., April 20-23, 1942

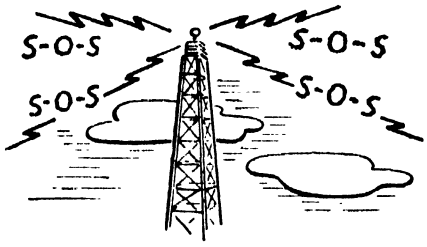
Now the SUBSTITUTE promises to OUT-PERFORM the material it replaced!

The first in a series of actual cases from the files of Monsanto's Technical Service Department which show how skill, experience and ingenuity can solve many of industry's critical wartime problems. For obvious reasons names and any clue which would identify the principals in the case have been omitted.



1. X, a Monsanto customer of long standing, opened his morning mail recently to find his continued business life suddenly threatened.

A certain chemical essential to his manufacturing process had fallen victim to priorities, was no longer available to him. Worse, he had only a slender supply on hand.



2. Now, X might have wired his Congressman or taken the next plane for Washington—but he didn't. And it wouldn't have helped if he had.

Instead, he sent an S. O. S. to Monsanto for technical service—and before his slender supply was exhausted, a new chemical had been found, tested, and put to work in his plant, ***where it fully equalled the old material and now gives promise of doing an even better job!***



3. Obviously not every problem handed to Monsanto Technical Service is so quickly solved—nor so happily. But the very breadth and variety of Monsanto's chemical manufacturing experience often gives its technical men a headstart toward a solution and with so many basic chemicals being drafted for the vital war program—technical service from your supplier often becomes as important as quality and uniformity in the chemicals he supplies!

A WORD ON QUALITY AND UNIFORMITY

Whatever troubles today's shortages may cause and however much they may wreck delivery schedules, there are two essentials you must be *sure* of getting in *every* shipment of chemicals that enters your plant—*quality and uniformity!*

That's why *every* batch of *every* Monsanto chemical is carefully controlled at *every* step in its manufacture . . . and *every* batch is *double-checked* in the control laboratory before it leaves Monsanto's plant for yours. MONSANTO CHEMICAL COMPANY, St. Louis, U. S. A.

MONSANTO CHEMICALS
SERVING INDUSTRY...WHICH SERVES MANKIND



"E" for Excellence . . . the pennant denoting the highest service accomplishments in the United States Navy . . . flies with the Naval Ordnance flag over Monsanto. In the words of the Secretary of the Navy, this award has been made to Monsanto "in recognition of your outstanding efforts in the production of ordnance materiel vital to our national defense."

Program of the Memphis Meeting of the American Chemical Society

April 20 to 23, 1942

General Program

Sunday, April 19

2:00 to 9:00 P. M.—Registration, East Corridor, Municipal Auditorium, Main Street and Poplar Avenue.
8:30 to 10:30 P. M.—Social gathering with refreshments, Georgian Room, Hotel Peabody.

Monday, April 20

8:00 A. M. to 6:00 P. M.—Registration.
9:30 A. M.—Council meeting, Ballroom, Mezzanine Floor, Hotel Peabody (closed meeting, Councilors only).
2:00 P. M.—General meeting, South Hall, Municipal Auditorium.

The Honorable Walter Chandler, Mayor of Memphis, **Address of Welcome.**
Presentation of diplomas certifying 50 years of continuous AMERICAN CHEMICAL SOCIETY membership to: Leo H. Baekeland, G. E. Barton, Walker Bowman, Harold H. Fries, Walter Mills Saunders, Albert L. Smith, Alfred Springer, C. P. Van Gundy, Homer Jay Wheeler, and Fred G. Zinsser.
Presentation of the **Borden Award in the Chemistry of Milk** to **George E. Holm.** (Award address before the Division of Agricultural and Food Chemistry, Section B, Thursday, 2:15 P. M., Room K, Municipal Auditorium, see page 392.)
Presentation of the **Eli Lilly and Company Award in Biological Chemistry** to **Earl Allison Evans, Jr.** (Award address before the Division of Biological Chemistry, Wednesday, 11:10 A. M., Room K, Municipal Auditorium, see page 394.)
Henry G. Knight, U. S. Bureau of Agricultural Chemistry and Engineering, **"Cotton—Yesterday, Today, and Tomorrow".**
A. Gibson, Colonel, Chemical Warfare Service, Inspector, Office of Civilian Defense, **"The Chemist's Place in Civilian Defense".**
Lawrence W. Bass, Mellon Institute of Industrial Research, Chairman, A. C. S. Committee on Economic Status, **Report of the Committee.**
Motion Picture, "Fighting the Fire Bomb", Office of Civilian Defense Training Film.

6:30 P. M.—Group dinners.
8:15 P. M.—Vanderbilt University A Cappella Choir. Goodwin Institute Auditorium, Madison Avenue and Third Street. Admission by ticket (no charge) which must be obtained at registration headquarters.
9:30 P. M.—Smoker, Ballroom and Louis XVI Room, Hotel Peabody. Admission by badge.

Tuesday, April 21

7:30 A. M.—Group breakfasts.
8:00 A. M. to 6:00 P. M.—Registration.
9:00 A. M.—Divisional meetings.
9:00 A. M.—Plant trips.
12:15 P. M.—Group luncheons.
2:00 P. M.—Divisional meetings.
2:00 P. M.—Plant trips.
6:30 P. M.—Group dinner.
7:00 P. M.—Pit Barbecue and Southern Melodies, North Hall, Municipal Auditorium. Admission by ticket (no charge) which must be obtained at registration headquarters before noon Tuesday.



The Port of Memphis and Riverside Drive

Wednesday, April 22

7:30 A. M.—Group breakfasts.
8:00 A. M. to 6:00 P. M.—Registration.
9:00 A. M.—Divisional meetings.
9:00 A. M.—Plant trips.
9:00 A. M. to 4:00 P. M.—Holly Springs Pilgrimage (see page 388).
12:15 P. M.—Group luncheons.
2:00 P. M.—Divisional meetings.
2:00 P. M.—Plant trips.
5:00 P. M.—Social hours.
7:15 P. M.—Social period (refreshments) for dinner attendants, Louis XVI Room, Hotel Peabody.
7:45 P. M.—Subscription dinner, Ballroom, Hotel Peabody. Tickets, $3.00 each, must be secured at registration headquarters before 4:00 P. M. Limit, 600.
10:00 P. M.—Dance, Ballroom, Hotel Peabody. Admission by badge.

Thursday, April 23

7:30 A. M.—Group breakfasts.
8:00 A. M. to 6:00 P. M.—Registration.
9:00 A. M.—Divisional meetings.
9:00 A. M.—Plant trips.
12:15 P. M.—Group luncheons.
1:30 P. M.—Golf tournament (see page 386).
2:00 P. M.—Divisional meetings.
2:00 P. M.—Plant trips.
6:30 P. M.—Group dinner.

Local Committee Chairmen

Office, Municipal Auditorium, North Mezzanine

HONORARY CHAIRMAN. Victor A. Coulter.
GENERAL CHAIRMAN. William F. Bowld.
VICE CHAIRMAN AND TREASURER. E. R. Barrow.
  ASSISTANT TREASURER. G. L. Weaver.
  PRINTING AND SIGNS. T. L. Rettger.
  PUBLICITY AND PRESS. R. F. Gould.
  REGISTRATION. J. N. Pless.
VICE CHAIRMAN. P. D. Bowers.
  INFORMATION. J. M. Hart, Jr.
  LADIES ENTERTAINMENT. G. N. Ferguson and Mrs. K. H. Hicks.
  STUDENT CHEMISTS. G. H. Hayden.
  WOMEN CHEMISTS. Mrs. K. H. Hicks.
VICE CHAIRMAN. T. P. Nash, Jr.
  ENTERTAINMENT. E. E. Hembree.
  GOLF. J. R. Meadow.
  GROUP MEALS. E. F. Williams.
VICE CHAIRMAN. L. N. Rogers.
  ACCOMMODATIONS. E. R. Stevens[1].
  MEETING ROOMS. J. D. Atkinson, Jr., 849 Biggs St., Memphis.
  TRANSPORTATION AND TRIPS. C. B. Weiss.

[1] Request hotel reservations on form printed on page 390.

Announcements

All events are on Central War Time.

Locations of Meetings. Registration and most divisional meetings will be held in the Municipal Auditorium, Main Street at Poplar Avenue. A few sessions are scheduled for the Pepper Memorial Sunday School Building of the First Methodist Church, Second Street between Poplar and Exchange Avenues. The Tuesday afternoon program on the Effect of National Emergency on Research Administration will be held in the Hotel Peabody.

Registration and Registration Fee. The registration headquarters of the meeting will open at 2:00 P. M. Sunday in the Main Street (east) corridor of the Municipal Auditorium, and will continue there throughout the meeting. Registrants are requested to *use the Poplar Avenue entrance.* The registration fee, required by vote of the Council to help carry local expenses, has been fixed at $3.00 for members and visitors other than American nonmember chemists and chemical engineers; $8.00 for American nonmember chemists and chemical engineers. Associate members of divisions or of local sections are not members of the AMERICAN CHEMICAL SOCIETY and, if chemists or chemical engineers, are subject to the $8.00 fee. Chemical students, both graduate and undergraduate, are given the courtesy of registration on exactly the same basis as members of the SOCIETY. All members and guests must register to help carry the expense of the meeting.

Badges. It is important that official badges be worn at all times, as admission to all divisional meetings and to certain of the events on the entertainment program is by badge only.

Mail. Mail and telegrams should be sent to the hotel where stopping. Communications addressed in care of the AMERICAN CHEMICAL SOCIETY cannot be delivered to the individual but will be held at the A. C. S. Information Booth in the Municipal Auditorium. The SOCIETY accepts no responsibility for delivery of mail. After each national meeting, some mail and telegrams remain undelivered. Therefore, as a matter of precaution, convention attendants should inquire for mail at the A. C. S. Information Booth, regardless of their local address.

Transportation. Street cars, electric coaches, and busses link all official hotels and the Municipal Auditorium. Exact information regarding transportation to and from the loop district can be obtained from maps of downtown Memphis, available at the Information Booth in the Municipal Auditorium. Fare on street cars and busses is 7 cents to any point in the city. Taxi fare is 35 cents for the first 3 miles, 10 cents for each additional 0.5 mile. As many as five may ride in a taxi for the price of one.

Parking. Most of the hotels maintain parking lots for guests. Open-air lots charge from 15 to 25 cents for all-day parking; garage charges average 25 cents for all day and 50 cents for day and night parking. Parking on the streets in the downtown area is regulated by meters which operate from 8:00 A. M. to 6:00 P. M., with a charge of 5 cents for one hour. Do not insert more than one coin in the meter, as only one hour's parking time will be obtained. Additional coins must be deposited each hour. Meters are located from Washington to Beale Avenues on Front, Main, Second, and Third Streets; to Fourth Street going east on Court, Madison, Monroe, and Union Avenues; and to the foot of the levee going west on Court, Union, Monroe, and Jefferson Avenues. Park only in marked spaces. East of Third Street, except Madison Avenue, and west of Front Street, meters permit parking at a charge of 5 cents for two hours. At the Auditorium parking lot, southwest of the Municipal Auditorium, meters provide four-hour parking at a charge of 5 cents.

Information. An information booth will be maintained in the lobby of the Municipal Auditorium.

Tickets. Tickets for all events should be secured as far in advance as possible in order to permit the committee to make the proper arrangements.

Press. The AMERICAN CHEMICAL SOCIETY News Service will maintain press headquarters on the Mezzanine Floor of Hotel Peabody, Room 215.

Offices. North Mezzanine, Municipal Auditorium. AMERICAN CHEMICAL SOCIETY, National Secretary, Room G; *Industrial and Engineering Chemistry*, Room G; Local Committee, Room H.

Ladies Headquarters. Hotel Peabody, Mezzanine Floor, Room 200.

Women Chemists. Headquarters for women chemists will be maintained in the north end of West Hall, Municipal Auditorium. Women chemists from Memphis will be in attendance each day throughout the meeting from 9:00 A. M. to 5:00 P. M. to welcome visitors and register them for the files of the Women's Service Committee. A courtesy desk will be maintained to provide information and to make contacts desired by women chemists. A breakfast for members of Iota Sigma Pi will be held in the Blue Room of the Hotel Claridge at 7:30 A. M. Tuesday, April 21; tickets, $0.85 each. A luncheon for women chemists will be held in Room 209, Hotel Peabody at 12:15 P. M. on Tuesday, April 21; tickets, $1.25 each. Kathryn H. Hicks, Chairman, Women Chemists Committee, Memphis meeting, will be toastmistress. A Round Table from 4:30 to dinner time will be held on Tuesday, April 21, in the women chemists headquarters, West Hall, Municipal Auditorium. Tea will be served. Women chemists are invited to attend any or all of the events scheduled on the Ladies Program (see page 386).

Group of Divisional Officers. This group will meet for breakfast Thursday at 7:30 A. M. in Room 209, Hotel Peabody. Tickets, 85 cents, must be procured before 6:00 P. M. Wednesday. Charles R. Hoover, Chairman; Howard I. Cramer, Secretary.

Group of Local Section Officers. This group will meet for breakfast Tuesday at 7:30 A. M. in Room 209, Hotel Peabody. Tickets, 85 cents, must be procured before 6:00 P. M. Monday. F. O. Rice, Chairman; Auburn A. Ross, Secretary.

Abstracts. The A. C. S. News Service, 1155 Sixteenth St., N. W., Washington, D. C., can supply a limited number of sets of abstracts of papers presented at the Memphis meeting at 50 cents per set to those submitting receipt for divisional dues; $1.00, to others who remit with order; $1.25, to those who fail to send cash with order; and $1.50, to those requiring bills to be rendered. The abstracts will be as furnished by the authors and will be mailed as soon as possible. Copies will also be on sale at Memphis.

Equipment for Meeting Rooms. Divisional meeting rooms will be equipped with a standard lantern-slide projector, screen, pointer, blackboard, chalk, reading stand, reading light, table, and ice water. Each divisional secretary should contact his local assistant and inspect the assigned meeting room before the first session of the division. Please direct all correspondence concerning

CONTINUED ON PAGE 382

TWO SUPER REFRACTORIES THAT OPERATE SAFELY AT 3200° AND 4000° F

TAM Zircon (Zirconium Silicate) refractories operate safely at temperatures over 3200° F. while TAM Zirconium Oxide refractories are used in applications over 4000° F.

These two TAM super refractories resist acids and oxidizing atmospheres. They are being successfully used in the manufacture of phosphates, fused silica, aluminum melting and platinum smelting. They are also widely used as crucible backing and for various high temperature applications.

An experienced staff of field engineers located in various parts of the country are available for consultations without obligation. Write:

TAM PRODUCTS INCLUDE

Zircon bricks, special shapes and crucibles . . . Zircon insulating refractories . . . Zircon ramming mixes, cements and grog . . . Zircon milled and granular . . . Electrically Fused Zirconium Oxide Refractories . . . Electrically Zirconium Oxide cements and ramming mixes . . . Electrically Fused Zirconium Oxide in various mesh sizes.

T A M ZIRCONIUM TITANIUM PRODUCTS

TITANIUM
ALLOY MANUFACTURING COMPANY

meeting rooms to J. D. Atkinson, Jr., 849 Biggs St., Memphis, Tenn.

Society Regulations Governing Registration

BYLAW 2 (*a*) Attendance at meetings of the SOCIETY is limited to registered persons

(*b*) All persons in registering at meetings of the SOCIETY shall state whether or not they are members of the SOCIETY and, if not, whether they are chemists or chemical engineers.

(*c*) American chemists or chemical engineers, nonmembers of the SOCIETY, attending meetings of the SOCIETY, shall assist in the support of the facilities which they enjoy by paying a higher registration fee than members This differential at general meetings shall be $5 00 higher than the fee charged members; while at regional and divisional meetings it shall be at least twice the regular fee adopted They shall be furnished with a special nonmember badge to differentiate them from members of the SOCIETY and from foreign and nonchemist guests. The differential charged shall not apply to regularly matriculated students majoring in chemistry or chemical engineering at any college or university.

(*d*) Meetings are normally open to all registrants, but any session may be closed to nonmembers of the SOCIETY by order of the President.

NOTE. Corporation members have the right to designate *one representative only* with membership privileges at each meeting. If a *corporation member* sends a substitute for the delegate of record, the Secretary's office should be informed by mail. In registering, such a representative should sign the corporation name, per his own as representative

Associate members of local sections and of divisions are not members of the Society and have no Society privileges All nonchemist visitors, including children, regardless of age, who participate in any trips, lunches, or other activities provided on either the men's or ladies program, regardless of whether they are free or paid events, must pay the visitors' registration fee, $3.00, and wear the appropriate badge.

Society Regulations Governing Papers

BYLAW 3. (*a*) Papers by American chemists or chemical engineers not members of the SOCIETY shall not appear on the programs of general, divisional, or regional meetings of the SOCIETY unless they be joint papers with SOCIETY members.

(*b*) All papers presented before general, divisional, regional, group, local section, or other meetings are the property of the SOCIETY, to be published in the journals of the SOCIETY or released by the appropriate editor if not retained for such publication.

NOTE. The editors will give prompt decisions when papers are sent to them with request for release. The editors concerned are A. B. Lamb, H. E. Howe, S C. Lind, N. W. Rakestraw, and W. Albert Noyes, Jr.

(*c*) The SOCIETY is not responsible for statements and opinions advanced by individuals in papers or discussions before its meetings.

(*d*) Any paper, although announced in the final program, may be excluded at any time prior to delivery by order of the President.

The Board of Directors has voted the following regulations (R-55) governing papers to be presented before general, divisional, regional, or group meetings, supplementing Bylaw 3:

(*a*) Authorship of papers shall be accredited only to individuals and not to companies or laboratories.

(*b*) No paper may be presented which has been offered for publication elsewhere.

(*c*) No paper, no matter how important, may be presented, the title of which does not appear on the final program.

(*d*) If a paper is declined by any division of the SOCIETY, the secretary of that division is instructed to notify the secretary of any other division to which it is likely to be offered.

Hotels

Hotel Peabody, Union Avenue between Second and Third Streets, has been designated as headquarters for the meeting.

Requests for reservations should be sent at once to the A. C. S. Hotel Committee, Memphis Chamber of Commerce, Hotel Peabody, Memphis, Tenn. Please fill out the hotel reservation request form on page 390, giving all the data requested.

Because of the present large demand for hotel rooms in Memphis, it is imperative that reservations be made at the earliest possible date. For the same reason, double occupancy of rooms is desirable. Since defense activities are making a heavy call on Memphis hotels, the convenience of a single room should be sacrificed as a patriotic contribution. It is in this spirit that the Hotel Committee asks that: (1) hotel reservations be made early, giving the dates of arrival and departure, and (2) members arrange to share double rooms. See page 406 for map of downtown Memphis.

Rooms for students, dormitory style, will be available at $0.75 and up per day

Official Hotels

HOTEL	RATES		
	For One Person[a]	For Two Persons	Suites
Peabody	$3.00 to 6 00	$4 00 to 10 00	$14 00 to 25 00
Claridge	3 00 to 5 00	4 00 to 8 00	.....
Ambassador	2 25 to 3 00	2 25 to 3 00	.....
Blackstone	1 50 to 2 50	2 50 to 4 00	
Chisca	1 50 to 4 50	3 50 to 5 00	7 00
DeVoy	2 00 to 5 00	3 50 to 5 00	...
Gayoso	2 50 to 5 00	3 50 to 6 00	.
Wm Len	2 50 to 3 50	3 50 to 4 00	6 50

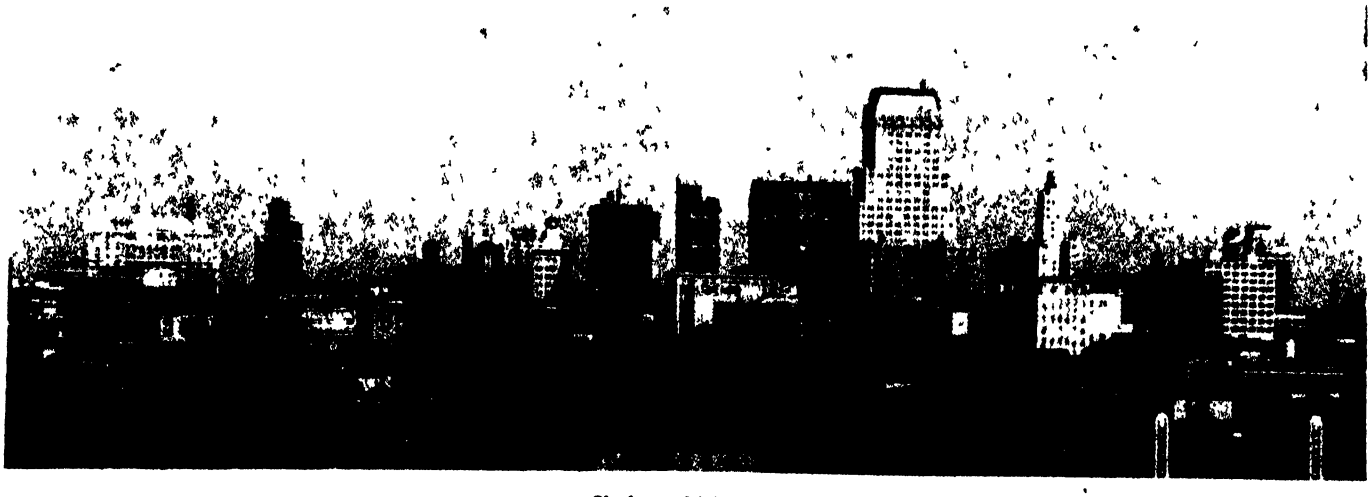
[a] Limited in number. Double occupancy is desirable.

Group Meals

Quoted prices include tips; any solicitation made at the tables should be refused. The deadlines for the purchase of tickets at registration headquarters in the Municipal Auditorium are as follows: Breakfasts, 6:00 P. M. of the preceding day; luncheons, 9.30 A. M.; dinners and social hours, 2:00 P. M. Meals will be ordered on the basis of sales before these times. In order to cover the cost of rearrangements, *a service charge of 15 cents will be added to the stated price for each meal if the ticket is not purchased before the deadline.* No refunds will be made on tickets after the deadline

The hotels reserve the right to transfer to special tables in their regular dining rooms any group meals for which fewer than 15 tickets have been sold at the deadline hour.

CONTINUED ON PAGE 384



Skyline of Memphis

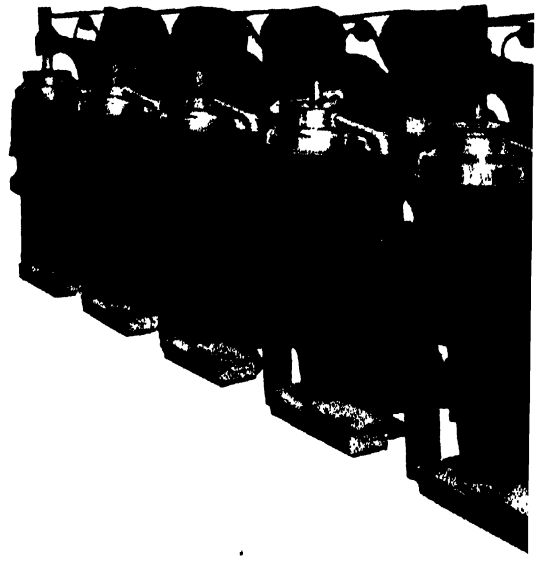


FIRST COUSIN

America needs guns and she needs all the available material to make those guns.

Above is illustrated a batch process involving thousands of pounds of iron and steel, housed by more structural material . . . all required where gravity settling is the procedure. Can this be justified today when continuous production can be rendered by the use of a few hundred pounds of material scientifically combined to form a centrifugal . . . when you can reduce process inventories to the amount of material which fills the pipe line to and from the machine . . . when you can make a better end product centrifugally in a fraction of the time?

Sharples Super-Centrifugal Force makes the above practicable and releases those valuable defense materials for other uses.



THE SHARPLES CORPORATIO

Organization	Place	Price
Monday		
Dinners, 6:30 P. M.		
A. A. A. S., Gibson Island Conference Policy Committee	Peabody, Room 212	$1.95
Alpha Chi Sigma	Gayoso, West Parlor	1.65
Division of Physical and Inorganic Chemistry	Gayoso, Ballroom	1.65
Kansas State College	DeVoy, Room A-B	1.40
Tuesday		
Breakfasts, 7:30 A. M.		
Indiana University	Gayoso, Room C	0.85
Iota Sigma Pi	Claridge, Blue Room	0.85
Local Section Officers	Peabody, Room 209	0.85
University of Arkansas	Peabody, Room 212	0.85
Luncheons, 12:15 P. M.		
Alabama Section, Alabama Polytechnic Institute, University of Alabama	Peabody, Room 212	1.15
Catholic University	Chisca, Parlor A	1.15
Central College	Peabody, Room 306	1.15
Division of Industrial and Engineering Chemistry	Claridge, Airdrome Room	1.15
Massachusetts Institute of Technology	Peabody, Georgian Room	1.15
Pennsylvania State College	Peabody, Room 213	1.15
Polytechnic Institute of Brooklyn	Claridge, Green Room	1.15
Princeton University	Peabody, Louis XVI Room	1.15
Purdue University	DeVoy, Room A-B	1.15
University of Chicago	Claridge, Balinese Room	1.15
University of Iowa	Claridge, Bamboo Room	1.15
University of Kansas	Claridge, Blue Room	1.15
University of Tennessee	Peabody, Pompeiian Room	1.15
University of Wisconsin	Claridge, Rose Room	1.15
Western Reserve University	Gayoso, East Parlor	1.15
Women Chemists	Peabody, Room 209	1.25
Dinner, 6:30 P. M.		
Division of Paint, Varnish, and Plastics Chemistry	Gayoso, Forrest Room	2.25
Wednesday		
Breakfasts, 7:30 A. M.		
Duke University	Peabody, Pompeiian Room	0.85
Gamma Sigma Epsilon	Peabody, Room 212	0.85
Missouri School of Mines	Peabody, Room 306	0.85
Phi Lambda Upsilon	Claridge, Rose Room	0.85
Students[a]	Chisca, East Lounge	0.50
Syracuse University	Peabody, Room 213	0.85
Luncheons, 12:15 P. M.		
Alpha Chi Sigma Professional Conference	Gayoso, Ballroom	1.15
Columbia University	Peabody, Georgian Room	1.15
Division of Chemical Education	Claridge, Balinese Room	1.15
Division of Medicinal Chemistry	Claridge, Airdrome Room	1.15
Friends of Hooker Scientific Library	Peabody, Room 306	1.15
Harvard University	Gayoso, East Parlor	1.15
Iowa State College	Gayoso, West Parlor	1.15
Johns Hopkins University	Claridge, Rose Room	1.15
Ohio State University	Peabody, Room 210	1.15
Oklahoma A. and M. College	DeVoy, Room A-B	1.15
University of Cincinnati	Gayoso, Room C	1.15
University of Michigan	Claridge, Bamboo Room	1.15
University of Minnesota	Peabody, Room 212	1.15
University of Pennsylvania	Peabody, Pompeiian Room	1.15
University of Pittsburgh	Claridge, Blue Room	1.15
Social Hours, 5:00 P. M.		
Cornell University	Peabody, Room 209	0.45[b]
Yale University	Peabody, Louis XVI Room	0.45[b]
Thursday		
Breakfasts, 7:30 A. M.		
Divisional Officers	Peabody, Room 209	0.85
University of Florida	Chisca, Parlor A	0.85
Luncheons, 12:15 P. M.		
A. and M. College of Texas	Claridge, Green Room	1.15
California Universities	Peabody, Room 209	1.15
Division of Agricultural and Food Chemistry	Peabody, Room 210	1.15
Division of Analytical and Micro Chemistry	Claridge, Rose Room	1.15
Division of Cellulose Chemistry	Gayoso, Ballroom	1.15
Division of Colloid Chemistry	DeVoy, Room A-B	1.15
Division of Sugar Chemistry and Technology	Claridge, Bamboo Room	1.15
Emory University, Georgia School of Technology, University of Georgia	Claridge, Airdrome Room	1.15
Northwestern University	Claridge, Blue Room	1.15
University of Illinois	Peabody, Georgian Room	1.15
Dinner, 6:30 P. M.		
University of Washington	Claridge, Blue Room	1.65

[a] Interested nonstudents invited.

[b] Tea, coffee, sandwiches, and cakes served. Sparkling water and ginger ale obtainable from private bar at standard prices.

Plant Trips

Inspection trips to plants have been greatly curtailed because of the war. Many industries cannot permit inspection trips and others must limit attendance in order to avoid interference with production. Many plants will require identification before passes will be issued. Please wear your A. C. S. badge, which will be considered as adequate identification.

Members and visitors should purchase tickets for inspection trips when registering. Tickets for morning trips will be withdrawn from sale at 5:00 P. M. the previous day and for afternoon trips at 9:00 A. M. the same day. If the limit for the trip has not been reached when tickets are withdrawn from sale in registration headquarters, they may be purchased at the time of departure for 15 cents more than the stated price.

Busses will leave the Poplar Avenue entrance of the Municipal Auditorium at the times indicated.

Destination	Departure	Return	Fare	Limit on Attendance
Tuesday, April 21				
American Snuff Co.	9:00 A. M.	12:00 NOON	$0.50	40
Forest Products Chemical Co.	9:00 A. M.	12:00 NOON	0.50	50
Buckeye Cotton Oil Co., Pulp Plant	2:00 P. M.	5:00 P. M.	0.50	50
Southern Shellac Manufacturing Co.	2:00 P. M.	4:30 P. M.	0.50	20
Wednesday, April 22				
American Snuff Co.	9:00 A. M.	12:00 NOON	0.50	40
Buckeye Cotton Oil Co., Hollywood Plant	9:00 A. M.	12:00 NOON	0.50	50
Layne and Bowler, Inc.	9:00 A. M.	12:00 NOON	0.50	50
Buckeye Cotton Oil Co., Pulp Plant	2:00 P. M.	5:00 P. M.	0.50	50
Municipal Filtration Plant	2:00 P. M.	4:30 P. M.	0.50	50
Southern Shellac Manufacturing Co.	2:00 P. M.	4:30 P. M.	0.50	20
Thursday, April 23				
Forest Products Chemical Co.	9:00 A. M.	12:00 NOON	0.50	50
Memphis Packing Co.	9:00 A. M.	12:00 NOON	0.50	40
McCallum and Robinson	9:00 A. M.	12:00 NOON	0.50	50
Buckeye Cotton Oil Co., Hollywood Plant	2:00 P. M.	5:00 P. M.	0.50	50
McCallum and Robinson	2:00 P. M.	4:30 P. M.	0.50	50
University of Tennessee	2:00 P. M.	4:30 P. M.	0.50	100

American Snuff Co.

Established in 1782, the American Snuff Co. has grown until it is one of the world's largest producers of snuff. The amount of snuff used yearly in the United States runs into surprisingly large figures. In the Memphis plant one can see all the various phases of manufacture from the aging of tobacco to the packing of the finished product. Of special interest to technical men are the moisture conditioning of the leaves, the careful roasting process, the dust-free grinding, and the screening of the fine tobacco powder. A tin can department is also operated which makes the containers used by the automatic filling machines.

Buckeye Cotton Oil Co.

Hollywood Plant. Huge industries have been built upon what was once a waste product of staple cotton. This former waste, the cottonseed, has taken its place among the important industrial raw materials of the Nation. The Hollywood plant is the largest cottonseed oil mill in the world. Here visitors will see the removal of first-cut linters for furniture stuffing, removal of second-cut linters for chemical cotton, and the salvaging of the remaining fuzz from hull fiber also to be used in chemical cotton processing. The seed meats are crushed, heated, and then squeezed by hydraulic presses to take out the oil that is used by the manufacturer of vegetable shortening. The remaining cake is utilized as cattle food.

Pulp Plant. The Memphis Pulp Plant is one of the three plants in the United States processing cotton linters. Here the lint from cottonseed (which was removed from the seed at the oil mill after the ginning process) is purified for any number of ultimate uses. In peacetime the Pulp Plant supplied its product for manufacture of such everyday essentials as acetate rayon, films, cellophane, plastics, floor covering, weiner casings, etc. In wartime the plant is doubly valuable as a basic industry for the manufacture of chemical cotton for smokeless powder.

CONTINUED ON PAGE 386

Pure Water

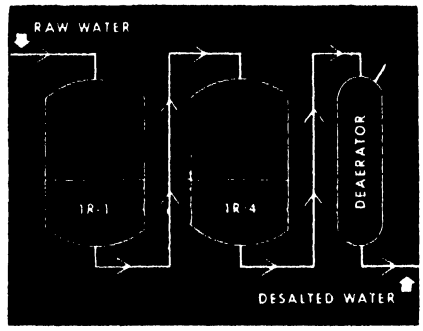
FOR INDUSTRY AT NEW LOW COST

AMBERLITE Ion Exchange Resins Improve the Older Methods of Purification

THE production of large amounts of very pure water is a constant problem in many industries. In many cases, a water equivalent to distilled in degree of purity is absolutely necessary, but, in other cases, although it has been proven that superior results would be obtained if such a water were used, cost has prohibited its use in such processes.

Distillation on a large scale is by no means trouble-free, and the use of plant condensates is often prevented due to presence of oil or iron therein. Now, for the first time, the development of the AMBERLITE Synthetic Ion Exchange Resins has made possible trouble-free production of very pure water at remarkably low cost. With exchange materials previously available it has been possible to remove soluble salts from water, but the physical and chemical properties of these earlier exchange materials were such that impurities were imparted to the effluent, and, due to low capacity, runs were short and much manipulation of the unit was necessary. Furthermore, the exchangers exhibited limited stability, and, in general, the difficulties which were encountered more than offset any economies possible by their use.

The AMBERLITE Ion Exchange Resins are outstanding from the standpoint of capacity and are unique in that the removal of ions is complete until break-through. That



is to say, there is no gradual increase in salt concentration in the effluent during operation. In addition, being true synthetic resins, they exhibit excellent physical and chemical stability under a wide variety of conditions.

Many Applications in Industry

The production of pure water in quantity at low cost is but one of the important services which the AMBERLITE Ion Exchange Resins render to industry. In a similar manner, the unique properties of the AMBERLITES make them useful in other water conditioning processes including softening of water, reduction of bicarbonate alkalinity, etc. The same unique properties make the AMBERLITES valuable in the recovery of copper, manganese, nickel and other valuable constituents from wastes. They also may be used to purify fine chemicals and dyestuffs, or to remove iron or other harmful ions from aqueous solutions.

For detailed information on these significant new resins, write today. The Resinous Products & Chemical Company is the only company licensed to produce these synthetic resins in the United States.

OTHER DEVELOPMENTS OF THE RESINOUS PRODUCTS LABORATORY

Synthetic Resins as Plywood Adhesives

TEGO—a reactive phenol formaldehyde resin in film form, is the standard plywood adhesive for airplanes, boats, and for other uses where maximum durability is essential.

UFORMITE—a urea formaldehyde resin adhesive widely used in place of the less durable animal and vegetable glues for plywood, furniture, etc.

Synthetic Resins in the Coatings Industry

More than fifteen years ago, AMBEROLS (modified oil-soluble phenol formaldehyde resins) paved the way for the modern, quick-drying varnishes. Since then, DURAPLEX alkyd resins, UFORMITE urea formaldehyde resins, and ACRYLOID polymers of acrylate and methacrylate esters have extended the use of synthetic resins in paints, varnishes, lacquers, printing inks, coated fabrics, and floor coverings.

Resin Emulsion Paints

Six years ago, work was begun on the development of alkyd resin emulsions as clear coatings, primers, and—in pigmented form—as paints. This emulsion, AQUAPLEX, is now in wide use as the base of an entirely new type of paint.

The Paraplex Family of Resins

The PARAPLEX resins are a unique class of the alkyd-type resins. They are tough, rubbery products of varying degrees of softness and are outstanding resin plasticizers for nitro-cellulose and ethyl-cellulose. Special forms are adapted for use in caulking and sealing compounds and in the modification of synthetic rubber.

Versatile Urea Formaldehyde Resins

UREA formaldehyde resins are proving to be the most versatile of the synthetic resin types. Produced as dry water-soluble powders, as aqueous solutions, as modifications soluble in ethyl alcohol and butyl alcohol, octyl alcohol and hydrocarbons, these resins are finding a widening use as plywood adhesives, in the treatment of textiles and paper and in baking finishes for wood and metal.

Complete Technical Advisory Service

Upon request, interested chemists will promptly receive technical literature on any of our products. In addition, a member of the Resinous Products' trained technical staff will consult with chemists on proposed applications of any of our products. This service, which includes the facilities of the Resinous Products Laboratory, is offered without obligation. Write today, stating what cooperation you would like us to render.

THE RESINOUS PRODUCTS & CHEMICAL COMPANY

WASHINGTON SQUARE, PHILADELPHIA, PA.

Forest Products Chemical Co.

Visitors to the plant of the Forest Products Chemical Co. will see one of the few wood distilling plants operating today. Synthetic processes for production of acetic acid and methyl alcohol have replaced many wood-distillation installations. By the use of modern developments, such as the Suida process of vapor-phase extraction and azeotropic distillation with ethyl acetate, the plant to be visited has been able to compete successfully.

This company was the first to sack and distribute charcoal for domestic use in the South.

Layne and Bowler, Inc.

Layne and Bowler, Inc., of Memphis, Tenn., manufactures the vertical centrifugal pump used largely for ground water supply and commonly known as the deep-well turbine pump. All operations from raw materials to finished pump are performed in this plant. It includes a pattern shop, foundry, and machine shop, and a testing laboratory. The pattern and core work involved in the castings is of interest both because of its intricacy and the close control necessary for consistent performance of the finished pumps. The extremely limited space available for the deep-well turbine pump, as compared with that for its horizontal brother on the surface, introduces sensitive problems in design and manufacture. Sizes regularly manufactured vary from one which can be placed in a 4-inch pipe to the largest, which fits into a 24-inch pipe. All pumps are tested in a laboratory using accurate methods of measuring power, speed, head, and flow.

McCallum and Robinson

Fire, water, and dirt keep this 15-acre, 28-year-old industry supplied with its raw material—damaged cotton. Here what otherwise would be a complete loss to the South is reconditioned and made into a variety of products such as blankets, mops, and rugs. The complete manufacture of a Romac rug is accomplished in 30 seconds.

Memphis Packing Co.

Farm diversification programs in recent years have pushed Memphis more and more into the packing industry. At the present time, the Memphis Packing Co. is the largest in the Mid-South and is equipped throughout with the most modern facilities. Visitors can see the preparation of cattle, swine, and sheep carcasses from the initial slaughtering to the final shipping to markets.

Municipal Filtration Plant

Although the Mississippi River has done and will continue to do much for Memphis, it is completely ignored as a source of municipal water. Instead, wells tap one of the purest underground streams found in the United States. The large-scale treatment of this well water by modern methods will be seen and explained.

Southern Shellac Manufacturing Co.

The Southern Shellac Manufacturing Co. is the only importer and bleacher of shellac in the South. It is also the only shellac manufacturer in the country that produces bleached shellac in a continuous process. This has been possible through the building and installation of a unique modification of the flash drying system for drying heat-sensitive products.

University of Tennessee, School of Biological Sciences

The University of Tennessee, with the cooperation of the Tennessee Valley Authority and the National Research Council, is carrying on an extensive program of malaria research. Members of the AMERICAN CHEMICAL SOCIETY are invited to inspect an exhibit representative of this project, which will be located in the Hotel Peabody, and to visit the Memphis laboratories of the university. A kodachrome moving picture of the intravascular changes produced in living tissues by malaria will be shown. Following this the group will be divided into smaller sections for personally conducted inspections of the mosquito insectary, monkey house, duck room, chemical laboratories, immunological laboratory, and the library.

Golf Tournament

The AMERICAN CHEMICAL SOCIETY Golf Tournament will be held Thursday, April 23, at the Chickasaw Golf Club, about 7 miles from downtown Memphis. Play will begin about 1:30 P. M. and the winner will receive the Wilson Cup for low gross score. Many other prizes will be awarded, including Defense Bonds and Stamps contributed by Memphis business firms and hotels. *Participation in the tournament will be restricted to members of the Society.*

Transportation will be by taxicab starting from the Municipal Auditorium, the Hotel Peabody, and the Hotel Claridge at 12:30 P. M. Round-trip tickets, $1.00 each, may be secured at registration headquarters until noon Thursday.

Luncheon will be available at the Club House at reasonable prices. The tournament greens fee will be $1.00. Save up your golf balls for this event!

The course will be open all week to registrants at the meeting. The greens fee will be $1.00 per day.

Students

Students of chemistry and chemical engineering are urged to attend the Memphis meeting. As usual there will be many unexcelled opportunities for informal contacts with chemists and chemical engineers. Papers covering a wide range of subjects will be presented at the technical sessions. Your field of interest is certain to be touched. Plant trips and entertainments will be added attractions.

The entire Wednesday program of the Division of Chemical Education will be provided by students. It will start with a special breakfast in the East Lounge of the Chisca Hotel at 7:30 A. M. Tickets, price $0.50 each, must be obtained before 6:00 P. M. Tuesday. This is a splendid opportunity to meet students of chemistry and chemical engineering from all parts of the United States, as well as outstanding members of the profession who will be present. The technical sessions of the division on Wednesday will be turned over to the students. Sixteen papers will be given by 19 student representatives of 9 colleges and universities in 8 states.

One of the features of the meetings of the AMERICAN CHEMICAL SOCIETY for students and chemists looking for positions is the Employment Clearing House. Members and paid student affiliates of the SOCIETY registered at the meeting are eligible to avail themselves of this opportunity to contact employers. West Hall, Municipal Auditorium, has been set aside for this purpose (see page 390 for further particulars).

The registration fee for regularly matriculated students of chemistry and chemical engineering is $3.00. The cost of living accommodations in Memphis is reasonable. Rooms at $0.75 per day per person may be reserved by writing the A. C. S. Hotel Committee, Memphis Chamber of Commerce, Hotel Peabody, Memphis, Tenn. Be sure to use the hotel reservation request form, page 390, for this purpose. Write immediately before these accommodations are all reserved.

Ladies Program

Headquarters, Room 200, Mezzanine Floor, Hotel Peabody.
Men are invited to take any of the tours listed on this program.
Admission to each event is by ticket.

Sunday, April 19

2:00 to 9:00 P. M.—Registration, East Corridor, Municipal Auditorium, Main Street and Poplar Avenue.
2:00 to 5:00 P. M.—Ladies headquarters, Hotel Peabody, will be open to welcome visitors.
8:30 to 10:30 P. M.—Social gathering with refreshments, Georgian Room, Hotel Peabody.

Monday, April 20

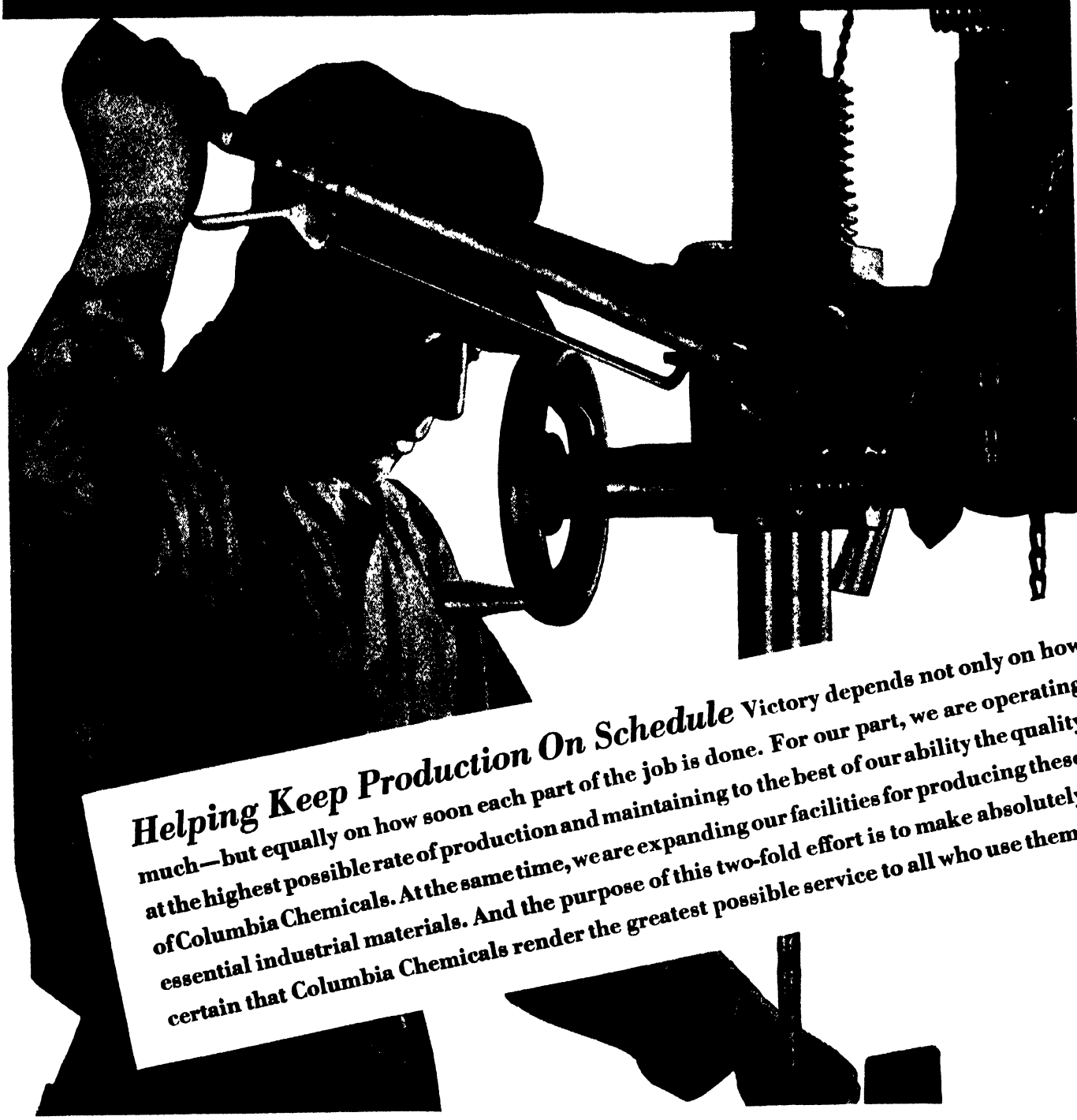
8:00 A. M. to 6:00 P. M.—Registration, East Corridor, Municipal Auditorium.
2:00 P. M.—General meeting (see page 379).
3:00 to 5:00 P. M.—Tea and reception in honor of the wives of the officers of the AMERICAN CHEMICAL SOCIETY, Louis XVI Room, Mezzanine Floor, Hotel Peabody. Admission by ticket (no charge) which must be obtained at ticket booth in registration headquarters before 12:00 noon, Monday. All registrants at the meeting are invited to attend.
8:15 P. M.—Vanderbilt University A Cappella Choir. Goodwin Institute Auditorium, Madison Avenue and Third Street. Admission by ticket (no charge) which must be obtained at registration headquarters.
9:30 P. M.—Smoker, Ballroom and Louis XVI Room, Hotel Peabody. Admission by badge.

Tuesday, April 21

10:00 A. M. to 4:00 P. M.—Tour of city, including Magevney Home, Riverside Drive, DeSoto Park, and Romac Rug Co. Luncheon

CONTINUED ON PAGE 388

COLUMBIA CHEMICALS



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will be served at the Memphis Country Club at 12:00 noon. At 1:00 P. M. the tour will be resumed. The Memphis Museum (Pink Palace), Overton Park, and Brooks Memorial Art Gallery will be seen. At the latter, there will be a special showing of southern pottery and Van Gogh art followed by tea. Busses leave the Hotel Peabody. Tickets for all-day tour, including luncheon and tea, $2.25 each, must be obtained at registration headquarters before 5:00 P. M. Monday.

11:30 A. M. to 4:00 P. M.—Luncheon and sightseeing. For those not desiring to take the morning tour, busses will leave Hotel Peabody at 11:30 A. M. and proceed to the Memphis Country Club for luncheon. Beginning at 1:00 P. M., points of interest will be visited as listed above. Tickets for afternoon tour, including luncheon and tea, $1.90 each, must be obtained at registration headquarters before 5:00 P. M. Monday.

7:00 P. M.—Pit Barbecue and Southern Melodies, North Hall, Municipal Auditorium. Admission by ticket (no charge) which must be obtained at registration headquarters before noon, Tuesday.

Wednesday, April 22

9:00 A. M. to 4:00 P. M.—All-day trip to Holly Springs, Miss. Participants will visit famous old southern homes and gardens (see below). Busses leave from Hotel Peabody. All interested registrants at the meeting, both men and women, are invited to take this trip. Tickets must be obtained at registration headquarters not later than 4:00 P. M. Tuesday, price $3.50 each, including transportation, luncheon, and pilgrimage fee.

7:15 P. M.—Social period (refreshments) for dinner attendants, Louis XVI Room, Hotel Peabody.

7:45 P. M.—Subscription dinner, Ballroom, Hotel Peabody. Tickets, $3.00 each, must be secured at registration headquarters before 4:00 P. M. Limit, 600.

10:00 P. M.—Dance, Ballroom, Hotel Peabody. Admission by badge.

Thursday, April 23

10:00 A. M. to 12:30 P. M.—Visit to Memphis gardens. Busses leave from Hotel Peabody. The entire garden fee of $1.00 will be given to the American Red Cross. Tickets, $1.30 each, must be obtained at registration headquarters before 5:00 P. M. Wednesday.

2:00 P. M.—Busses leave Hotel Peabody for visit to Buckeye Cotton Oil Co., where cotton ginning and other operations will be shown. Tickets, 30 cents each, must be obtained at registration headquarters before 9:00 A. M.

Holly Springs Pilgrimage

Holly Springs, Miss., abounding with the glamor of the Old South, today stands as a landmark to the culture and refinement engendered by the early settlers. Opened to settlement by the Chickasaw Session of October 22, 1832, Holly Springs has, from the first, enjoyed a glorious prosperity. Great Georgian mansions, filled with the luxuries of life, made their appearance in the '40s and '50s. Many of these old houses have been preserved with their original furnishings and treasures still in possession of the builders descendants.

The Memphis committee has arranged a trip to Holly Springs on Wednesday, April 22. Included among the homes opened for the occasion are some quite famous houses. Airliewood, built by William Henry Coxe in 1859, was used as General U. S. Grant's headquarters in 1862. In the same year during federal occupation, Mrs. Grant made her home in the Walter Place, built by Col. Harvey W. Walter, noted lawyer and public-spirited citizen. Cedarhurst was the home of Sherwood Bonner, gifted writer of southern dialect stories. Gray Gables, built in 1832, is characterized by a spiral staircase, hand-carved woodwork, lofty ceilings, and fine stained glass. The Strickland Place, more than 100 years old, is noted as the first two-storied house built in Marshall County. The Featherston Place, built in 1834, was the home of the brilliant statesman, General Winfield Scott Featherston. It has the English basement characteristic of that period. The McCarroll House has been owned and occupied by five generations of the same family for more than 100 years.

Although arranged as part of the ladies program, men may participate in this pilgrimage. Tickets must be obtained at the ticket booth in registration headquarters not later than 4:00 P. M. Tuesday, price $3.50 each, including transportation, luncheon, and pilgrimage fee.

The Memphis Museum (Pink Palace)

The Memphis Museum is located in the heart of beautiful Chickasaw Gardens in the eastern part of the city. From the entrance on the south a large park extends to Central Avenue; on the north the land slopes to a picturesque lake. The pink Georgia marble building is framed by trees and shrubs. Visitors approaching the museum by any of the excellent highways can see its stately walls from a distance, since it stands on one of the highest points of land in the vicinity. The unfinished building and grounds were acquired by the City of Memphis in 1926, the original contract referring to "a large and costly mansion known as the Pink Palace". The exhibits shown in the museum include birds, fossils, marine life, minerals, cotton, lumber, china, glass, art, Indians, weapons, and aviation.

DeSoto Park

No city is richer in the historic traditions of North America than Memphis. Long before the well-known historic events at Jamestown or Plymouth Rock, came the expedition of Hernando De Soto, whose Spanish cavaliers were the first white men to set foot on the Chickasaw Bluffs. Four centuries after the dawn of history on the Chickasaw Bluffs, DeSoto Park enshrines memories which revive the long pageant of the American empire on its westward march. Not the silence of the wilderness but the clamor of a city enfolds the green square today. Yet, in the reminiscent mood of some sunny hour, it is easy to imagine, in the rustle of a tree, a sentry's whisper, or in a sudden sound, the crack of a long-stilled musket; easy, indeed, to glimpse a crude block house nearby, its log walls dissolving into a vision of the caballeros and their weary steeds who fade in turn, leaving the lonely sentinel, the red man who, as he disappears at last from the western horizon, leaves behind the word that has outlived the proud banners of Castile, the silver lilies of France, and the vain boasts of the conquerors—MISSISSIPPI—"the great river".

Brooks Memorial Art Gallery

The Brooks Memorial Art Gallery was given to the citizens of Memphis in 1916 by Mrs. Bessie Vance Brooks in memory of her husband, Samuel Hamilton Brooks. Built in a classical style of Georgian marble, it is situated in Overton Park on a site donated by the Memphis Park Commission. A small but very fine collection of paintings is on permanent display and loan exhibitions of fine and applied art are changed monthly. An Art Reference Library was started three years ago through the efforts of interested friends

CONTINUED ON PAGE 390



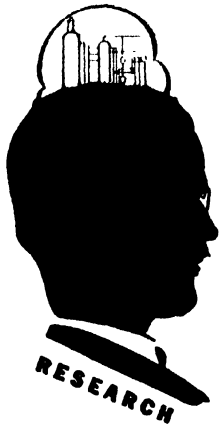
STATE OF TENNESSEE, DEPT. OF CONSERVATION

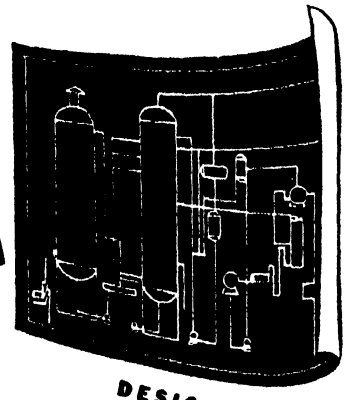
Court Square

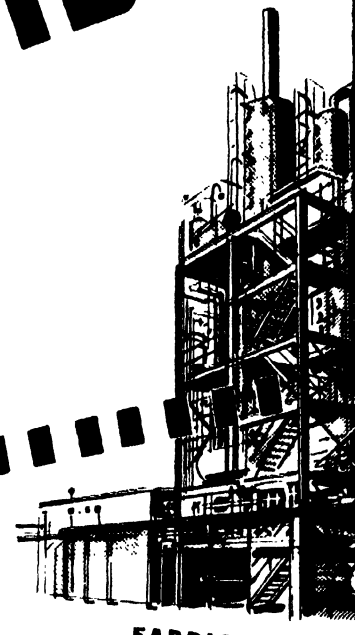
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- High Pressure Processing
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- Gas Cleaning

tributed by gallery patrons, are on file. Twelve thousand reproductions of paintings, architecture, sculpture, furniture, ceramics, etc., are used extensively by the art teachers and students of the city and by clubs of Memphis and the Mid-South. During convention week, Brooks Memorial Art Gallery will exhibit famous old southern pottery and a collection of Van Gogh art.

Employment Clearing House

West Hall, Municipal Auditorium

At Memphis the SOCIETY will again provide facilities to bring together employers looking for chemists and chemical engineers and *members and paid student affiliates registered at the meeting*, seeking employment and wishing to make such contacts.

Beginning Sunday afternoon, candidates for employment will file records in the Clearing House on forms which provide space for a photograph, personal data, and information regarding education and experience. The records are maintained in classified files and are indexed under all fields of training and experience. This enables an employer to find quickly the records of those with the qualifications desired.

Beginning Monday morning, appointments for interviews will be made at the request of employers and at the times they specify. Private booths will be available for such conferences. No chemist or chemical engineer looking for employment and no employer looking for trained men can afford to miss this opportunity. Many personnel representatives attend each meeting solely to take advantage of the service.

Candidates for Employment

By action of the Board of Directors (December 12, 1940), the Employment Clearing House is open only to members and paid student affiliates of the AMERICAN CHEMICAL SOCIETY registered at the meeting.

The Clearing House will be open to candidates for employment at 2 P. M. Sunday, April 19. Since employers begin inspecting the vitae on Monday, most effective use is made of the records of those who arrive early in the week. At the most recent Clearing House, a larger proportion of interviews and offers of employment were received by those who registered during the first two days. Records filed in advance cannot be inspected by employers until after the arrival of the registrants, since all users are assured that everyone whose vita is on file is available for interview. Those who have not filed vitae by mail may fill out the forms in the Clearing House after arrival.

Amplification of the data on the forms and lists of publications cannot be accepted for filing in the Clearing House. Many employers decline to interview an individual whose photograph is not on his record; therefore, each person should bring with him two copies of a *good* picture (look pleasant; avoid flashlight photographs), not larger than 2.5 × 3 inches, and attach them to duplicate copies of his vita.

A representative of the United States Civil Service Commission will be in the Employment Clearing House to interview any persons interested in government employment. He will furnish information and will authorize appointments to positions at the proper

Employers

By action of the Board of Directors (December 6, 1941), the Employment Clearing House is not open to any employer or employer's representative "who, in offers made as a result of interviews in the Clearing House, is unwilling to meet the recommendations unanimously adopted at the Atlantic City meeting of the AMERICAN CHEMICAL SOCIETY in its resolution on employer-employee relationships". (See NEWS EDITION, December 25, 1941, page 1442.)

Although employment of chemists and chemical engineers is at a high level owing to the demands of rapidly expanding industry, it is expected that employers will find in the Memphis Clearing House registrants whose availability might not otherwise be known. They will be chiefly of two types: June graduates of small Mid-Western colleges not scouted by industry and those individuals seeking a change of employment, especially chemists and chemical engineers in nonessential industries wishing to make new connections in order to contribute directly to the defense program. Many employers expected a small Clearing House registration at the past two meetings. Actually 324 were available for interview in Atlantic City and 527 in St. Louis. At each of these meetings more than 1,000 interviews were arranged.

Employers who have never visited an A. C. S. Employment Clearing House will find this unique employment aid of distinct value. Many personnel department representatives attend each meeting solely to take advantage of this service. The number of employers regularly using the A. C. S. Employment Clearing House at national meetings of the SOCIETY indicates that the activity is meeting a real need.

The forms filed by candidates for employment provide space for a photograph, personal data, and information regarding education and experience. A classified index will be maintained so that one can find quickly those with the special training or experience desired. A private room will be available in which employers' representatives may inspect the index and vitae at any time from Monday through Thursday. At the request of the employer, interviews will be arranged promptly with any whose records are on file. The space available in Memphis again will permit erection of private interview booths.

We know of no other place at which one can find not only the records of such a diversified group of chemists and chemical engineers, but the individuals themselves. Any employer, having a vacancy to fill or anticipating one, can ill afford to pass up this opportunity to make personal contacts.

The advantages to employers are many. They may inspect these records without any of the registrants knowing they are looking for chemists. Personal interviews are always more satisfactory than correspondence; this plan makes available to each employer individuals from widely scattered localities who otherwise could be interviewed only through time-consuming and costly travel.

Plan on using the A. C. S. Employment Clearing House in West Hall, Municipal Auditorium, Memphis, April 20 to 23, 1942.

CONTINUED ON PAGE 392

A. C. S. Hotel Committee, Memphis Chamber of Commerce, Hotel Peabody, Memphis, Tenn.

Dear Sir: Please make hotel reservations noted below:

_____ 1942

Hotel _____ First choice

Hotel _____ Second choice

Hotel _____ Third choice

If the hotel of first choice is unable to accept the reservation, the Hotel Committee will endeavor to comply with your second or third choice in the order named.

_____ Double rooms for _____ persons _____ Rate desired $_____ to $_____ per day

_____ Single rooms _____ Rate desired $_____ to $_____ per day

_____ Suites-parlor _____ bedroom(s) for _____ persons Rate desired $_____ to $_____ per day

Arriving April..... ..... hour.....A. M.....P. M. Leaving.....

Print names and addresses of all occupants including person making reservation:

NAME	STREET ADDRESS	CITY	STATE

Please attach sheet listing additional names if necessary.

Signature _____

VITAMINS AND DEFENSE

IN all wars since history began disease has been the cause of more casualties, both military and civilian, than the weapons of the enemy. During the last World War it began to be recognized that some of these diseases, such as scurvy, were caused by a definite deficiency of some essential ingredient in the diet while others probably spread because of lowered resistance of the population due to this and other dietary lacks. Because of their relationship to life, these essentials were termed vitamins. Since practically nothing was known about them at the time, little could be done toward correcting these deficiencies.

Since then science has made tremendous strides in the chemistry of vitamins. The structure of most of those isolated has been determined and methods for synthesizing many of them developed.

The nations of the world have not been slow to recognize the importance of the vitamins. In her rearmament program Germany included factories for their production along with those for manufacturing guns, explosives and other munitions of war. One important ingredient in the emergency ration of the German parachute troops has been tablets of synthetic Ascorbic Acid (vitamin C). Our own Government has also recognized the importance of this vitamin and has included a product containing synthetic Ascorbic Acid in the ration of those now training for defense of our nation both on land and sea.

The United States and the British Empire have also included the maintenance of civilian health and morale in their defense plans. Enriched flours and breads, to which a number of the vitamins together with certain minerals have been added, have received official sanction. This development has been hampered by an insufficient supply of one of the vitamin ingredients — Riboflavin (vitamin B_2).

Chas. Pfizer & Co., Inc. have been glad to assist in the Defense Program. We have been one of the largest producers of Ascorbic Acid (vitamin C) for several years. There has been a continual increase in our production of this synthetic vitamin and plans are now in the process of consummation which will still further enlarge our productive facilities.

After a research program of several years, the production of Riboflavin (vitamin B_2) was started by our Company in 1940. At the present time we are bending every effort toward a great increase in the size of our productive facilities in order to assist in supplying the large quantities of this essential vitamin which are needed.

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Division of Agricultural and Food Chemistry

ELLERY H. HARVEY, *Chairman;* ROGER H. LUECK, *Secretary*
WALES NEWBY AND GEORGE N. FERGUSON, *Local Assistants*

Tuesday Morning

Auditorium, Room M

VITAMINS

Joint program with the Division of Biological Chemistry (see page 394).

Tuesday Afternoon

Auditorium, Room M

SYMPOSIUM ON TRACE ELEMENTS IN NUTRITION

Joint symposium with the Division of Biological Chemistry.

C. R. FELLERS, *Presiding*

2:00— 1. W. D. GALLUP. The Nutritional Importance of Manganese.
2:25— 2. P. S. WINNEK. The Presence and Possible Importance of Bromine in Living Tissues.
2:50— 3. J. S. MCHARGUE, R. H. HAGEMAN, G. D. SHERMAN, W. S. HODGKISS, AND E. S. HODGE. The Effect of Some Minor Element Compounds on the Yield and Mineral Content of Oats, Wheat, and Potatoes.
3:15— 4. J. D. KURBATOV AND M. L. POOL. Radioactive Isotopes in the Study of Trace Elements in Nutrition.
3:40— 5. A. L. MOXON AND H. D. ANDERSON. Some Factors Influencing the Toxicity of Selenium.
4:00— 6. EDWIN HOVE. Zinc in Animal and Plant Nutrition.
4:25— 7. R. A. KEHOE. The Occurrence, Origin, and Significance of Lead in Biological Material.
4:50— 8. W. M. NEAL. Some Effects of Copper Intake on Cattle.

Wednesday Morning and Afternoon

Auditorium, Room M

UTILIZATION OF AGRICULTURAL PRODUCTS OF THE SOUTH

E. H. HARVEY, *Presiding*

9:00— 9. T. A. PICKETT. Some Effects of Heat Treatments of Peanuts.
9:25— 10. D. S. PAYNE. Peanut Flour. Development, Manufacture, and Utilization.
9:50—11. J. B. GALLENT. The Preparation and Uses of Sulfonated Peanut Oil.
10:15—12. ROBERT S. HARRIS. The Use of Peanuts and Peanut Products in the Feeding of Large Population Groups.
10:40—13. L. I. MILLER. Sulfur Dusting for Leaf Spot Control. A Major Factor in Peanut Production.
11:05—14. F. R. EDWARDS. Recent Knowledge of Feeding Products of Cotton Seeds and Peanuts.
11:30—15. A. R. KEMMERER, J. F. FUDGE, AND G. S. FRAPS. Carotene Content of Texas Range Forages.

2:00—16. R. F. POOLE. Cotton Diseases and Their Control.
2:25—17. H. M. BRIGGS. Cottonseed Meal for Pregnant Ewes.
2:50—18. R. C. ROARK. Developments in Insecticides for the Control of Cotton Insects.
3:15—19. D. G. STURKIE. Fertilizers and Cropping Systems as Affecting Cotton Yields in Alabama.
3:40—20. T. R. SWANBACK. The Effect of Source on Magnesium Absorption by Tobacco.
4:05—21. L. H. DAVIS, A. W. PETRE, AND C. F. BAILEY. Laboratory Temperature and Humidity Cabinet for Studying the Hygroscopic Properties of Tobacco.
4:30—22. M. J. COPLEY, R. K. ESKEW, AND J. J. WILLAMAN. Problems in the Industrial Utilization of Tobacco.

Thursday Morning

Auditorium, Room M

STARCH

Joint program with the Division of Sugar Chemistry and Technology.

S. M. CANTOR, *Presiding*

9:00—23. R. M. HIXON AND G. F. SPRAGUE. Waxy Maize Starch. A Possible Competitor for Tapioca.
9:25—24. W. Z. HASSID AND R. M. MCCREADY. The Structure of Starch and the Mechanism of Its Formation.
10:05—25. S. RUBEN, M. D. KAMEN, W. Z. HASSID, M. RANDALL, AND T. H. NORRIS. Studies on Photosynthesis Using the Radioactive and Stable Isotopes of Carbon, Hydrogen, and Oxygen.
10:45—26. R. W. KERR AND G. M. SEVERSON. On the Multiple Amylose Concept of Starch. III. The Isolation of Crystalline Amylose.
11:20—27. W. W. MOYER. The Preparation and Uses of Levulinic Acid from Starch.

12:15— Divisional luncheon, in honor of H. E. Barnard, Hotel Peabody, Room 210, $1.15.

Thursday Afternoon

GENERAL PAPERS

SECTION A

Auditorium, Room M

E. H. HARVEY, *Presiding*

2:15—28. C. A. BROWNE. C. W. Scheele (1742–86) and J. B. Boussingault (1802–87). A Two-Century Retrospect in Agricultural Chemistry.
2:45—29. H. A. SCHUETTE AND P. L. DU BROW. The Invertase Activity of Honey.
3:10—30. W. H. MACINTIRE, S. H. WINTERBERG, AND J. G. THOMPSON. The Fluorine Content of Certain Plants as Affected by Various Fertilizer Treatments.
3:40—31. Z. I. KERTESZ. Note on the Nature of Protopectin and the Interrelation of Pectic Substances.
4:05—32. T. D. SPIES. Observations on the Effectiveness of a Yeast–Peanut Butter Mixture in the Treatment of Nutritional Deficiencies.
4:30—33. W. H. STROWD. Calcium Content of American Foods in Relation to Human Needs.

SECTION B

Auditorium, Room K

G. A. FITZGERALD, *Presiding*

2:15—34. **George E. Holm. The Physical and Chemical Aspects of the Lipides in Milk. Address, Borden Award in the Chemistry of Milk.**
2:50—35. RAYMOND REISER AND G. S. FRAPS. The Determination of Blood in Packing House By-Products.
3:15—36. J. H. MITCHELL, JR., H. R. KRAYBILL, AND F. P. ZSCHEILE. Quantitative Spectral Analysis of Fats.
3:40—37. C. A. MURRAY AND E. B. OBERG. Photometric Determination of Acetone-Insoluble Material in Soybean Oil. Relation of Acetone-Insoluble Material to "Break".
4:05—38. CALVIN GOLUMBIC. The Isolation of New Antioxidants from Vegetable Fats.
4:30—39. F. H. GALLAGHER, H. R. BILFORD, W. H. STARK, AND PAUL KOLACHOV. Fast Conversion of Distillery Mash for Use in a Continuous Process.

Division of Analytical and Micro Chemistry

GEORGE L. ROYER, *Chairman;* FRANCIS W. POWER, S.J., *Secretary*
MAURICE M. BRUNDIGE, *Local Assistant*

Wednesday Afternoon

Auditorium, Room J

GENERAL PAPERS

GEORGE L. ROYER, *Presiding*

2:00— 1. L. M. O'HARA, R. B. ELLIS, AND PAUL KOLACHOV. True Proof of Blended Whisky.
2:20— 2. PHILIP J. ELVING AND W. B. LIGETT. The Determination of Fluorine and Other Halogens in Organic Compounds.
2:45— 3. PAUL E. PELLETIER AND A. R. WREATH. Rapid Determination of P_2O_5 in Strong Phosphoric Acid.
3:00— 4. HOBART H. WILLARD AND LYNNE L. MERRITT, JR. Ozone as an Analytical Reagent.
3:15— 5. HOBART H. WILLARD AND TAFT Y. TORIBARA. A Volumetric Method for Determining Tin, Based on the Formation of a Dioxalatothiometastannate.
3:25— 6. THOMAS H. VAUGHN AND EUGENE C. NUTTING, JR. The Residue Volume Method of Solubility Determination.
3:40— 7. ARTHUR L. LE ROSEN. A Method for Standardization of Chromatographic Analysis.
3:55— 8. PHILIP W. WEST AND THOMAS HOUTMAN. Detection of Orthophosphates by Means of Drop Reactions.
4:10— 9. FRANCIS W. POWER, S.J. Applications of Modern Statistical Methods in Chemical Analysis.

CONTINUED ON PAGE 394



HE WOULD HAVE BURNED FOR THIS DISCOVERY!

WITH none but his cat to watch him, the alchemist in the Middle Ages worked at peril of his life, exploring the secrets of nature.

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Thursday Morning and Afternoon

Auditorium, Room L

SYMPOSIUM ON ANALYTICAL METHODS IN ORGANIC CHEMISTRY

Joint symposium with the Division of Organic Chemistry.

LEE IRVIN SMITH, *Presiding*

9:15—10. LEE IRVIN SMITH. Introductory Remarks.
9:25—11. FREDERICK D. ROSSINI. The Separation of Hydrocarbons from Petroleum and the Determination of Their Properties and Purity.
10:15—12. ERNEST H. HUNTRESS. Some Recent Developments in the Systematic Identification of Organic Compounds.
11:00—13. WALTER M. LAUER. Studies of Some Microanalytical Procedures.

12:15— Divisional luncheon, Hotel Claridge, Rose Room, $1.15.

GEORGE L. ROYER, *Presiding*

2:15—14. WALLACE R. BRODE. The Application of Absorption Spectra Measurements to the Determination of Impurities and the Structure of Organic Compounds.
3:00—15. ROBERT C. GORE. Infrared Spectroscopy as an Organic Analytical Tool.

Division of Biological Chemistry

B. H. NICOLET, *Chairman;* ERWIN BRAND, *Secretary*
DEMPSIE B. MORRISON, *Local Assistant*

Tuesday Morning

Auditorium, Room M

VITAMINS

Joint program with the Division of Agricultural and Food Chemistry.

B. H. NICOLET, *Presiding*

9:00— 1. F. M. STRONG AND L. E. CARPENTER. Preparation of Samples for Microbiological Determination of Riboflavin.
9:15— 2. A. LEVITON. The Adsorption of Riboflavin on Lactose in the Crystallization of Lactose from Whey Concentrates.
9:35— 3. ESTELLE HAUSMAN, LAWRENCE ROSNER, AND HOWARD J. CANNON. The Preparation of Cereal Extracts for Nicotinic Acid Determination.
9:50— 4. GUSTAV J. MARTIN. Inositol as a Complicating Factor in Pantothenic Acid Deficiency in the Rat.
10:05— 5. JACK R. LEONARDS, ALFRED H. FREE, AND VICTOR C. MYERS. The Effect of Vitamin B Deficiency on the Intestinal Absorption of Galactose in the Rat.
10:20— 6. L. R. RICHARDSON, BARBARA LONG, AND A. G. HOGAN. The Vitamins Required for Growth and Reproduction in the Rat.
10:35— 7. J. C. FRITZ, J. L. HALPIN, J. H. HOOPER, AND E. H. KRAMKE. The Oxidative Destruction of Vitamin D.
10:50— 8. B. W. BEADLE AND F. P. ZSCHEILE. Studies on the Carotenoids. Isomerization of β-Carotene and Its Relation to Carotene Analysis.
11:05— 9. EDGAR M. SHANTZ, JOHN D. CAWLEY, AND NORRIS D. EMBREE. Anhydro ("Cyclized") Vitamin A.
11:20—10. NORRIS D. EMBREE AND EDGAR M. SHANTZ. Kitol, a New Provitamin A.
11:40—11. EDWARD A. WHITE, JOHN R. FOY, AND LEOPOLD R. CERECEDO. Unsaturated Fatty Acid Deficiency in Mice.

Tuesday Afternoon

Auditorium, Room M

SYMPOSIUM ON TRACE ELEMENTS IN NUTRITION

Joint symposium with the Division of Agricultural and Food Chemistry (see page 392).

Wednesday Morning

Auditorium, Room K

PROTEINS

B. H. NICOLET, *Presiding*

9:00—12. KENNETH E. HAMLIN, JR., AND WALTER H. HARTUNG. The Synthesis of α-Amino Acids from Substituted Acetoacetic Esters.
9:20—13. M. B. YOUNG AND H. A. YOUNG. Absorption of Oxygen by Glutathione in Alkaline Solutions of Range pH 9 to 11.
9:35—14. JAKOB A. STEKOL. On the Inhibition of Growth of Rats by Nicotinic Acid.
9:55—15. WALTON B. GEIGER, JR., AND MILTON HARRIS. The Nature of Keratinization.
10:15—16. ERWIN BRAND AND BEATRICE KASSELL. Photometric Determination of Arginine.
10:30—17. ERWIN BRAND AND BEATRICE KASSELL. Analysis and Minimum Molecular Weight of β-Lactoglobulin.
10:45—18. BEN H. NICOLET AND LEO A. SHINN. A Synthesis of Lanthionine from Cysteine and Silk, and the Mechanism of Lanthionine Formation in Proteins.
11:10—19. **Earl Allison Evans, Jr. Carbon Dioxide Assimilation in Animal Tissues. Address, Eli Lilly and Company Award in Biological Chemistry.**

Wednesday Afternoon

Auditorium, Room K

PROTEINS, GENERAL PAPERS

B. H. NICOLET, *Presiding*

2:00—20. EDWARD F. WARD. Reactions of Proteins with Alkyl Halides and Sulfates.
2:15—21. GEORGE D. WESSINGER AND GERALD REED. The Determination of Zinc in Insulin by a Polarographic Method.
2:30—22. M. L. CROSSLEY, R. H. KIENLE, G. L. M. CHRISTOPHER, AND BRUNO VASSEL. The Chemistry of Infectious Diseases. IV. Kinetic Study of Polarographic Data Pertaining to Alkali-Treated Normal and Pneumococcus Infected Dog Sera.
2:45—23. M. L. CROSSLEY, R. H. KIENLE, G. L. M. CHRISTOPHER, J. M. SAYWARD, AND BRUNO VASSEL. The Chemistry of Infectious Diseases. V. Preliminary Monomolecular Film Studies of Serum Proteins.
3:05—24. CYRIL D. EVANS AND RALPH H. MANLEY. A Method of Stabilizing Zein Dispersions against Gelation.
3:25—25. NORMAN L. MATTHEWS. The Separation of the Higher Alkyl α-Glyceryl Ethers from Other Members of the Unsaponifiable Fraction.
3:40—26. HARRY D. FOREMAN AND J. B. BROWN. The Solubility of Fatty Acids in Organic Solvents at Low Temperatures.
4:00—27. HAROLD C. HODGE, JOHN F. BONNER, GERHARD DESSAUER, AND MARLENE FALKENHEIM. The Adsorption of Arsenates at 40° C. on Enamel, Dentine, Bone, and Hydroxylapatite as Shown by the Radioactive Isotope.
4:15—28. W. A. WISANSKY AND S. ANSBACHER. Studies on Tyrosinase Chemistry with *p*-Aminobenzoic Acid.
4:30—29. JOHN C. WIRTH AND F. F. NORD. Progress in the Study of Alcoholic Fermentation of Carbohydrates through Fusaria.
4:50—30. O. WINTERSTEINER AND J. D. DUTCHER. Crystalline Curarine from *Chondodendron tomentosum*.

Division of Cellulose Chemistry

E. E. HARRIS, *Chairman;* C. R. FORDYCE, *Secretary*
J. DUDLEY ATKINSON, JR., *Local Assistant*

Thursday Morning and Afternoon

Auditorium, Room D

9:30— 1. ARTHUR F. MARTIN. A New Correlation of Viscosity and Concentration for High Molecular Weight Compounds.
10:00— 2. GLENN A. GREATHOUSE, DOROTHEA KLEMME, AND H. D. BARKER. Evaluation of Methods for Testing Cellulose Deterioration by Fungi.
10:25— 3. ERNEST ANDERSON, R. L. MALAN, DONALD SCOTT, AND JOHN E. PICKERING. The Composition of Hemicelluloses. I. Hemicelluloses from the Leaves and Rinds of Corn Stalks, *Zea Mays*. II. Hemicelluloses from Rice Hulls, *Oriza Sativa*.
10:50— Intermission.
11:00— 4. EARL E. BERKLEY. Structure of Cotton Fibers as Revealed by the Electron Microscope.
11:15— 5. EARL E. BERKLEY, I. W. BAILEY, AND O. C. WOODYARD. Cell Contour and Cellulose Orientation as Shown by Microscopic and X-Ray Techniques.

12:15— Divisional luncheon, Hotel Gayoso, Ballroom, $1.15.

2:30— 6. E. P. SAMSEL AND J. A. MCHARD. The Determination of Alkoxyl Groups in Cellulose Ethers.
2:50— 7. THOMAS S. GARDNER AND C. B. PURVES. Distribution of Acetyl Groups in a Technical Acetone-Soluble Cellulose Acetate.
3:15— 8. H. A. RUTHERFORD, F. W. MINOR, A. R. MARTIN, AND MILTON HARRIS. Oxidation of Cellulose. The Reaction of Cellulose with Periodic Acid.
3:40— 9. G. GOLDFINGER AND H. MARK. Alkaline Purification of Cellulose.

CONTINUED ON PAGE 396

SUBSTITUTES

• JAPAN WAX

Many manufacturers have found that Nipocer N, a synthetic wax manufactured from freely available domestic raw materials, can replace Japan Wax.

Nipocer N is a light colored wax with a melting range of 41° C.–47° C. It blends with most waxes and resins and is easily emulsified with the usual emulsifying agents. Nipocer N is superior to Japan Wax in that it is less subject to oxidation and rancidification and is always uniform. It is being used in textile preparations, lubricants of various types, protective coatings, impregnants, polishes, and for most purposes where a wax with the properties of Japan Wax is desirable.

• GUM TRAGACANTH RIBBON

A shortage of high grade Gum Tragacanth Ribbon has caused users to seek substitutes. Gomagel gives viscosity and body in water similar to that of Gum Tragacanth Ribbon.

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• SAPONIN

A new foaming agent called Foamapin Liquid for technical purposes, produced from freely available natural raw materials, can replace Saponin.

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Division of Chemical Education

F. E. BROWN, *Chairman;* P. H. FALL, *Secretary*
G. H. WOLLETT, *Local Assistant*

Auditorium, Room D

Tuesday Morning

F. E. BROWN, *Presiding*

9:00— 1. ED. F. DEGERING, W. A. ALLEN, C. BORDENCA, L. A. GILLETTE, AND K. SCHAAF. Relative Electronegativity. VIII. Addition at the Olefin Bond.
9:20— 2. L. P. BIEFELD AND MARGARET GRIFFING. Color Nomenclature in Qualitative Analysis. I. The Intersociety Color Council Nomenclature.
9:35— 3. L. P. BIEFELD AND MARGARET GRIFFING. Color Nomenclature in Qualitative Analysis. II. ISCC-NBS Color Names.
9:50— 4. E. C. HERMANN AND JACOB R. MEADOW. Ethylene Mercaptan and Its Reaction with Aldehydes and Ketones.
10:05— 5. N. D. CHERONIS. The Use of Semimicrotechnique in Elementary Organic Chemistry. III.
10:25— 6. J. A. BURROWS, PAUL ARTHUR, AND O. M. SMITH. The Use of Semimicrotechnique in Teaching General Chemistry Laboratory.
10:35— 7. D. G. NICHOLSON. When High School Teachers Take College Freshman Examinations!
10:50— 8. MAY L. WHITSITT. Some Additional Factors to Consider in the Training of Undergraduate Students Majoring in Chemistry.
11:05— 9. F. B. DUTTON AND DALE DREISBACH. The Use of Standardized Tests in the Teaching of General Chemistry at Baldwin-Wallace College.
11:25—10. P. R. FEHLANDT. Vitalizing the Teaching of General Chemistry.
11:40—11. J. A. BURROWS. The Cost of Installing and Maintaining a Chemistry Laboratory in a Small Secondary School Using Homemade and Semimicroequipment.

Tuesday Afternoon

ROUND TABLE ON THE PROBLEM OF TEACHING CHEMISTRY

H. N. ALYEA, *Presiding*

2:00—12. T. A. ASHFORD. The Problem of Chemistry in General Education.
2:20—13. J. A. BABOR. Subject Matter Common to All Courses in General Chemistry, and the Sequence of the Topics.
2:40—14. J. E. CAVELTI. The Perennial Problem of Course Content in a Growing Science.
3:00—15. C. S. ADAMS. The Importance of Laboratory Work in General Chemistry at the College Level.
3:20—16. B. C. HENDRICKS. The Varied Objectives Implied in Service Courses in General Chemistry.
3:40—17. F. D. MARTIN. A Diagnostic and Remedial Study of Failures in Freshman Chemistry.
4:00— General discussion led by W. C. FERNELIUS and W. C. JOHNSON.
5:00— Meeting of Executive Committee.

Wednesday Morning and Afternoon

STUDENT PROGRAM

7:30— Student breakfast, Chisca Hotel, East Lounge, 50 cents. Attendance not limited to students; any interested persons welcome.

G. H. HAYDEN, *Presiding*

9:15—18. C. J. WEBSTER. Robert Peter—Practical Educator.
9:30—19. B. A. THOMAS, JR. Robert Peter as an Agricultural Chemist.
9:45—20. NASH COLLIER, JR. Benefits of Undergraduate Research. Description of a Problem.
10:00—21. MARY RITA STOVALL, NORITA THIBODEAUX, AND SISTER MARY ADELINE. A Study of the Sugars in the Fruit of Bittersweet.
10:15—22. B. A. SMITH. Colloidal Selenium.
10:30—23. NANCY BROWER. Copper from Chile.
10:45—24. ALICE KUEBEL. A Preparation and Some Properties of Ammonium Diuranate
11:00—25. J. S. BURCH. The Cracking of Heavy Hydrocarbons.
11:15—26. HULIT MADINGER. The Production of 100-Octane Fuels by Alkylation.
11:30—27. MARY A. SULLIVAN. The Analysis of the Intermediate Complex Compound Containing Nickel Formed in the Preparation of 4,4'-Dicyanobiphenyl by the Sandmeyer Reaction.
12:15— Divisional luncheon, Hotel Claridge, Balinese Room, $1.15. Speaker, HARRY N. HOLMES, President of the AMERICAN CHEMICAL SOCIETY.

C. E. WHITE, *Presiding*

2:30—28. W. J. L. WALLACE AND THEODORE AUSTIN. Variation of Index of Refraction with Concentration in Aqueous Solutions of Glycine and *dl*-Alanine.
2:40—29. IBERT WELLS. The Chemistry of Vitamin B_1.
2:55—30. E. M. BURAS, JR. Hydrolysis of Alkaline Earth Sulfides.
3:10—31. R. R. PHILLIPS. Theories of Catalysis.
3:25—32. JOHN STERLING. Synthetic Rubber Polymerization.
3:40—33. HUBERT DUBOIS. Alkalies, Magnesium and Sulfur Compounds in Portland Cement.

Division of Colloid Chemistry

FRED OLSON, *Chairman;* J. W. MCBAIN, *Secretary*
GEORGE N. FERGUSON, *Local Assistant*

Auditorium, Room J

Thursday Morning

10:00— 1. J. W. MCBAIN. Application of the Phase Rule to Soap Boiling.
10:30— 2. W. O. MILLIGAN, HARRY B. WEISER, AND JOHN M. MARSHALL, JR. X-Ray Diffraction Studies on Precipitated Cuprous and Cupric Sulfides.
11:00— 3. C. E. MARSHALL AND C. A. KRINBILL. The Electrochemical Properties of Mineral Membranes. V. Beidellite Membranes and the Determination of Sodium.
11:30— 4. SYDNEY ROSS. Measurement of Foam and Emulsion Stabilities in Characteristic Units.
12:15— Divisional luncheon, DeVoy Hotel, Room A-B, $1.15.

Division of Gas and Fuel Chemistry

O. W. REES, *Chairman;* G. R. YOHE, *Secretary*
HERBERT FISHBURN, *Local Assistant*

Auditorium, Room F

Wednesday Afternoon

2:00— 1. O. W. REES. Introductory Remarks.
2:15— 2. MARTIN A. ELLIOTT AND L. B. BERGER. Studying Combustion in the Diesel Engine by Addition of Gaseous Combustibles to the Intake Air.
2:45— 3. L. L. HIRST, A. EISNER, J. H. FIELD, H. M. COOPER, R. F. ABERNETHY, AND H. H. STORCH. Hydrogenation and Liquefaction of Coal. IV. Characterization of Assay Oils.
3:15— 4. GEORGE W. LAND. The Application of Radiographic Methods to the Problem of the Absorption of Liquids by Coal.
3:40— 5. G. R. YOHE AND MYRON H. WILT. The Oxidizing Power of Illinois Coal. II. The Effects of Extended Time.
4:00— 6. O. W. REES AND K. F. BURSACK. The Use of a New Type of Equipment for Determining Moisture in Coal.

Division of the History of Chemistry

HARRISON HALE, *Chairman;* RALPH E. OESPER, *Secretary*
OGDEN BAINE, *Local Assistant*

Auditorium, Room E

Tuesday Morning

SYMPOSIUM ON THE HISTORY OF CHEMISTRY IN THE SOUTH

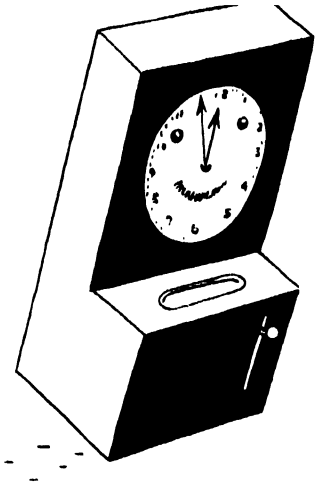
9:00— 1. HARRISON HALE. Introductory Remarks.
9:05— 2. JOHN XAN. History of Chemistry in Alabama.
9:20— 3. P. G. HORTON AND HARRISON HALE. History of Chemistry in Arkansas.
9:40— 4. OGDEN BAINE. History of Chemical Education in Tennessee.
10:00— 5. M. HUME BEDFORD. Some Representative Chemists of Kentucky.
10:15— 6. E. A. FIEGER. History of Chemistry in Louisiana. Development of the Sugar Cane Industry.
10:30— 7. J. E. COPENHAVER. History of Chemistry in South Carolina.
10:45— 8. WORTLEY F. RUDD. History of Chemistry and Chemical Education in Virginia.
11.00— 9. TOWNES R. LEIGH. Brief History of Chemistry in the Colleges and Universities in Florida.

Wednesday Morning

GENERAL PAPERS

9:00—10. JOHN T. CHAPPELL. Chemical Gleanings from the Bible.

CONTINUED ON PAGE 402



BUSINESS AS UNUSUAL

Eagle Eye* Reports Briefly on NATIONAL DEFENSE and Temperature Controllers

(with no appreciable assistance from the censors)

"Business as *un*usual is the only way to describe this company, today. Never in its brief but busy history have I seen so much activity. New materials, methods, and demands require daily adjustments and these people seem to thrive on them. But then, Wheelco has always pioneered the new and *un*usual.

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Stranger, " 'Just one more question. Those POTENTIO-TROLS . . .?' "

Sales Manager, " 'They are the Rolls-Royce of temperature controllers. The ones you saw will control the treating temperatures of hair springs used in the noses of shells. They are being shipped to the [redacted], at [redacted], [redacted], but let me tell you about PROPORTIONING CONTROL, PROGRAM CONTROL, REMOTE CONTROLLERS, RHEOTROLS, THERM-OTROLS, ...' "

Stranger, (interrupting) " 'I'd like to hear it but I have to hurry. Maybe some other time.' "

Sales Manager (*calling after him*) " **'I'll send you a complete catalog.** (*Aside*) **Or to anyone else who wants more information on Wheelco equipment.'** "

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American Chemical Society[1]

103RD MEETING. Memphis, Tenn., April 20 to 23, 1942.

104TH MEETING. Buffalo, N. Y., September 7 to 11, 1942.

105TH MEETING. Indianapolis, Ind., spring of 1943.

106TH MEETING. Minneapolis, Minn., fall of 1943.

NATIONAL CHEMICAL EXPOSITION. Stevens Hotel, Chicago, Ill., November 17 to 22, 1942.

NINETEENTH NATIONAL COLLOID SYMPOSIUM, Division of Colloid Chemistry. University of Colorado, Boulder, Colo., June 18 to 20, 1942.

Other Scientific Societies

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, Southwestern Division. Las Cruces, N. Mex., April 27 to 30. Annual meeting.

AMERICAN ASSOCIATION OF CEREAL CHEMISTS. Edgewater Beach Hotel, Chicago, Ill., May 18 to 22. Annual meeting.

AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS AND AMERICAN INDUSTRIAL HYGIENE ASSOCIATION. Hotel Gibson, Cincinnati, Ohio, April 13 to 17. Annual meeting.

AMERICAN CERAMIC SOCIETY. Hotel Netherland-Plaza, Cincinnati, Ohio, week of April 19. Annual meeting.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Boston, Mass., May 11 to 13. Semiannual meeting.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Chicago, Ill., June 22 to 26.

AMERICAN INSTITUTE OF NUTRITION. Boston, Mass., April 1 and 2.

AMERICAN LEATHER CHEMISTS ASSOCIATION. Deshler-Walleck Hotel, Columbus, Ohio, June 1 and 2.

AMERICAN SOCIETY OF BIOLOGICAL CHEMISTS. Copley-Plaza, Boston, Mass., March 31 to April 4.

AMERICAN SOCIETY OF BREWING CHEMISTS. Netherland-Plaza Hotel, Cincinnati, Ohio, May 25 to 27.

AMERICAN SOCIETY FOR TESTING MATERIALS. Atlantic City, N. J., June 22 to 26.

ELECTROCHEMICAL SOCIETY. The Hermitage Hotel, Nashville, Tenn., April 15 to 18.

INSTITUTE OF FOOD TECHNOLOGISTS. Minneapolis, Minn., June 15 to 17.

NATIONAL PETROLEUM ASSOCIATION. Hotel Cleveland, Cleveland, Ohio, April 16 and 17. Semiannual meeting.

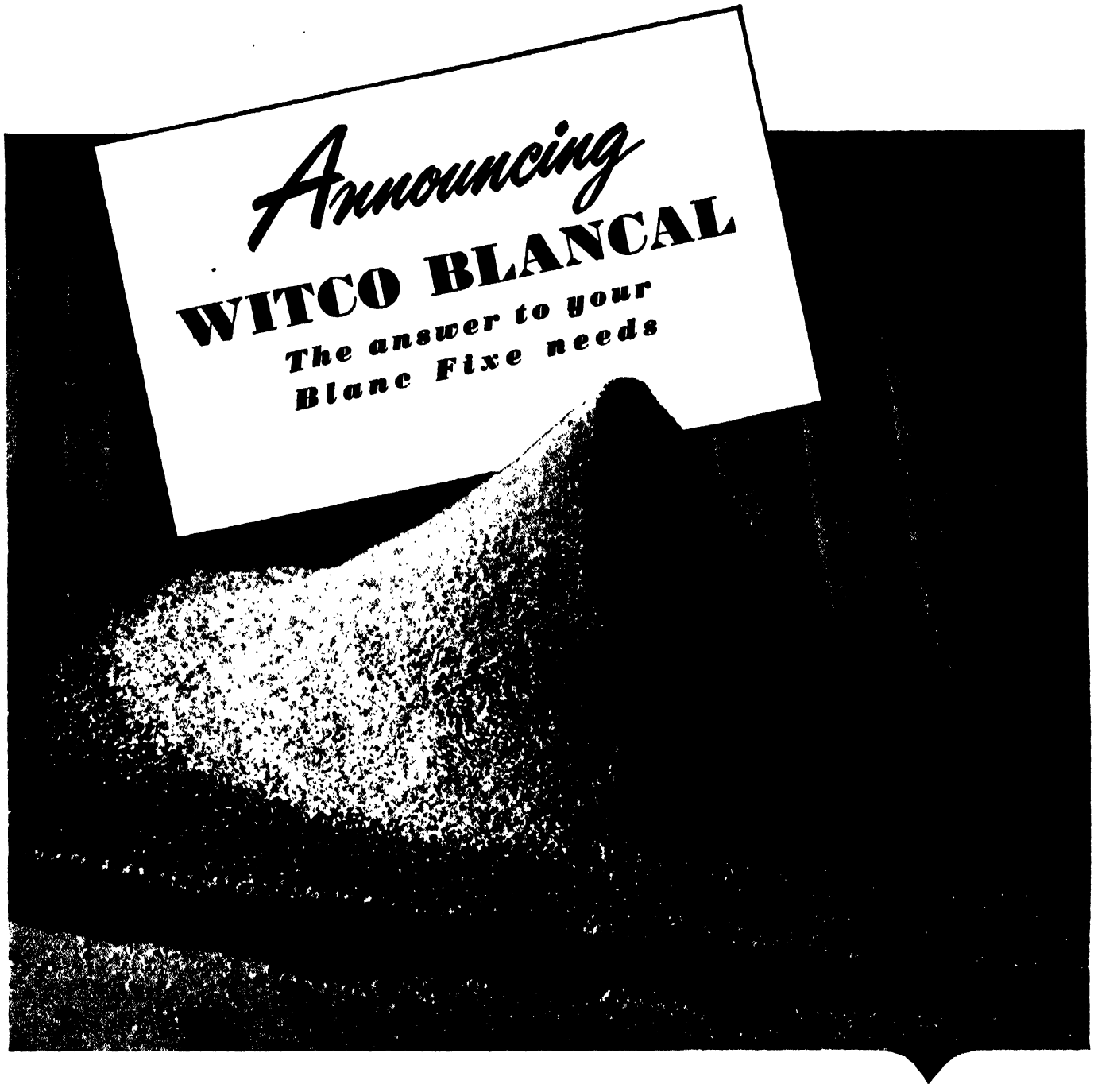
SCIENTIFIC APPARATUS MAKERS OF AMERICA. Hotel Hershey, Hershey, Penna., June 1 to 3.

[1] The list of the Society's National Officers and Directors, Editors, members of Council, Divisional and Local Section Officers, Committees, and Chapters of Student Affiliates appears in CHEMICAL AND ENGINEERING NEWS three times a year—usually February 10, May 10, and October 10. The latest list is printed on page 187 of the February 10 issue.

Local Sections

SECTION AND PLACE	APRIL	SPEAKER	SUBJECT
Akron, Women's City Club	8	**Harry N. Holmes**	Vitamins and Public Health
Ames, Iowa State College	15	**Albert L. Henne**	Pure Hydrocarbons
Cleveland, Cleveland Engineering Society	15		Symposium
Colorado, Oxford Hotel, Denver	11	**Albert L. Henne**	Aliphatic Fluorides
Detroit, Rackham Building	10	**M. C. Teague**	Latex in War
Florida, Chemistry Auditorium, University of Florida, Gainesville	1	**H. Jermain Creighton**	Mannitol and Sorbitol
Indiana, see Purdue			
Maine, Lecture Room, Chemistry Building, Bates College, Lewiston	11	**R. M. Burns**	The Chemistry of Corrosion
Michigan State College, Kedzie Chemical Laboratory, East Lansing	9	**M. C. Teague**	Some Recent Fiber-Latex Developments
Midland, Mich., Auditorium, Dow Chemical Co.	8	**M. C. Teague**	The Use of Latex in time of War
Nebraska, Chemistry Building, University of Nebraska, Lincoln	13	**Albert L. Henne**	Aliphatic Fluorides
New York, Hotel Pennsylvania	10	**Marston T. Bogert**	The Ramparts the Chemists are Guarding
North Carolina, 206 Venable Hall, University of North Carolina, Chapel Hill	6	**H. Jermain Creighton**	Mannitol and Sorbitol
North Jersey, Hotel Winfield Scott, Elizabeth	6	**Harry N. Holmes**	Strategic Materials and National Defense
Northeastern, Huntington Hall, M. I. T., Cambridge, Mass.	9	**R. M. Burns**	Protective Coatings for Corrosion Prevention
Northwestern Utah, Chemistry Building, University of Utah, Salt Lake City	9	**Albert L. Henne**	Aliphatic Fluorides
Omaha, University of Omaha	14	**Albert L. Henne**	Aliphatic Fluorides
Oregon, Chemistry Building, Oregon State College, Corvallis	4	**Albert L. Henne**	Aliphatic Fluorides
Pennsylvania–New York Western Border, Olean, N. Y.	11	**D. K. Tressler**	Chemistry of the Frozen Foods
Purdue, Purdue Memorial Union Building, Lafayette, Ind	11	**Harry N. Holmes**	A Chemist's Adventures in Medicine (joint meeting with Indiana Section)
Rhode Island, Providence	10	**R. M. Burns**	
Rochester, Lower Strong Auditorium, River Campus, University of Rochester	6	**John F. Flagg**	Recent Developments in Organic Analytical Reagents
Sacramento, Calif., Junior College	8	**Albert L. Henne**	Aliphatic Fluorides
South Carolina, Science Hall, Furman University, Greenville	3	**H. Jermain Creighton**	Mannitol and Sorbitol
South Jersey, Du Pont Penns Grove Country Club, Penns Grove	14	**C. R. Hoover**	The Treatment of Liquid Industrial Wastes
Syracuse, Bowne Hall, Syracuse University	15	**Sidney J. French**	Low Melting Alloys
Toledo, Room 1, University of Toledo	6	**M. C. Teague**	The Use of Latex in Time of War
University of Michigan, Chemistry Building, Ann Arbor	7	**M. C. Teague**	Rubber Latex in Peace and in War
Virginia, Williamsburg	11	**W. Henry Bradshaw**	Viscose and Cordura Rayon
Virginia Blue Ridge, Roanoke	11	**John H. Rushton**	Liquid-Liquid Extractions
Washington, D. C., Cosmos Club	9	**D. A. MacInnes**	Electrophoretic Study of Proteins
Wooster (Ohio), Orrville	14	**V. H. Morris**	The Cereal Chemist Bakes a Cake





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Dept. B

9:15—11. C. A. Browne. Bernard Tollens (1841-1918) and Some American Students of His School of Agricultural Chemistry.
9:35—12. Virgil F. Payne. Letters to Robert Peter. V. From Amos Easton and Fay Edgerton.
9:50—13. Florence E. Wall. August Wilhelm von Hofmann (1818-92). An Appreciation.
10:05—14. George W. Muhleman. Life Begins at 70.
10:25—15. C. A. Browne. Report of the Committee on the History of Chemistry in America.
11:15— Business meeting.

Division of Industrial and Engineering Chemistry

L. W. Bass, *Chairman;* Whitney Weinrich, *Secretary*
Frank A. Anderson, *Local Assistant*

Tuesday Morning

Auditorium, Room J

GENERAL PAPERS

L. W. Bass, *Presiding*

9:00— 1. G. L. Frear, E. F. Ogg, and L. H. Hull. Preferential Oxidation of Phosphorus in the Presence of Carbon Monoxide.
9:20— 2. R. F. Nickerson. Structure, Properties, and Industrial Utilization of Cotton.
9:50 — 3. A. L. Barney and H. B. Hass. A New Method for the Conversion of Thymol to Racemic Menthol.
10:10— 4. C. F. Feasley with Ed. F. Degering. Utilization of Aliphatic Nitro Compounds. VII. The Condensation of Aryl Diazonium Salts and/or Hydroxides with Secondary Nitroalkanes.
10:25— 5. Donald F. Othmer and Philip E. Tobias. Liquid-Liquid Extraction Data. II.
10:40— 6. Donald F. Othmer and Philip E. Tobias. Liquid-Liquid Extraction Data. III. Tie-Line Correlation.
10:55— 7. Donald F. Othmer and Philip E. Tobias. Liquid-Liquid Extraction Data. IV. Partial Pressures of Ternary Liquid Systems and the Prediction of Tie Lines.
11:15 — 8. Donald F. Othmer and R. E. White. Correlating Gas Solubilities and Partial Pressure Data.

12:15— Divisional luncheon, Hotel Claridge, Airdrome Room, $1.15.

Tuesday Afternoon

Hotel Peabody, Ballroom

EFFECT OF NATIONAL EMERGENCY ON RESEARCH ADMINISTRATION

L. W. Bass, *Presiding*

2:00— 9. Albert L. Elder. Research Investigation, Secrets, and Chemical Patents during the War.
2:45—10. Open Forum on Effect of Priorities on Laboratory Supplies and Equipment.
H. E. Barnard will discuss the application of priorities to the needs of chemical laboratories. This will be followed by comments from selected laboratory administrators. The meeting will then be opened for discussion.

Wednesday Morning

Auditorium, Room J

GENERAL PAPERS

R. Norris Shreve, *Presiding*

9:00—11. Thomas H. Vaughn and Anton Vittone, Jr. The Properties of Detergent Solutions. A Comparison of the Detergent Action and Whiteness Retention Property of Laundry Soap Builders.
9:15—12. L. P. Hart, R. W. Work, L. T. Irish, and M. A. Howe. Characteristics of Composition Cork.
9:45—13. E. D. Unger, W. H. Stark, R. E. Scalf, and Paul Kolachov. Engineering and Design Factors in a Continuous Aerobic Process for Production of Distiller's Yeast.
10:05—14. Robert O. Schmitt, Paul Kolachov, and Herman F. Willkie. Study of Processing Equipment for Whisky Filtration.
10:25—15. Milton Gallagher, Paul Kolachov, and Herman F. Willkie. Whisky Losses during Aging.
10:45—16. Walter J. Podbielniak. Decontamination and Dehumidification of Air by Counter-Current Washing in a Centrifugal Contactor.

Division of Medicinal Chemistry

John H. Gardner, *Chairman;* John H. Speer, *Secretary*
Forrest K. Green, *Local Assistant*

Wednesday Morning

Auditorium, Room F

GENERAL PAPERS

9:15— 1. Henry R. Henze and Robert L. McKee. Hydantoins Containing a Tetrahydropyranyl Substituent.
9:30 — 2. Simon L. Ruskin. Preparation of New Sulfonamide Compounds.
9:45— 3. Maurice L. Moore and Charles S. Miller. Dicarboxylic Acid Derivatives of Sulfonamides.
10:00— 4. Philip S. Winnek, George W. Anderson, Harry W. Marson, H. Eldridge Faith, and Richard O. Roblin, Jr. Studies in Chemotherapy. V. Sulfanilylcyanamide and Related Compounds.
10:15— 5. L. L. Bambas. Some Chemotherapeutically Active Heterocyclic Sulfones.
10:30— 6. Arthur W. Weston, A. Wayne Ruddy, and C. M. Suter. The Condensation of Unsaturated Amines with Aromatic Compounds. The Preparation of Beta-Substituted Phenethylamines.
10:45— 7. Robert R. Burtner, John W. Cusic, and Gerhard Lehmann. Antispasmodic Properties of Basic Esters of Some Polynuclear Carboxylic Acids.
11:00— 8. Allan R. Day. The Preparation of Some Substituted Benzimidazoles and a Study of Their Physiological Properties.

12:15— Divisional luncheon, Hotel Claridge, Airdrome Room, $1.15.

Division of Organic Chemistry

Lee I. Smith, *Chairman;* Arthur C. Cope, *Secretary*
Jacob R. Meadow, *Local Assistant*

Auditorium, Room L

Tuesday Morning and Afternoon

9:30— 1. Kenneth N. Campbell and Barbara K. Campbell. Studies on the Dehydration of Amino Alcohols. II.
9:45— 2. William H. Elliott and C. N. Jordan. The Synthesis of Some Dialkyl Amino Alkyl Picryl Ethers.
10:00— 3. Edgar A. Steck and Allan R. Day. A Study of the Mechanism Involved in the Formation of Phenanthrimidazoles from Phenanthraquinone, Aldehydes, and Ammonia.
10:15— 4. Charles W. C. Stein and Allan R. Day. The Reaction of Retenequinonimine with Aldehydes and Amines.
10:30— 5. Sherman D. Lesesne with Henry R. Henze. Utilization of Alkoxy Ketones in the Synthesis of Quinolines by the Pfitzinger Reaction. II.
10:45 — 6. Walter F. Holcomb and Cliff S. Hamilton. Derivatives of 4-Amino-6-Methoxyquinaldine.
11:00— 7. Jacob R. Meadow and E. Emmet Reid. Identification of Alcohols with Saccharin Chloride.
11:15 — 8. Kenneth N. Campbell, Barbara K. Campbell, and Elmer Paul Chaput. The Action of Phenylmagnesium Bromide on Alpha-Chlorobutyronitrile.
11:30— 9. M. S. Kharasch and W. B. Reynolds. Oxidation of Grignard Reagents. Effect of Metallic Catalysts.
11:45—10. Richard T. Arnold and R. Winston Liggett. Resonance and the Hindered Carbonyl-Grignard Reaction.

2:00—11. Robert C. Hockett and Mortimer H. Nickerson. A Crystalline Hemiacetal of 2,4; 3,5-Diethylidene-*l*-xylose with 1,3; 2,4-Diethylidene-*d*-sorbitol.
2:15—12. Robert C. Hockett and William H. Reeder, III. The Rates of Oxidation of 3,4,5,6-Tetrabenzoyl-*ald.*-*d*-glucose and of 3,5,6-Tribenzoyl-*d*-glucofuranose by Lead Tetraacetate.
2:30—13. W. T. Haskins, Raymond M. Hann, and C. S. Hudson. Synthesis of Cellobiose.
2:45—14. Herbert I. Bernstein, William C. Quimby, and Everett S. Wallis. Photochemical Dimerization of *trans*-Cinnamic Acid.
3:00—15. C. F. H. Allen and J. Van Allan. Carbonyl Bridge Compounds.
3:15—16. Charles C. Price, Robert W. Kell, Edwin Krebs, and Byron E. Tate. Addition Polymerization Catalyzed by Substituted Acyl Peroxides.
3:30—17. Lee T. Smith, C. H. Fisher, E. M. Filachione, W. P. Ratchford, and M. L. Fein. Pyrolysis of Lactic Acid Derivatives. II. Methyl Lactate, Acetoxypropionic Acid, Acetoxypropionyl Chloride, and Alkyl Acetoxypropionates.

CONTINUED ON PAGE 404

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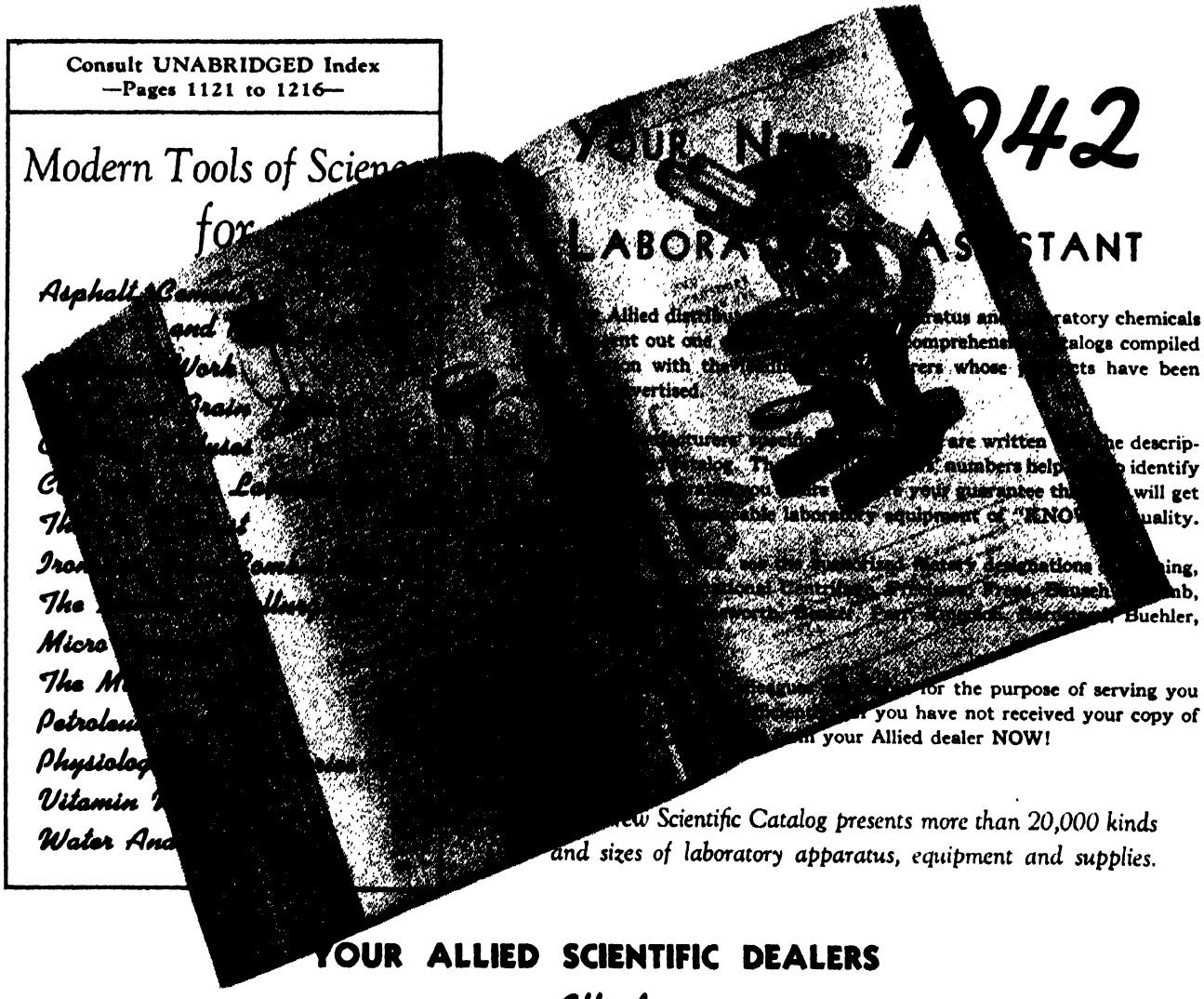
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3:45—18. Charles D. Hurd and Percy Perletz. Experiments with Phenyl Propionate and Phenoxyacetone.
4:00—19. William E. Vaughan and Frederick F. Rust. The Photoaddition of Hydrogen Bromide to Olefinic Bonds.
4:15—20. Frederick F. Rust and William E. Vaughan. The Olefin–Oxygen–Hydrogen Bromide Photoreaction.
4:30—21. William E. Vaughan and Frederick F. Rust. The Photoaddition of Hydrogen Sulfide to Olefinic Bonds.
4:45—22. V. I. Komarewsky, C. R. Stein, and D. P. Meigs. Catalytic Dehydration and Dehydrogenation of Benzyl Alcohol.

Wednesday Morning and Afternoon

9:30—23. Jonas Kamlet. A New Synthesis of Coumarins.
9:45—24. Walter A. Cook and Kathryn H. Cook. The Halogenation of *m*-Diphenylbenzene. II. The Monoiodo Derivative.
10:00—25. C. A. Buehler, Archie V. Slack, David A. Shirley, and Wm. T. Humphreys. Action of Formaldehyde on *m*-Hydroxybenzoic Acid.
10:15—26. L. Chas. Raiford and R. P. Perry. Structures of the Mono- and Dibromoveratric Acids.
10:30—27. G. Bryant Bachman and R. I. Hoaglin. An Attempted Synthesis of a Cyclooctatetraene. *Cis-trans* Isomerism of Substituted Diphenylbutadienes.
10:45—28. Lawrence J. Andrews and William G. Young. Allylic Rearrangements. The Hydrolysis of Butenyl Chlorides.
11:00—29. M. J. Murray, R. H. Saunders, F. F. Cleveland, and V. I. Komarewsky. The Detection of Carbonyl Groups in Aldols.
11:15—30. Charles K. Bradsher and E. Studley Smith. The Mechanism of the Cyclodehydration of *o*-Benzylphenones.
11:30—31. Charles C. Price and C. F. Huber. The Reaction of Methyl Furoate with Benzene.
11:45—32. E. T. McBee and I. B. Silverberg. Friedel and Crafts Reaction of Chloronitroparaffins.

2:00—33. C. A. Sprang with Ed. F. Degering. The Utilization of Aliphatic Nitro Compounds. VI. Nitrodiols (Nitroglycols) Prepared from Simple Aldehydes.
2:15—34. William M. Malisoff and Stuart Gilman Ballin. Studies in the Thiosterols. I. Thiocholesterol and Its Derivatives.
2:30—35. P. N. Chakravorty and R. H. Levin. Studies on Cholesterol Oxides.
2:45—36. Lee Irvin Smith, W. B. Renfrow, Jr., and J. W. Opie. The Chemistry of Vitamin E. XXXVIII. "α-Tocopheramine". The Amino-Analog of α-Tocopherol, a New Vitamin E Factor.



Madison Avenue, the Wall Street of Memphis

3:00—37. Lee Irvin Smith, W. B. Renfrow, Jr., and J. W. Opie. Chemistry of Vitamin E. XXXIX. Calcium α-Tocopheryl Succinate.
3:15—38. Willard M. Hoehn, L. H. Schmidt, and Hettie B. Hughes. Bacterial Oxidation of Cholic Acid. IV. The Isolation and Identification of Intermediate Oxidation Products of Cholic Acid.
3:30—39. S. Ruben, P. Nahinsky, C. N. Rice, and M. D. Kamen. Tracer Studies with Radioactive Carbon. The Synthesis and Oxidation of Several Three-Carbon Acids.
3:45—40. E. Campaigne and C. M. Suter. The Action of Sulfuric Acid on *tert*-Carboxylic Acids.
4:00—41. James Cason. Branched-Chain Fatty Acids. Synthesis of 17-Methyloctadecanoic Acid.
4:15—42. Keith M. Seymour and Harvey Posvic. A Study of Certain Acids Related to Naturally Occurring Naphthenic Acids.
4:30—43. M. S. Kharasch, W. Nudenberg, and S. Archer. Factors Determining the Course and Mechanisms of Grignard Reactions. The Effect of Metal Halide on the Reaction between Aromatic Acid Chlorides and Phenylmagnesium Bromide.

Thursday Morning and Afternoon

SYMPOSIUM ON ANALYTICAL METHODS IN ORGANIC CHEMISTRY

Joint symposium with the Division of Analytical and Micro Chemistry (see page 394).

Division of Paint, Varnish, and Plastics Chemistry

S. L. Bass, *Chairman;* A. C. Elm, *Secretary*
Dell Austin, *Local Assistant*

Auditorium, Room A

Tuesday Morning and Afternoon

PAINT AND VARNISH GROUP

W. W. Bauer, *Presiding*

9:00— 1. D. G. Nicholson. Complexed Metal Soaps as Oxygen Absorption and Drying Catalysts.
9:25— 2. D. G. Nicholson. Durability of Soap-Treated Zinc Oxide Paints.
9:45— 3. Charles Bogin and H. L. Wampner. The Nitroparaffins as Solvents in the Coating Industry.
10:10— 4. Albert Lightbody and D. H. Dawson. Effect of Binder on the Hiding Power of Enamels.
10:35— 5. E. K. Fischer and C. W. Jerome. The Effect of Surface-Active Agents on Pigment Dispersions in Nonaqueous Media.
11:00— 6. J. P. Kass. Catalytic Isomerization of Drying Oils.
11:25— 7. J. P. Kass. The Linoleic Acids of Synthetic Conjugated Oils.
11:50— Business meeting.

2:00— 8. E. T. McBride. Ordnance Department Paint Developments.
2:25— 9. C. E. Barnett. Some Properties of Luminescent Materials.
2:50—10. W. W. Kittelberger. The Influence of Bare Metal Areas in the Water Immersion Testing of Metal Protective Paints.
3:15—11. J. A. Geddes and D. H. Dawson. Determination of Paint Consistency on the Modified Stormer Viscometer.
3:40—12. E. H. McArdle and A. E. Robertson. Solvent Properties of Isomeric Paraffins. I.
4:05—13. D. W. Young and E. H. McArdle. Note on Viscosity Determination of Polymer Solutions.

6:30— Divisional dinner, Hotel Gayoso, Forrest Room, $2.25.

Wednesday Morning and Afternoon

PLASTICS GROUP

S. L. Bass, *Presiding*

9:00—14. N. Wright. Infrared Data on the Structure of Polystyrene
9:30—15. T. Alfrey and H. Mark. The Fractionation of Polystyrene.
10:00—16. A. R. Kemp and H. Peters. Viscosity and Cryoscopic Studies of Polystyrene. Discussion of Staudinger's Viscosity Rule.
10:30—17. A. R. Kemp and H. Peters. Cryoscopic and Viscosity Studies of Polyisobutylene. Cryoscopic Deviation of Polyisobutylene Solutions from Raoult's Law.

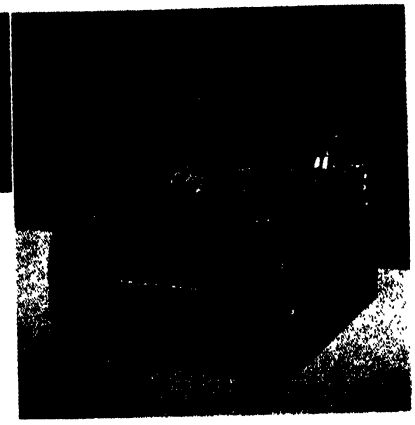
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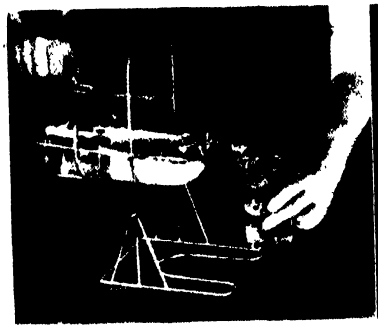
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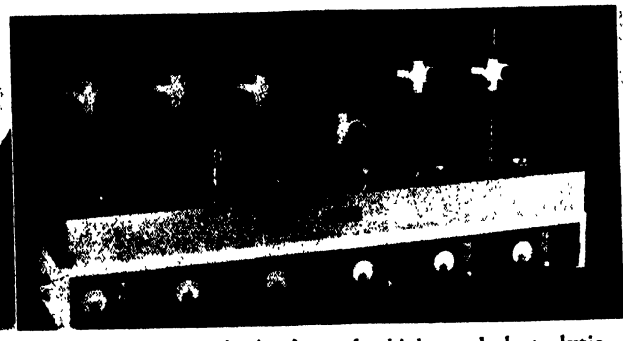
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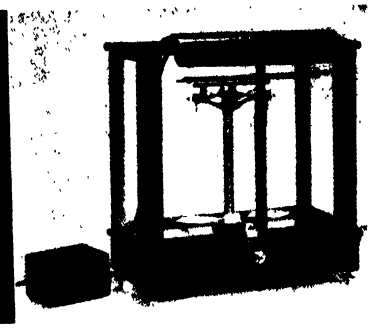
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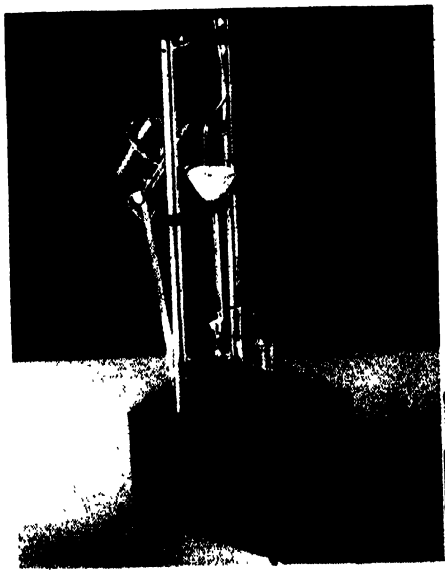
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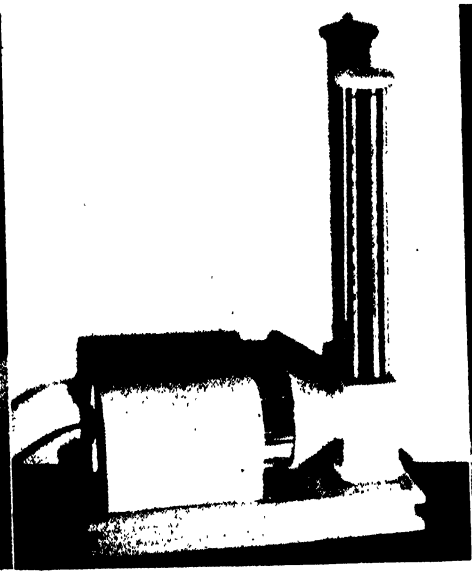
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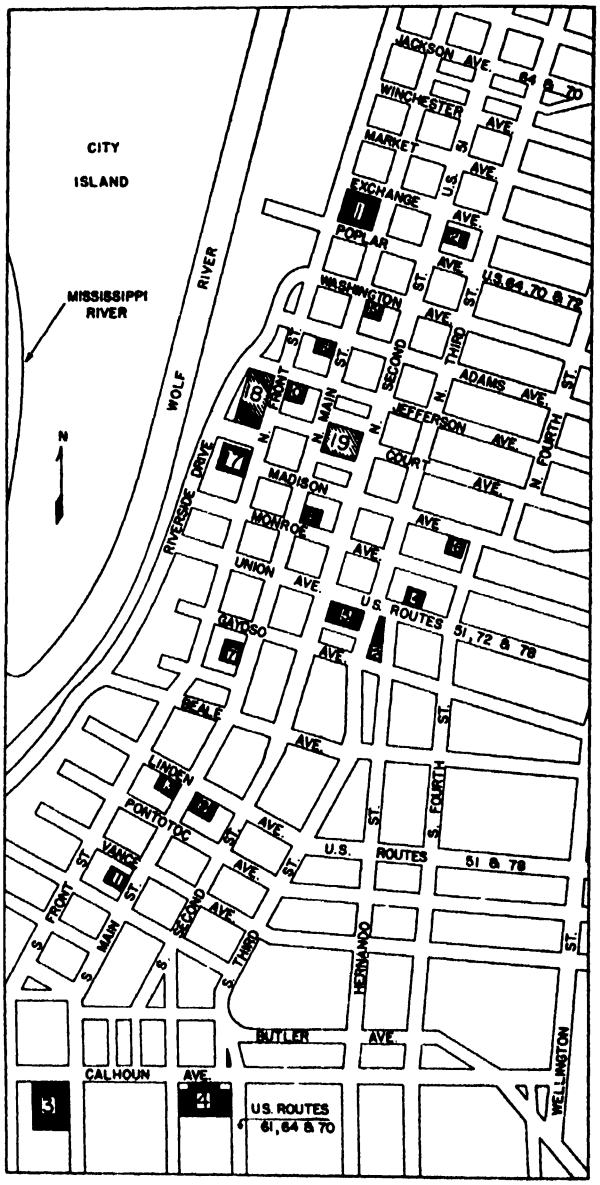
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11:00—18. M. L. Huggins. Theory of Solutions of High Polymers.
11:30—19. Albert Bartovics, W. H. Gardner, and H. Mark. Investigation of the Viscosity of Shellac.

2:00—20. E. T. McBride. Ordnance Department Plastics Developments.
2:30—21. E. L. Kropscott. The Relative Permanence to Heat of Injection-Molded Thermoplastics.
3:00—22. Fritz Rosenthal. Cottonseed Meal in Phenolic Plastics.
3:30—23. P. V. McKinney. Proposed Electrophotometer Color Intensity Standards for Grading Resins.
4:00—24. P. O. Powers. The Cloud Point of Varnish Resins in Drying Oils.



Map of Downtown Memphis

1. Municipal Auditorium
2. First Methodist Church, Pepper Memorial Bldg.
3. Grand Central Station
4. Union Station
5. Peabody Hotel
6. Claridge Hotel
7. Gayoso Hotel
8. Wm. Len Hotel
9. Chisca Hotel
10. DeVoy Hotel
11. Ambassador Hotel
12. Tennessee Hotel
13. Adler Hotel
14. Rex Hotel
15. Jefferson Hotel
16. Reid Hotel
17. Post Office
18. Confederate Park
19. Court Square

Outlying Hotels

Blackstone Hotel	855 Union Ave.
Parkview Hotel	1914 Poplar Ave.
Alamo Plaza Courts	2862 Summer Ave.

Division of Petroleum Chemistry

J. K. Roberts, *Chairman;* L. M. Henderson, *Acting Secretary*
Douglas F. Calder, *Local Assistant*

Auditorium, Room K

Tuesday Morning and Afternoon

9:30— 1. Gustav Egloff and P. M. Van Arsdell. Substitute Fuels. A War Economy of World Dimension.
10:00— 2. Julian G. Ryan. Influence of Sulfur Compounds upon Octane Number and Lead Susceptibility of Gasoline.
10:30— 3. O. L. Polly, A. C. Byrns, and W. E. Bradley. Isolation of Sulfur Compounds from a California Straight-Run Gasoline.
10:50— 4. G. H. von Fuchs and H. Diamond. Oxidation Characteristics of Lubricating Oils. The Relation between Stability and Chemical Composition.
11:15— 5. George Wash, W. O. Ney, Jr., W. Crouch, and H. L. Lochte. Some Additional Acids from California Petroleum.
11:35— 6. E. C. Knowles and F. C. McCoy. Surface Consistency Characteristics of Asphalts.

2:00— 7. Gustav Egloff, George Hulla, and Jacque C. Morrell. Alkenes, Alkadienes, Alkapolyenes. Their Source and Production.
2:30— 8. B. T. Brooks. Thirty Years of Petroleum Research.
3:00— 9. Karl Uhrig and Harry Levin. Determination of Thiosulfate in Used Doctor Solution.
3:20—10. B. R. Stanerson and Harry Levin. Determination of Olefins in C_3 and C_4 Hydrocarbons.
3:40—11. A. E. Hirschler. Molecular Weights of Viscous Hydrocarbon Oils.
4:00—12. F. Drew Mayfield. Critical States of Two-Component Paraffin Hydrocarbon Systems.
4:20—13. Gustav Egloff and R. C. Kuder. Studies of the Physical Properties of Alicyclic Hydrocarbons. II. Boiling Points of Monocyclic Hydrocarbons.

Division of Physical and Inorganic Chemistry

W. C. Fernelius, *Chairman;* O. K. Rice, *Secretary*
Glenn H. Brown and G. Leslie McKee, Jr., *Local Assistants*

Monday Afternoon

6:30— Divisional dinner, Hotel Gayoso, Ballroom, $1.65.

Tuesday Morning and Afternoon

First Methodist Church, Pepper Memorial Building, Room X

SYMPOSIUM ON THE HYDROGEN BOND AND RELATED TOPICS

O. K. Rice, *Presiding*

9:30— 1. O. K. Rice. Introduction.
9:45— 2. Kasimir Fajans and William M. Spurgeon. Intermolecular Bonding by the Proton and Other Particles of High Polarizing Power.
10:45— 3. M. J. Copley. Effect of the Hydrogen Bond on Solubility.
11:25— 4. Arthur A. Maryott, Marcus E. Hobbs, and Paul M. Gross. The Heat of Dissociation of the Hydrogen Bond.

2:15— 5. H. Mark. Intermolecular Forces and Hydrogen Bridges in High Polymers.
3:15— 6. Maurice L. Huggins. Hydrogen Bonds in Proteins.

Wednesday Morning

SECTION A. PHYSICAL CHEMISTRY

First Methodist Church, Pepper Memorial Building, Room X

R. E. Gibson, *Presiding*

9:15— 7. Marcus E. Hobbs, A. J. Weith, Jr., and Paul M. Gross. The Electric Moment of the Hydrogen Fluoride Molecule as Determined in Dioxane Solution.
9:40— 8. J. Russell Bright and Joseph J. Jasper. Molecular Surface Energy of Sulfur Dioxide Addition Compounds. II.
10:05— 9. Arthur Tobolsky, Ira Wheeler, and Henry Eyring. Entropies of Liquids.
10:30—10. W. E. Wallace. Heats of Solution and Dilution of Calcium Sulfate Dihydrate in Aqueous Sodium Chloride Solutions.
10:55—11. Edward S. Amis and Joseph B. Price. Dielectric

CONTINUED ON PAGE 408



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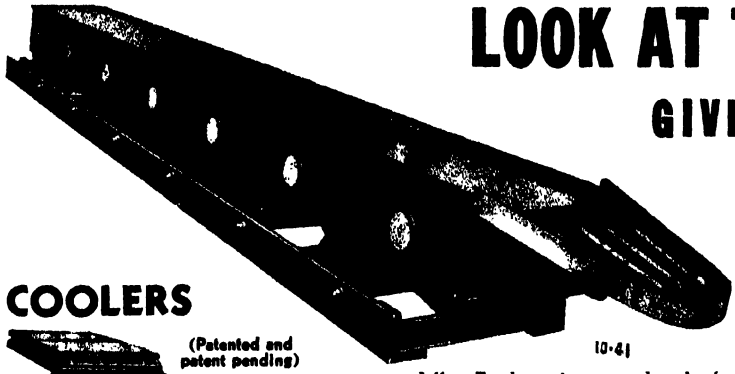
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- Anhydrous Hydrogen Fluoride
- Anhydrous Boron Trifluoride
- Aluminum Salts
- Antimony Salts
- Cadmium Pigments
- Chromium Salts
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- Manganese Salts
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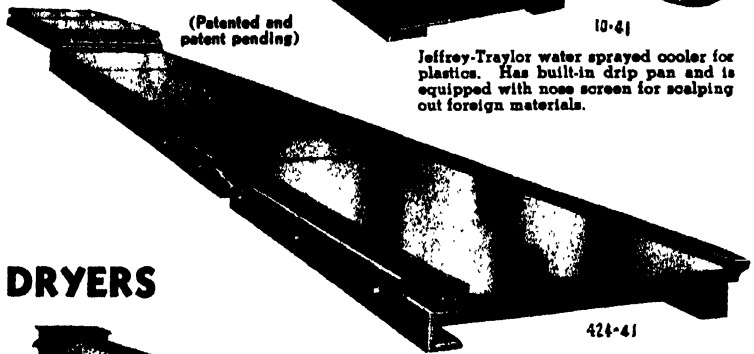


COOLERS

(Patented and patent pending)

10-41

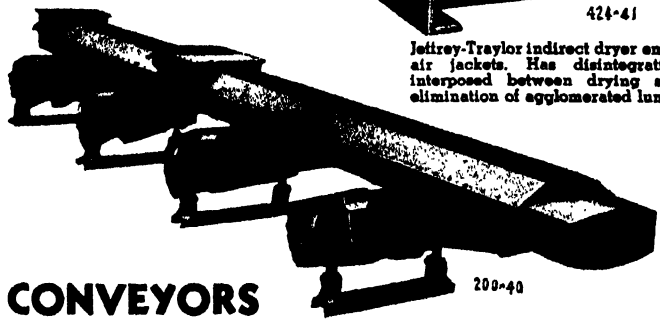
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and Solvent Effects upon the Regeneration in Acid Solution of Alkali-Faded Bromo Phenol Blue.

11:20—12. Hilton A. Smith and R. R. Myers. The Acid Catalyzed Hydrolysis of Phenyl-Substituted Aliphatic Esters.

11:45—13. Lloyd B. Thomas and Francois G. Olmer. Accommodation Coefficients of Gases on Platinum Filaments as a Function of Temperature.

SECTION B. PHYSICAL CHEMISTRY

First Methodist Church, Pepper Memorial Building, Room Y

W. C. Fernelius, *Presiding*

9:15—14. Thos. De Vries and J. B. Montgomery. A Study of Flow Calorimeters.

9:40—15. Frank W. Schwab and Edward Wichers. The Freezing Temperature of Benzoic Acid as a Secondary Fixed Point in Thermometry.

10:05—16. R. H. Kienle and J. M. Sayward. Certain Physical-Chemical Properties of Orthanilamide, Metanilamide, and Sulfanilamide.

10:30—17. Frank B. West and Anthony Pietromonaco. The Equilibrium Constant in the System Isopropyl Alcohol–Sodium Hydroxide–Sodium Isopropoxide–Water.

10:55—18. R. H. Ewell and L. M. Welch. Rectification in Ternary Systems. I. Methanol-Acetone–Methylene Chloride and Methanol-Acetone-Chloroform.

11:20—19. William E. Vaughan and Frank C. Collins. P-V-T-x Relations of the System Propane-Isopentane.

Wednesday Afternoon

SECTION A. KINETICS

First Methodist Church, Pepper Memorial Building, Room X

R. E. Gibson, *Presiding*

2:00—20. T. Higuchi, W. U. Day, L. B. Seely, Jr., and J. E. Willard. Reactions of Halogens with Halogenated Methanes.

2:25—21. Robert B. Anderson and H. H. Rowley. The Kinetics of the Thermal Decomposition of *n*-Propyl and *i*-Propyl Formates.

2:50—22. Paul Fugassi and Earl Warrick. The Empirical Correlation of the Activation Energies of Gaseous Unimolecular Reactions with Vibrational Frequencies.

3:15—23. Bruce Longtin. The Statistical Thermodynamic Basis of Rate Laws.

3:40—24. Chas. E. Waring and Paul Becher. The Theoretical Significance of the Functional Relation between the Parameters of the Andrade Equation.

4:05—25. Chas. E. Waring and Paul Becher. Explanation of the Functional Relation between the Constants of the Arrhenius Equation.

SECTION B. INORGANIC CHEMISTRY

First Methodist Church, Pepper Memorial Building, Room Y

W. C. Fernelius, *Presiding*

2:00—26. Harold Simmons Booth and Donald Ray Martin. Systems with Boron Trifluoride.

2:25—27. Chester A. Snell and Roland Ward. The Reaction of Monazite Sand with Sodium Carbonate.

2:50—28. Ralph C. Young. The Reaction of Anhydrous Rare Earth Bromides with Certain Esters and Separations Based Thereon.

3:15—29. Therald Moeller. Contributions to the Chemistry of Indium. VI. The Effects of Certain Alpha-Hydroxy Anions upon the Precipitation of Hydrous Indium Hydroxide.

3:40—30. Hobart H. Willard and Taft Y. Toribara. A Study of Complex Dioxalatothiometastannates.

4:05—31. H. B. Van Valkenburgh. The Absorption Spectra and Other Properties of Some Isomeric Cobalt Ammines.

Thursday Morning and Afternoon

First Methodist Church, Pepper Memorial Building, Room X

SYMPOSIUM OF RARE EARTHS

L. F. Yntema, *Presiding*

9:20—32. B. S. Hopkins. Introduction.

9:40—33. Edward Wichers. The Analytical Reactions of the Rare Earths.

10:30—34. Herbert N. McCoy. Review of the Chemistry of Europium.

11:20—35. D. W. Pearce. Geochemistry of the Rare Earths.

2:00—36. L. L. Quill, M. L. Pool and J. D. Kurbatov. The Radioactivity of the Rare Earth Elements.

2:50—37. Charles M. Mason. The Magnetic Properties of the Rare Earths.

3:40—38. F. H. Spedding. Absorption Spectra of the Rare Earth Oxides.



Pepper Memorial Building and the First Methodist Church

Division of Sugar Chemistry and Technology

S. M. Cantor, *Chairman;* E. Whitman Rice, *Secretary*
Robert F. Could, *Local Assistant*

Wednesday Morning

First Methodist Church, Pepper Memorial Building, Room Z

CHEMICAL UTILIZATION OF CARBOHYDRATES

S. M. Cantor, *Presiding*

9:00—1. S. M. Cantor. Introductory Remarks.

9:10—2. Norman F. Kennedy. Chemical Utilization of Starch and Products from Starch.

9:50—3. J. K. Dale. The Preparation of Chemicals from Carbohydrate Materials by Fermentation Methods.

10:30—4. E. Whitman Rice. Sugar as a Base Material for Chemical Production.

11:10—5. Carl S. Miner. Discussion of papers.

11:25— General discussion.

Wednesday Afternoon

First Methodist Church, Pepper Memorial Building, Room Z

GENERAL PAPERS

2:00—6. L. A. Underkofler, Lu Cheng Hao, and Ellis I. Fulmer. Fungal Amylases as Saccharifying Agents in the Ethanol Fermentation of Corn.

2:30—7. H. R. Bilford, R. E. Scalf, W. H. Stark, and Paul Kolachov. A Rapid Continuous Fermentation Process for the Alcoholic Fermentation of Molasses.

3:00—8. T. R. Gillett and A. L. Holven. Photoelectric Measurement of Reflected Color of Sugar Products.

3:20—9. A. L. Holven. Continuous Automatic Measurement of Supersaturation in Sugar Boiling Operations.

3:40—10. Victor R. Deitz. Some Physical Properties of Bone Chars and Other Carbon Adsorbents.

4:00—11. W. A. La Lande, Jr., J. B. Sanborn, O. T. Aepli, and W. S. W. McCarter. The Adjustment of the pH of Sugar Solutions with Attapulgus Clay.

4:30—12. C. A. Frankenhoff. The Effect of Air on Colors of Sugar Liquors.

Thursday Morning

Auditorium, Room M

STARCH

Joint program with the Division of Agricultural and Food Chemistry (see page 392).

12:15— Divisional luncheon, Hotel Claridge, Bamboo Room, $1.15.

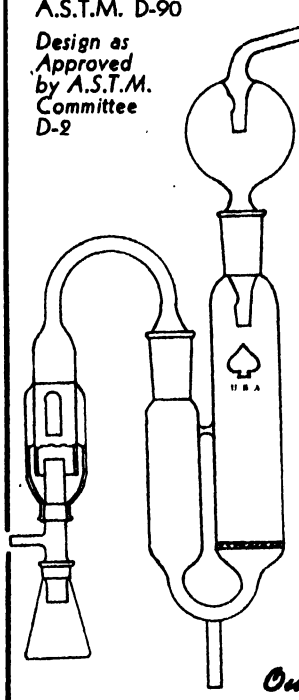
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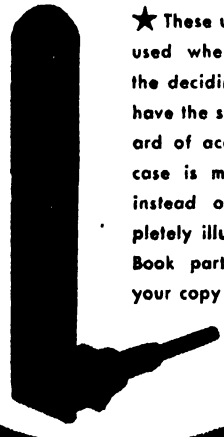
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Thursday Afternoon

Auditorium, Room J

STARCH (*Continued*)

2:00—13. M. L. Wolfrom, A. E. Brown, and C. S. Smith. The Molecular Structure of Synthetic Starch.
2:40—14. Dexter French and R. E. Rundle. The Configuration of the Schardinger Alpha Dextrin and Its Iodine Addition Compounds.
3:10—15. R. E. Rundle and Dexter French. The Configuration of the *V* Modification of Starch and the Starch Iodine Complex.
3:40—16. George H. Coleman, Aaron Miller, and Robert L. Sundberg. Isomaltose and the Nonfermentable Portion of Hydrol.
4:10—17. David Rankin with Ed. F. Degering. The Preparation and Properties of Certain Ether Derivatives of Starch.

Division of Water, Sewage, and Sanitation Chemistry

C. S. Howard, *Chairman;* H. Gladys Swope, *Secretary*
Russel Wiener, *Local Assistant*

Auditorium, Room F

Tuesday Morning and Afternoon

9:15— 1. A. A. Hirsch. A Carbonate Equilibria Slide Rule and Alkalinity Relationships in Natural and Treated Waters.
9:30— 2. M. C. Schwartz and L. W. Morris. Filter Photometry and Beer's Law.
9:40— 3. M. C. Schwartz. Photometric Determination of Silica in the Presence of Phosphates.
10:00— 4. J. W. Polsky and E. C. Feddern. The Determination of Calcium in the Presence of Magnesium by Standard Soap Solution. A Rapid Titration Method.
10:20— 5. F. K. Lindsay. Removal of Iron from Water by Carbonaceous Ion Exchangers.
10:40— 6. A. M. Buswell and E. C. Dunlop. Estimation of Phenols in Water by Means of Ultraviolet Absorption Spectra.
11:00— 7. Carroll E. Imhoff and Lohr Burkardt. Crystalline Compounds Observed in Water Treatment.
11:25— 8. L. F. Warrick, F. J. McKee, and A. E. Bartsch. Controlling Aquatic Nuisances by Chemical Methods.

2:00— 9. Philip W. West. The Shattering and Cracking of Ice. The Role of Carbon Dioxide.
2:20—10. Foster Dee Snell and J. Mitchell Fain. The Chemical Treatment of Trade Waste. VIII. Laundry Wastes.
2:45—11. N. H. Sanborn. The Treatment of Vegetable Cannery Wastes.
3:05—12. T. C. Hoppe. Variations in the Rates of Oxidation of Organic Matter.
3:25—13. Willem Rudolfs and Wm. A. Moggio. Lime in Sewage Treatment. Comparison of Properties of Hydrated Limes and Their Effects on Sewage.
3:45—14. Willem Rudolfs and Glenn W. Stahl. Phosphine Production during Sludge Digestion.
4:00—15. G. E. Symons and Burrows Morey. Solids Determination in Sewage. Discussion by W. D. Hatfield.
4:25—16. Harrison Hale. Public Water Supplies of Arkansas.
4:45—17. S. K. Love and H. A. Swenson. The Chemical Character of Public Water Supplies in Southeastern Florida.
5:00—18. O. M. Smith. Waters of Oklahoma.
5:20— Executive Committee meeting.

Annual New York Section Students' Meeting Scheduled

The annual students' program sponsored by the New York Section of the American Chemical Society is scheduled at the Hotel Pennsylvania, New York, April 10, at 5:00 P. M. Seniors majoring in chemistry and chemical engineering and graduate students from 12 schools in the metropolitan area will present research papers. Undergraduate juniors and seniors majoring in chemistry, student affiliates, graduate students, and junior members of the Society are invited to attend. A special students' dinner will be held at 6:30 P. M. The price is 75 cents each and tickets must be obtained in advance at colleges and universities throughout the city. Students may attend the regular meeting of the section at 8:00 P.M.

Student Program

Physical Chemistry (Inorganic)

H. H. Baker, Jr., *Presiding*

Leo Garfinkel. Some Aspects of the Nitroprusside–Nitrito Pentacyano Ferroate System.
E. Giolito. Analysis and Measurement of the Dielectric Constant.
Kenneth J. McCallum. Experimental Determination of the Electron Affinity of Chlorine.

Physical Chemistry (Organic)

David Perlman, *Presiding*

Kenneth Sancier. Electrolytic Reduction of Nitrobenzene in Liquid Ammonia.
Felix Wroblewski. Racemization of Optically Active Hydantoins.
Sidney Weiss. Reduction of Beta-Diketones at the Dropping Mercury Electrode.

Organic Chemistry

Thomas B. Dorris, *Presiding*

Robert Fuchs. Invert Soaps: Morpholinium Salts.
Herbert S. Cockeram. Aleuritic Acid: Reaction with Acetone.
Joseph G. Sandza. Pantothenic Acid and the Vitamin B Complex.

Chemical Engineering

James M. Church, *Presiding*

Phillip E. Tobias. Theory of Tie Lines in Ternary Liquid Systems.
E. J. Goett. Process for the Manufacture of Methyl Chloroacrylate.
C. R. Giannotta. An Experimental Gas-Fired Furnace.

Combined Divisions

Harold A. Horan, *Presiding.*

Marion D. Barnes. Fading of Phenolphthalein by Hydroxyl Ion.

Twenty-Fifth Anniversary of Fan Manufacturers

The National Association of Fan Manufacturers celebrated its 25th anniversary in connection with its annual meeting at Detroit, Mich., February 12. The following officers were elected for the ensuing year: J. M. Birkenstock, president; Edgar F. Wendt, vice president; and L. O. Monroe, secretary-treasurer.

The association announces that its third edition of "Standard Methods for Centrifugal and Axial Fans" will soon be available for distribution, as well as a new code on "Sound Measurement of Centrifugal and Axial Fans".



Midwest Power Conference

Leland Olds, chairman of the Federal Power Commission, and Willard Chevalier, publisher of *Business Week* and vice president of McGraw-Hill will be the headline speakers at the Midwest Power Conference, April 9 to 10, in Chicago.

Mr. Olds will speak on "Power and the War Effort", and his speech will feature the opening session of the meeting. Mr. Chevalier will be the featured speaker at the All Engineers Dinner, which is the social highlight of the program.

Outside of the usual formalities, the entire opening session of the conference will be devoted to the Nation's power problem.

Fluorspar Industry Sets New Record in 1941

The domestic fluorspar industry was called upon to supply an unprecedented demand in 1941 to meet requirements of steel mills and aluminum plants, both of which set new production records, and the greatly accelerated needs of manufacturers of glass, enamel, and hydrofluoric acid, according to final 1941 figures reported by the U. S. Bureau of Mines.

Shipments from mines in 1941, amounting to 320,669 short tons, were 37 per cent greater than in 1940 and 22 per cent more than the previous record of 263,817 tons made in 1918. The 1941 shipments were sufficient not only to take care of consumption, but also to enable consumers to increase inventories slightly. There was only a small decline in stocks at mines. Sales of imported fluorspar in the United States, however, were 31 per cent less than in 1940.

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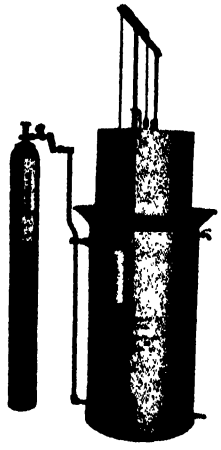
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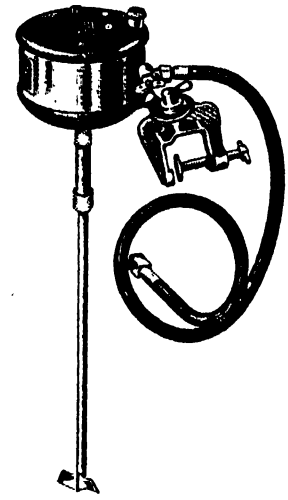
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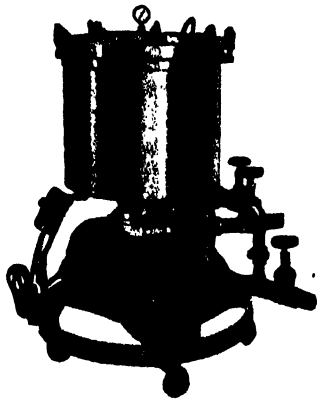
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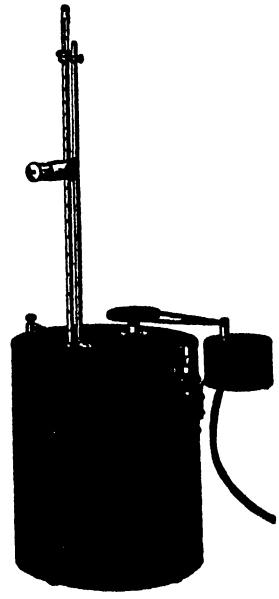
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Emergency Actions during A. S. T. M. Committee Week

THE 1942 A. S. T. M. Committee Week, held in Cleveland on March 2 to 6, was featured by emergency actions on important specifications and test methods. More than 520 technologists attended the various committee meetings. Attendance was good at practically all of the 150 meetings, but particularly in such fields as steel, rubber products, petroleum, and road and paving materials.

In the next few weeks a large number of emergency alternate provisions will be issued to expedite procurement or conserve critical materials. Gummed stickers with full details are sent to all who use the Book of A. S. T. M. Standards, and the provisions are also published in the *A. S. T. M. Bulletin*.

Since 1942 is the Book of Standards year when the society will reissue in three parts its widely used volume of specifications and standard tests, many committees were busy bringing up to date the standards work in their charge. Many of these matters will be included in the committee reports to be presented at the 45th A. S. T. M. annual meeting in Atlantic City, N. J., June 22 to 26.

Chicago Section Works with OCD

THE Chicago Section of the AMERICAN CHEMICAL SOCIETY has been asked to cooperate with the Chicago Metropolitan Area Office of Civilian Defense in the development and supervision of the training of instructors in war gas defense for this area. Ward V. Evans, Northwestern University, has been appointed chief gas training officer. Dr. Evans presented the first course of three two-hour lectures during the week of March 16. Chemists and chemically trained persons taking this course are to become instructors in their local communities after examination and certification by the training division. It is expected that the course will be repeated later, and other courses added as soon as they can be developed.

The section also has an active Defense Committee, and a National Defense Forum has been added to the group meetings which follow the monthly meetings.

Frank S. MacGregor, since June 1941 director of the Priorities Division of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has replaced **Milton Kutz** as assistant general manager of the R. & H. Chemicals Department. Mr. Kutz, who has been on leave of absence because of ill health, will become sales adviser and assistant to the general manager of the R. & H. Chemicals Department.

Lead Contamination

RECENT press reports that materials such as tooth paste can be kept in collapsible tubes made from lead without becoming contaminated are not true. The press drew this conclusion from a paper presented at a recent meeting of the American Institute of Mining and Metallurgical Engineers under the authorship of the undersigned and Messrs. Markus and Grobe. This paper demonstrated that in carbonate solutions in the pH range from 9.5 to 11.2 the tin-lead couple is under cathodic control and the anodic elements are tin. The effect of several addition agents was also demonstrated. The experiments did not deal with any commercial material such as tooth paste or shaving cream, and the corrosion properties of lead alone were not discussed. There is of course no scientific justification for applying the results obtained for the lead-tin couple in carbonate solutions to uncoupled lead in any other environment.

In order to avoid cases of lead contamination, it is important that these facts should be disseminated as widely as possible by scientists who are qualified to understand their implications.

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U. S. Rubber to Make TNT

THE United States Rubber Co. has been awarded a contract by the War Department to operate a Pennsylvania plant for the manufacture of trinitrotoluene. The company will consult with the architect, inspect installation of production equipment, and train key personnel. The Government will finance the project and the company will operate on a cost plus fixed fee basis, under direction of its Naugatuck Chemical Division. The company is now operating an ordnance plant in the Middle West for the manufacture of small arms ammunition.

U. S. Cork-Producing Possibilities Studied

EXPERIMENTS in planting cork oak, from which cork is stripped, are planned by the U. S. Department of Agriculture, if the Forest Service can get acorns from the Mediterranean. Normally the United States imports about $10,000,000 worth of cork annually from Spain, Portugal, and North Africa. Parts of the Southwest, southern California, Arizona, New Mexico, and Texas, have a similar climate, and the department believes cork should do well here.

From a few cork oaks planted in California more than 70 years ago, good first-yield cork has been gathered under supervision of the Agricultural Extension Service of the University of California. Several native trees produce a kind of cork suitable for several types of products, such as heat insulation and packing material. These include Southwestern fir and the more common Douglas fir. White fir also offers some possibilities.

Civilian Use of Gas Masks

THE cry now going up for civilian gas masks, if heeded, will result in a crime of the first magnitude against our offense effort", Joel H. Hildebrand, chairman of the Department of Chemistry, University of California, and codesigner of the American Army gas mask of 1918, said in addressing the Commonwealth Club of California in San Francisco, March 6.

Continuing, Dr. Hildebrand said:

Unless you are some sort of warden, you have little excuse for being exposed to toxic gas. You should stay indoors, where you are better protected without a gas mask than you would be out-of-doors with one.

Close all doors and windows and shut off any furnace that draws air in from the outside. Seal the cracks, if you are very nervous, with tape or wet rags or paper. Go to the upper floors and wait for the gas to blow away or for the street squads to disinfect. Breathe through a wet towel, and, if this is not sufficient comfort, put your head under a pillow and pray.

You do not need a gas mask and you are disloyal to our fighters if you demand one when labor, rubber, and other materials are so vitally needed for fighting purposes.

Production and Consumption of Mercury Drop Slightly

CONSUMPTION of mercury declined from 3,900 flasks in December 1941 to 3,800 in January 1942, while production was falling from 3,900 to 3,700 flasks. Certain strategic materials, including mercury, were placed under import control late in December. General Import Order M-63 provides that, unless otherwise authorized by WPB, contracts for imports of these materials will be handled by the Metals Reserve Company. Conservation Order M-78, issued by WPB in January, limited the use of mercury for all purposes not considered essential. Mercury prices throughout the month averaged $202.519.

Stocks in consumers' and dealers' hands, calculated from reports covering 93 per cent of metal on hand at the end of December, amounted to 12,900 flasks and producers' stocks were at least 573 flasks, compared with 12,400 and 439 flasks, respectively, at the end of December. Stocks of metal in the hands of consumers of redistilled metal only at the end of December were 1,600 flasks in addition to those reported above.

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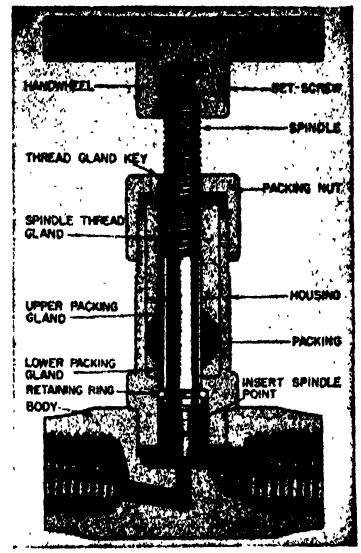
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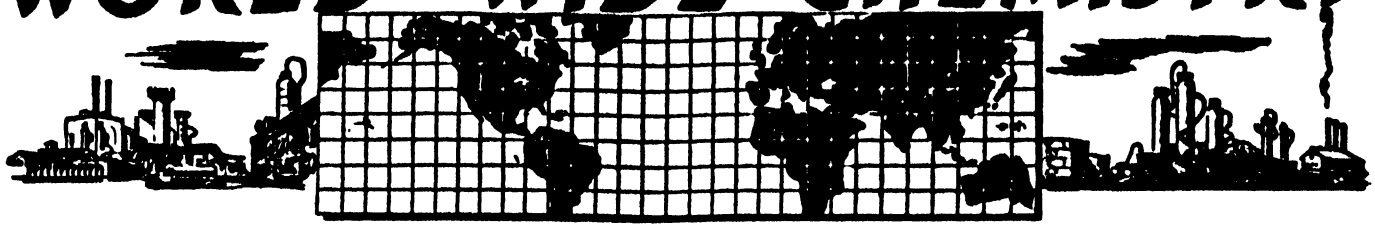
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WORLD-WIDE CHEMISTRY



The Sociedad Industrial Pizareño S. A., Santiago, which manufactures asbestos cement from domestic raw materials, has started making and erecting prefabricated houses for workers from this material. The houses are fire-, weather-, and earthquake-proof. They can be erected without any iron or steel, an important factor because of the scarcity of these materials in Chile. The president of this firm, Rudolfo Jaramillo Bruce, studied the system of prefabricated housing in the United States last year. His factory has made various articles from asbestos cement for many years with so much success that not only in Chile but also in parts of Peru and Bolivia asbestos-cement roofs are called Pizareños.

Government Helps Industry Promote Steel Production

The government has promised every kind of aid to the Sociedad Siderúrgicade Valdivia so that this company will be able to complete the second furnace at Corral as soon as possible and boost pig iron production to 40,000 metric tons a year. This amount of pig iron and the scrap available in the country, export of which is prohibited, will make possible production of 50,000 tons of steel products yearly, enough for the more urgent needs.

The Yugoslavian metallurgical engineer, Stephen Rusicka, inventor of the process to manufacture metallurgical coke from wood coal, has been hired by the Corporación de Fomento and brought to Chile. Mr. Rusicka has supervised the workings of a pilot plant, and his findings are that the metallurgical coke produced is of excellent quality, free from ashes and sulfur, and cheaper than imported coke.

Petroleum Group, Similar to A. P. I., Is Organized

During the recent Pan-American Congress of Mining and Geology the Comité Chile del Instituto Sudamericano de Petroleo, similar in many aspects to the American Petroleum Institute, was formed. The provisional directory consists of engineers and chemists—Hector Marchant, Osvaldo Vergara, Roberto Mueller, Marín Rodriguez, who is president of the Mining and Geology Congress, Carlos Ponce de León, Manuel Zañartu, F. Thomas, Hernán Besa, and Alberto Cabero.

New Bituminous Coal Deposits Are Opened

Work has started on the newly opened bituminous coal deposits at Hueyusca, Department of Osorno, Province of Valdivia. The mined product seems to be of very good quality. An analysis made by the laboratory of the Corporación de Fomento showed an average content of 6.120 calories.

Local Manufacture of Caffeine Started

The Droguería del Pacífico S. A., Valparaiso, has started to manufacture caffeine at its factories at Llay-Llay Department of Quillota, Province of Aconcágua. The product will be made from imported coffee. Production is planned only to cover Chilean needs during the war, because prices of this product have run up to over $20 per kilogram, f. o. b. New York. Yearly consumption in Chile is about 2,000 kg. a year, and stocks are very low.

Loans Granted to Help In Establishing Industries

The Corporación de Fomento has granted the following loans to:

Sociedad Coricola Chilena, Ltda., 500,000 Chilean dollars, for growing mulberry trees and developing the industry of natural silk in Chile.

Cooperativa Lechera de Bio-Bio, 150,000 Chilean dollars, for increasing the capacity for producing condensed and powdered milk; 400,000 Chilean dollars for finishing equipment for a fruit-drying plant in Aconcágua.

Compañía Yoduradora de Cobre, 107,181 Chilean dollars against shares of this company for continuing experiments regarding iodining of metals.

Chile Exports Ictiol to Neighbors, Great Britain

Ictiol is made in Chile from bituminous slate, which is very similar in formation and smell to that of Austria. Exports in 1940, mainly to other South American countries and to Great Britain, amounted to over 40 metric tons. Ictiol is now made by three factories, at Santiago, Valparaiso, and Llay-Llay. The slate deposits are mostly in the Province of Aconcágua.

RUDOLFO ZOELLNER, J.

CLASIFICADOR 208
SANTIAGO
February 2, 1942

Continental Europe

Production of Calcium Carbide in France Approaches Prewar Figure

Production of calcium carbide in France has suffered greatly as a result of the war, but it is reported that the output is again approaching the 1938 figure of 150,000 tons. Even so, domestic production covers only part of the greatly increased demand for lighting, motor fuel, welding, and chemical manufacture. The demand for gas generators in motor vehicles in particular has increased to such an extent that the Vichy Government had to restrict its use. Civilian consumption has also been restricted; retail sales of acetylene are permitted only against coupons issued by the Petroleum Department.

French Heavy Industries Increase By-Products Output

Shortage of benzene and coal-tar derivatives in many industries has caused French coal and steel producers to concentrate on utilization of by-products. The Mines de Houille de Marles have raised their capital from 208,000,000 to 312,000,000 francs, largely for the extension of the by-product plant. The Société Chimique de la Grande Paroisse

EDITOR'S NOTE. Those interested in further details should address the correspondent whose name and address appear for each country, and enclose sufficient international coupons to prepay the reply. United States stamps should not be sent.

has increased its capital from 70,000,000 to 105,000,000 francs. The Aciéries de Longwy, one of the foremost companies in the heavy industries, is to extend its field of activity by starting to manufacture chemical fertilizers. Produits Chimiques et Engrais d'Auby reports that a new plant has been built for the manufacture of several fertilizers. Engrais de Roubaix increased shipments of chemical fertilizers, thanks to the long season, but complains of difficulties in replenishing stocks. The factory at Coudekerque must be extensively repaired owing to damage suffered during the war. The Société des Produits Azotés experienced considerable difficulties in the supply of raw materials for its two principal products, calcium carbide and cyanamide.

French Dunlop Plans to Make Synthetic Rubber

Plans for establishment of a synthetic rubber industry in France have been announced by the Dunlop Co. which has used Buna supplied from Germany for some time. Stocks of natural rubber in France have been exhausted, and further dismissals of large numbers of workers would, it is announced, have been necessary had not supplies of Buna been received from Germany and French factories been converted to the manufacture of goods from synthetic rubber.

Before the war experiments with rubber substitutes in France did not go beyond scientific tests. Although some progress has been made meantime, it is pointed out that shortage of construction material, coal, and electric power represents serious handicaps for the establishment of a synthetic rubber industry in the country. Germany, interested in the proposition because of the large orders placed by the occupation army with French aircraft and truck manufacturers, may assist in the supply of equipment.

Nitrogen Industry In France Concentrated

Following concentration of the French nitrogen industry in the Groupement de l'Industrie de l'Azote, a new company, Société de Gestion de Groupement de l'Industrie de l'Azote, has been formed with a capital divided into 620 shares, of which Kuhlmann has taken 300, Grande Paroisse 140, St. Gobain 100, and Produits Azotés 60. The remaining shares are held by gas interests.

French Firm to Produce Methanol and Acetic Acid

The Société de Produits de Bois is erecting a large, modern factory near Chaumont, in the department Marne, for the distillation of wood. Methanol and



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acetic acid as well as solid fuels for gas generators will be produced.

Loss of Overseas Supplies Causes Changes in Belgian Chemical Industry

Loss of the overseas supply sources of minerals treated in Belgian smelters has compelled chemical manufacturers who based their output on by-products from the smelting industry to change their programs. Production of sulfuric acid, superphosphates, and mixed fertilizers on the basis of zinc sulfides and rock phosphates had to be largely abandoned, but firms like Produits Chimiques de Tessenderloo and Union Chimique Belge report for 1940–41 that new lines for the domestic market provided some compensation. Belgian agriculture was supplied with adequate quantities of nitrogenous fertilizers, but phosphatic fertilizers are in short supply. While a number of chemicals can no longer be produced, certain organic products have been put on the market. Profits declined substantially as a result of these changes and the loss of overseas markets.

Dutch Rayon Producer Expands the Manufacture of Staple Fibers

The AKU company which owns large rayon interests in Holland, Germany, and other countries announces that its staple fiber factory will probably be completed by August, while the manufacture of cellulose from straw is expected to commence early in 1943. Until then the staple fiber factory will rely on imported cellulose. Its production is to be larger than the present rayon output of the two AKU factories at Arnhem and Ede, estimated at 9,000 tons a year. A factory for the manufacture of casein wool has been nearly finished at Ede, and the machinery now employed on making casein wool at Arnhem will soon be transferred there. The N. V. Onderzoeking-Instituut Research, Arnhem, which was formed some time ago for the centralization of all research work, has equipped a department for investigations into hitherto neglected problems of the cellulose industry. The new laboratory is situated at Utrecht and will cooperate closely with the university in that town.

Germany to Use Annual Plants for Production of Synthetic Fiber

It is officially announced that about 60 per cent of all textile requirements in "Greater Germany" are now covered by synthetic fibers, among which cellwool has made particular headway. Cellwool factories are also situated in Poland, Norway, Holland, Belgium, France, Slovakia, and the Protectorate, but few of these seem to be operating as yet. The high percentage share of synthetic fibers in German textile consumption is due to shortage of natural fibers rather than to any spectacular advances in synthetic fiber production during the past year. Eastern European forests are to be drawn on systematically as a raw material, but in the long run greater reliance is to be placed on annual plants cultivated or collected especially for use in cellulose factories. Water reed, sorghum, *Arundo donax*, sunflower stems, fescue grass, flax chaff, and potato tops have been considered in this connection. Experiments on brake (*Pteridium aquilinum*) have shown that, if stems are treated with 2.2 per cent of sodium hydroxide and 0.8 per cent of sodium sulfide by the usual sulfate process for 6 hours at a temperature of 160° C. (maximum pressure 7.9 atmospheres), a cellulose material is obtained which has a 91.9 per cent content of alpha-cellulose and possesses properties approximating those of a good straw cellulose. Somewhat lower values were obtained by sulfite treatment. Brake cellulose can, it is claimed, be used for the production of a number of papers of medium quality, especially if mixed with cellulose of other origin, but nothing is said about the suitability of the material for production of synthetic fibers.

Concentration Progresses in Nazi Bone Products Industry

Scheidemandel, the leading producer of glue, stearin, candles, animal fertilizers and other chemical products from bones and slaughterhouse waste, has taken over several more interests in companies with similar production, so that this section of the German chemical industry is now widely concentrated. The turnover during the past year was maintained at 1940 levels, which were rather below prewar figures, although demand for bone products like glue, animal fats, and manure has greatly increased.

Deutscher Kaliverein Offers Prize for New Potash Processes

Deutscher Kaliverein has offered prizes of 175,000 marks for new manufacturing processes which permit the treatment of German potash salts without accumulation of waste waters and lyes. Two separate problems are mentioned: treatment of potash salts, and treatment of residues from the solutions of hard salts.

German Research Institutes Study Problem of Slow Nitrogen Fertilizer

How to best maintain the effectiveness of chemical fertilizers in well-drained soils has been studied by German research institutes. Of the condensation products

of cyanamide and urea with formaldehyde, acetaldehyde, and crotonaldehyde, only acetaldehyde-urea proved so resistant against the danger of being drained off that the increase in crops was comparable to that resulting from calcium cyanamide.

Sulfite Lye May Replace Coal-Tar Pitch in Briquets

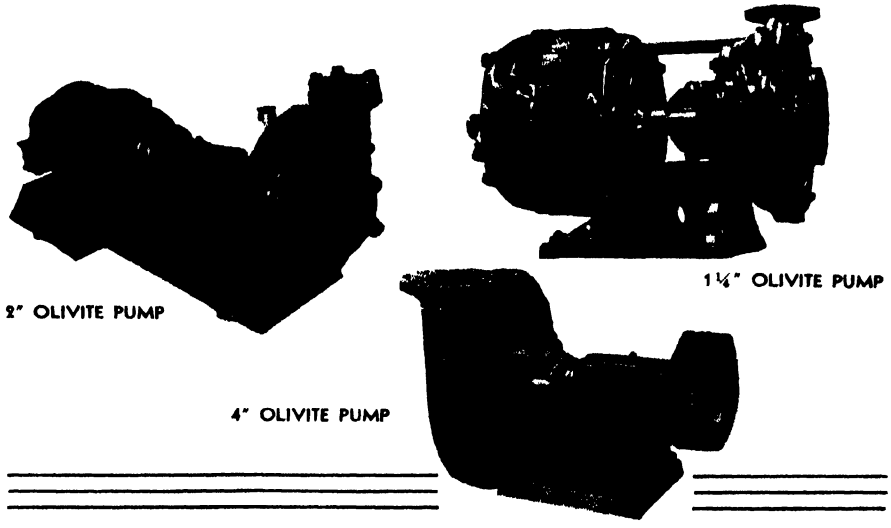
Zellstoffabrik Waldhof, Mannheim, has been experimenting with sulfite lye as a binder in briquets. Its suitability depends upon plasticity and adhesive power which in turn depend upon the water content. Pitch prepared from beech lyes with 12 to 14 per cent water, from spruce lyes with 13.5 to 15.5 per cent water, or from fermented spruce lyes with 15 to 18 per cent water have similar softening properties as coal-tar pitch which solidifies at 60 to 70 per cent, and may be used in place of the usual grades of pitch for making briquets. The experiments have not yet been completed, but it is believed that utilization of these lyes will help reduce consumption of coal-tar pitch.

New Fuels Are Provided for German Producer Gas Vehicles

Development of new solid fuels which can be used in gas generators for commercial vehicles is being emphasized in Germany. Considerable progress has been made with wood, according to Lt.-Col. Schanze, director of the German generator office, in the development of generator types capable of using wet wood. Although in 1935 best quality beechwood only could be used, soft woods can now be employed in normal generators provided the moisture content does not exceed 20 per cent. Drying has to be brought about by natural processes. The agricultural generator tractor can use wood with 40 per cent moisture, a special advantage in view of the reliance on local fuel for this type of generator.

For road vehicles, however, the tendency is towards the development of generators which use bituminous materials. Anthracite is a very good generator fuel, although the high temperatures reached during carbonization necessitate use of chromium and nickel alloys which are scarce in Germany. Among lignites special grades with low ash and sulfur content can be used directly; for other kinds experiments are under way on reduction of the ash content preparatory to use in generators. An unspecified carbonization process is claimed to yield a product which is superior to charcoal in its application to generator use, but the supply is still very small. Coal itself cannot at present be used, but coke is a generator fuel of growing importance in Germany, and work now under way aims at reduction of the ash content of coke.

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If you are handling *any* hot or cold acid or other corrosive solution, you should investigate the Olivite Pump. It should give you lowest cost pumping. As a starter, send for our latest Bulletin—No. 308.

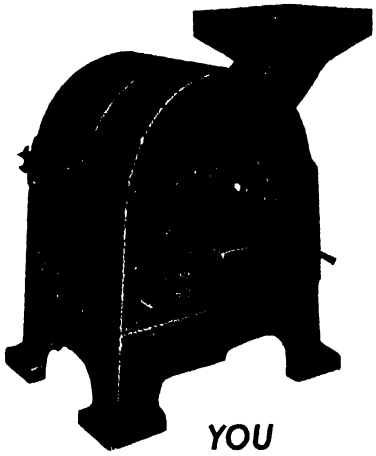
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Another process is said to provide a valuable and economical fuel from coal. Coal dust cannot be used, but it may be possible to convert the coal dust into gas outside the generator proper.

While quite a number of different fuels for generator vehicles are thus available, although not all in sufficient quantities, conversion of old motor trucks and other commercial vehicles to generator use is proceeding slowly. A new decree providing that vehicles stationed near sources of town gas, long-distance gas, sewage gas, methane, etc., must be converted to these fuel materials indicates that German authorities are not too eager to increase the consumption of generator fuels at the present time. Passenger cars are not admitted for conversion.

Oppanol Employed on Large Scale in Chemical Apparatus

Oppanol, the polymerization product of isobutylene produced by I. G. Farbenindustrie, is used largely with various fillers, as its resistance to acids and alkalies is actually increased by suitable admixtures. Oppanol foils are employed in construction as a protection against subsoil water. ORG foils, foils of Oppanol with fillers, are used for the same purpose and on a larger scale for covering tanks and containers in chemical apparatus.

The mechanical strength of the material does not equal that of polyvinyl chloride basis foils but is considered adequate. Adhesion to metal and wood is secured by cold glues, but there are special adhesives to make the foils stick to concrete. Seams are welded under pressure at temperatures around 300° C., usually with special welding equipment. ORG hoses are fitted to many metal, wood, and concrete pipes where normal temperatures do not drop below −50° C. or rise beyond +100° or in special cases 130° C. ORG foils are said to offer an economic substitute for lead and rubber covers.

Preparations Completed for Danish Fertilizer Industry

Plans have been worked out for establishment of a nitrogenous fertilizer industry in Denmark. A power station, coke-oven plant, and ammonia works are to be built at a total cost of 200,000,000 kroner, of which 45,000,000 kroner are to be used for the fertilizer factory proper. The Municipal Council of Copenhagen is interested in the project which is shortly to be put into operation.

Tanning Extracts to Be Manufactured in Denmark

Investigations by the Association of Danish Leather Manufacturers have led to formation of a company with a capital of 600,000 kroner which is to build a factory for tanning extracts at Gribskov. The plant will produce 1,200 to 1,500 tons of tanning materials from oak wood and spruce bark and cover about half the local requirements. The plans have been approved by the government because supplies of tanning extracts from abroad have suffered greatly from the war.

Norsk Hydro Plans New Chemical Enterprises

Norsk Hydro Elektrisk Kvaelstof A.S., the big Norwegian company which operates various electrochemical plants, has been engaged in the development of new plans to utilize surplus electric power. Some of the old established sections of the company's industrial output program had to be curtailed because of lack of overseas markets and difficulties of transportation. Norsk Hydro will, it is reported, cooperate with German interests in electrometallurgical production and may commence the manufacture of some new chemical products.

G. ABRAHAMSON
150 HALFWAY ST.
SIDCUP, KENT
February 2, 1942

Construction of Fertilizer Plant in Bahamas Rumored

INTEREST attaches to the report of impending construction of a fertilizer plant in the Bahamas, which so far has not been officially confirmed. Agriculture is an important phase of Bahama activity, and fertilizers must be imported, although in relatively low amounts.

New Chemical Plants Established in Mexico

MANUFACTURE of calcium carbide is being undertaken in a new plant in Mexico at Guadelajara, operated by a Spanish refugee and financed with Swedish capital, according to the U. S. Department of Commerce. Plants also are being established, it is reported, for manufacture of cellulose, small rubber articles, yeast, packings for machinery, paper, refined sugar cane, cement, and vegetable oil.

New Zealand Licenses Manufacture of Agar

TO MEET war conditions New Zealand authorities have recently placed under license all manufacture of agar. Large quantities of seaweed are available for raw material, and it is hoped that once production has been established, further imports will be obviated. Agar is needed for hospital use, scientific purposes, and canning of meat and fish.

Development of mineral resources in Brazil has shown a steady and remarkable increase since 1928, being more pronounced after 1931 under the government of President Vargas. Recently the press reported that orders amounting to $33,000,000 have been placed in the United States by the Companhia Siderurgica Nacional, a joint governmental and private enterprise, for 55 coke ovens including plants for the production of ammonia, tar, benzene, and toluene. All the machinery will be installed at Volta Redonda, near Barra Mansa, in the state of Rio de Janeiro, in which the steelworks will be built.

President Vargas has approved a recommendation of the Federal Council for Foreign Trade that technical and financial research should be conducted on the possibility of developing deposits of nickel, cobalt, and copper at Buritĺ in the state of Goyaz and at Liberdade in the state of Minas Geraes on a sound profitable basis.

Rapid growth of the iron, steel, and allied industries in Brazil was discussed in a recent publication issued by the Federal Council for Foreign Trade. Industries using tin, lead, copper, and aluminum depended largely on imported raw materials. Brazil will be able to dispense with some of those raw materials in the near future, it was said. Two plants for production of aluminum from Brazilian bauxite ores are to be erected, one near the city of São Paulo and the other at Ouro Preto in the state of Minas Geraes. To facilitate the establishment of plants for the production of aluminum from Brazilian bauxite ore, the government has authorized the Bank of Brazil to extend to 12 years the limit for the repayment of a loan granted to the Companhia Brasileira de Aluminio S. A. Although about 10,000 tons of pig and sheet lead are imported yearly, the lead and silver plant inaugurated this year in Apiaĺ, state of São Paulo, will supply the major requirements of those metals to local industries.

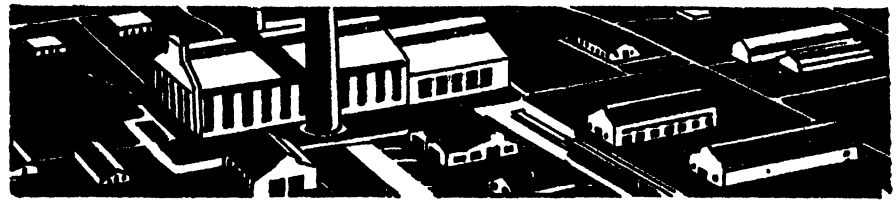
Copper deposits in the states of Rio Grande do Sul and Paraíba are being worked to supply Brazilian industries. Press notices in Rio de Janeiro recently reported the beginning of exploitation of two new tin mines in the state of Rio Grande do Sul. Cassiterite is also found in the Picuĺ and Soledade zones, state of Paraíba, where surveys for copper mining are being carried out by Brazilian technicians belonging to the Departamento Nacional da Produção Mineral, a federal organization controlling mineral resources.

The bulletin issued by the Federal Council for Foreign Trade showed that goods manufactured of iron, aluminum, copper, and other metals increased from 21,533 metric tons in 1928 to 52,501 metric tons in 1939. During the same period tinplated and enameled iron, also including aluminumware, rose from 4,123 to almost 16,000 metric tons. Brazil is almost self-sufficient in scissors, penknives, and table cutlery, of which small exportations have already been made. Imports of nails, screws, and rivets decreased from 4,824 metric tons in 1928 to only 307 tons in 1940, while production rose from practically nothing to almost 22,000 metric tons in 1940. Since Brazil is able to produce locally hinges, locks, padlocks, and similar goods, imports of these articles dropped from 1,913 metric tons in 1928 to 253 in 1940. Steel office furniture, safes, dentists' and barbers' chairs, ice chests, enameled iron baths, and sanitary ware are manufactured on a scale sufficiently large to fill the country's requirements.

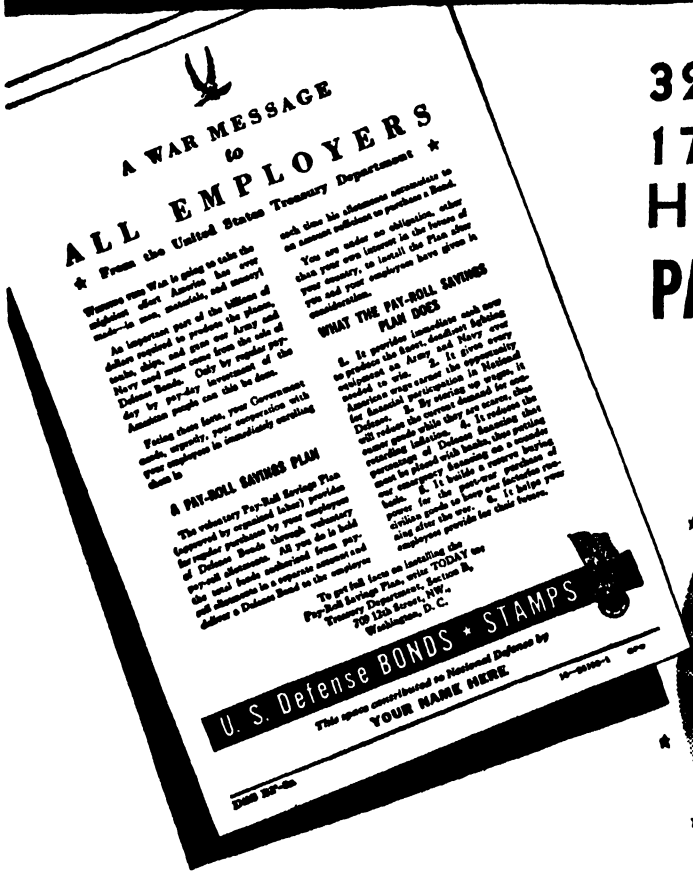
Exportations of chief minerals during the first eight months of 1941 compared with the whole year of 1940, together with the percentages of each country of destination, as recently published by the Federal Council for Foreign Trade are:

Minerals and Other Commodities	Tonnage Exported		Destination in 1941	
	1940	*1941 (8 months)*	*Country*	*Per Cent*
Asbestos	2.9	2.0	United States	100
Kaolin	197.0	564.0	Argentina	93.7
			Chile	3.9
			Uruguay	2.4
Rock crystals	1103.0	1176.7	United States	42.4
			Japan	23.9
			Great Britain	27.9
			Germany	4.8
			Others	1.0
Marbles	269.9	174.7	Chile	70.7
			Argentina	20.3
			Others	9.0
Beryllium	1472.1	1012.3	United States	48.8
			Germany	45.9
			Others	5.3
Mica	1117.5	565.5	Japan	48.9
			United States	27.4
			Germany	11.9
			Others	11.8
Chromite	4572.0	2093.0	United States	100.0
Bauxite	82.0	2748.0	United States	86.8
			Uruguay	11.8
			Argentina	1.4
Iron ore	255,548.0	245,141.0	Great Britain	60.9
			United States	29.2
			Canada	9.9
Manganese ore	222,713.0	250,123.0	United States	94.6
			Japan	5.4
Ilmenite	12.2	2,620.9	United States	100.0
Rutile	498.6	1,035.9	United States	49.9
			Germany	29.7
			Great Britain	20.4
Monasite	180.0	379.0	United States	100.0
Columbite	15.3	3.4	Germany	100.0
Zirconium	1,520.8	4,366.2	United States	92.7
			Germany	6.0
			Japan	1.3
Tantalite	27.1	48.7	United States	57.7
			Japan	42.3
Tungsten	10.0	17.5	Japan	100.0
Coal	6,900.0	43,484.0	Argentina	78.2
			Uruguay	21.4
			Others	0 4
Pig iron	22,147.5	23,459.8	Argentina	69.6
			Japan	25.3
			Others	5.1
Iron (laminated, bars, etc.)	8,421.3	18,771.3	Argentina	99.9
			Bolivia	0.1
Steel	9.6	1.1	Bolivia	100.0
Brass and copper alloys	122.6	37.4	Argentina	78.2
			Uruguay	20.6
			United States	1.2
Cement	402.2	431.5	Bolivia	65.4
			Peru	30.3
			Colombia	4.3
Ferronickel	89.0	440.7	Germany	99.5
			United States	0.5

CONTINUED ON PAGE 421

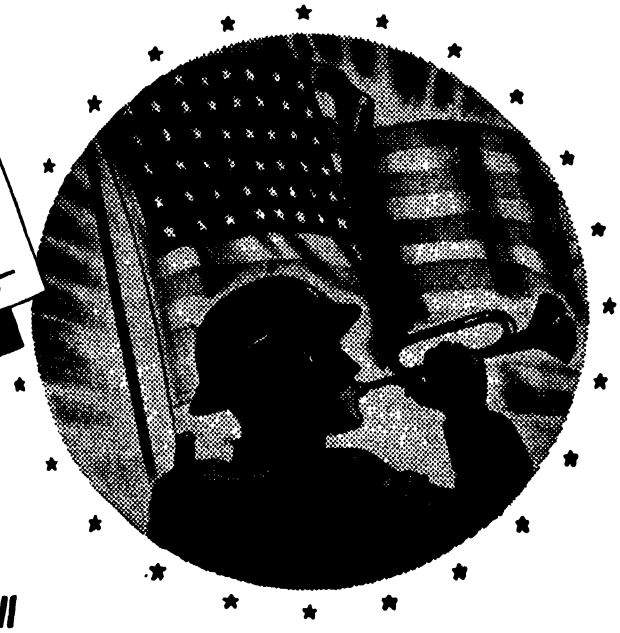


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U. S. Defense BONDS ★ STAMPS

This space is a contribution to NATIONAL DEFENSE by Chem. Eng. News

GPO 16—26944-1 Form No. DSS-280

In a recent agreement between the United States and Brazil, 10 minerals, including rock crystals, rutile, ferronickel, zirconium, bauxite, chromite, and beryl ores were considered strategic or critical materials. The United States will buy all of Brazil's output of these minerals for 1942 and 1943. Any surplus after purchases made by regular American importers will be bought by the U. S. Government through the Metals Reserve Corporation.

Although in World War I new factories were put in operation, the trend was quite different from that in World War II. During the last war every kind of industry producing goods was established, while in the present conflict preference is being given to creation of basic industries which will probably be a definite influence on both exports and imports. Exports naturally will be improved by the demand for the new Brazilian-made products in other South and Central American Republics. Imports will also be affected since a large number of imported goods will be replaced by those manufactured locally.

New Uses for Vegetable Oil and Waxes Are Probed

The government has appointed a committee to study a proposition presented by the state of Maranhão regarding babassú oil. Several experiments have been carried out in that state for using babassú oil as a fuel in Diesel motors, and the results were completely satisfactory. The committee is studying technical features of the proposition presented to the government through the Federal Council for Foreign Trade.

To intensify production of ouricurí or licurí wax, as it is better known in Brazil, President Vargas has approved a decision of the Federal Council for Foreign Trade derogating the privilege for exploitation and refining of such wax. This decision will permit a large amount of business in this wax, presented to Brazil owing mainly to the quality and fair prices of the new substitute for carnauba wax. Starting to appear in exports statistics with only 3,075 kg. in 1937, licurí or ouricurí wax contributed with more than 1,341 metric tons during the first eight months of 1941. Exports during 1941 were made to the United States, Great Britain, Union of South Africa, Argentina, Chile, Colombia, Peru, Canada, Uruguay, and Australia. The average price was about $708.40 per metric tons, f. o. b. Brazil port, against $1,271.10 for carnauba wax. Exports of carnauba wax during the first nine months of 1941 were 8,557 metric tons against 6,202 metric tons during the same period of 1940.

President Vargas has signed a decree prohibiting the cutting down of cashew trees except with special permission (see CHEM. ENG. NEWS, January 10, page 45). This law was established to intensify and encourage production of the valuable oil obtained from the nut. A commission of American technicians is being awaited in Brazil to survey the northern region, paying special attention to development of oil-bearing fruits and plants and to the recommendation of new uses for Brazilian vegetable oils and waxes.

South America Schedules Several Scientific Meetings

The Fourth South American Chemical Congress was postponed to September of this year because of present world conditions. The Brazilian Chemical Society is planning to promote a South American meeting to discuss problems related to the sugar industry, alcohol motor fuels, and standard methods for sugar analysis.

During the current year the Argentine Chemical Association will complete 30 years of existence, and another scientific meeting is being planned for that time.

Imports of Cement for Defense Program Started

As previously mentioned in Brazilian letters, the country several years ago

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Adaptable for grinding batches of dry materials, from a few ounces to several pounds at a time

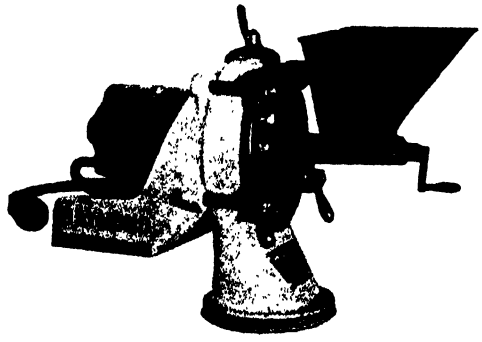
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stopped the importation of common portland cement because of the steady increase in local production. Since the outbreak of war, the local plants have been unable to fill the ever increasing demand for the defense program. As a result, the federal government is permitting importation of foreign products, and several cargoes were received recently.

Garampara Oil from Maranhão Analyzed

Several tests were recently made in Rio de Janeiro with samples of garampara oil, produced in Maranhão. The analysis showed an iodine value of 98 and a saponification number corresponding to 187. About 37 per cent of oil was obtained from the nut.

Two Plants to Manufacture Window Glass Are Being Built

The press reports that construction of the first plant for sheet glass was started in November 1941 at São Gonçalo, near the city of Niterói, state of Rio de Janeiro. The plant belongs to the Companhia Vidreira do Brasil, a concern recently incorporated under Brazilian laws, the principal partners being associated with several Portuguese firms interested in the wholesale market of glass goods. The Companhia Vidraria Santa Marina, established for a long time in São Paulo, has announced that machinery for the production of window glass has already been ordered in the United States for a new factory to be built during the current year.

Graphite Deposits in Brazil Being Developed

Under present circumstances graphite will probably be incorporated in the agreement signed with the United States to prevent exportation of certain strategic and critical raw materials to other countries than the United States. Several mines are being developed in Brazil, and the product has as good characteristics as that previously imported from England. A high quality of graphite is found in the mines located in the north of the country. In Minas Geraes there are several deposits having a carbon content which varies from 50 to 85 per cent, usually associated with monazite, zircon, and ilmenite. The graphite of São Fidelis, in the state of Rio, contains about 83 per cent carbon. Recently extensive deposits were located in the Formosa District which is on the Goiás and Minas Geraes borders. Deposits of good graphite with a carbon content varying from 80 to 85 per cent exist in the states of Ceará and Santa Catarina. In the state of São Paulo there are two installations for treating graphite, the first located in Pindamonhangaba where the first flotation plant was installed in Brazil and the second in the region of Apiaí. Production during 1941 was estimated at more than 180 metric tons, enough to cover the local requirements.

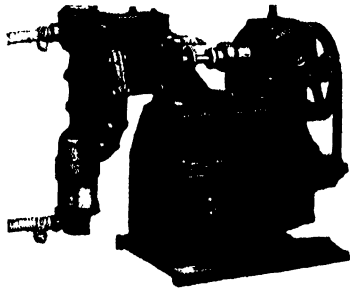
Additional New Plants Established Recently

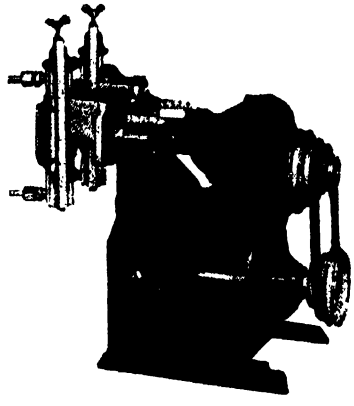
In the drive for self-sufficiency, new plants were recently established. The *Revista da Chimica Industrial* in the December 1941 issue reported the opening of the following factories: vegetable oils refinery in Pará; orange juice and essential oils from citrus fruits in Rio de Janeiro; caroá textiles in Paraíba; soap and candles in Baía; and cottonseed oil, matches, starch, and cotton weaving in São Paulo. Enlargement of several factories were also reported by the daily press.

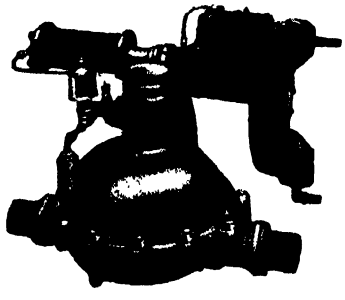
Magnesite Deposits in Baía to Be Developed

A firm known as Magnesita S.A. was organized a few months ago to exploit deposits of magnesite in the south of the state of Baía. The proved reserves were estimated at about 40,000,000 metric

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tons. The government recently authorized the railway crossing the state of Baía to study the possibility of extending the rails to the deposits. It was also reported that a national banking organization, the Banco de Minas Geraes, will finance the exploitation. No analysis of this mineral has been revealed, but statements published by the owners of the deposits say that the magnesite from the Brumado region (state of Baía) will be used not only as a refractory material in the metallurgical industry, but also for the production of metallic magnesium. Minor occurrences of this mineral exist also in the states of Goiás and Rio Grande do Sul.

Timbó and Pyrethrum Production Increasing

Industrialization of timbó and pyrethrum in Brazil was initiated only a few years ago. Timbó is a native plant in Brazil and produces, besides other minor constituents, the rotenone used for insecticide preparations. In 1935 exports of timbó roots amounted to 245 metric tons and, after the decision of the government prohibiting the exportation of roots, foreign buyers started to purchase the timbó powder, which in 1941 amounted to more than 500 metric tons. Total production of timbó powder in 1941 was estimated at approximately 750 metric tons, the state of Pará being the main producer.

Cultivation of pyrethrum in Brazil is relatively recent. The first plantations started to produce in 1936, and the 1941 crop amounted to more than 800 metric tons. The local consumption of pyrethrum flowers is estimated at about 100 metric tons, the balance being exported—to the United States, Germany, and Great Britain in 1940. Users of pyrethrum flowers in the United States are giving preference to the Brazilian product due to the high percentage of pirethrius contents. Because of present world conditions, exports of pyrethrum flowers from Brazil will probably replace those from other producer countries.

Gains in Exports of Essential Oils Expected

The first exports to the United States of essential oils, mainly citrus fruit essences, did not meet with the standard types required by American consumers, and the shipments were reduced up to the beginning of 1941. Because of this situation some modern plants for essential citrus oils were built, and some others will go into production during the current year.

The products now in the market meet the vigorous standards established by American users, and exports during 1941 amounted to about 90,000 kg. against 13,400 kg. in 1940 and only 5,234 kg. in 1939. Exports during the current year, it is estimated, will be around 200 metric tons when the new factories go into operation.

C. E. Nabuco de Araujo, Jr.

Caixa Postal 970
Rio de Janeiro
January and February, 1942

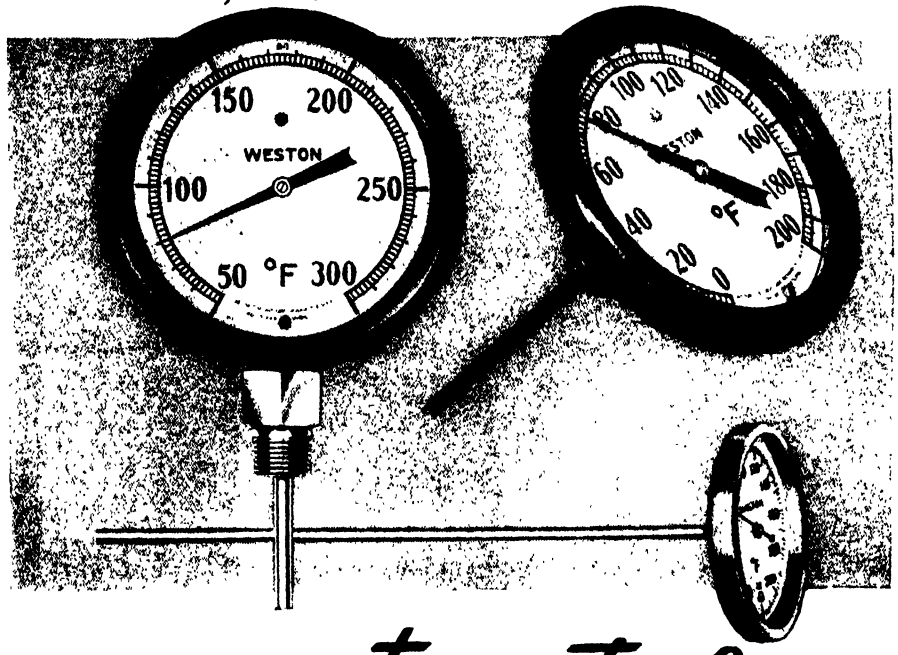
The British Government has established controls over saccharin and dulcin (*p*-phenetylcarbamide) respecting strength and wholesale and retail prices. Manufacture of solutions except for pharmaceutical use is barred.

Cuban Sulfur Market Dominated by U. S.

American exporters dominate the Cuban market for sulfur, in which imports from the United States represent more than 99 per cent. For 1940 these were 183 tons, compared to 48 in 1939.

In July of last year considerable interest was reported in a supposed sulfur deposit in Pinar del Rio Province of Cuba, which various experts have said is a natural formation with about 500 tons of visible sulfur. Extractions at a rate of about 15 tons weekly have taken place since.

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Handbook of Chemistry and Physics. *Charles D. Hodgman*, Editor-in-chief. 25th ed. 2503 pages. Chemical Rubber Publishing Co., 1900 West 112th St., Cleveland, Ohio, July 1941. Price, $3.50.

THE policy of change and addition, followed by the editorial board of the Handbook of Chemistry and Physics in bringing each succeeding volume up to date, has been continued successfully in the latest edition, the 25th. Aside from the new and completely revised material, a great number of minor changes were made. A table of natural secants and cosecants has been added to the mathematical section, and tables for the conversion of the millibar (newly standardized by the U. S. Weather Bureau) to inches and centimeters of mercury are newly acquired.

Complete revision of the amino acid properties section, photographic data section, isotope table, and vitamin material are noted. Revised to meet specifications of the American Association of Physics Teachers is the table of symbols and abbreviations.

Organic Syntheses. Collective Vol. I. *Henry Gilman* and *A. H. Blatt.* 2nd ed. ix + 580 pages. John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y., 1941. Price, $6.00.

IN REVIEWING this volume it is difficult to refrain from superlatives. This collection of carefully selected and thoroughly tested synthetic methods for more than 250 organic compounds has proved of great value in both industrial and academic laboratories. The directions are given with such lucidity and detail that relatively inexperienced chemists can prepare a wide variety of important organic compounds expeditiously and with satisfactory yields. The availability of tested methods for the preparation of a broad range of key organic compounds has been and will continue to be a potent factor in facilitating the prosecution of the major objectives in many organic researches. Every research worker knows how time consuming the synthesis and purification of incidental materials can be before the real problem is initiated.

The plan of the first edition has been followed quite closely with necessary corrections and the additions of new or improved procedures. The inclusion of information as to the commercial availability of certain organic compounds will be of value to many and is a practice which should be carefully followed in subsequent volumes.

The general format including the typography, presswork, paper, and binding are excellent. The editors and contributors have done a painstaking and excellent job, and to them organic chemists should be deeply grateful.

H. A. LUBS

Resins, Rubbers, Plastics. A looseleaf abstract service. Vol. 1, No. 1. Edited by *H. Mark* and *E. S. Proskauer.* 33 pages. Interscience Publishers, Inc., 215 Fourth Ave., New York, N. Y. Price, $35 per year.

THIS new abstract service, announced last year, now appears as a first monthly section of 33 pages, including a general index and 16 abstracts of papers. The editors announce that they expect to supply some 500 to 600 pages during the year. Thus the present offering may be considered a 6 per cent sample.

The table of contents is an index of the whole subject matter expected to be covered. It is arranged on a decimal system with eight principal headings to cover the General Part and four principal headings, designated alphabetically, comprising the Special Part. In the first group are Physical and Chemical Properties; Physical and Chemical Methods and Testing; Chemical Statics and Kinetics; Manufacture; Molding and Vulcanisation; Finishing of Products; Applications; and Physiology. The Special Part is subdivided into Resins (natural and synthetic), Plastics; Rubber (natural and synthetic); Fibers and Paper (laminates); and Asphalts, Tar Products, Pits (evidently a misprint for pitch).



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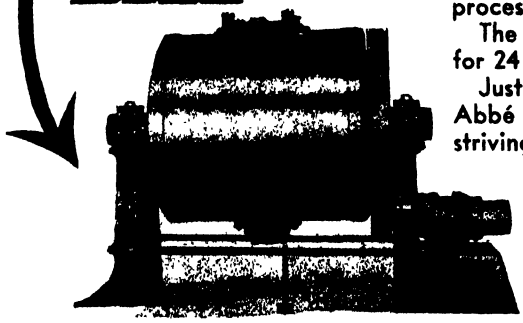
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The abstracts appear to be well done. Much more data are included than in the usual abstracts, and graphs and tables are introduced to increase their value. The text is reproduced by the photo-offset process from a typewritten original. Naturally no abstract can meet every demand, but this reviewer's guess is that these will supply most needs.

Perhaps it is unfair to criticize the narrow selection of sources represented by this first sample. But one is struck by the fact that only six publications supply these 16 abstracts. Nine are from A. C. S. publications—*Journal of the American Chemical Society* and *Industrial and Engineering Chemistry* (*Industrial* and *Analytical Editions*). Other publications represented are *India Rubber World* (four abstracts of two papers), *Journal of the American Dental Association* (two), and *Rayon Textile Monthly* (one). All articles abstracted appeared in January issues. One wonders what has happened to all the others of the 86 publications listed in the prospectus.

The carefully worked out system for filing the abstracts in a looseleaf binder (price, $3.00), according to the index numbers printed on each sheet, makes the material easily available for ready reference. Furthermore, the plan provides for several abstracts of a single article from different points of view as shown by three abstracts of one paper in the present group.

A start has been made with the new service, certainly, and the development of the idea will be watched with interest. Its value is not proved by the present offering.

Chemical Solutions. *Frank Welchers.* 1st ed. 408 pages, cloth, 6 × 9. D. Van Nostrand Co., 250 Fourth Ave., New York, N. Y., 1942. Price, $4.75.

This volume is composed of concise accounts of the use, method of preparation, and procedure by which some 1,700 solutions, reagents, indicators, culture media, stains, etc., are applied in laboratory practice. They are arranged alphabetically in accordance with the name of the person by which each is known or the name of its active constituent. Supplementary information is given, where needed, in regard to the sensitiveness of the reactions, interfering substances, keeping qualities, etc. Finally references are included to some 35 books and 98 scientific periodicals from which the compiled information was gathered.

The index is to the substances for the identification of which the solutions and reagents are used. It shows, for example, 60 different reagents for alkaloids, 45 for albumin, 32 for blood, and 35 for glucose. Listed also are 162 stains, 116 culture media, and 41 etching solutions. Thus in many cases there would seem to be an embarrassment of choice. No aid, however, is given, since a critical appraisal of the relative advantages of the many reagents would have led the author far beyond the purpose of bringing together for convenient reference the widely scattered information in this field of laboratory technique. This alone has been a contribution worthy of the appreciation of laboratory workers in many branches of research.

The typography, printing, paper, and binding are of a high standard of excellence and the book will undoubtedly serve a useful purpose in conveniently supplying needful information to large numbers of those engaged in experimental investigations.

Atherton Seidell

Fuel Flue Gases. *Chemical Committee, Technical Section, American Gas Association.* 1st ed. 198 pages. American Gas Association, 420 Lexington Ave., New York, N. Y., 1941. Price, $1.25 to students; $2.25 to A. G. A. members; $3.50 to nonmembers; discounts for quantity purchases.

One of the functions of the American Gas Association is to publish books on various technical phases of the business of manufacturing and distributing industrial fuel gases. Among the more notable examples, from the chemist's standpoint, are Gas Chemists' Handbook, the last edition of which was published in 1929, and "Combustion", published in 1932. "Fuel Flue Gases" overlaps these two in some respects, but in general is sufficiently distinctive to warrant recommendation to the gas chemist and engineer.

The introduction, discussing the kinetic molecular theory and the gas laws, is not well written. A popular rather than a scientific style is employed in some sections; the organization of material is erratic.

The first five chapters—complete fuel gas analysis, physical tests, applications of gas analyses, inert gas safety, and specific constituents of fuel gases—cover the determination and practical utilization of all the chemical and physical tests that can readily be applied to gases. Although analytical details are not discussed, a critical examination of the various pieces of analytical equipment offered for sale is valuable. Applications of gas analyses include combustion calculations, dissociation, calculation of flame temperature, heating value, purging, inflammability limits, and explosive pressures. The interchangeability of gases for domestic appliances and suitability of gases for carburizing are items of interest.

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sions of the American Gas Association have been devoted more to discussions of the so-called gum problem than any other single subject. In that period the problem has arisen, been investigated by many workers, and solved in a fairly satisfactory manner. The chapter on deposits in distribution systems is an excellent summary of this important and recent development in manufactured gas distribution technology.

The last three chapters cover atmospheres other than those from combustion, furnace atmospheres, and flue gas analysis.

E. H. SMOKER

Chromatographic Adsorption Analysis. *Harold H. Strain.* 222 pages. Interscience Publishers, Inc., 215 Fourth Ave., New York, N. Y., 1942. Price, $3.75.

THIS book is recommended as a reference on chromatography. It presents a résumé of the work carried out to date in this field and a complete bibliography with subject titles.

Correlations between the adsorbability of organic molecules and the polarity of their substituted groups are discussed. Generalizations concerning the chemical structure and adsorbability of molecules of a similar class were noted. Recommended materials for adsorption colors are listed, although for any particularly new problem which arises trial and error methods must be used to effect the best conditions for separating the mixture. A few generalizations are given on the selection of a solvent for the product to be chromatographed and on the properties of the solvent necessary for the successful removal of the separated products from the chromatogram. Chromatography has been successfully used for the preparation of elements, anions, cations, and isotopes, as well as for the purification of inorganic compounds.

A lengthy chapter reviews the separation of colored and noncolored organic compounds, such as fats, acids, terpenes, sterols, vitamins, hormones, anthocyanins, carotenoids, and coal-tar dyestuffs.

Chromatography is now being applied commercially in different fields, such as water purification, dehydration of natural gas, removal of oil vapor from compressed gases, and removal of color contaminants from liquids used for dry cleaning.

S. S. ROSSANDER

Glass Substitutes for Strategic Materials

IMPENDING and actual shortages of metals, plastics, and other materials have led to more serious consideration of glass as a substitute or alternate. At the suggestion of the Division of Substitute Materials of OPM, now WPB, technicians of the Pittsburgh Plate Glass Co. have prepared a 30-page brochure describing a dozen types of glass, giving availability information together with a suggested list of uses which include those designed to conserve strategic materials. This publication is available on request from the company's Technical Development Department, Grant Building, Pittsburgh, Penna.

Domestic Deposits of Strontium Mineral

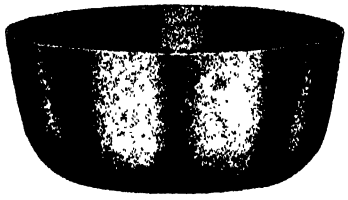
CELESTITE, a strontium mineral used for making tracer bullets, military flares, and similar pyrotechnics requiring a dazzling red light, is one mineral for which the United States will not have to depend upon foreign sources, the U. S. Bureau of Mines reports. If Axis submarines succeed in cutting off imports from Great Britain, the United States need only turn to its western states and develop known deposits of celestite as follows: California, one deposit of an estimated 600,000 tons and another of 12,000 tons; Arizona, a deposit of 180,000 tons; and Washington, a deposit of 12,000 tons. This total of 804,000 tons of celestite at the 1940 rate of consumption would last 268 years. Strontium has been mined in Texas and Ohio, and is reported to exist in Arkansas, Michigan, New York, Pennsylvania, Utah, and West Virginia.

The United States imports strontium minerals from Europe instead of developing its own western reserves because the cost of shipping the ores from the West to Atlantic seaboard markets heretofore has been prohibitive. England normally can ship a ton of celestite at ballast rates to the United States for $5.90, while it costs $16.40 from California to the Atlantic Coast. Imports of strontium minerals are duty free, and the relatively small peacetime requirements have been a further deterrent to the development of a domestic industry.

The economic background of strontium minerals, mining and preparation, uses, domestic occurrence, imports, and prices are described in detail in Information Circular No. 7200, "Strontium Minerals", by Charles L. Harness, published by the U. S. Bureau of Mines, Washington, D. C.

List of Russian Journals in North America to Be Compiled

THE Science-Technology group of the national Special Libraries Association has undertaken to compile, for the benefit of users of the Russian scientific and technical periodicals, current or otherwise, a complete list as far as possible of the holdings of such periodicals in all the libraries of the United States and Canada, whether personal, institutional, or industrial.



The American Platinum Works
N. J. R.R. AVE. AT OLIVER ST.
Newark, N.J.
EST. 1875

PLATINUM SUGAR ANALYSIS DISH—FIG. 92 OUR CATALOG N17

Owners and librarians in charge of such materials are asked to cooperate by sending a detailed statement of their holdings to Miss Nathalie D. Frank, 512 West 162nd St., New York, N. Y., stating whether the journals can be borrowed on interlibrary loan and whether the library has facilities for photostatting or microfilming.

Forest Products and National Defense

AMERICAN Forest Products Industries, Inc., 1337 Connecticut Ave., Washington, D. C., has prepared an attractive booklet, "Behind the Eagle Stand the Forests", which illustrates the participation of the lumber and timber products industries in the national defense effort. This is a profusely illustrated 40-page booklet that tells both in words and in pictures what the forest industries are doing for the Army, Navy, defense housing, defense industries, and all industry, and shows the wide field of nondefense uses in which timber construction can be used now to relieve the scarcity of other materials needed for fighting tools. It includes a large map of the United States, which presents graphically the location of various types of forest resources.

Subsurface Sampling of Petroleum Discussed

KNOWLEDGE of the exact amount of gas originally in reservoir petroleum permits more efficient utilization of natural gas in oil production and contributes substantially to the wartime resources conservation efforts of the Nation, according to the U. S. Bureau of Mines. The amount is calculated from samples obtained at the bottom of oil wells through a technique developed by the bureau and widely used by many oil companies.

These methods of analyzing physical properties of reservoir oils are described in Bureau of Mines Technical Paper 629, "Collecting and Examining Subsurface Samples of Petroleum", by Peter Grandone and Alton B. Cook. Copies may be obtained from the Government Printing Office, Washington, D. C., for 20 cents each.

Petroleum Research

LONG before the accelerated war production program began, the Petroleum and Natural Gas Division of the U. S. Bureau of Mines had launched its present studies of problems on petroleum and natural gas output with a view toward conservation of resources and more efficient utilization of petroleum. The division's program covered oil and gas development and production research, petroleum chemistry and refining research, pipe line transportation research, special chemical and engineering problems, helium operations, work for other government departments, and visual education. These researches have been summarized in "Biennial Report of the Petroleum and Natural Gas Division, Fiscal Years 1940 and 1941", Report of Investigations 3616, by R. A. Cattell, G. B. Shea, and others. Copies are obtainable from the Bureau of Mines, Washington, D. C.

February Issue of Chemical Reviews

CHEMICAL REVIEWS for February contains the following articles:

T. H. JAMES AND G. KORNFELD. Reduction of Silver Halides and the Mechanism of Photographic Development.

H. L. HALLER, L. D. GOODHUE, AND HOWARD A. JONES. The Constituents of Derris and Other Rotenone-Bearing Plants.

ALICE G. RENFREW AND LEONARD H. CRETCHER. Structure and Antipneumococcic Activity in the Cinchona Series.

R. B. VAN ORDER AND H. G. LINDWALL. Indole.

EDWIN R. LITTMANN AND J. R. M. KLOTZ. Naphthenic Acids. II. Manufacture, Properties, and Uses.

R. H. MANSKE. The Chemistry of Quinolines.

R. H. MANSKE. The Chemistry of Isoquinolines.

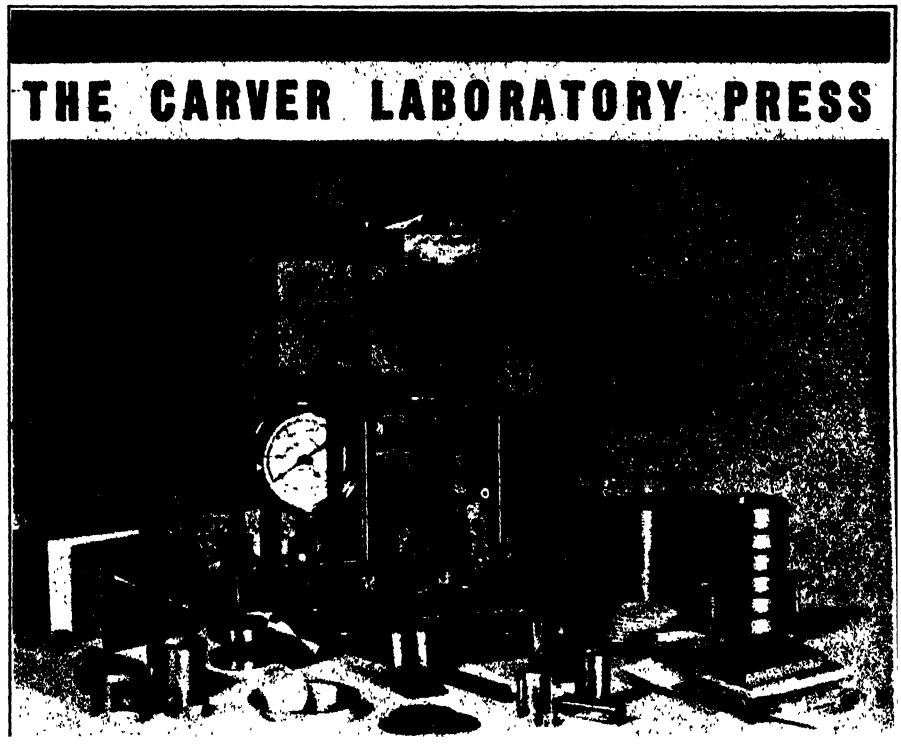
Cold Magic

UNDER the title "Cold Magic" the York Ice Machinery Corp., York, Penna., has begun publication of a house organ which it plans to distribute quarterly to all York employees.

The first issue, for Winter 1942 is an attractive 32-page well illustrated volume, which contains articles on "Our Battle of Production", "Recent Developments in Large Ammonia Absorption Systems", and "Our Neighbors to the South", in addition to a considerable number of "Doings in the York Family".

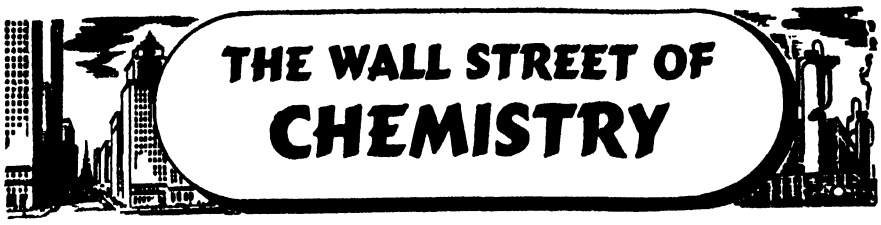
Imports of Natural Dyes to U. S. Maintain Importance

NATURAL vegetable dye materials, the bulk of which are from Jamaica, Dominican Republic, and Ecuador, continue to hold their place in the United States despite the development of synthetic dyes. Such natural dyes and coloring matter as annatto seed or achiote, furnishing extract for coloring butter, cheese, or other foods and dyeing orange yellow on cotton and silk, are used in this connection. Smaller amounts from the Far East, British Malaya, India, and the Netherlands Indies doubtless will be cut off for an indefinite time.



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	Annual Earnings		Per Common Share	
	1940	*1941*	*1940*	*1941*
Abbott Laboratories	$ 2,239,408	$ 2,245,811	$2.89	$2.90
Allied Chemical & Dye Corp.	.....	21,416,566	..	..
Babcock & Wilcox Co.	3,588,199	4,252,100	5.34	6.33
Bausch & Lomb Optical Co.	1,675,772	1,389,559	3 41	2.74
Celanese Corp.	6,376,896	7,105,685	3.38	3.43
Corn Products Refining Co.	9,581,054	10,266,027	3.10	3.37
Crocker-Wheeler Electric Mfg. Co.	.....	731,563	..	..
Fairbanks-Morse & Co.	2,749,699	2,920,618	4.59	4.87
General Aniline & Film Corp	4,106,057	4,115,731	0.55	0.56
General Electric Co.	56,241,083	57,197,000	1.95	1.98
General Printing Ink Corp.	836,855	943,070	0.86	1.00
General Refractories Co.	1,159,065	1,268,775	2.46	2.70
B. F. Goodrich Co.	6,121,357	8,608,324	3.11	5.02
Harbison-Walker Refractories Co	2,513,935	2,608,813	1.71	1.81
Hewitt Rubber Corp.	280,701	396,304	1.67	2.35
Hygrade Sylvania Corp.	880,625	1,067,185	3.59	1.78
International Salt Co.	955,034	902,815	3.98	3.76
Lambert Co.	1,173,054	1,350,410	1.57	1.81
Libbey-Owens-Ford Glass Co.	9,992,766	8,821,437	3.97	3.52
Mid-West Abrasive Co.	104,164	102,913	0.34	0.34
Molybdenum Corp.	769,991	511,154	1.33	0.88
Monroe Chemical Co.	91,584	103,521	0.21	0.31
Monsanto Chemical Co	5,467,774	6,769,435	4.04	4.90
National Gypsum Co.	1,565,196	1,533,816	1.03	0.94
National Lead Co.	6,102,702	5,375,685	1.34	1.10
National Oil Products Co.	704,967	887,273	3.92	4.11
Norwich Pharmacal Co.	757,883	788,013	0.95	0.99
Penick & Ford, Ltd.	1,073,938	1,597,342	2.91	4.33
Pure Oil Co.	8,718,057	15,285,255	1.21	2.86
Ruberoid Co.	802,100	1,563,099	2.02	3.93
St. Joseph Lead Co.	5,111,942	4,893,455	2.61	2.50
A. E. Staley Mfg. Co.	1,282,756	1,978,008	2.29	3.97
Sterling Products, Inc.	9,229,231	8,651,387	5.30	4.96
Texas Gulf Sulphur Co.	9,140,887	9,015,775	2.38	2.35
Tubize Chatillon Corp.	1,509,520	1,393,638	1 24	0.86
United Carbon Co.	1,336,331	1,711,547	3 36	4.30
Vick Chemical Co	1,951,881	1,827,101	2.86	2.68
Victor Chemical Works	1,090,223	1,187,224	1 57	1.58
Western Electric Co.	32,787,030	18,427,536	5.46	3.07
Westinghouse Electric & Mfg. Co.	18,985,428	23,117,510	7.10	7.21
Westvaco Chlorine Products Corp.	1,316,401	1,296,164	2.96	2.92
Zonite Products Corp.	114,606	226,243	0.14	0.27

Allied Chemical & Dye Corp. total business for 1941 exceeded that of 1940 by about 30 per cent and was the largest in the history of the company. Total taxes increased 121 per cent over 1940 and were equal to $13.67 per share of stock. Regular dividends of $6.00 per share and a special dividend of $2.00 per share were paid. Gross additions to the property account amounted to $21,681,841.

The **Bausch & Lomb Optical Co.** reports sales amounting to $30,562,045 in 1941, the largest in the history of the company, and comparing with $21,858,742 in the previous year. Federal income and excess profits taxes totaled $2,677,959 against $824,013 in 1940.

Sales of the **Celanese Corp.** reached a new high in 1941 at $62,277,141, a gain of 40 per cent over 1940. The company spent $8,700,000 on increased plant facilities. On December 5, 1941, the Celluloid Corp. was acquired as a plastic division of Celanese. The company reports that its new textile fiber, Fortisan, is now being used for parachutes, balloon cloth, and in flare parachutes, and that a new yarn, Lancse, is being used instead of wool.

The **Corn Products Refining Co.** in 1941 handled the greatest volume of business in its history, but may better the output by 10 per cent in 1942. It was necessary to write off foreign assets and accounts receivable and to make a charge to surplus to cover the loss. The total corn grind of 53,500,000 bushels was accomplished by practically continuous operation 24 hours a day, seven days a week, for most of the year.

Fairbanks, Morse & Co. report 1941 net sales of $48,520,959, the largest in the company's history, and net profit the largest since 1925. During the year $447,000 of outstanding 4 per cent debentures were retired. Taxes amounted to $6,834,608 or $11.40 per share, compared with $5.59 per share in 1940. The greater part of the company's manufacturing capacity is now devoted to defense work.

Plants of the **B. F. Goodrich Co.** were operated at a high rate of capacity during 1941, with increasing production being devoted to war purposes. In October the balance of $15,600,000 of a 3 per cent bank loan due in 1945 was paid off, using treasury funds and the proceeds of a new 2.25 per cent $10,000,000 bank loan, maturing serially to 1948. On December 1 an issue of $5,000,000 first mortgage bonds, 3 per cent series, maturing in 1956, was sold at par to an insurance company. Provision for federal income and excess profits taxes amounted to $10,810,000, compared with $2,200,000 for the previous

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AIDING NATIONAL DEFENSE

Numerous Croll-Reynolds Evactors are working overtime maintaining high vacuum in plants making explosives, synthetic rubber, airplane lubricants and a long list of other ordnance materials. They are maintaining high vacuum on engines and turbines of dozens of American ships sailing the seven seas.

While the large and special units require up to three months or more for fabrication the smaller ones are sometimes made in two weeks, or less, when the demand is urgent. These include single and multi-stage units for vacuum up to a small fraction of 1 mm. absolute, also small condensers and vacuum chilling equipment.

A recent development is a vacuum-cooled condenser for maintaining condensing temperatures down to 34° F. Inquiries will be handled as promptly as possible under the circumstances.

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Write for Bulletin 3197-A

ILLINOIS TESTING LABORATORIES, INC.

429 N. LaSalle St. Chicago, Illinois

year. Net sales increased 45.5 per cent over 1940.

The **International Salt Co.** produced in 1941 a volume of salt considerably in excess of that for 1940. Under the indenture provision under which the 12-year 3.25 per cent sinking fund debentures are issued, the company called for redemption at par on December 31, 1941, $100,000 of the issue, leaving $2,900,000 outstanding.

In 1941 the **Monsanto Chemical Co.** paid to employees $3.26 and to the Government $2.18 in taxes for every dollar paid to stockholders. Sales rose 40 per cent to $63,756,221 in 1941, research expenses rose 14 per cent to $1,404,030, and approximately $8,500,000 was spent for improvements and extension of plant facilities. The company increased capacity for production of phthalic anhydride and plasticizers for use in synthetic resins and rubbers, and by the middle of 1942 phenol capacity will be twice that of a year ago. Contact sulfuric acid, chlorine, and aniline plants are under construction.

National Lead Co.'s sales in 1941 were 54 per cent greater than a year ago, but taxes rose from $2,521,531 in 1940 to $10,015,669 in 1941.

United Carbon Co. sales of carbon black and natural gas in 1941 were 34.5 per cent above 1940, a record. Its research department has been working with manufacturers of synthetic rubber on the adaptability of carbon black to synthetic products.

The **Westinghouse Electric & Manufacturing Co.** has set up a special fund to cushion the effect on employees of unemployment incident to the eventual transition from emergency war production to normal production. An amount equal to 0.5 per cent of the pay roll each month will be added to the fund. The pay roll is now more than $15,000,000 per month.

Blackout Candles

A SPECIAL pack of candles for blackout use is announced by Standard Oil Co. of Indiana, Whiting. The white candles, packed in pairs, will burn approximately 9 hours each. They measure 5 inches high and 1.25 inches wide and will stand without the use of a holder. The blackout candles, made in the candle shops of the Standard Oil Co., are also ideal for general emergency use.

Toluene Substitute

NOTOL No. 1 is a hydrocarbon solvent, high in aromatics, which is finding favor in commercial application by industrial users as a toluene substitute. This solvent is produced in accordance with the specifications of United States Patent 2,229,328. Its nitrocellulose tolerance is within 80 per cent that of toluene. It is a product of the Neville Co., Neville Island, Pittsburgh, Penna.

Cement-Asbestos Pipe

ROXITE, a new line of cement-asbestos pipe offered by the United States Stoneware Co., Akron, Ohio, is manufactured by a patented high-pressure process which is said to give the pipe higher density and greater mechanical strength than other cement-asbestos pipe. Patented Flexlock sleeves and fittings are used to couple Roxite pipe and no special tools are necessary for assembling. The method of coupling does away with the need for any special treatment or threading of pipe ends.

Standard Roxite pipe is designed for handling mildly corrosive solutions or fumes and gases in ventilating ducts and stacks, and for transporting processing water which must be kept free of metallic contamination, etc. For more severe duty the pipe is also available with an impregnated or synthetic coating which offers adequate protection for many types of highly corrosive conditions. The standard coating consists of an internal and external synthetic resin finish having a thickness of about $^1/_{64}$ inch. Another protection is Tygon corrosion-resistant lining material, having an effective thickness of about $^1/_8$ inch. This lining thickness offers high resistance to abrasion along with immunity against almost all corrosive chemicals, with exception of glacial acetic, concentrated sulfuric, and chlorinated solvents.





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The MINE AND SMELTER SUPPLY CO., Denver, Colo.

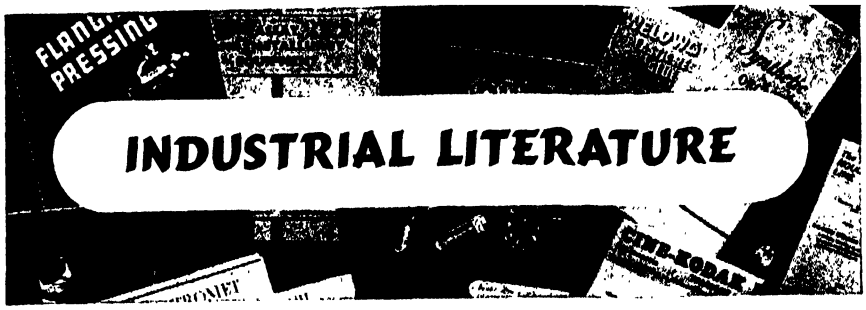
Ammonia
Argon
Boron Trifluoride
Butadiene
Butane
Butene 1
Butene 2
Carbon Dioxide
Carbon Monoxide
Chlorine
Dimethylamine
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Nickel Carbonyl
Nitrogen
Nitrous Oxide
Oxygen
Phosgene
Propane
Propylene
Sulphur Dioxide
Trimethylamine



Listed publications should be requested directly from the company concerned. Use business stationery, mention bulletin numbers, and refer to this journal. Publications will be sent free unless otherwise noted.

Analysis of Plating Solutions. This 48-page booklet, now in its sixth edition, covers in detail a wide range of analytical methods, necessary equipment, standard solutions, and physical and chemical tables used in the plating field. *Simple Methods of Analyzing Plating Solutions Booklet CAE.* HANSON-VAN WINKLE-MUNNING, Matawan, N. J.

Autotransformers. A 4-page folder is devoted to voltage control equipment of the autotransformer type. Linear output voltage, smooth control, and small temperature rise are some of the features mentioned. *Bulletin 424-D CAE.* GENERAL RADIO Co., Cambridge, Mass.

Balancing Machines. This 56-page catalog offers a treatise on static and dynamic balancing of rotating machine parts. An entire section is devoted to theory of balancing. Latest equipment is shown and discussed. *Catalog 19 CAE.* TINIUS OLSEN TESTING MACHINE Co., 500 North 12th St., Philadelphia, Penna.

Control Equipment. Control motors, motor-operated valves, thermostats, and hygrostats are covered in this folder of 13 data sheets. The equipment is designed for plant application. *Folder F-1695 CAE.* BARBER-COLMAN Co., Rockford, Ill.

Copper Alloys Weights and Data. This 35-page handbook, available in its fourth edition, contains tables of weights of sheets, strips, rods, wires, and tubes made of nonferrous metals and alloys. *Revere Weights and Data Handbook CAE.* REVERE COPPER AND BRASS, INC., New York, N. Y.

Electric Remote Speed Indicator. This instrument, for use with the company's variable speed control equipment, is described in a 4-page illustrated folder. *Bulletin G-427 CAE.* REEVES PULLEY Co., INC., Columbus, Ind.

Evaporative Condensers. A series of 3 data sheets describes equipment designed to supplant water-cooled condensers and water-cooling towers in refrigerative systems and also cool liquids in various industrial applications. *Evaporative Condensers Data Sheets CAE.* CARRIER CORP., Syracuse, N. Y.

Hercules Products. Chemical products manufactured by Hercules are listed with their properties and uses in this 25-page booklet. *Hercules Products Booklet CAE.* HERCULES POWDER Co., Wilmington, Del.

Industrial Oil Burners. This 4-page folder discusses mechanical and steam atomizing burners and their installations. These burners are capable of being converted to combined gas and oil burners. *Bulletin 108 CAE.* PEABODY ENGINEERING CORP., 580 Fifth Ave., New York, N. Y.

Instruments. This 22-page catalog gives data on a complete line of pH meters, spectrophotometers, titrimeters, and Anoxia photometers. *Bulletin 104 CAE.* COLEMAN ELECTRIC Co., INC., 318 Madison St., Maywood, Ill.

Lard Chiller and Plasticizer. A 16-page illustrated booklet describes complete units for cooling lard under controlled conditions. The lard is crystallized while being agitated rapidly in the first unit. It is then held with mild agitation in a second unit where, due to the heat of crystallization, its temperature rises, and the final tempering or plasticizing is produced. *Improving Lard the Votator Way Booklet CAE.* THE GIRDLER CORP., INC., Louisville, Ky.

Magnetic Separators. A series of magnetic separators utilizing gravity feed, mechanically rotated rougher rolls, and multiple magnetic fields is covered in this 10-page booklet. *Bulletin 701 CAE.* STEARNS MAGNETIC MFG. Co., Milwaukee, Wis.

Manometers. An 8-page bulletin describes a series of industrial manometers. Included are drawings showing various types of installation. *Trimount Bulletin CAE.* TRIMOUNT INSTRUMENT Co., 37 West Van Buren St., Chicago, Ill.

Multistage Centrifugal Pumps. The pumps which are the subject of this 18-page bulletin are available in four to seven stages. Their outstanding feature is that they are hydraulically, dynamically balanced against end thrust. *Bulletin 238 CAE.* PENNSYLVANIA PUMP & COMPRESSOR Co., Easton, Penna

Noise Measurement. Standardized industrial noise instruments are made conveniently with the instrument described in a 4-page illustrated folder. The instrument is completely portable and is nondirectional in its operation. *Folder 448-A CAE.* GENERAL RADIO Co., Cambridge, Mass.

Pumps. A 20-page catalog is devoted to centrifugal, piston, and plunger pumps for services ranging from boiler feed to paper-mill corrosive liquors. *Warren Pumping Machinery Catalog CAE.* WARREN STEAM PUMP Co., INC., Warren, Mass.

Pyrometers. This 6-page bulletin is devoted to suggestions to aid in obtaining the maximum life and efficiency from pyrometric equipment during this wartime emergency. *Defense Bulletin One CAE.* WHEELCO INSTRUMENTS Co., Harrison and Peoria Sts., Chicago, Ill.

Respirators. This single-page folder covers a series of respirators designed to protect against various dusts and vapors. *Folder CAE.* H. S. COVER, South Bend, Ind.

Rotary Compressors. Described in this 16-page bulletin are rotary compressors, dry vacuum pumps, and ammonia gas and sewage gas boosters. These compressors are of the multicellular type, designed for direct coupling to motor or engine. Pressures up to 50-pound gage or vacua up to 90 to 95 per cent of barometer are attainable. *Bulletin 7202* (including *Bulletin 7500*) *CAE.* YEOMANS BROS. Co., 1433 North Dayton St., Chicago, Ill.

Rotary Laboratory Pumps. This 30-page booklet is devoted to vacuum equipment and technique for the laboratory. A series of rotary pumps, a diffusion pump, and such equipment as piping, refrigeration, and vacuum gages are fully discussed. *Welch Duo-Seal Pumps and Vacuum Technique Booklet CAE.* W. M. WELCH SCIENTIFIC Co., 1515 Sedgwick St., Chicago, Ill.

Sealing Solutions for Castings. This 4-page folder describes how porous or leaky metal and alloy pressure castings may be reclaimed by impregnating them with Bakelite sealing solutions. Complete instructions are given for the application of this treatment. *Form 5101A CAE.* BAKELITE CORP., 30 East 42nd St., New York, N. Y.

Slo-Mixers. A 6-page illustrated folder describes paddle-type mixers for use in sewage and water treatment plants, in connection with the Langlier process of multistage flocculation. *Bulletin 389 CAE.* CHAIN BELT Co., 1600 West Bruce St., Milwaukee, Wis.

Steam Distribution Equipment. A 156-page loose-leaf catalog describes such items as expansion joints, conduit, insulation, pipe supports, water heaters, condensation meters, and traps. *Catalog 35 CAE.* AMERICAN DISTRICT STEAM Co., North Tonawanda, N. Y.

Unit Heaters. This 8-page bulletin covers a heater said to incorporate improved air-flow and heat-transfer characteristics. *Catalog AC 574 CAE.* FEEDERS MFG. Co., Buffalo, N. Y.

Water Stills. Single, double, and triple distillation units are described in this 4-page folder. Featured is the vertical condenser mounted directly over the evaporator, which permits ready escape of volatiles and balances the construction. *Bulletin CAE.* AETNA SCIENTIFIC CORP., 236A Broadway, Cambridge, Mass.

AMERICAN CHEMICAL SOCIETY MONOGRAPHS

For Today's Problems

ORGANIC CHEMISTRY

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Physical Constants of Hydrocarbons—by Gustav Egloff.
Volume I, Paraffins, Olefins, Acetylenes, and Other Aliphatic Hydrocarbons. 9.00
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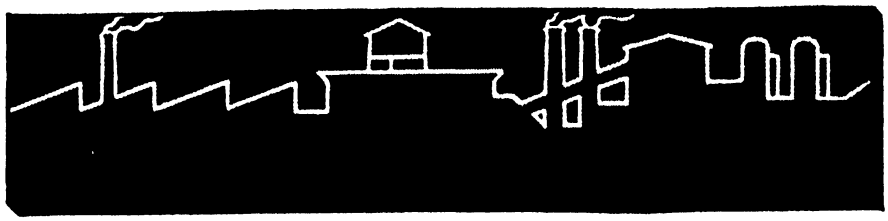
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PHYSICS

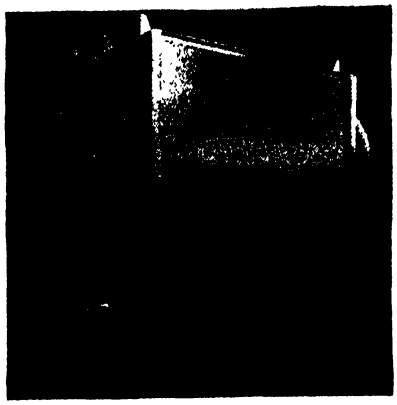
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REINHOLD PUBLISHING CORPORATION, 330 W. 42nd Street, New York, N. Y.



Double-Ribbon Mixer

A LARGE double-ribbon type mixer has been completed for an automotive manufacturer by the H. K. Porter Co., 4945 Harrison St., Pittsburgh, Penna. Be-



lieved to be one of the largest of these mixers ever manufactured, it is designed for use in mixing automobile body insulating material. The mixer has a total operating capacity of 2,000 gallons, with a mixing bowl 6 feet wide by 9 feet 2 inches long and 6 feet 6 inches high. The tank, fabricated from plain steel, is driven from both ends by machine cut gears riding on antifriction bearings. Motor drive is mounted on the same base as the machine itself, thus eliminating danger of misalignment.

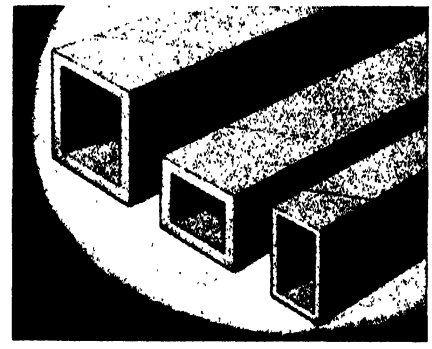
Fast, efficient mixing is accomplished by means of spiral ribbons arranged to create a positive folding action on the material inside the cylinder. Special end seals prevent contamination of materials being mixed.

Variable Speed Transmission

THE largest variable speed transmission to be equipped with hydraulic automatic control was recently built by Reeves Pulley Co., Columbus, Ind., for use on a rotary veneer lathe in a South Carolina plant. This transmission, weighing 4,300 pounds uncrated, is nearly 9 feet long, 5 feet wide, and stands almost 4 feet high, over-all. It transmits 26 horsepower at maximum speed and provides infinitely variable speeds over a speed ratio of 3:1.

The hydraulic control provides completely automatic speed variation on the transmission. The purpose in this particular installation is to maintain uniformly high peripheral cutting speed on the log from full original diameter down to the smallest diameter at end of the cut. Without this control, speed of rotation of the log would decrease as its diameter decreased, so that much less veneer would be cut toward the end of the run than at the start.

Paper Tubes for Electric Coils



AN IMPROVEMENT in tubes for electric coils is announced by Precision Paper Tube Co., 2033 West Charleston St., Chicago, Ill. Among advantages said to be gained by use of a specially adapted heat die machine are heavy compression, ensuring a new degree of strength and resistance to collapse, finer accuracy in sizing to specifications, superior dielectric properties, and lower moisture absorption rate.

The tubes are preliminarily formed as heretofore of dielectric kraft or fish paper, or a combination of both. The paper is spirally wound on a steel die in an automatic machine. The tube is then pushed pneumatically through the new heated compression die which effects an added compression of about 10 per cent.

Tubes made by this process, supplied in round, oval, square, or rectangular cross section and in continuous lengths of any wall thickness with any inside or outside diameter, can be held to a tolerance of 0.002 inch.

Heat-Transfer Unit for Liquids and Viscous Materials

A HIGHLY efficient, continuous, closed type of heat-transfer mechanism for liquids and viscous materials is manufactured by the Votator Division of The Girdler Corp., Louisville, Ky. Basic features of the unit, known as the Votator, are continuous operation under pressure in a closed system and rapid rate of heat transfer.

The process makes it possible to get extremely high K value, uniform and accurate temperature throughout the product, and accurate temperature control. The high ratio of heat-transfer surface to volume of material permits change in temperature of the product through a wide range in the shortest possible time. The heat transfer is so rapid that many products can be supercooled well below the crystallization point and discharged from the Votator in a liquid state.

Products may be heated or cooled without contacting the atmosphere, due to the fully enclosed design of the unit. Conversely, predetermined amounts of

CONTINUED ON PAGE 435

Chemists and Chemical Engineers Needed in the Production Army

PLANT-LABORATORY-CLASS ROOM

ARE YOU AVAILABLE?

Register in the A. C. S. EMPLOYMENT CLEARING HOUSE
Memphis, Tennessee **April 19–24, 1942**

Open only to members and paid student affiliates of the American Chemical Society registered at the meeting

Advance registration accepted until April 4

Write to the American Chemical Society, 1155–16th Street, N. W., Washington, D. C. if you wish forms sent you by mail.

See CHEMICAL AND ENGINEERING NEWS
January 10, page 36

EMPLOYMENT INFORMATION

RATES to be paid in advance. Standard setting 5c a word, minimum charge $2.00 each; include 8 words for box address. Exceptions see ⟶ Display, $10.00 per column inch. 2 inches maximum, larger units at regular display unit rates. No discounts or allowances.
SEND advertisements with remittance to INDUSTRIAL AND ENGINEERING CHEMISTRY, 332 West 42nd St., New York, N. Y., to reach there not later than 10:00 A.M. on the 10th and 25th, closing dates for NEWS EDITIONS of the 25th and 10th, respectively. Insertions made in order of receipt provided necessary remittances are complete.
Employers are requested to mention in their announcements the section of the country in which the open position is located to ensure replies only from those who are geographically available.
In printing these advertisements the SOCIETY assumes no obligations as to qualifications of prospective employees or responsibility of employers.

Unemployed members of the AMERICAN CHEMICAL SOCIETY seeking employment for themselves are allowed in one calendar year 3 free announcements, one per issue, set in standard style and limited to 50 words each, including 8-word box address. Excess words 5c each. Additional standard announcements 50% of regular rate.

Employed members of the AMERICAN CHEMICAL SOCIETY seeking new positions are permitted 3 standard announcements during the calendar year at 50% of the regular rate—include 8 words for box address.

Employers seeking chemists and chemical engineers are permitted 3 standard announcements, not to exceed 50 words each including box address and not more than one per issue, during the calendar year without charge, provided they agree in writing to acknowledge all replies (excess words 5c each), otherwise full rate applies.

The AMERICAN CHEMICAL SOCIETY is vitally interested in the welfare of its members and in seeing that the chemical industry is manned with competent chemists and chemical engineers. These pages are part of our service in that connection. In addition most of the larger sections of the AMERICAN CHEMICAL SOCIETY and several of the smaller ones have active employment committees. Local section secretaries in your area will inform you as to any employment aids that may be available locally.

An Employment Clearinghouse is operated at each national meeting of the SOCIETY for the purpose of bringing together representatives of industry looking for chemists and members and student affiliates in attendance wishing to make such contacts. For further details, consult the preliminary and final programs as printed in the NEWS EDITION prior to each meeting.

In the New York area, special employment facilities are offered by the Employment Bureau of the Chemists' Club, 52 East 41st St., New York, N. Y. In the Chicago area, the Chicago Section maintains an employment service at 413 Stevens Hotel, Chicago, Ill.

Those replying to announcements should be careful to send copies and not original documents. Advertising circulars will not be forwarded and to that end all letters will be opened at the forwarding office.

SITUATIONS OPEN

Those announcements in which the letter "P" is part of the address key have paid in full and are not committed to acknowledge replies. The Society regards acknowledgment by employers of all applications as an act of common courtesy but can assume no responsibility for their failure to do so.

RESEARCH FELLOWSHIPS in Wood chemistry available September 1942 for M.S. candidate. Full time research and study. Stipend $50 per month for nine months. Bachelor degree in chemistry or chemical engineering required. Address applications to Dean D. S. Jeffers, University of Idaho, Moscow, Idaho.

THREE ORGANIC Chemists M.A. degree 1941 or 1942 preferred wanted for organic research developing new uses and products for organic chemical manufacturer. Submit full details concerning education, scholarship, experience, personal data, references, draft status, and recent photo. State salary desired. Address Post Office Box 460, Niagara Falls, N. Y.

PHYSICAL CHEMIST. Eastern A. C. S. approved college with modern well equipped laboratory and library needs instructor for next academic year. Candidate should be less than 28 years old, preferably single, with a Ph.D. from leading university. Instructor will have light teaching load, and plenty of opportunity for research.
Box 103-T-2, Ind. & Eng. Chem., Easton, Pa.

TEACHING FELLOWSHIPS in chemistry, State College of Washington; master's and doctor's programs in organic, inorganic, analytical, physical, and physiological chemistry. One-half time assisting, stipend $450, plus out-of-state tuition.
Box 104-T-2, Ind. & Eng. Chem., Easton, Pa.

WE have POSITIONS for all types of Chemical Engineers and Chemists and would be glad to receive applications from those who are being displaced because they are in non-essential industries, or for any other reason wish to make a change.
Box 26-NP-3, Ind. & Eng. Chem., Easton, Pa.

WE have POSITIONS for women who have majored in Chemistry and would be interested in receiving applications from those who are now graduating or who have received their degrees within the last five years.
Box 27-NP-3, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST. With broad experience in industrial analysis for development of analytical apparatus. In reply give complete details of education, personal history, experience, salary desired, references, and send recent photograph. Location — Western Pennsylvania.
Box 34-NP-3, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, assistant to plant superintendent in organic chemical manufacturing, principally pharmaceuticals. Location — New Jersey. Age preferred — 30 to 35 yrs., with 10 years' experience in production work. Furnish photograph, complete personal data including draft status, nationality, experience, education, and several references.
Box 42-N-3, Ind. & Eng. Chem., Easton, Pa.

CHEMIST or CHEMICAL engineer — mechanically inclined with one or two years' industrial experience plant & laboratory control. Metallurgical background desirable. Philadelphia area.
Box 48-NP-3, Ind. & Eng. Chem., Easton, Pa

INORGANIC CHEMIST, for research and development of inorganic heavy chemicals with well-known progressive upstate New York concern. Submit full details of education, experience and complete personal data. Recent photograph desirable.
Box 89-NP-3, Ind. & Eng. Chem., Easton, Pa.

SEVERAL ENGINEERS with chemical, mechanical, or electrical training, and a physicist required at once for expanded development program by well-known group of associated companies manufacturing lumber, plywood, fibrous products and defense materials. Location Middle West or West Coast. Recent graduates, several years' experience, preferred. Submit details, education, experience, references, salary requirement, photograph, draft classification.
Box 57-N-3, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMISTS, Ph.D's., with thorough training in laboratory research methods as well as in the fundamentals of organic or physical chemistry for positions as project leaders in research laboratory of major petroleum company of southwest. Recent graduates preferred. Give personal data and details as to scholastic training, salary expected, and references. Enclose recent photo. Advise if plan to attend Memphis meeting of A. C. S.
Box 86-NP-3, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST, wanted by progressive upstate New York manufacturer. Recent or June graduate with advanced degree in Analytical Chemistry preferred. Submit full details of education, experience and complete personal data. Recent photograph desirable.
Box 90-NP-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, for research work by progressive upstate New York manufacturer. Recent or June Ph.D. preferred. Submit full details of education, experience and complete personal data. Recent photograph desirable.
Box 91-NP-3, Ind. & Eng. Chem., Easton, Pa.

RESEARCH FELLOWSHIP available September 1942, stipend $770, yearly. Fee exemption. Full time for research and study. M.S. or equivalent in either physical or analytical chemistry, desired. Send applications to L. P. Biefeld, Dept. of Chemistry, Purdue University, Lafayette, Indiana.

A GRADUATE CHEMIST with five or more years' research or semi-research background, preferably experienced in dry pigments. Applicant must be classified 3A. Give past record in detail and salary desired.
Box 17-TP-3, Ind. & Eng. Chem., Easton, Pa.

FOOD CHEMIST wanted for bakery products control laboratory: Applicant must have college degree in chemistry and several years' experience in general food chemistry. Should have ability to supervise laboratory work and analyse flour, shortening, milk, eggs, and other products used by a bakery. Apply by written application only, giving personal and technical qualifications, experience, draft status, age, references, recent photograph, and salary desired. Application will be treated in strict confidence. The Great Atlantic and Pacific Tea Company, National Bakery Division, 420 Lexington, New York.

ANALYTICAL RESEARCH Chemist, by fast-growing laboratory in Middle West. Must have had experience in meticulous analysis of gaseous fuels. Ph.D. preferred but not essential. Salary open.
Box 30-T-3, Ind. & Eng. Chem., Easton, Pa.

CAPABLE EXECUTIVE to assist in general management and development of successful southern chemical industry.
Box 31-TP-3, Ind. & Eng. Chem., Easton, Pa.

CARBON BLACK Chemist, B.S. degree or equivalent. Good scholastic record and about one year's experience in chemical research on carbon black required. Give education, experience, personal data, and draft status. Starting salary $1800-$2400 per year.
Box 37-T-3, Ind. & Eng. Chem., Easton, Pa.

ASSISTANT CHEMIST in Brewery. Recent graduate. Applicants should give age, educational background, experience, if any, salary expected and recent photograph. Location, Western New York.
Box 39-T-3, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER. Applicants should give educational history, scholastic grades, experience, age and other personal data, and recent photo. Good opportunity for well-qualified person.
Box 46-TP-3, Ind. & Eng. Chem., Easton, Pa.

HEAT EXCHANGER engineer to be assistant manager of heat transfer division of Pennsylvania Manufacturer. Opening is permanent, immediate, excellent opportunity for advancement. Chemical engineering degree preferable, mechanical engineer suitable. Experience designing heat exchangers necessary but will consider application from recent graduate specially trained in heat transfer. Salary commensurate with ability
Box 49-TP-3, Ind. & Eng. Chem., Easton, Pa.

CEREAL CHEMIST. Master or Ph.D. Please furnish details of educational and personal history, references and recent photo. Opportunity for qualified person in research laboratory of prominent food organization.
Box 55-TP-3, Ind. & Eng. Chem., Easton, Pa.

EXPERIENCED MAN or woman, analytical chemist for pharmaceuticals. Broad organic background essential. Large concern, Northern New Jersey. State full qualifications and salary expected. Include recent photograph. Our employees are aware of this advertisement.
Box 56-TP-3, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST in food research laboratory. Good training in fundamentals of chemistry required. Give details of educational history and experience, age, and other personal data, and small photo.
Box 60-TP-3, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER for Research and Development Department of established heavy chemical and metallurgical plant in southeast. Desire well qualified man with five to ten years' research and industrial experience, preferably in metallurgical and inorganic chemical work, for permanent position. Give particulars of training, scholastic ranking, experience, salary expected, personal data and photo in first letter.
Box 77-T-3, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST. Master or Ph.D. Submit educational history, personal data and small snapshot. Opening offers opportunity for qualified person in food organization research laboratory.
Box 85-TP-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST. Bachelor or Master. Applicant should submit educational history, experience, age and small snapshot. Good opportunity for qualified person.
Box 86-TP-3, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST, in food industry. Applicant should have broad training in the fundamentals of chemistry and chemical engineering, and some experience in food technology. Submit details of educational and personal history, and recent snapshot. Excellent opportunity for qualified person.
Box 87-TP-3, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 434)

Address communications to the box number indicated and Mail to Easton, Penna.

The American Chemical Society has no information concerning the position advertised—or in regard to those seeking employment.

SITUATIONS WANTED
(A.C.S. MEMBERS)

SPECIAL LIBRARIES ASSOCIATION will recommend trained chemical and technical men and women librarians at no cost to employer or member. Competent persons are now available. Write to the Executive Office, 31 East Tenth Street, New York, New York, for additional information.

COLLEGE TEACHING or Research, Ph.D., 1931, with teaching experience in general, organic, physical chemistry, research work in colloids, publications, Protestant, midwest preferred, age 37, American, draft deferred.
Box 40-N-2, Ind. & Eng. Chem., Easton, Pa.

SYNTHETIC RESIN Chemist. Five years' experience in technical research on synthetic coatings and adhesives. Also experienced in photochemistry. I have shown originality; and I have obtained practical results. Married. Age, 28. Harvard training. Now employed, seeking better opportunity.
Box 68-N-2, Ind. & Eng. Chem., Easton, Pa.

RESPONSIBLE TEACHING, research or development position desired by Chemical Engineer Ph.D. 1934. 6 years' industrial research, development and control experience (inorganic heavy chemicals). 6 years' teaching. Patents. Present research on waste gas recovery and industrial utilization of agricultural by-products Age 35. Married.
Box 37-T-2, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, M.S., with Ph.D. in agricultural biochemistry. Graduate training includes work in chemical engineering, organic chemistry, biochemistry, and bacteriology. Five years' experience in food industry. Sigma Xi, Phi Lambda Upsilon. Desires position in the Middle or Far West.
Box 43-T-2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST: will complete work for Ph.D. 1942. Major inorganic and analytical. Good training in organic. Desire position doing research. Preferably New York City or vicinity. 18 years' practical experience. Publications. Available immediately.
Box 61-T-2, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. 1928, minor physics, 13 years' experience synthesis, aliphatic, aromatic, heterocyclic compounds, also enzymes, vitamins, coal tar products and plasticisers; familiar with physico-chemical methods. Want responsible position in organic research, preferably with biochemical applications. North or South America.
Box 65-T-2, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.A., sixteen years' experience in research, production, and control especially in foods, bacteriology, and biochemistry. A good plant manager and superintendent; successful research and sales experience. Can get things done and usually make money for employers. Age 39, married, Protestant.
Box 92-T-2, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, B.Ch.E., 1940, Tau Beta Pi. Single, 23, 3A draft. Two years' experience development synthetic resins and plastics, mainly laminated phenolics. Desire any position in plastics industry. Metropolitan area preferred, but will consider anywhere. Available immediately.
Box 100-T-2, Ind. & Eng. Chem., Easton, Pa.

ORGANIC BIOCHEMIST, Ph.D., 1942. Available immediately. Research experience in organic syntheses and enzyme chemistry. Interested in organic, biochemical or drug research. Age 24, single, draft deferred. East preferred. Member Phi Beta Kappa, Phi Lambda Upsilon, Sigma Xi.
Box 102-T-2, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., with some engineering training, age 35, married, Protestant, Anglo Saxon, 10 years' research experience, naval stores, terpenes, resin acids, olefin polymerisation and hydration, catalytic vapor phase oxidation. Wishes position teaching, research, development, plant operation.
Box 33-N-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., 27, married, now teaching in a large N. Y. college. Desires part-time work in synthetic organic research and for full-time summer employment in N. Y. C. area. Excellent training and experience. Particular desire to assist in war effort.
Box 38-N-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, B.S. 1941, M.I.T., over 100 semester hours chemistry. 6 months' experience plastics research. Now employed. Desire position with greater opportunity. Research, development, or production. Available on short notice. Prefer Middle Atlantic or Middle West. Age 22, single, Class 1B. Excellent references.
Box 40-N-3, Ind. & Eng. Chem., Easton, Pa.

INORGANIC and PHYSICAL Ph.D. desires position with more promising future. 3 years' experience at A.C.S. accredited colleges teaching qualitative, quantitative and general chemistry. Research publications. Age 27, Protestant, married. Available in late May for academic or industrial position.
Box 51-N-3, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, M.A. 1941 from leading A.C.S. approved university. Age 24, single, good health. Thorough training in all branches of chemistry. Prefer far West, but available anywhere immediately. Mechanically inclined. Desire research or development position. Hope to attend Memphis meeting.
Box 53-N-3, Ind. & Eng. Chem., Easton, Pa.

PRIVATE RESEARCH assistant in large Eastern university. Organic chemist, Ph.D. 1941. Undergraduate major — Bio-chemistry. Research on amines, amino acids, unsaturation, organic synthesis. Publications. Graduate assistant in organic 4 yrs. Desire research or teaching position. Draft deferred, 27, single, available immediately.
Box 54-N-3, Ind. & Eng. Chem., Easton, Pa.

EXPERIENCED REFINER of corn starch, corn syrup and by-products, seeks position as director of research, chief chemist, assistant shift superintendent or general superintendent.
Box 60-N-3, Ind. & Eng. Chem., Easton, Pa.

PLANT MANAGER or Superintendent. Accustomed full responsibility. Chemist and chemical engineer. Plant design, pilot, layout, development; operation, maintenance, production planning, costs, chemical economics, personnel and sales relations. Synthetics, solvents, plastics, extracts, oils, alkaloids. Distillation (including vacuum), alcohol recovery. Age forty, married, American ancestry, Protestant, consulting experience, patents, publications, references. Available short notice. Reasonable salary.
Box 65-N-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. 1939. Desires research position in the middle-west, in the field of synthetic organic chemistry. Resin experience. Presently employed, available within reasonable time. Draft deferred. Single.
Box 68-N-3, Ind. & Eng. Chem., Easton, Pa.

COLLEGE TEACHING or research, Ph.D., 1928, with ten years' experience in teaching general, inorganic, analytical chemistry. Publications. Abstractor for the encyclopedia of chemical reactions. First rate references. Age 37, single. Ex-Austrian. Employed. Available within reasonable notice. Location immaterial.
Box 69-N-3, Ind. & Eng. Chem., Easton, Pa.

ENGINEER with exceptional training and ability. Degrees in chemical and industrial engineering leading universities. Successful record in research and development on plastics, cellulose paper, lignin, extraction and engineering economics; would prefer production. Fluent French, Spanish. Single, 24, draft deferred, immediately available.
Box 11-T-3, Ind. & Eng. Chem., Easton, Pa.

KNOWN INDUSTRIAL Biologist, for many years active in the food and fermentation industries in his former research laboratories. Wishes to contact progressive concern which is interested in the development of new products and the utilization of by-products. The connection should be consultant and advisory based upon mutual understanding.
Box 12-T-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. 1940 research in Friedel-Crafts alkylation. Thesis and publications. Sigma Xi and Phi Lambda Upsilon. Research experience in petroleum chemistry, manufacture medicinal white oil and petroleum sulfonates. Employed, draft deferred.
Box 15-T-3, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, M.S. 1941 A.C.S. accredited midwestern college. Training in organic, inorganic, analytical, and bacteriology. Industrial experience in analytical and food processing. Patent. Desires National Defense Work. Age 27, single, dependents. Employed. Available reasonable notice.
Box 16-T-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.S. Univ. of Penna. (1939). Organic major, physical minor. Over two years' research experience in organic synthesis. 24, single, draft deferred. New York City area preferred. Available at short notice.
Box 18-T-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. Experienced in industrial research and organic synthesis. Also thorough and practical background in analytical and physical chemistry. Honor societies. Publication. Now profitably employed but seeking responsible position which offers greater opportunity for advancement.
Box 19-T-3, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, Ph.D., 1937. College teaching, general, physical, organic, analytical. Varied research: inorganic, electrochemistry, catalysts, polarograph. Expert glassblower. Sigma XI. Age 30, married. Industrial research position desired in East.
Box 21-T-3, Ind. & Eng. Chem., Easton, Pa.

TEACHING, INDUSTRY, Ph.D. in Physical and Inorganic. Broad analytical training and experience. Several years' college teaching General and Analytical. Sigma Xi, Phi Lambda Upsilon. Available June. Male, age 30, married.
Box 23-T-3, Ind. & Eng. Chem., Easton, Pa.

PROFESSORSHIP, by Ph.D. Ten years' teaching experience, chiefly general, some physical, organic, analytical. Five years' experience in industrial research laboratory where now employed. Age 36, married, four children, Protestant, honorary societies. South preferred.
Box 24-T-3, Ind. & Eng. Chem., Easton, Pa.

SALES ENGINEER. Graduate in Industrial Chemical Engineering and other university courses. Broad experience in petroleum field including sales management, sales engineering both automotive and industrial fuel oil and its application to processing and power plants, marine shipping, terminal operation both marine and pipe line. Age 42, married. Employed but seeks change. Employer not in defense industry.
Box 27-T-3, Ind. & Eng. Chem., Easton, Pa.

CHEMIST and CHEMICAL Engineer, B.S. 1941. Now working toward M.Ch.E. Extensive laboratory training in analytical organic and inorganic. Single, 23, draft deferred. Desires analytical, production, control and research work. New York preferred; will consider anywhere. Available June 1st.
Box 29-T-3, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST Ph.D. from leading university desires research and teaching position. 12 years' experience teaching and directing research. Numerous publications. Have taught organic, colloid, physical and biochemistry. Married. Available immediately.
Box 32-T-3, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER: 18 years' in plant process control, plant research, supervision, and laboratory supervision. Experience includes 12 years' chemical technology in apparatus field, 4 yrs. development & supervision in carbon and dry cell industry, 2 yrs. in metallurgical field. Wide experience in consulting work in electrochemical, food, and instrument application. Location Midwest or West. Interested in technical sales or production supervision.
Box 33-T-3, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, M.I.T. graduate plus business training with twenty years' diversified experience directing (often as consultant) research and development on products, processes, equipment; cooperating in design and initial operation of million dollar plants; solving production problems; increasing morale and efficiency of men. Recently in pulp and paper; earlier in rubber chemicals, varnishes and heavy coatings, gas and by-products.
Box 34-T-3, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Ph.D., married, Protestant, six years' research experience. Excellent knowledge of recent developments in biochemical field. Broad training in all branches of chemistry. Numerous publications. Member of several societies. Desires responsible position in research laboratory of progressive food or pharmaceutical concern.
Box 35-T-3, Ind. & Eng. Chem., Easton, Pa.

CHEMIST B.SC. in Chemistry, May 1942, prefers employment within 100 miles of Philadelphia, but will go anywhere. Scholarship student (I.Q. 150), with summer experience in control laboratory. Basically trained in inorganic, organic, analytical and physical chemistry, also in microanalysis.
Box 38-T-3, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST, B.Sc. May, 1942. Standard training in main divisions of chemistry, including microanalysis and chemistry of foods and drugs. Scholarship student, college laboratory assistant, summer experience in petroleum industry.
Box 40-T-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, B.S., 1933, desires research position. Thoroughly experienced in the production and assay of pharmaceutical and vitamin preparations. Director of Research Laboratory with 7 years' experience in the development of pharmaceutical, vitamin and food products. 2 years' experience in the manufacture of fine organic chemicals. Married, 3A draft deferred.
Box 42-T-3, Ind. & Eng. Chem., Easton, Pa.

DEVELOPMENT and RESEARCH chemist with exceptional training and experience. Ability to initiate and direct research problems with sound judgment and resourcefulness. 17 years' highly successful record in heavy chemicals, petroleum, high pressure gases and catalytic processes. Desire responsible position here or in Latin America.
Box 50-T-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., 1942 midwest university. Bacteriology minor. General chemical background. Research experience, organometallics, sugars, aminophenols, general synthetic reactions. Interests, organic, drug, or bacteriological research or teaching with research. Age 25, married, draft deferred. Available for interview at Memphis meeting.
Box 51-T-3, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 435)

(Situations Wanted Continued)

DETROIT, TOLEDO, Cleveland. Industrial and research chemist Ph.D. wishes research or administrative position in this area. Ten years' experience resins, plastics, lacquers, cellulose derivatives, cellulose films, wool substitute fibers, paper, waxes. Patent litigation experience. Married. Employed.
Box 53-T-3, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, M.S. Thirteen years' experience in research, development, and production on nitrogen, chlorine, and sulfur compounds, poisonous and volatile gases, and high pressure catalytic synthesis. Expert in training personnel and starting new plants.
Box 54-T-3, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S., 1934. Six years' industrial research, development, and control work on milk products. Employed but interested in responsible position or good opportunity for advancement. Would prefer research in plastics or synthetic rubber. Midwest location but will consider other work, anywhere. Took 2 year pre-engineering course, also have major in mathematics. Age 31, married.
Box 57-T-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, research, development. M.A. eastern university 1942. Teaching fellow. B.A. far western university 1938. Two years' experience in mid-west in synthetic resins, coatings, plastics, and related products. Persistent worker. Age 25. Selective service 2-A. Available June.
Box 58-T-3, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST and BACTERIOLOGIST for college teaching and research. Ph.D. 1940. Minor in organic. Two years' post-doctorate experience in enzyme and vitamin research. Three years' consultant to pharmaceutical company. Publications. Presently employed but desires position with opportunity for teaching. Sigma Xi. Age 26. Married. Draft deferred. Available August 1942.
Box 59-T-3, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER B.S. Specializing in explosives and ammonium nitrate processing. Experience in paper industry. American, single, Protestant, 2B classification. Location immaterial. Available reasonable notice and salary.
Box 61-T-3, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST Ph.D. 1940. Now employed desires responsible position with a progressive firm. Experienced in small animal experimentation, vitamin assays and endocrine chemistry. Publications, honor societies. Eastern location preferred.
Box 63-T-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, B.S., with special training in rubber chemistry and technology. Sound background in physical and analytical chemistry. Taking graduate work. Now working on coal degradation. Desires research position in synthetic rubber development. Age 21, single.
Box 64-T-3, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL METHODS. Chemist-biochemist. Ph.D. Five years' research and microanalysis of soil, plant and biological materials. Trace metals, vitamins and insecticides. Spectrographic and photometric techniques. Honor societies. 19 publications. Married, age 32. Now employed. Interested in methods research or directional position. Location immaterial.
Box 65-T-3, Ind. & Eng. Chem., Easton, Pa.

THOROUGHLY TRAINED chemist. M.S. Iowa State; B.S., Ph.D. Cornell. Research: plant pigments, vitamins, bioassays, balance studies, feed and food analyses, mineral nutrition. Experience; two years' industrial, one year head of chemistry department small college. Phi Kappa Phi. 26, married. Desires teaching with opportunity for research.
Box 66-T-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST Ph.D. Industrial experience in synthetic medicinal research, hydrogenation. Working knowledge of pharmacology. High scholastic standing, fellowships, college teaching. Patents, publications. Young, married, draft deferred. Desires pharmaceutical research position in East.
Box 67-T-3, Ind. & Eng. Chem., Easton, Pa.

NUTRITIONAL CHEMIST. Assistant Professor of Biological Chemistry in large University desires new position, either academic or industrial. Numerous research publications. Location immaterial. Available immediately.
Box 69-T-3, Ind. & Eng. Chem., Easton, Pa.

PAINT CHEMIST: Twelve years' experience in direction of research, production, development and sales service of paints, resins, varnishes and enamels. B.S. in Chemical Engineering; married. Now employed, desire better opportunity.
Box 72-T-3, Ind. & Eng. Chem., Easton, Pa.

Ph.D., 5 YEARS' research in Sweden on short waves and isotope separation, 2 years' research fluorine chemistry in America, many publications. Austrian. No enemy alien, Christian, single, age 29, first citizenship papers obtained.
Box 73-T-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST. Ph.D. Wide experience in theoretical and synthetic organic chemistry. Undergraduate and graduate study, academic and industrial Post-doctorate appointments, and instructorship, at large Eastern University. Phi Beta Kappa, Sigma Xi. Publications, independent research. Employed. Desires industrial or academic position.
Box 76-T-3, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST. M.Sc. 1940 with 1 year of industrial experience desires employment in any of the Defense Industries, in Control or in Production. Also desires position as an Assistant Spectrographer. Eastern location preferable.
Box 78-T-3, Ind. & Eng. Chem., Easton, Pa.

NEW PRODUCT? Could I suggest or work out with you that new product? Biochemist, Ph.D. with industrial plant and laboratory experience in vitamins and vitamin products, nutrition, foods and bioassays. Desires supervision of production or research with progressive company. Married.
Box 79-T-3, Ind. & Eng. Chem., Easton, Pa.

COLLEGE TEACHING or research, Ph.D., 1940. Organic major. Two years' college teaching, general, organic, analytical; two years' graduate assistant. Phi Beta Kappa, Sigma Xi, fellowships, publications. Available September, 1942. Woman, single.
Box 80-T-3, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, B.S. 1938. Phi Lambda Upsilon, highest honors. Now employed, four years' experience in the petroleum field. Direct charge of research and pilot plant development work on alkylation, isomerization, cracking with a large oil company. Other miscellaneous duties. Desire development or production work. Age 28, married, 3A.
Box 81-T-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D.; Sigma Xi; wishes part-time literature or laboratory work in New York City area; now employed; own laboratory; synthesis and analysis; prefers small active firm.
Box 82-T-3, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(NONMEMBERS)

CHEMICAL ENGINEER, eight years' experience in research, development, specification, applications of vinyl type resins and coatings. Interested in plastics or synthetic rubber. B.Ch.E., M.Sc., age 31, married, Protestant, class 3-A, employed non-defense.
Box 85-N-3, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, American Born, wants position as analytical chemist in some industry. B.S. degree in May, 1942. 39 semester hours in chemistry including quantitative, organic and physical. Location immaterial.
Box 10-T-3, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, B.S., May 1942; at A.I.Ch.E. approved school. Excellent preparation in organic and physical chemistry. Prefer development work, or position leading to this, in chemistry, particularly organic. Southwestern location desired but not essential.
Box 20-T-3, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, (B.S. '41). Now employed as analytical chemist and bacteriologist in a large, well known food laboratory. Desires a similar position in the South.
Box 25-T-3, Ind. & Eng. Chem., Easton, Pa.

YOUNG INDUSTRIAL Chemist, 5 years' experience in Argentina, in assaying, ceramics casting process research; food, packing house products, gas works, sulphuric acid lead chamber plant and coal tar by-products analysis. Ceramics coal tar distillation and by-products and sulphuric acid control. Unmarried. Fluent Spanish. San Juan 868, 3o, B, Buenos Aires, Argentina.

RESEARCH CHEMIST. Young Ph.D. with several years' industrial experience desires new position. Excellent training. Varied experience. Publications, Phi Beta Kappa, Sigma Xi.
Box 30-T-3, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, Master, 1940, Christian. Working chemical plant layout and general engineering. Training in development and some production. Desires position with progressive group in process improvement, development or pilot plant work.
Box 44-T-3, Ind. & Eng. Chem., Easton, Pa.

CHEMIST—B.S. Chemical Engineering. Seventeen years' experience. Eight years' charge laboratory, manufacturer of petroleum resins, aromatic solvents used in paint and varnish and insecticide field, synthetic coatings from same, also three years' technical sales. Analysis of iron, steel, nonferrous metals. Married.
Box 45-T-3, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, young, B.Ch.E. cum laude; M.S.Ch.E.; experience all phases petroleum refining and research and development; asphalts, road oils, fuel oils. Graduate research product development & agricultural by-product. Will consider any chemical engineering industry. Location immaterial. 1B classification.
Box 52-T-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.S., 1937, leading midwestern university. Age 26, married. Three years' experience in organic synthesis. Now employed as research chemist developing syntheses for nicotinic acid. Patents. Eastern location preferred.
Box 68-T-3, Ind. & Eng. Chem., Easton, Pa.

PHYSICIST, Ph.D. Caltech, Sigma Xi. Experience vacuum technique, electrical measurements, photographic industry. Languages, economics. Draft deferred. Citizen Czechoslovakia, First Papers.
Box 83-T-3, Ind. & Eng. Chem., Easton, Pa.

PHENOLIC RESIN chemist seeks responsible position. B.S. degree in organic plus some graduate work. Several years' experience in the plastics and resin field. Successful research on resins for molding, plywood glues, friction materials, abrasives, laminated products, oleoresinous applications as varnishes, enamels, etc. Applicant now employed, a native American, Christian, and married.
Box 84-T-3, Ind. & Eng. Chem., Easton, Pa.

Industrial News

CONTINUED FROM PAGE 432

gas may be incorporated into the product. The unit can be used to make a uniform mixture or to emulsify a mixture of products while the temperature is being changed.

Arrangement of the connections for the product and for the medium permit varied piping hook-ups, so that the mechanism can be incorporated into virtually any flow system. Multiple assemblies may be used for both heating and cooling the product in a few seconds. The company is prepared to produce the mechanism in standard sizes and designs as well as to meet specific requirements.

Conductivity Bridge with Expanded Range

SPECIFIC resistance values up to 2.5 megohms, in six ranges, are covered by the new model RC-1-C conductivity bridge announced by Industrial Instruments, Inc., 156 Culver Ave., Jersey City, N. J. This adaptation of the Wheatstone bridge permits wider application than the previous model covering values up to 250,000 ohms in five ranges.

A six-point switch covers the six resistance ranges. A single dial control provides direct resistance readings in conjunction with the multiplying factor of the range switch. Accuracy, guaranteed within 1 per cent except for extreme ends of calibration, is entirely independent of line-voltage variations. The alternating current bridge with cathode-ray visual null indicator provides for a sturdy instrument. The scale length of about 14 inches, or a total of 84 linear inches of calibration over the six ranges, permits close readings.

Used as a conductivity bridge in connection with the proper cell, this instrument can detect impurities in distilled water of the order of 1 part of chloride ion in 2,000,000 parts of distilled water.

Durez 11863

A PHENOLIC molding compound having a very low power factor (0.07 at 1000 K. C.) and high dielectric breakdown and fatigue has recently been introduced by Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y. This material was especially developed for radio parts as condensers, crystal holders, etc. It has been designated as Durez 11863 and is said to have excellent moldability, being easy to handle in compression molds.

MISCELLANEOUS

BUSINESS OPPORTUNITIES • FOR SALE • WANTED • ETC.

Five cents a word, minimum charge $2.00; display available at $7.50 per inch; in advance. No discounts or allowances

MICRO-ELEMENTARY ANALYSES: C, H, N, S, P, Halogens, Methoxyl, Mol. wt., etc., U.S.P. and other official tests, Purity tests, Microinorganic assays, Spot tests, Micro-distillations, Toxicological investigations, and typical micro-chemical research work. Dr. Carl Tiedcke, 266 Fifth Avenue, New York, N. Y.

WANTED: Subcontractor with equipment to carry out Hydrogenations on several products on a profitable custom basis. If you have surplus capacity for this type of operation write at once to Box 36-N-3, Ind. & Eng. Chem., Easton, Pa.

WANTED: up to 50 gals. of diethyl carbinol, 100 lbs. of diethyl ketone, up to 2000 lbs. of capric acid, 5 grams each of ketipinic acid, thienyl mercaptan, methyl furfurol. Quote prices.
Box 13-T-3, Ind. & Eng. Chem., Easton, Pa.

WANTED TO BUY: Pulfrich Refractometer in good condition. Must be suitable for use with liquids of n_D^{25} of 1.3 to 1.6.
Box 43-T-3, Ind. & Eng. Chem., Easton, Pa.

WANTED: First four volumes of Bielstein fourth edition and their supplements. Please state condition and price.
Box 62 T 3, Ind & Eng. Chem., Easton, Pa.

WE OFFER: Allantoin, Benzedrine Base, Calcium levulinate, Cholesterol, Creatine, Cystine, Digitonin, Hydrazine Hydrate, Methonine, Tryptophane. Sugars: Fucose, Dulcitol, Glutathione, Melibiose, (d-Ribose)-Raffinose. Acids: Barbituric, Galacturonic, Glucuronic, Levulinic-Lactic, Maleic Anhydride, Naphthalene acetic.
Box 47-T-3, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Chemical Abstracts, Vols. 1-27 inclusive, complete with 1st and 2nd Decennial Index, unbound, substantially new condition. Buyer to pay freight or express from Cambridge, Massachusetts. Highest bid received by April 15 will be accepted; minimum acceptable $350. Terms C.O.D. L. H. Littlefield, 12 Oxford Street, Cambridge, Massachusetts.

FOR SALE: Chemical Abstracts volumes 6 35, and 3rd Decennial Index only. Completely bound in green library buckram. Condition excellent. Sold only as a unit. Price $500.
Box 41-T-3, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Due to dissolution of partnership, an active commercial laboratory business, long successful in highly industrialized area, is for sale complete. Specially equipped for metallurgical and general analysis.
Box 70-T-3, Ind. & Eng. Chem., Easton, Pa.

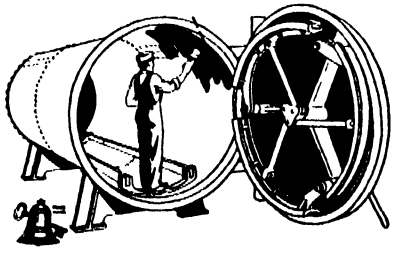
FOR SALE: Rare Metals. Misch metal, Beryllium, Barium, Caesium, Columbium, Gallium, Germanium, Indium, Iron powder Pure 99.99, Lanthanum, Lithium, Manganese 99.90, Potassium, Samarium, Strontium, Vanadium, Yttrium, Uranium, Titanium Carbide, Thorium, Ferrouranium, Ferro Boron.
Box 48-T-3, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: "Berichte Deutsche Chemische Gesellschaft": Vols. 1-59 (1868-1926); "Maly's Jahresberichte Fortschritte der Tierchemie": complete set; "Proceedings Physical Society (England)": Vols. 1-53 (1874-1938); "Quarterly Cumulative Index Medicus": Vols. 1-29 (1927-1941), bound; "Chemical Abstracts": complete set with 3 Decennial Indices, set newly bound in black buckram. A. Calvert, 221 Seaman Ave., New York, N. Y.

FOR SALE: Chemisches Centralblatt 1897 to 1914. Zeitschrift anorganische Chemie vols. 40 to 91. 109 to 138. Zeitschrift analytische Chemie vols. 43 to 120. Beilstein, organische Chemie vols. 1, 2, 3. The Dyer 1933 to 1940. Schultz Farbstofftabellen 7 edition. Wanted: Intern. Critical Tables. Journal praktische Chemie, Berichte Deutsche Chemische Gesellschaft.
Box 74-T-3, Ind. & Eng. Chem., Easton, Pa.

SELLING OUT our Mineral Stock: 100 pounds each: Apatite, Arsenopyrite, Brucite, Beryl, Chalcopyrite, Columbite, Halloysite, Limonite, Olivine, Selenite, Spodumene, Wollastonite. 50 pounds each: Anorthite, Azurite, Cinnabar, Hematite, Lodestone, Monazite, Malachite, Pyrrhotite, Rhodonite, Sphalerite, Witherite. 25 pounds each: Calamine, Cuprite, Halite, Gadolinite, Polycrasite, Euxentie, Marcasite, Samarskite. 10 pounds each: Alabaster, Crude Ceylon Sapphire, Cyrtolite, O Iceland Spar, Powellite, Uraninite, Fergusonite, Titanite.
Box 75-T-3, Ind. & Eng. Chem., Easton, Pa.

Vulcanizer Interior Paint



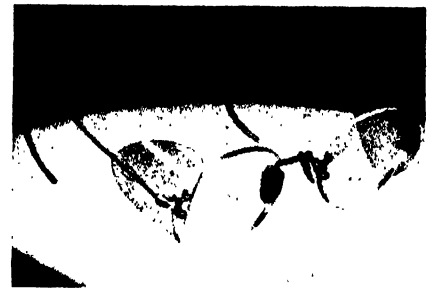
SEVERAL years ago two engineers at different companies met instant death when the vulcanizers they tended suddenly exploded from the ravaging effect of rust-corroded rivets inside the vulcanizers. Top chemists in the rubber industry sought to develop a paint that would be anticorrosive under high steam pressure and prevent further accidents from explosive vulcanizers.

A paint known as "Bonnejohn", developed by Belke Manufacturing Co., 947 North Cicero Ave., Chicago, is composed of materials properly combined to be anticorrosive under high steam pressures and to minimize sulfurous fumes and acid action. It comes as a boon to the rubber industry at a time when the national defense program requires the protection and care of equipment so important to production needs.

Applied with a brush, Bonnejohn spreads easily with exceptional adhesive qualities and requires no preliminary preparation other than having interior surfaces and fittings reasonably clean before application. It has been tested for durability and will not peel, crack, or blister.

Eye Protection

TODAY'S total warfare, mobilization of woman power as well as man power, has placed greater emphasis on the need for



eye protection. The new-type rimless safety spectacles, manufactured by the Tulca Division, Univis Lens Co., Dayton, Ohio, are being rapidly adopted. They are available with or without removable side shields. Tulca lenses, made of a special new material (not glass), weigh only one half as much as glass safety lenses. This lighter weight factor is said to overcome the tendency to remove the goggle, as with heavier types, thus offering continual eye protection throughout the day.

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CHEMICAL AND ENGINEERING NEWS
HARRISON E. HOWE, Editor
PUBLISHED BY THE AMERICAN CHEMICAL SOCIETY
VOLUME 20 APRIL 10, 1942 NUMBER 7

Defense Industry in Memphis

NATIONAL defense presented a challenge to Memphis and the Mid-South when France fell in the spring of 1940. Over night this country realized it must arm itself at once. The squirrel rifle no longer offered protection. What could the agricultural South do to help mechanize our Army? How could it give modern Mars the sword and shield he needed?

Today that challenge has been answered. Memphis has rolled up its sleeves. It has gone to work. Nearly every industrial plant in Memphis and the Mid-South is directly or indirectly producing materials for the Army or Navy. Colonel Memphis, symbol of plantation aristocracy, has felt the impact of national defense, the call to arm, and has enlisted for the duration.

Many plants have been converted from civilian to war production, and a number of new concerns have been established there in the past year. Bomber plane parts are being produced at an ever-increasing rate at the Fisher-Tennessee Division of General Motors, where only wood parts for automobile bodies were once made. The American Finishing Co. in south Memphis is devoting most of its plant facilities to textile finishing for the Army. Firestone Tire & Rubber Co. is making tires that will fit only trucks for khaki-clad men. A year ago the Continental Piston Ring Co. was turning out steel rings for automobile engines; now it has undergone a plant expansion and is producing small shells.

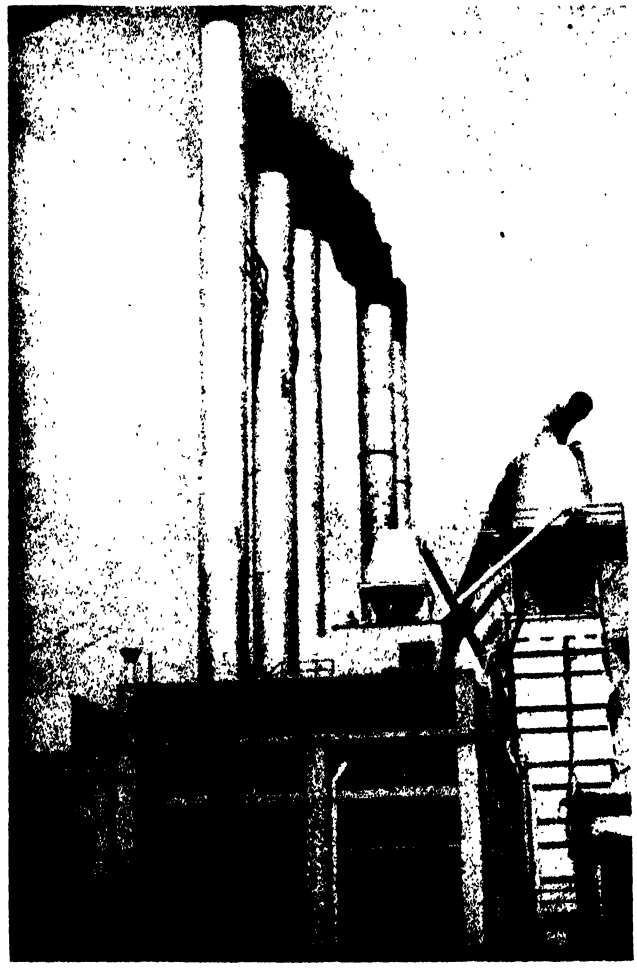
Only recently this city has been chosen as the site for the $1,000,000 Sefton Fibre Can Co. which is to make munition containers for the now famous shell-loading plant between Humboldt and Milan, Tenn. Just south of the city limits is the $15,000,000 Quartermasters' Depot. Nine miles east of town, work is underway on another major munitions industry. The National Fireworks Co. is building a plant to manufacture rapid-fire antiaircraft ammunition, the first contract being for the Navy. Hydrogen gas for the new Paris, Tenn., balloon field is being produced by the Humko Co., and the Ernst Bischoff Co., nationally known manufacturer of pharmaceuticals, has located a plant in Memphis to make ointments for the Chemical Warfare Division of the Army.

Cotton, the basic agricultural economy of the Mid-South, is proving its worth again in a war crisis. Cotton linters are going into gunpowder and the fiber is being used for uniforms and tent cloth. The demand for lumber has been tremendous, but the Memphis market has been able to supply the need.

These outstanding examples of Memphis' answer to the Nation's call for defense materials didn't just happen. They are the result of planning, of intelligent industrial surveys. Memphis was chosen because of its fortunate strategic location—its climate, labor, available supply of pure artesian water, and excellent transportation facilities. In times like these transportation is one of the most important factors engineers have to consider. Because of its transportation—river, rail, air, and truck—Memphis has furnished goods and services with maximum speed.

But national defense in its true sense isn't confined to million-dollar contracts or low-winged bombers. An army must eat and thousands of pounds of beef, canned goods, and vegetables have been supplied by Memphis wholesalers. An army has to have tents, and one lumber company alone has supplied $200,000 worth of wooden tent parts. Another concern has supplied the Army with $5,000 worth of notebooks. An awning company has a $1,000 contract for canvas rolls. Several carloads of paint have been manufactured and shipped to meet defense demands. A small ink manufacturer has a $1,300 order. Inventors Laboratory, a newly formed Memphis concern, is filling an $8,200 prime contract for elbow assemblies for airplanes. Memphis plants furnish fabricated steel parts, precision gages, mill work, mattress covers, and even tooth paste and aspirin.

The trend is too fast and the volume too great to list accurately the actual dollars and cents value of the contracts filled or in force in Memphis. It is safe to say that millions of dollars worth of defense goods are being produced now, materials that are going to back up the Nation's armed forces.



Smokestacks at Memphis-Fisher Aircraft Division of General Motors

Chickasaw Ordnance Works

AN ADDITION to Memphis industries during 1940 was the $25,000,000 explosives plant built by E. I. du Pont de Nemours and Co., Inc., for the British Purchasing Commission. Situated several miles outside the city limits, it manufactures smokeless powder and trinitrotoluene (TNT). An explosives plant requires a large area because the buildings must be located some distance apart for safety. Approximately 5,000 acres of land were purchased during the early part of 1940 and about one half of this was fenced in. The first ground was broken during June and the first smokeless powder granulated in December. Six months from the start of construction to the start of production is an enviable record for a plant of this kind. TNT manufacture did not start until February 1941, because erection of this portion of the plant was not started as soon as the smokeless powder section. Another record established during the plant construction was a safety record of over 3,000,000 man-hours without a lost-time injury. The personnel of the plant averages at present approximately 3,000, most of whom were originally residents of Memphis and Shelby County.

Memphis was selected as the location of this plant for several reasons. First, the area is several hundred miles distant from the seaboard, which minimizes the danger of aerial bombardment. Second, cotton linters are available for the manufacture of smokeless powder. Memphis is the cotton-marketing center for the Mid-South. Third, the supply of high-quality labor is plentiful. Fourth, numerous railroad facilities connect in all directions for shipment in of raw materials and shipment out of finished products. Fifth, the source of good water, absolutely necessary for the processing of smokeless powder, is large and unfailing. Sixth, practically all the raw materials entering into the manufacture of smokeless powder and TNT are available in sufficient quantities within a radius of 500 miles.

The plant consists essentially of six different areas:

Power, which is the source of all water, steam, and electricity used.

Acid, where nitric acid is manufactured by the oxidation of anhydrous ammonia and where nitric acid and sulfuric acid are mixed together. Recovered acids are also concentrated in this area for further use.

Nitrocellulose, where the cotton linters are nitrated to nitrocellulose and the resultant nitrate purified and stabilized.

Powder, where the purified nitrocellulose is mixed with other ingredients and solvents and processed into smokeless powder, which is then given a solvent recovery, water-dry and air-dry treatment. Upon completion of the air-dry treatment, the powder is thoroughly blended and packed into boxes for shipment. An important part of this area is the solvent section wherein ether is manufactured and recovered alcohol and ether rectified.

TNT, where toluene is nitrated to DNT and TNT by means of mixed sulfuric and nitric acids, purified and packed for shipment.

Maintenance, where a considerable portion of the personnel is employed in caring for and replacing equipment. The maintaining of equipment in a chemical manufacturing plant involves constant surveillance to keep production running smoothly.

Of equal importance in plant operation are the service groups- accounting, employment, safety, fire protection, plant protection, transportation, and technical. The last group consists of approximately 125 chemists and chemical engineers, responsible for the quality of the raw matrials and the finished products.

The Buckeye Cotton Oil Co.

THE Buckeye Cotton Oil Co., a wholly owned subsidiary of the Procter & Gamble Co., was started with a mill at West Point, Miss., when the cottonseed industry was still in its early stages of development. That mill has since been discontinued, but further additions by purchase or construction have enlarged the company until at present there are 15 active mills throughout the South. The operations at Memphis include the Hollywood Mill, largest cottonseed oil mill in the world. The Binghamton Oil Mill at Memphis crushes soybeans, and the Chemical Pulp Division purifies cotton linters for plastics, rayon, films, and smokeless powder.

The Buckeye Cotton Oil Co. established its first laboratory in 1910. With the growth of laboratory control, two division laboratories were established, one in Atlanta for the southeastern territory and one in Memphis at the Binghamton plant for the valley territory. In 1926 mill laboratories were established as a part of the standard equipment at each of its major crushing points, and chemists were employed to handle all local analytical work.

Hollywood Mill

The Hollywood Mill is a relatively modern one-floor mill and represents up-to-date practices in the laboratory control of its many operations. The photograph on the opposite page shows the layout of the mill and storage facilities.

Typical processes of a cottonseed oil mill, of which there are many in the Memphis area, are cleaning, storing, and drying, delinting, hulling, rolling, cooking, pressing, grinding cakes for meal, and pelleting.

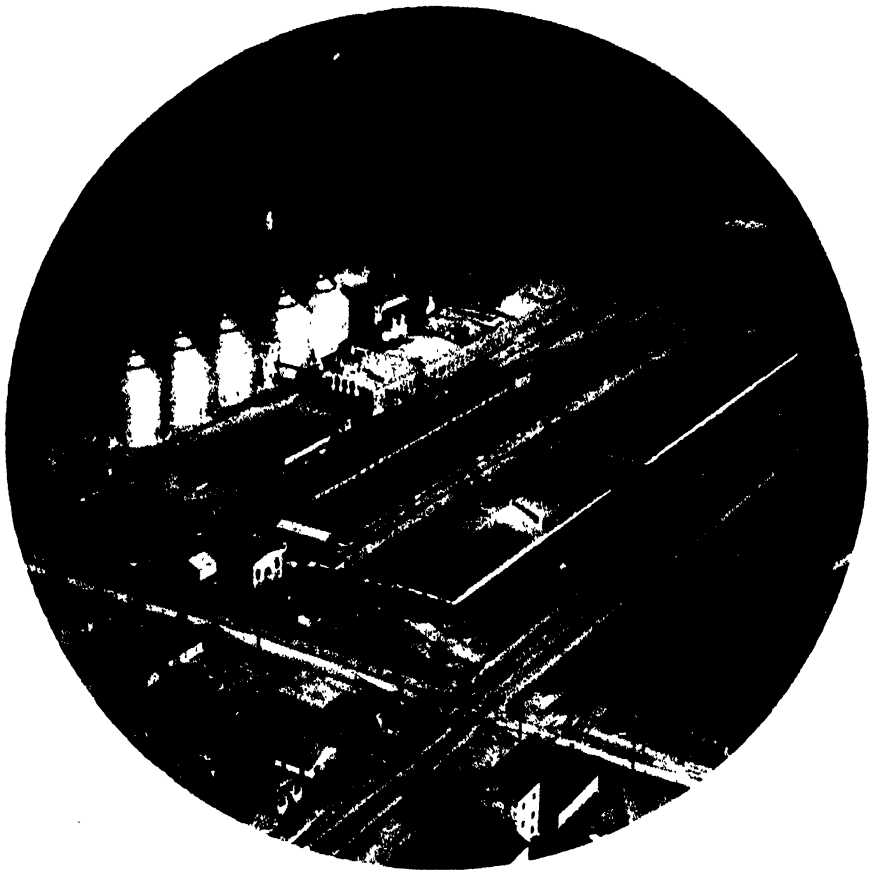
The seed is stored in large tanks and houses equipped with fans and ducts for ventilation to prevent "heating". The batteries of conical-top seed storage tanks developed by Buckeye are a familiar landmark in the South. Drying is carried out only as wet seed require it. The seed are cleaned by screening in two stages—first, to remove boles and large trash and second, sand and dirt. Finally an air draft and a magnetic separator finish removal of foreign matter.

The cotton gins receiving the seed from the farmer have removed the long fibers leaving short seed hairs or lint. The delinter used in oil mills is similar to a gin, but because it removes short fibers the saws are set closer together and are sharper. The lint is usually removed in two passages through the delinters giving a medium length or first-cut lint and a short or second-cut lint. The first-cut lint goes mainly into production of high-class mattresses, while second-cut lint is purified for chemical uses. The cottonseed hulls are cracked in a bar or disk huller which in either case passes the seed between two edges with a differential speed. The hulls are then separated from the meats by a combination of screening and air separations. There is a ready sale for cottonseed hulls as roughage for cattle.

To prepare the meats for the cooking and pressing operations, they are passed between rollers driven at the same speed and in direct contact with one another. In passing downward through the stand of rolls, the seed are subjected to successively greater crushing pressure and delivered in thin flakes. This procedure crushes some of the cells and brings the structure to condition so that cooking and pressing will liberate the oil.

Cooking cottonseed is an art which has not been entirely untangled by scientific investigation. In his book on "Cotton-

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Hollywood Mill, Buckeye Cotton Oil Co.

seed Products", Thornton says, "The function of cooking is to permit the proper adjustment of the moisture, rupture of oil-bearing cells, coagulate the proteins, coalesce the gummy materials, destroy molds and other lower organisms, make the cake more palatable and more wholesome by inactivating the gossypol."

The meats are delivered from the bottom of the cooker to the former where they are wrapped in a press cloth of human or camel hair and lightly pressed to preform the cake. A typical box press will hold 15 cakes arranged one above the other. After reaching maximum pressure, approximately 4,000 pounds per square inch, it is held constant long enough to allow the oil to drain from the cakes. Twenty minutes is a common drainage time, although it is varied to meet various conditions of drainage, oil price, etc. After settling, the oil is ready to be shipped to the refiners. Upon removal of the cake from the press, the cloths are taken off in an automatic stripper and any soft oily edges are cut off by an automatic trimmer. A considerable amount of the cake is sold as such to mixed feed manufacturers.

Most of the cottonseed cake is ground to meal of definite protein content and sacked for sale to feed mills and livestock feeders. The control of the protein is accomplished by regulating the amount of hulls with the cake. An increasingly larger proportion of cottonseed meal is made into pellets—a form preferred for range feeding of cattle. They are formed by chopping off the meal as it is extruded in cylindrical form through a die.

Binghamton Oil Mill

Growing soybeans in the cotton territory is a recent development. The beans are received and stored in a manner similar to cottonseed but, since there is no lint to be removed, soybean processing is much simpler than that for cottonseed. At the Binghamton Mill modern expellers instead of the older hydraulic presses are used to extract the oil. The expeller is a continuous mechanical press resembling a huge sausage grinder. The cylindrical barrel is made up of bars set from 0.001 to 0.040 inch apart. As the worm forces the soybeans, which have been prepared merely by cracking and drying, through this barrel, the oil seeps out through the openings between the bars. A soybean mill has only two products, oil and cake, whose uses are similar to those from cottonseed.

Chemical Pulp Division

The pulp plant was built shortly after the first World War for the purification of hull fiber. This product, however, was economically suitable for only a limited number of grades of paper, and about 1925 the use of cotton linters for chemical pulp was developed for the expanding rayon industry. With the outbreak of the present war an increasing amount of purified linters are being used for smokeless powder.

Since the average cottonseed oil mill producing linters operates for only about six months a year, enough lint must be stored to carry the pulp plant through the nonproducing season. The lint is tested and graded when stored so that the proper type can be selected from the various kinds of pulp. To prepare a charge for digestion, the bales are opened and the cotton broken up and cleaned pneumatically as far as practicable. The digester is a typical autoclave into which



Huller room at the Hollywood Mill

is charged the cotton and sodium hydroxide solution. The charge is brought up to pressure and, after suitable cooking time, is blown into the wash tanks. The black liquor is drained off, and wash water is used to free the cooked lint from alkali. Bleaching is done with hypochlorite solution under carefully controlled conditions of concentration, time, and temperature. After a proper bleach is attained, an acid sour is given and the charge washed.

The chemical pulp may be finished as bulk or sheet. The bulk pulp is pumped from the storage tubs to a preliminary dehydrator, through rubber wringer rolls and a picker, and fed into a textile dryer. The dried pulp is baled, inspected, wrapped in heavy kraft paper, weighed, and tagged. Sheet pulp is carried through a Fourdrinier machine and cut into any desired size for handling by the plastics and rayon manufacturers. The pulp plant at Binghamton is one of the few of this kind in the United States.

The chief products made from bulk pulp are acetate and cuprammonium rayon, paper, nitrocellulose, and films. The sheet pulp goes chiefly into high-strength viscose rayon yarns, paper, and floor covering (linoleum).

Chemistry's Contribution to the Cottonseed Industry

GENE HOLCOMB
National Cotton Council, Memphis, Tenn.

When Harry D. Wilson, Louisiana's venerable Commissioner of Agriculture, was a boy he derived great personal pleasure from the fact that his father's cotton gin was located on a river's bank. This meant that he did not have to spend his Saturdays, as did many boys in the fall, hauling cottonseed to a safe distance from the gin and burning it. He could simply dump the lot into the river and let the current carry it away. Today cottonseed bring to Commissioner Wilson's great host of farmer friends more than $100,000,000 each year. The story of this transformation from waste product to a $200,000,000 industry is principally a story of chemistry.

The first problems of utilizing cottonseed were mechanical rather than chemical. During the first half of the 19th century the removal of linters and the separation of the hulls from the kernels engaged the attention of experimenters. It was generally believed that the oil which the seed contained would find a market as an illuminant. A number of statements were made to the effect that it would displace whale oil in American lamps and drive Yankee whalers from the seas. But whatever the possibilities of cotton oil may have been in the field of illumination, they were never realized. The discovery of petroleum was made at approximately the same time that efficient machinery for delinting and hulling cottonseed was invented, and the new, natural product provided America with illumination until the advent of gas and electricity. Cottonseed oil had to find other markets.

In finding such markets, the chemist played a most important part. Even while cottonseed crushing was in its experimental stage a few far-sighted scientists had predicted that the oil's future lay in the field of foods. They claimed it to be the equal of the finest olive oil and suggested that it be used for the same purposes. Since the oils produced by the early millers with their crude equipment and without facilities for refining was a considerably different product from the cotton oil of today, these early claims were based more on optimism than fact. Even when oil mills began to crush seed in appreciable quantities during the 1870's, most of the oil was exported. The little that was consumed in America usually went into the soap kettles. But about 1880, when the number of profitably producing mills had increased to 45, a number of events transpired which were destined to shape the whole future course of the cottonseed industry. One was the introduction of cottonseed oil into oleomargarine, a new food product imported that year from France. At first the oil was added in small quantities, but later in increasing amounts. In this way a new market in the highly important food field was opened to cottonseed by the chemist.



Cotton gins

At first, however, the effect of margarine upon cottonseed oil was more indirect than direct. Introduction of steam rendering in the meat packing industry had yielded a product known as prime steam lard. Few packers marketed this product themselves. Instead they sold it to a group of processors known as lard refiners, who stiffened the lard by the addition of tallow, lard stearin, or better grades of lard, and sold it under their own name. Development of the margarine industry created a strong demand for two products of the packing industry—natural lard and oleo oil. The latter, made from the highest grade of tallow, yields as a by-product a hard edible stearin. The packers, naturally, welcomed the opportunity to sell these two products to the margarine industry. As a result the lard refiners were left without the best grades of lard and tallow with which to refine prime steam lard. Large quantities of oleo stearin were available, however. It was this combination of circumstances which lead to the discovery of one of the first formulas including cottonseed oil in a new product. The formula called for 8 parts oleo stearin, 38 parts cottonseed oil, and 60 parts lard, and was developed by the N. K. Fairbank Co. of Chicago, one of the first firms in the fats and oils field to employ an industrial chemist, inaugurating the policy in 1879. The chemist was William D. Allbright, a young graduate of Massachusetts Institute of Technology.

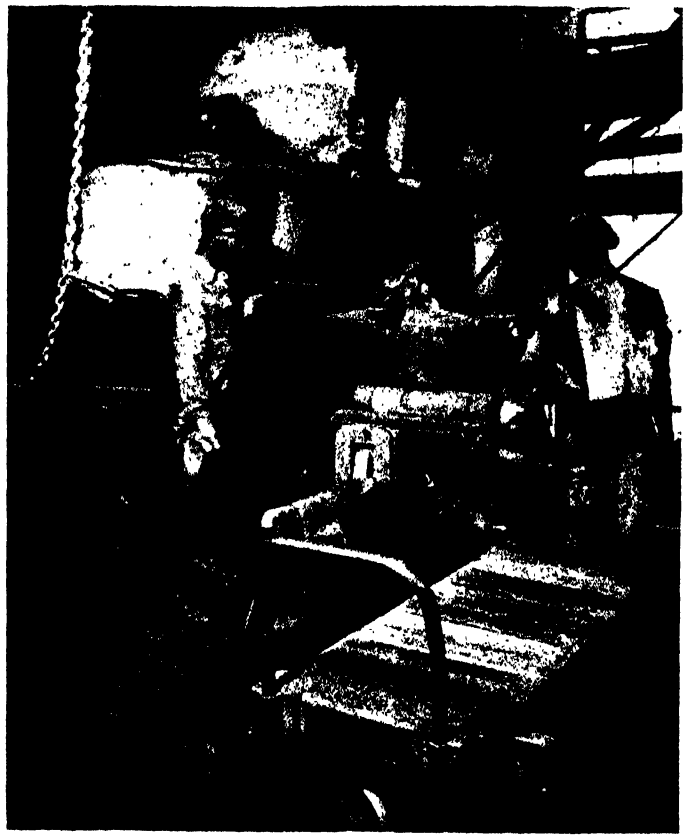
The above mixture of lard, oleo stearin, and cottonseed oil, together with the application of chemistry to the manufacture of food fats, marked the beginning of a whole new industry—the shortening industry. A large number of technological developments followed, greatly increasing the usability of cottonseed oil. One of the barriers to using substantial quantities of cotton oil was the fact that it was yellow in color, while the consumer expected a cooking fat to be white. In the early days cotton oil was bleached by exposure to the sun. Large tanks placed on the roofs were used by several manufacturers. About 1880 Allbright and Eckstein introduced the use of fuller's earth for bleaching both cottonseed oil and lard. The oil or lard was heated with from 0.5 to 2 per cent of fuller's earth, depending upon the strength of the latter. At first the earth was removed by settling and decantation. Later the filter press was introduced and, to avoid loss of oil by retention in the earth, dry live steam was passed through the press. This procedure made possible efficient bleaching with little loss of oil.

Shortly after the introduction of chemical bleaching, use of sodium hydroxide in refining was discovered. Previously oil had been refined by the use of pearlash. David Wesson introduced the sodium hydroxide method in the Fairbank plant and it proved to be both efficient and economical.

Even with chemical refining and bleach-

ing, the cottonseed oil retained certain objectionable qualities of flavor and odor. Eckstein was responsible for the process of deodorizing cottonseed oil by heating it to the "cooking" temperature of 340° F. and blowing high-pressure steam through it. James Boyce, chemist for the old American Cotton Oil Co., made substantial improvement in the method and equipment. About 1900 David Wesson perfected the process by introducing into the performance of the operation the use of a vacuum. This permitted the use of lower temperature than was possible under atmospheric pressure and avoided the dangers involved in cooking the oil.

The above chemical advances were accompanied by a rapid growth in the production of "compounds", a term adopted to replace the ill-reputed "refined lard". Approximately 20 trade-marked brands of compounds were placed on the market during the 1880's, and 45 new brands were added during the 1890's. Most of these products contained the cottonseed oil which was becoming increasingly available and desirable. Practically all of them, however, also contained animal fats. The use of cottonseed oil in solid cooking fats was still limited by the available supply of stearin which could be used as a stiffening agent. The final step in this series of chemical discoveries which were to make cotton oil the leading food oil in the United States was hydrogenation. This process was developed in Europe, and, like most discoveries of this type, was the cumulative work of a number of scientists, including Debus, Saytseff, Kolbe, Sabatier, Sendevens, and Normann. By means of hydrogenation, as finally perfected, it became possible to transform a liquid oil into a solid fat by the addition of hydrogen in the presence of a catalyst which, in this instance, was nickel.



NATIONAL COTTON COUNCIL

Slabs of hot cottonseed meal after the oil has been squeezed out

This discovery greatly enlarged the volume of cottonseed oil that could be used in the production of cooking fats. Patent rights to the process were purchased by an American firm, and the first all-cottonseed oil shortening was placed on the American market in 1911. It was widely advertised as an all-vegetable product in an appeal to groups who, either for aesthetic or religious reasons, were unfriendly toward animal fat products.

Chemistry's contribution in making cottonseed oil such a desirable shortening ingredient has been equally valuable to other products. Chemists have enabled cotton oil to become a leading, if not the leading, ingredient in salad oil, salad dressing, mayonnaise, and margarine. Unfortunately, while chemistry has made possible the production of such an excellent economical table spread as margarine, established interests, fearing the competition of this product, have succeeded in imposing upon it taxes which seriously limit its sale.

Chemists, however, have not confined their work in cottonseed to oil. They have been active in improving and developing markets for the other three cottonseed products—cake or meal, hulls, and linters. Cottonseed meal has always been used as a livestock feed. For a number of years, however, there existed considerable misinformation regarding its effect on livestock. Many persons believed that feeding quantities of the meal resulted in "cottonseed meal poisoning". Theorists attributed this condition to gossypol, a toxic substance known to be present in cottonseed. Chemists have proved this theory false. They have shown that the gossypol which remains in meal after processing is rendered incapable of being harmful by the cooking of the meats. The animal nutritionists have contributed their part by demonstrating that so-called



NATIONAL COTTON COUNCIL



NATIONAL COTTONSEED PRODUCTS ASSOC., INC.

Cottonseed stored at cottonseed oil mill warehouse

"cottonseed poisoning" occurs in cases where no meal is fed at all. Finally it was proved that what was thought to be poisoning was simply a deficiency of vitamin A, and that the condition will not occur, regardless of the quantity of cottonseed meal fed, providing the ration includes green pasture or some other source of vitamin A. Particular credit for work in this field is due E. P. Clark and Henry Stevens of the U. S. Bureau of Chemistry and Soils, Fred Hale, Texas Agricultural Experiment Station, C. F. Huffman and L. W. Moore, Michigan State College, A. H. Kuhlman and Earl Weaver, Oklahoma A. & M. College, and others. The work of these men has demonstrated the interrelationship of various divisions of science and has established cottonseed meal as one of the better livestock feeds.

Cottonseed hulls also have been the object of the chemist's research. While used primarily as a roughage for livestock, hulls have indicated considerable potentialities in other fields. Among the products obtained experimentally from hulls are xylose, saccharin concentrate, and furfural, extensively used in petroleum refining. These products, while not yet produced commercially, are a challenge to further research.

Cottonseed linters are well known as the most versatile of cottonseed products. Linters are practically pure cellulose; and it is common knowledge what the chemist has done with cellulose. Gunpowder, rayon, cellophane, paints and lacquers, safety glass, and the seemingly limitless field of plastics are markets which have been opened to cottonseed linters by the skill of the chemist.

The cottonseed industry, child of chemistry though it is, can lodge only one complaint against the chemist. His interests are too catholic. Each time he finds a new use for cottonseed products, he immediately produces a new competitor. He perfects the use of cottonseed oil in shortening, or oleomargarine, then discovers that soybean or palm oil can be used for the same purposes. He finds that linters can be used to produce rayon, then develops a process which makes possible the use of wood pulp in their place.

Yet this is as it should be. The chemist must play no favorites. He must seek the best possible product at the lowest possible cost. In doing this he not only serves humanity, but also helps retain a free, competitive economy, the life's blood of democracy.

Sets of Abstracts

As USUAL, sets of abstracts of meeting papers in planographed book form will be supplied by the A. C. S. News Service, 1155 16th St., N. W., Washington, D. C. Sets are not guaranteed to be complete, but contain abstracts from all divisions as submitted by authors. The abstracts will be mailed as soon as possible after receipt of order, beginning about April 15, and will also be on sale at Memphis, Tenn.

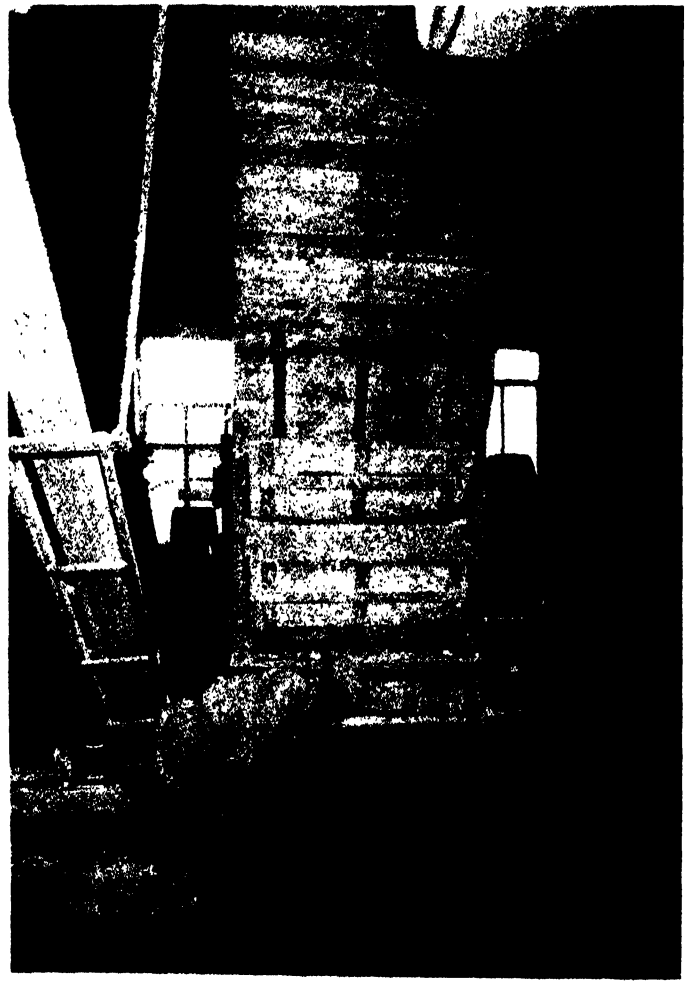
This enterprise is undertaken in a spirit of service and not for profit. Sets are offered on the following terms:

To members of divisions who forward receipt for divisional dues with remittance and order, 50 cents.

To those without receipt for divisional dues, who remit with order, $1.00.

To those who fail to enclose remittance with order, necessitating correspondence, $1.25.

To those who require bills to be rendered, $1.50.



NATIONAL COTTONSEED PRODUCTS ASSOC., INC.

Roller breaking cottonseed cake into meal

Investigations at Mellon Institute 1941-42[1]

THE extension of the research activities of the institute occasioned by national defense work was carried forward during much of 1941 in the various ways described in the preceding report [NEWS EDITION, 19, 389 (1941)]. Because of the nature and scope of these investigational projects the transition from defense to war effected few differences in the general character of the programs. Prevision had in most instances indicated to industrial fellowship donors and the institute alike the need for prewar research planning and the change to a wartime basis was made quickly and smoothly.

The research exigencies of the emergency, however, have caused a considerable increase in the personnel of certain fellowships, particularly those concerned with coke by-products, and have resulted in many special studies for federal government agencies by various fellowships, such as those pertaining to heat insulation, petroleum, plate glass, protective coatings, synthetic organic chemicals, and tar synthetics. The range of the investigations of most fellowships has regard for postwar economic problems. Every opportunity is being taken by the institute's donors and fellows to be of broad aid to American science and technology during these days of urgent effort, as will be described subsequently in releasable news about the researches of a number of fellowships. E. W. Reid, on leave of absence from the institute's research staff, has recently been appointed chief of the Chemicals Branch of the War Production Board, in succession to E. R. Weidlein, the director of the institute, who is now adviser to this branch and also chairman of the Synthetic Rubber Committee set up jointly by WPB and RFC.

Outstanding has been the growth of the institute's industrial research staff to 205 fellows (from 187) and 150 fellowship assistants (from 114). The services of these scientists and engineers have been required on the 95 industrial fellowships in operation—the 42 multiple and 53 individual fellowships listed at the end of this report. Seven of these fellowships have been active a quarter century or more, 9 are 20 years of age or older, 12 have concluded at least 15 years of investigation, and 26 have been at work a decade; 53 fellowships have been operating 5 years or longer. There have been no changes in the personnel of the department of research in pure chemistry. During this fiscal year—March 1, 1941, to March 1, 1942—the institute has expended $1,378,752 in carrying on its various pure and applied science projects.

New Fellowships of 1941-42

Nine fellowships have started on their researches during the year: Calcite Technology, Coke-Plant Construction Materials, Fur, Lock-Nut Technology, Naphthalene Chemistry, Packaging, Pine Chemicals, Tape Technology, and Tar Constituents.

Science Assists Calcite Technology. A fellowship has been founded by the Limestone Products Corp. of America to study calcite and the by-products of limestone quarrying, with W. J. Remington as the incumbent, aided by Conrad Trost, a technical representative of the donor. The fellowship has proceeded to investigate the commercial possibilities of Micrite, a new finely pulverized calcite of high purity; the physical and chemical properties of the material have been determined and research is under way on its behavior as a filler in rubber compounds

Utilization of Fur. A. W. Harvey on the fellowship of the Fur Processing Corp. is studying problems in preparing fur for employment in the manufacture of hats, other possible industrial uses for fur, and the disposal of by-products in the cutting of hatters' fur. During the year he has been active principally in the application of the Bealmac process, which, as he and his co-workers have described, eliminates the mercury hazard in the felt-hat industry [NEWS EDITION, 19, 1239–44 (1941)]; this procedure was devised by previous fellowships sustained by the same group [see NEWS EDITION, 10, 99 (1932)].

Research in Naphthalene Chemistry. E. E. Stahly is endeavoring to develop for the Koppers Co. new uses for naphthalene and its derivatives. The most promising potential markets are in the fields of plastics, solvents, dyes, pesticides, and detergents. On the basis of present needs, the current work is being concentrated on plastic compositions.

Novel Applications for Pine Chemicals. A project for the development of new uses for rosins, terpenes, and their derivatives has been initiated by the Hercules Powder Co. with G. B. Feild as the fellow.

Ebulliometry in the Investigation of Tar Constituents. A new multiple fellowship of the Koppers Co. (Wojciech Swietoslawski, senior fellow) is applying the ebulliometric method and the principle of comparative measurements in the examination of the properties of high-boiling liquids. New methods so far contrived have been for the separation of carbazole from anthracene cake, separation of para- and meta-xylenes, based on their physicochemical properties, and separation of the main constituents of the tar-base fraction, especially beta-picoline, in the pure state. In all cases the ebulliometric method has been employed for carrying out analytical determinations of very complex mixtures.



Differential ebulliometer used in determining the purity of separated tar constituents

Completed Fellowship Programs

Eight fellowships were terminated during the year: Carbon Black, Concrete, Cottonseed Products, Printing, Safety Fuse, Silicate, Special Dyes, and Sterilamp.

Carbon Blacks as Adsorbents. The work of the Columbian Carbon Co.'s fellowship (W. J. Remington, incumbent) was concluded by a study of the activation of colloidal carbons with the aim of investiging the possibilities of colloidal carbons for use in adsorption, either in their original form or after treatment. In general the findings revealed that col-

[1] Abstract of the Twenty-Ninth Annual Report of the director to the trustees of the institution, covering the fiscal year ended February 28, 1942.

loidal carbons in their original powder state were not suitable for employment in the purification of water or in the adsorption of vapors, but that a few possessed a very high capacity for the decolorization of sugar solutions. Some of the carbon blacks, prepared in pellet form with a suitable binder and steam-activated, showed marked increases in their capacities for adsorbing vapors and for purifying water. This fellowship had a life of 15 years; its biography abounds in unexpected exploits. The Columbian Carbon Co. will later resume research in the institute on a new program.

New Precast Concrete Units. The concrete fellowship, under D. R. MacPherson, ended comprehensive research for The Cemenstone Co. on the manufacture of new concrete products for employment in the construction field. The main efforts were directed toward the development of precast units which would have wide applicability in buildings. One of the accomplishments was an insulated light-weight roof panel of low-heat conductivity, composed of concrete and a commercial rigid-type insulating material; this product, on the market for more than a year, has been used successfully in numerous structures. Recently the fellowship finished an investigation of manufacturing methods for large structural units, such as precast concrete columns, girders, and hollow floor and wall panels. Production specifications, based on the experimental work, are guiding full-plant operation on the fabrication of these shapes, whose need by architects and engineers is manifest by the increasing demand for them. The speed of erection of these structural elements is the essence of their utility.

Improved Safety Fuses. The safety fuse fellowship, established in 1930 by the Ensign-Bickford Co., ceased with the transfer of the work to the recently organized Bickford Research Laboratories at Avon, Conn., of which D. E. Pearsall, incumbent of the fellowship, is the director.

During the year the laboratory activities of the fellowship were interspersed with field trips to various mining districts to enable the direct study of blasting conditions. The early investigations pertained to the burning mechanisms and other fundamental properties of safety fuses and to the materials used in their construction. The later researches had for their ultimate aim the improvement of safety fuses and the efficiency of their ignition of explosives. The major accomplishments embrace orange and white wax finished fuses, fuses with special properties, EBP fuse powders, and ignition specialities.

Bibliographic Information

During the calendar year 1941, 5 bulletins, 34 research papers, and 53 other articles made their appearance from the institute. The total publications for the 31 years ended December 31, 1941, have been 18 books, 158 bulletins, and 1,887 journal contributions. Fifty-three United States patents and 14 foreign patents on fellowship inventions were issued in 1941; 854 United States patents and 855 foreign patents have been granted since 1911.

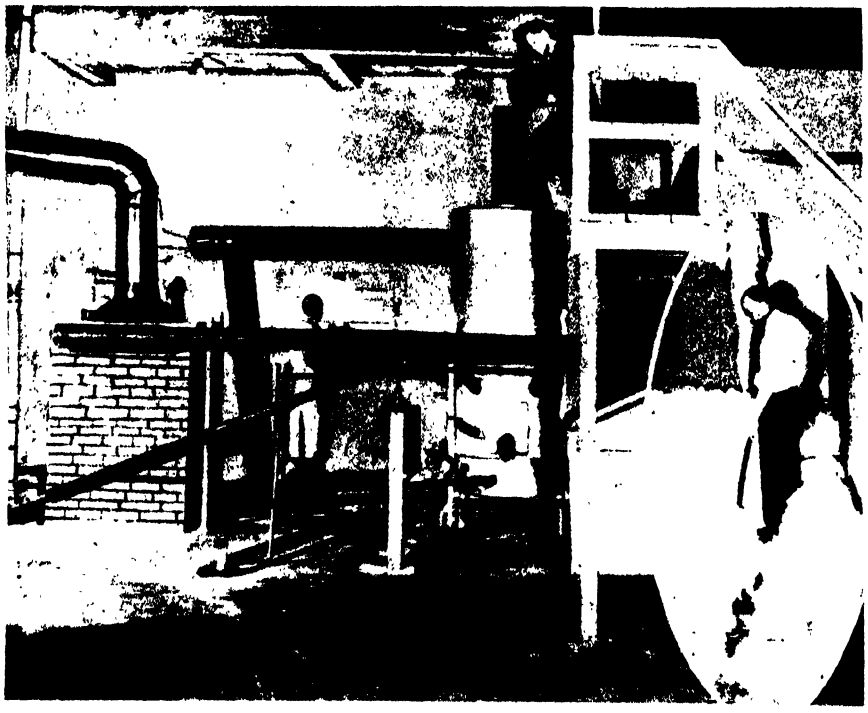
Releasable Information Regarding Continued Industrial Fellowship Researches

Anthracite and Its By-Products Have Definite Advantages. High-grade mineral wool (Anthrafloss) for insulating purposes has been made from anthracite by-products by the anthracite industries multiple fellowship under H. J. Rose. Systematic laboratory investigations were first conducted on the available raw materials, after which the practical possibilities of both cupola and slagging-gas-producer processes were explored in the pilot plant shown in the accompanying illustration. A paper on "Mineral Wool from Anthracite Colliery Refuse and Anthracite Ashes" was presented at the Third Annual Anthracite Conference of Lehigh University. Such materials contain enough, or nearly enough, combustible to supply the heat needed in the process. The resulting white mineral wool contains a higher percentage of alumina than typical rock wool or slag wool and has a very desirable combination of chemical and physical properties.

The recent increased interest in civic smoke elimination has resulted in a renewed appreciation of anthracite, which is the only natural fuel that is completely smokeless under all conditions of use. Its advantages have been summarized in an article entitled "Anthracite, the Principal Smokeless Fuel". Engineering studies have continued on methods whereby increased convenience may be obtained with anthracite. Attention has been given to the design of combination coal bins and ash-storage pits of integral masonry construction for new homes, which can be serviced without the necessity for anyone to enter the basement to deliver coal or remove ashes.

The second largest B. t. u. requirement in the average home is for heating the domestic hot-water supply. Systematic tests have been conducted on anthracite-fired tank heaters by methods previously developed. These tests were not made simply to determine the maximum output rating, but rather to study the all-around performance of tank heaters with respect to the various factors important to the domestic user. A published report, "Performance of Anthracite-Fired Water Heaters", records some of the data obtained and demonstrates the great economy with which water can be heated with anthracite, even for small daily requirements. It also sets forth that small tank heaters have greater possibilities with respect to performance and convenience than has generally been realized.

A summary of these and other research projects has been given in a paper, "Anthracite Research at Mellon Institute", submitted at the Fourth Annual Anthracite Conference.



Small-scale production of mineral wool from anthracite by-products. The inserted panel on the right shows the appearance of this wool in the chamber in the rear of the pilot plant.

Progress in Heat-Insulation Investigations. The Philip Carey Manufacturing Co.'s multiple fellowship on heat insulation and roofing, with R. H. Heilman as senior fellow, has followed its studies on the thermal conductivity of a wide variety of insulating materials and on the effects of chemical composition and physical characteristics on the rate of heat transmission through asbestos and magnesia products. The fellowship has aided in the development of an efficient insulating material suitable for temperatures up to and

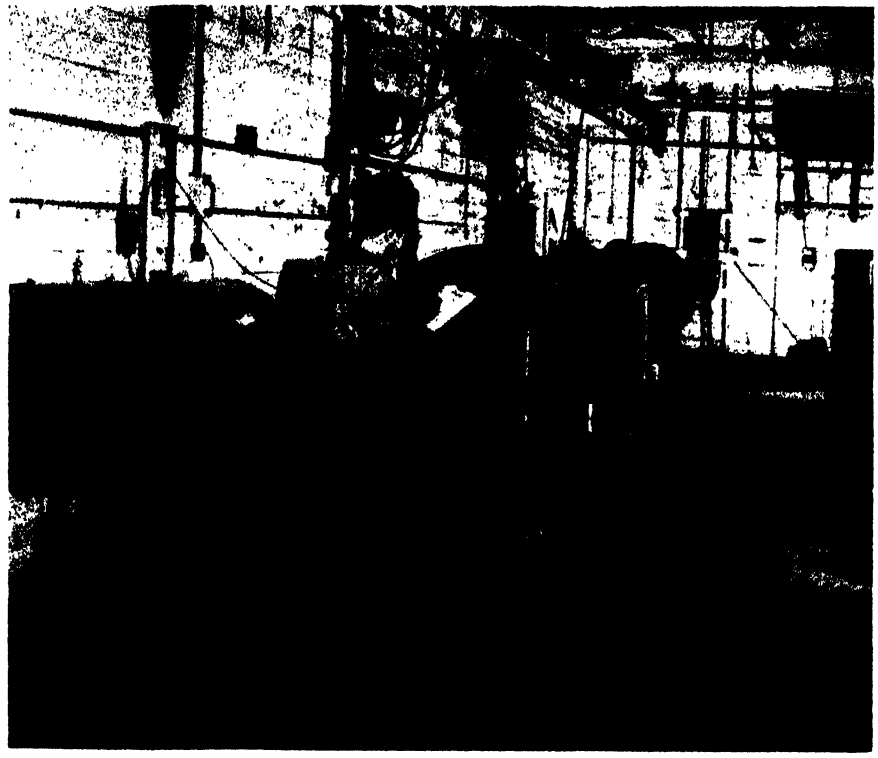
including 1,500° F., known as Hi-Temp No. 15.

The research, begun a year ago on suitable vapor barriers for low-temperature insulating materials, has been continued. The permeability of a number of materials has been accurately determined under controlled conditions of humidity and vapor pressure. As an additional check on these findings an insulating covering consisting of organic material has been vaporproofed and applied to a pipe operating continuously at a comparatively low temperature with the outer surface exposed to an atmosphere of high relative humidity.

Industrialization of Plast-Sponge and Plast-Iron. The prominent result of the research program of the multiple fellowship of Plastic Metals, Inc., has been the construction of a large commercial sponge-iron plant. This factory, located in Johnstown, Penna., is scheduled for early completion and, when operations commence, the donor will be one of the largest producers of powdered iron in the world.

The sponge-iron powder made in this new plant will have a variety of applications, many of which are of unusual importance in prosecuting the war. Among the most interesting uses of this material is that in which it is compressed into plates which serve as anodes in the donor's electrodeposition process for manufacturing Plast-Iron [NEWS EDITION, 19, 392 (1941)]. Plast-Iron, because of its purity (99.95+ per cent iron), has been adopted by many companies as the standard material for producing high-density powder metallurgical compacts, electrical parts, such as radio cores and magnets, and other articles wherein iron of a high degree of uniformity as well as purity is essential. Another large outlet for the sponge iron to be made in the donor's new plant is in Plast-Sponge powder, which is manufactured by reducing iron ore, mill scale, or other forms of iron oxide to a high-quality sponge iron. After this iron is pulverized, classified, and otherwise processed, it is ready for use in those applications for powdered iron which do not require the unusual purity of Plast-Iron.

In addition to completing the basic research and development work which led to the construction of the new plant, the fellowship, among other things, has undertaken during the past year exhaustive studies of electric power sources and iron ore deposits in the United States and Canada. These studies, which have brought forth many totally unexpected facts, are being continued with the end in view of establishing accurate information for the selection of plant sites and for further commercialization of the processes. Owing to the present shortage of both machine tools and skilled machinists, the various war production agencies in Washington, as well as the procurement offices of the Army and Navy, are displaying keen interest in the art of powder metallurgy. On the basis of the number of defense and offense items which already are being produced by the pressing and sintering of metal powders, it seems reasonable to predict that, before this emergency period is over, powder metallurgy will take its place as a full-fledged industry capable of fabricating many articles faster, cheaper, and better than they were ever made before. With a sound economic foundation, this new manufacture should encounter little trouble after hostilities cease.



Grinding room in the Plast-Iron pilot plant

Beneficial Results Accrue in Gray Cast-Iron Production. The foundry practice fellowship of the National Radiator Co. (W. A. Pennington, incumbent) has as its projects the determination of proper means for adjusting the silicon content of gray cast iron, studies of chemical reactions within the cupola with particular regard to kinetics and thermodynamics, application of statistical methods to plant data to find the probable effects of various factors upon foundry losses, and development of operating procedures to give uniformity of product in the different plants.

In the operation of the cupola to make gray cast iron, about 10 per cent of the silicon of the mix is lost through oxidation. Usually some material which contains iron silicide in high concentration is added in the cupola in such amount that, when 10 per cent of the total silicon is lost, there will still be enough left to give the desired composition. At least part of the silicon adjustment can be made by a reduction in the cupola loss. Thermodynamic studies indicate that the loss may be reduced to half by using a hot blast because the tendency for the oxidation of silicon increases as the temperature is lowered. A material has been used which apparently reduces the loss to practically zero, by being preferentially oxidized with a saving of the silicon. In several instances it has proved to be more economical to adjust the silicon by adding a suitable material in the ladle. Such a material should give an exothermic reaction to prevent an undue lowering of the temperature of the metal. Where oxides are formed by chemical reactions, particularly oxides insoluble in the molten iron, centers of nucleation are furnished for graphite precipitation. This inoculation gives a good distribution of graphite, permitting the use of less silicon and still producing an iron with suitable machinability.

As to the chemical reactions taking place in the cupola, it is not so much a matter of what reactions are involved as it is the specific location and the thermodynamics and kinetics of the various reactions. The melting rate, for example, after equilibrium is attained in coke-bed height, is chiefly dependent upon the rate at which air is supplied and the coke ratio (weight of iron to weight of coke). The greater the volume of air or the greater the coke ratio, the faster will be the melting of the iron. On the other hand, the temperature of the metal will increase as the volume of air is increased and also as the coke ratio is decreased.

Statistical analysis has been employed beneficially in correlating various factors with foundry losses, there being found in

nearly all cases direct linear relations. Good reproducible results are obtained where the principles of probability are employed in this manner. Procedures are being evolved for application in the various plants so that a high degree of uniformity of product may be had. The control tests now being used give more assurance than ever before of obtaining radiator sections of which few will be rejected owing to cold shots and poor machinability. Furthermore, it will be convenient to eliminate practically all the serious casting strain, giving an optimum of strength at points where it is especially required.

Research Strengthens Wartime Steel Technology. The multiple fellowship of the Pittsburgh Steel Co., whose senior fellow is S. A. Braley, is cooperating with the A. S. T. M. in field tests of metallic coatings for iron and steel. Physical properties of wires subjected to atmospheres of divers types, including severely industrial, mildly industrial, seacoast, and rural, have been investigated. The findings are contained in the latest report of the Wire Inspection Committees on Field Tests of Wire and Wire Products. During the past few years several research laboratories including this fellowship have collaborated in an investigation of methods for oxygen analysis, the project being sponsored jointly by the Iron and Steel Division of the American Institute of Mining and Metallurgical Engineers and by the National Bureau of Standards.

In 1941 the fellowship studied several different types of ferrous materials, such as pig iron, before and after desulfurization, basic open-hearth steels, and stainless steels made in electric furnaces by the vacuum-fusion method. This problem is primarily concerned with an attempt to establish whether certain types of failures in fabrication or service may be attributable to the oxides, hydrides, or nitrides present. It has been shown that desulfurizing pig iron by means of soda ash does not introduce any additional quantities of the oxygen, hydrogen, or nitrogen compounds, thus indicating that a blast furnace may be operated to obtain a maximum yield of iron without regard to the sulfur content and then to reduce the sulfur to an allowable amount by means of a desulfurizing agent without affecting its quality.

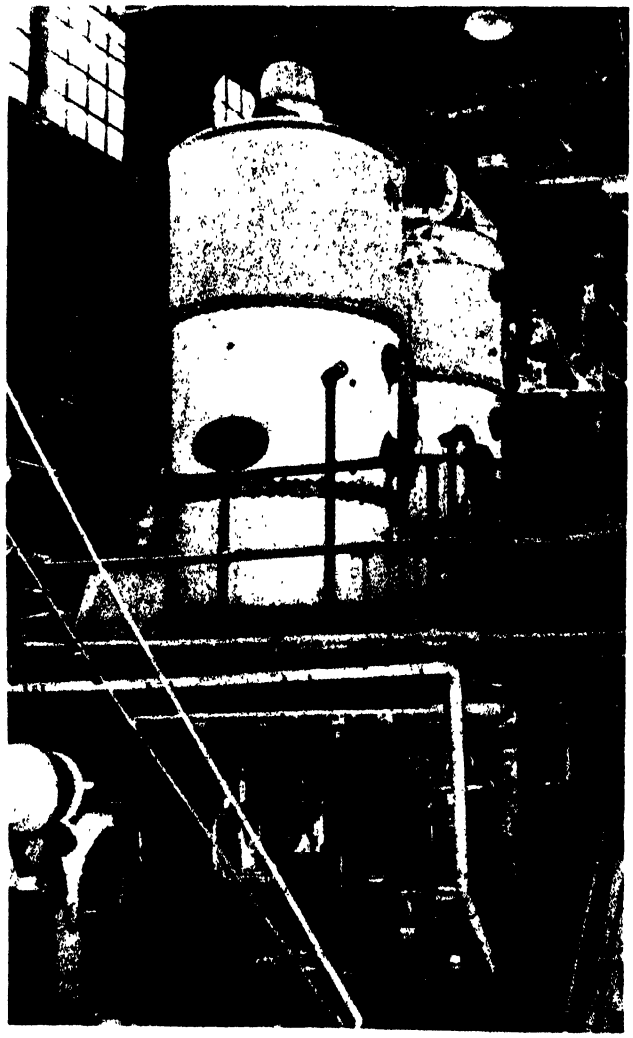
As most of the nonferrous metals commonly employed as protective coatings on iron and steel are urgently needed in war matériel, the possibilities of either substituting a nonessential metal or developing new alloys requiring only relatively small amounts of the much needed metals are under investigation. Considerable time has been devoted to hot-dip processes for wire and wire products. Hand-in-hand with this research, attention has been accorded to methods of preparing steel surfaces along with the development of suitable fluxes to obtain the maximum atmospheric corrosion protection with a minimum amount of metallic coating. In the emergency it is imperative that the alloying elements, such as manganese, silicon, nickel, chromium, tungsten, vanadium, and molybdenum, used in the production of steel be conserved. A study of the physical properties obtained by the heat treatment of plain carbon steel wires in conjunction with newly developed quenching oils has yielded useful information.

Assuring Work on the Refining of Chromium. On the multiple fellowship on protected metals sustained by the H. H. Robertson Co. the research being conducted by H. J. Read on the refining of chromium has involved several new approaches to the general problem. Further work is being done along selected and promising lines. As it has been taken as a premise that no significant advances can be made through modification of the methods now used in refining chromium, entirely new techniques are being tried in an effort to refine this vitally important metal. Many domestic and near-by chromite deposits contain ores of too low a grade for use in present metallurgical practice, and a refining process which could utilize such ores would be of the greatest utility, particularly in times of national emergency when high-grade ore from distant sources is not available. This situation is a cogent factor in guiding the course of the present investigation.

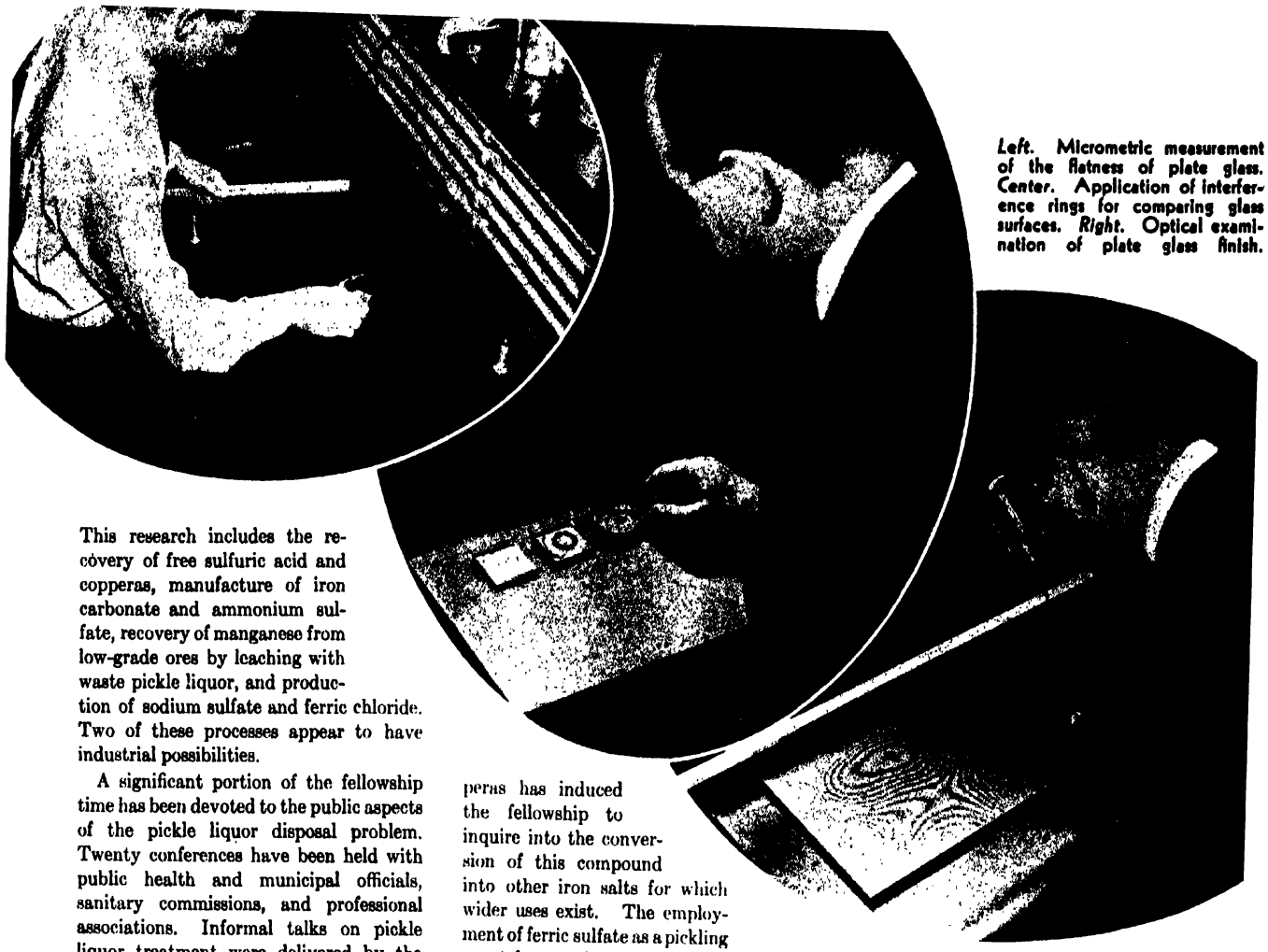
The Steady Pursuit of Waste Pickle Liquor Utilization. The acid recovery fellowship of the American Iron and Steel Institute (R. D. Hoak, senior fellow; W. W. Hodge, advisory fellow) has continued, during its fourth year, to evaluate processes designed to recover values from waste pickle liquor, to propose and investigate the potentialities of new procedures, to confer with public health and municipal officials in the solution of problems arising through inadequate pickle liquor treatment, and to advise the technical staffs of steel mills on treatment or disposal methods which best meet their particular requirements.

Three new recovery methods are being appraised. One of them is intended to treat hydrochloric acid pickling waste. Such a process, if economically sound, could become very important to the industry because it would permit the large-scale substitution of hydrochloric for sulfuric acid. Hydrochloric acid pickles much more rapidly than sulfuric and produces a superior surface, but its volatility and higher cost have militated against its large-scale adoption.

New data on a number of the 47 processes of all types previously investigated have been studied. Research initiated in the fellowship laboratory has been conducted on five potential processes for the recovery of values from waste pickle liquor. Investigations on three of these projects have been tentatively concluded, while two processes are still being studied.



Evaporator and crystallizer in the factory of the Sulphiro Co., Martins Ferry, Ohio, in which ferrous sulfate is produced from waste pickle liquor



Left. Micrometric measurement of the flatness of plate glass. *Center.* Application of interference rings for comparing glass surfaces. *Right.* Optical examination of plate glass finish.

This research includes the recovery of free sulfuric acid and copperas, manufacture of iron carbonate and ammonium sulfate, recovery of manganese from low-grade ores by leaching with waste pickle liquor, and production of sodium sulfate and ferric chloride. Two of these processes appear to have industrial possibilities.

A significant portion of the fellowship time has been devoted to the public aspects of the pickle liquor disposal problem. Twenty conferences have been held with public health and municipal officials, sanitary commissions, and professional associations. Informal talks on pickle liquor treatment were delivered by the fellows before four engineering groups. These discussions have led to a better understanding on the part of public officials of the complexity of the problem and the progress being made by the steel industry in reducing pollution from this source. In many cases advice could be given on the solution of specific problems. A discourse on the general subject of stream pollution was published during the year. The fellows also visited 24 steel plants to discuss treatment methods with technicians in charge of pickling operations. These sessions served to broaden the fellows' appreciation of the difficulties encountered in pickle liquor disposal at individual plants and provided them opportunities to suggest the best disposal methods to employ. It is gratifying to point out that, without exception, these technical men are desirous of cooperating with the fellowship, being anxious to adopt processes which can be fitted in with their plant economy. The construction of pilot plants to study certain processes on a scale to enable the evaluation of operating efficiency has been under consideration by several steel companies. Prevailing conditions, however, have made it extremely difficult to obtain the requisite equipment and it is probable that such investigations will have to be deferred for some time.

The saturation of the market for copperas has induced the fellowship to inquire into the conversion of this compound into other iron salts for which wider uses exist. The employment of ferric sulfate as a pickling agent for stainless steel is increasing and has the advantage of releasing nitric acid and dichromates for war needs. Ferric chloride is utilized as a sludge conditioner in 85 per cent of the sewage treatment works which apply vacuum filtration. As research continues to establish the advantages of iron salts in water purification and in the treatment of sewage and organic industrial wastes, these compounds will receive recognition from potential users. The fellowship has developed interesting possibilities for the manufacture of compounds which find a large field of utility.

Science in Cast-Iron Enameling. On the American Radiator and Standard Sanitary Corp. fellowship D. G. Bennett has been working on numerous problems involved in the dry-process enameling of cast iron. The composition of pig iron has been given searching scrutiny as have the clays of importance in keeping a cupola in continuous operation. Iron, as cast, has been investigated as to constitution and inclusions by chemical and spectrographic methods while comprehensive physical tests have been carried out. With the development of bathroom fixtures of increasing usefulness and beauty considerable effort must be devoted to making sure of their durability under extreme conditions of service. As indicated, the cast iron, the foundation material of a fixture, has been studied from every point of view.

A very high degree of adherence of the enamel to the metal is essential. As this property is hidden, success in attaining it is indicated where the enameled ware user is practically unaware such a problem exists. Test methods have been worked out that aid in the development of adherence to a high degree with a concomitant decrease in the probability of enamel failure. The porcelain enamel itself has been and is being investigated from the standpoints of its proper fit to the metal, body and surface hardness, resistance to chemical reagents, reflectance, and opacity. In short, with the progressive development of ware exemplifying function and grace, the fellowship's efforts are devoted toward maintaining and improving the chemical stability and mechanical strength of the brilliant and attractive porcelain enamel finish applied to cast-iron fixtures.

Better Hollow-Ware Enameling Materials. The ceramic chemicals fellowship maintained by the O. Hommel Co. has E. E. Marbaker at work on problems incident to the adaptation of the Hommelaya (two coat–one fire) process to the enameling of hollow ware. The scope of the fellowship also includes the investigation of raw materials, such as clays of domestic origin, and a definitive comparison of a number of enamel clays has been made. Determinations have been

concluded on the effects of these clays in a standard ground coat formula on setting power, measured by the weight of enamel adhering to bare pickled and to ground-coated steel plates, and on viscosity. The results, which serve as a basis of appraisal and classification of the clays, have led to an inquiry into the action of varying amounts of setting agents on the properties of slips in which the clays are used.

Basic Research in Flat Glass. The fellowship on plate glass technology of the Pittsburgh Plate Glass Co. (F. W. Adams, senior fellow) has effected substantial advances in methods for evaluating the flatness and texture of surfaces. These accomplishments enable exact analyses of commercial glass grinding and polishing operations and assist in the production of glass for special purposes. Plate glass of sufficient flatness for use as surface plates for fine gaging work affords a superior replacement for the older metal plates. The use of monochromatic light in developing interference patterns or Newton's rings permits a rapid examination of surface finish and flatness. Glass approaching optical flatness may be produced for test plates and other purposes requiring high accuracy of surface. The ready and positive identification of glasses of different types makes this interference technique useful in many applications. The topographic profilograph, which graphically measures surface textures, has been very valuable in studying details of the processes of grinding and polishing glass; it has also proved of real utility in developing the Nucite glass chalkboard and in showing the permanence of its surface under conditions of extended use. Accurate measurements of thickness and parallelism of surfaces of plate glass have been helpful in improving it to a point where superior optical properties are realized, leading to products suitable for many special purposes.

Garspar, Garcolite, and Gartex. The mineral products fellowship, sustained by Norbert S. Garbisch, has carried forward under G. J. Bair its studies of waste grinding sand from plate-glass manufacture. Improvements in the processing of the products Garspar, Garcolite, and Gartex have been incorporated in the plant operation at Ford City, Penna. Further investigations of particle size fractionation and chemical surface treatment are being conducted to obtain products having specific properties for new applications.

Commercial tests of Garspar, the flux-containing silica, in pottery and glass have been extended and new markets developed. Many large production melts of Garspar glass batch prepared by the Garco process, an important development of the fellowship, have substantiated the previous experimental results and predictions. A batch prepared of Garspar in this manner will melt into a finished glass in a small fraction of the time required for a normal batch. A commercial plant to prepare batches this way has been constructed and is in operation.



Regard for a new organic thiocyanate

Garcolite has been used as a pulverulent aggregate in concrete for highways, a flood-control dam, ready-mix concrete, floors, and concrete blocks. Its fine particle size and surface characteristics well suit it for plasticizing a concrete mix. It reduces segregation and bleeding, increases strength and density, and enhances the finished appearance of concrete. Although Garcolite possesses no hydraulic properties itself, it is surface-active to cement and by extending the cement paste it gives the properties of a much richer mix.

The associated fellowship research on Gartex has been continued by K. J. Miller. Gartex is the processed filler for rubber, plastics, paints, and the like. Studies of this product in hard rubber compounds and synthetics have been particularly fruitful. The investigation of new surface treatments is an important phase of this work.

Furtherance of Uses for Sulfur. M. G. Mayberry and his associates on the multiple fellowship of the Texas Gulf Sulphur Co. have proceeded with the study of new and improved applications of sulfur. Cements prepared by mixing sulfur and aggregate have found increasing utilization because of their acid resistance. The effects of various agents on the properties of sulfur cements have been investigated. Additions of furfuryl alcohol, beta-naphthol, and a sulfur-aniline reaction product improve certain properties of the cements and increase their possible uses. The properties and uses of sulfur as a filtering medium have been determined. Following experimental conditions comparable to those encountered in commercial water filters, the efficiency of sulfur in removing sediment from water was found to equal or surpass that of sand filters.

Fundamental research on the reaction of gaseous olefins with sulfur has enabled the explanation of the effects of temperature and concentration. The reaction products have been isolated and factors influencing polymer size are being investigated. Polymeric hydrocarbons have also been reacted with varying amounts of sulfur, thermoplastic resins having been obtained. These plastics have softening points ranging from 55° to 70° C. and are soluble in most organic solvents, including aromatic hydrocarbons, chlorinated hydrocarbons, and ketones; they are resistant to salt solutions, dilute alkalies, and most acids. Mastics have been prepared by mixing the resins with plasticizers and fillers. The resins may be modified by the addition of drying oils, the products being infusible and only slightly soluble in most organic solvents: a typical modification has good adhesion to metal, has been used as a coating material for cloth and paper, and is utilizable with fillers in making mastics.

Thiocyanates and Their Applications. According to W. H. Hill and his aids on the multiple fellowship on gas by-products of the Koppers Co., other inorganic thiocyanates besides ammonium thiocyanate have been investigated, and more organic derivatives have been prepared. While sodium thiocyanate is much less corrosive than the ammonium salt, it is more hygroscopic, picking up water at relative humidities higher than about 30 per cent. For many industrial uses the barium salt may prove desirable, for it is more readily handled than the others and lends itself to the production of various thiocyanates by double decomposition with sulfates of the appropriate bases. Increasing attention has been paid to the recovery of hydrocyanic acid from coke-oven gas in forms in addition to the thiocyanates.

The new pigments and pickling inhibitors mentioned last year have been developed further and evaluated on larger scales with promising results. A new series of rubber accelerators has been discovered that seems to be as good as or even better than the compounds most commonly used in industry.

Investigations on Coke-Oven Light Oil and Its Derivatives. The Koppers Co.'s

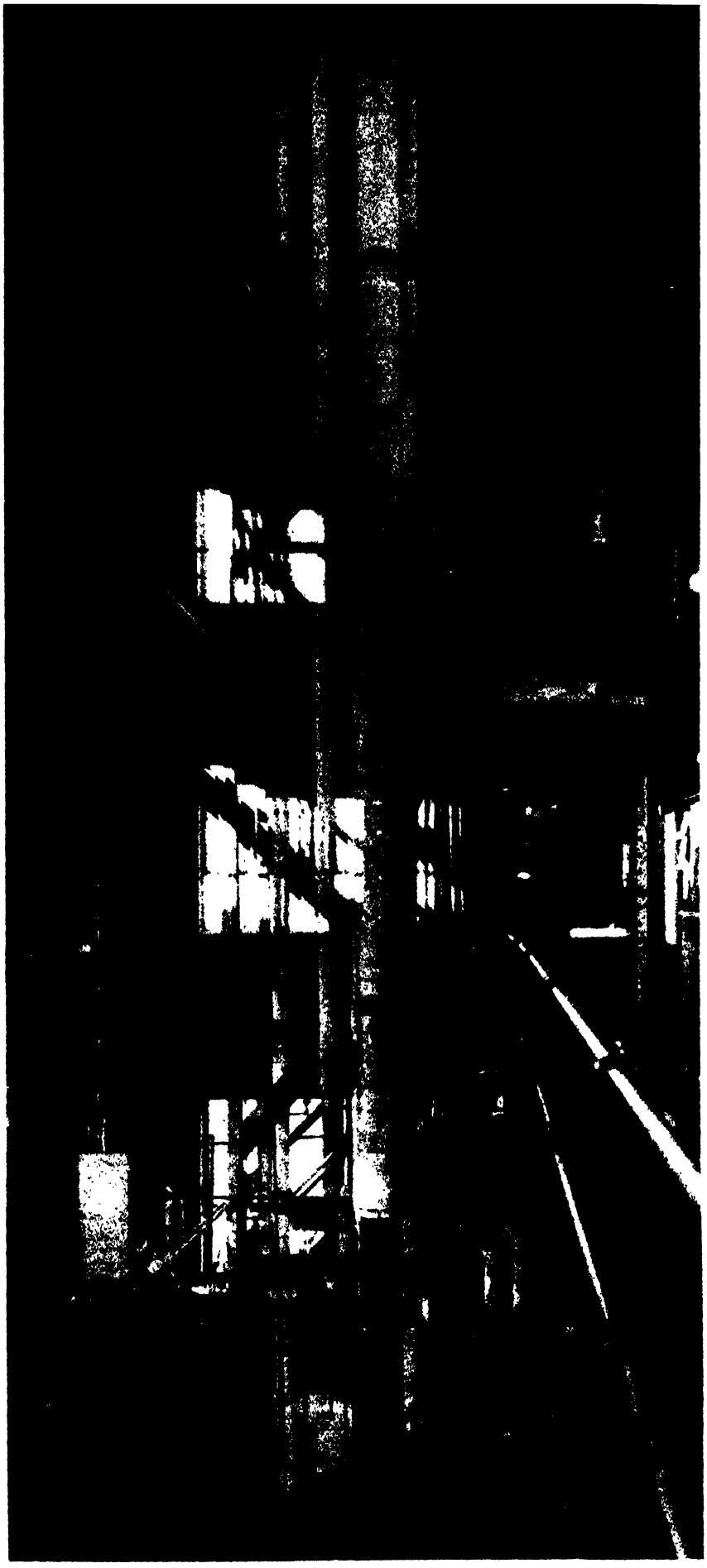
tar distillation fellowship headed by W. L. Glowacki has continued its long-term program of research on the upgrading of the components of coke-oven light oil and studies of analytical methods relating to these materials.

Important results have been obtained during work directed to the wider utilization of 3° tar bases and coke-oven light-oil forerunnings, xylenes, and crude heavy solvent. In the field of analytical procedures an attempt to fill a long-felt want was made through the publication of a pamphlet entitled "The Determination and Examination of Light Oil in Gas" (American Gas Association, New York, N. Y.), a compendium of modern methods for producers and users of light oil primary derivatives. In cooperation with the National Research Council a comprehensive description of the light-oil industry has been prepared for a general treatise on the chemical utilization of coal.

The Properties of Tars and Pitches and Their Improvement. Studies of the physical properties and distinguishing characteristics of various bituminous materials have been extended by W. F. Fair, Jr., and his co-workers on the multiple fellowship on tar properties of the Koppers Co. Emphasis has been put on the measurement of absolute viscosities of tars and pitches and on the determination of temperature susceptibilities. Methods for bringing about changes in certain of these characteristics in desired directions and prolonged investigation of the rheological properties of regular and improved tar compositions indicate to better advantage the types of tars and pitches most suitable for various applications and also suggest additional industrial outlets for the modified materials. Accelerated aging, outdoor exposure, and practical service tests of various kinds are being made in connection with this program to establish correlations between specific properties and actual performance for various types of tars and pitches.

New Products from Tars. On the multiple fellowship on tar treatment of the Koppers Co. (C. F. Winans, senior fellow) the researches have progressed along several lines, some of which are supplemental to earlier investigations. In the beneficiation of heavy creosote oil, pitch oil, and coal tar itself by hydrogenation, the boiling range is in every case lowered so that the products of hydrogenation fall in the distilling ranges for solvents and creosote oil. Careful distillation of these hydrogenated products has given solid and liquid distillate fractions of varying aromaticity. The hydrogenation of the residue formed by the distillation of tar acids (phenols, cresols, xylenols) has given rise to additional amounts of valuable tar acids.

A process has been carried over into a pilot plant for the complete and economi-



Pilot plant of the industrial fellowship on gas purification for developing a new process for removal of organic sulfur from coke-oven gas



Viscometry section, multiple fellowship on tar properties. From left to right the viscometers are as follows: Koppers capillary rise, Shell open-end co-axial rotating cylinder, Brookfield, Saybolt-Furol, and simplified falling co-axial cylinder.

cal separation of beta-picoline, gamma-picoline, and 2,6-lutidine from a tar-base fraction known as 3°-picoline mixture; this method yields products of substantially 100 per cent purity. A program of separation of other complex coal-tar fractions to obtain pure products is being followed and a variety of chemical derivatives is being prepared in the laboratory.

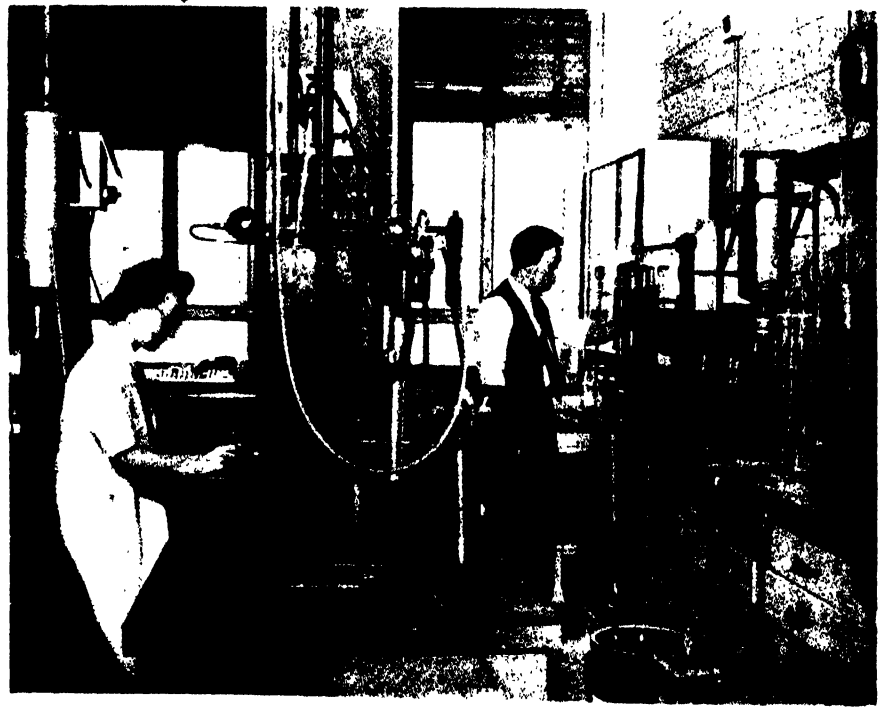
Gratifying Progress in Waste Disposal from By-Product Coking. The multiple fellowship of the Carnegie-Illinois Steel Corp., now in its ninth year, is coping through research with problems of waste disposal in the by-product coking industry, which has justly acquired the term "by-product" by reason of its use of the secondary output of coal carbonization. Out of the work of the fellowship have come new methods for recovering and utilizing several materials.

Among the problems investigated by the incumbents, P. J. Wilson, Jr., senior fellow, and J. H. Wells, has been the elimination of organic matter from ammoniacal liquor. This liquor, after removal of ammonia, is a major industrial waste, and the presence of organic matter adds greatly to difficulties in its disposal. Procedures evolved by the fellowship for destroying the organic matter by oxidation have been protected by patents. The greater portion of the organic matter in the liquor, for instance, can be oxidized by adjusting the pH of the solution slightly on the alkaline side, adding a small amount of sodium sulfate, and electrolyzing with anodes of lead peroxide. Phenols can be completely broken down by electrolysis with graphite anodes, using current densities of about 0.1 ampere per square decimeter.

The residues which accumulate in the stills for fractionating light oil in coke plants have usually been burned or discarded. The study of this waste by the fellowship has led to the development of methods for effecting the conversion into resins and high-boiling aromatic solvents. As these products have been shown to be of commercial value, the still residues can now be sold. An investigation of the pyridine bases present in the gas and tar fractions was initiated by the fellowship in 1935, and work on their recovery and utilization was continued over a period of years, leading to the construction of two plants for the production of pure pyridine as well as several of its methyl homologs. The manufacture of pyridine in the United States has multiplied many times within the past few years and has made possible its extensive application in such fields as pharmaceuticals, textile waterproofing and dyeing, and organic synthesis. During the distillation of light oil, low-boiling compounds come off below 80°, the boiling point of benzene. These forerunnings have generally been discarded to the atmosphere or returned to the coke-oven gas. Analyses made by the fellowship on typical samples have shown the presence of a relatively large proportion of cyclopentadiene, of great interest as a potential copolymer in the preparation of synthetic rubbers and resins and for the synthesis of other organic compounds. Accordingly a process for the commercial recovery of this cyclopentadiene has been evolved.

Contributions of Value to Natural Gas Technology. The investigation of the composition of the various grades of natural gasoline manufactured by the Peoples Natural Gas Co. has been the major problem of the multiple fellowship whose head is R. W. Miller. Owing to the paucity of fundamental research in this field, little has been known in the past regarding the exact composition of the majority of the natural gasolines produced in the United States.

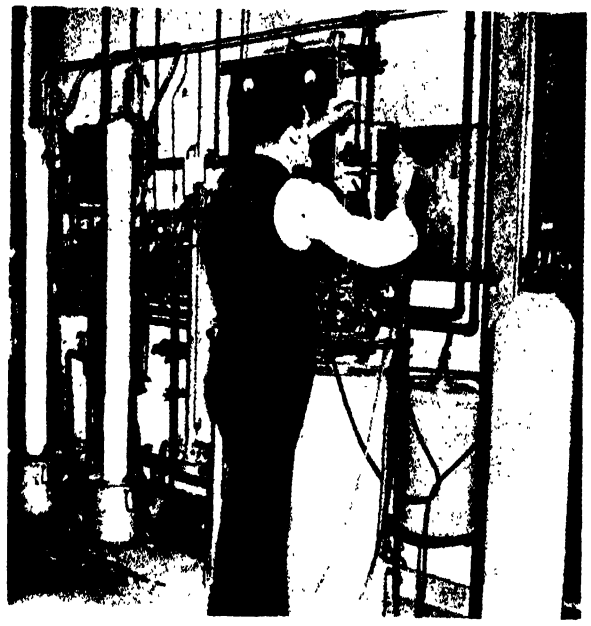
A fractionating column, capable of handling gasolines at pressures as high as



A pyrolytic laboratory of the multiple fellowship on tar synthetics

60 pounds gage, has been designed and constructed. With the aid of this apparatus, several grades and types of natural gasoline and casinghead gasoline have been analyzed. The data obtained thus far have revealed that certain of the products contain amounts of isobutane and isopentane which make them desirable for sources of alkylation materials and for the production of 100-octane grade aviation fuel. As a result of the analyses of the natural gasoline and the natural gas at one of the stations, the feasibility of installing a butane extraction plant was demonstrated. Normal butane is useful in the manufacture of butadiene for synthetic rubber production. It has also been possible, by the comparison of products at several of the manufacturing stations of the donor, to determine the conditions which contribute to the yield of high-grade gasolines.

Special investigations have been conducted on corrosion problems concerned with the donor's products and their use and on the prevention of the formation of natural gas hydrates. A plant for the injection of methanol into the natural gas transmitted into New York State has been installed for the latter purpose. Equilibrium studies of the amount of methanol retained in the gas and the effectiveness of the process are being made. During previous years appreciable reduction in the capacity of the pipe line has occurred because of natural gas hydrates.



Construction of apparatus for a study of the composition of crude petroleums

Petroleum Problems Prosecuted Productively. The multiple fellowship of the Gulf Research and Development Co., in operation since 1911 and supervised by W. A. Gruse since 1923, has had another year of creative activity. The elaboration and application of micromethods for the examination of petroleum oil materials have been advanced. The microtitration for acidity has been simplified and now gives acceptable results on 0.05 cc. samples of oxidized oil. The analytical oxidation itself is done on a microscale, using 1 cc. samples, a considerable number of which can be handled at one time. Correlation with known macromethods of oxidation is under way. The study of the chemical constitution of certain lubricating oils, carried on for several years, has been brought to a temporary conclusion and the results are being prepared for publication.

Research on fractional distillation under diffusion pump vacuum has been continued. A quantitative examination has been completed on the performance of a new type of high vacuum column, unpacked, but of such construction as to be equivalent to several theoretical plates; the findings are to be presented in a paper. Search has gone on for pairs of high boiling, thermally stable liquids suitable for evaluating column performance at relatively high vacua. The requirements are very exacting and no entirely satisfactory materials have been discovered. In the meantime a method has been devised for the comparison of vapor pressures of relatively nonvolatile liquids that is readily applicable to the determination of initial vapor pressures of oils in the lubricating class. The results will be published.

The study of the chemical constitution of high-melting waxes has been carried onward as has that of the over-all chemical nature of crude petroleums. Work with the mass spectrograph for the examination of hydrocarbon decomposition reactions is still in progress. A by-product of some of the chemical investigations now going on is a very satisfactory method for determining the make-up of some of the complex mixtures of phenols available in natural materials and industrial products.

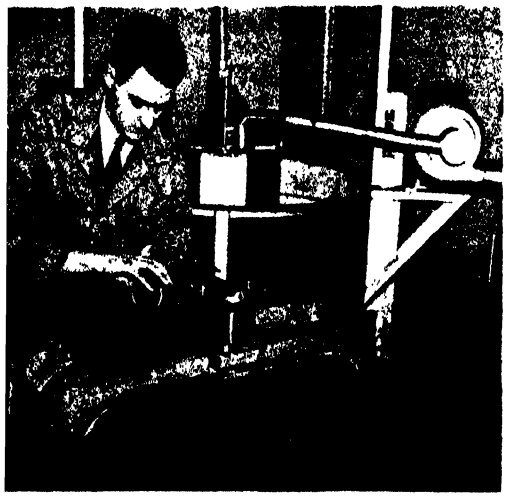
The prototype engine work has been directed in part at locating the causes for low-temperature corrosion of some of the newer alloy-bearing materials used in high-speed engines; the data will be made available. Following specifications laid down in this laboratory, a flexible-type single-cylinder test engine for lubricating oils has been designed and is being built in small numbers.

Research on Oil Cleaning Goes Onward. The fellowship of the Fram Corp. (G. O. Ebrey, incumbent) has progressed in studying the principles and factors involved in the removal of solids from liquids, such as lubricants. The relations among these factors have been found to be of great importance. The fellowship is aware that in lubricating oil filtration, as in many other procedures for removing particles of extremely fine subdivision, not all the particle separation can be explained on a purely mechanical basis but that influences are exerted by surface phenomena as well as simple straining. The removal of finely divided solids from a viscous liquid while still maintaining suitable liquid flow presents some unusual problems. A number of types of filter media with different physical properties have been tested to determine their applicability for separating solid sludge from oil. Then, too, the effect of thickness of sludge cake on permeability to oil flow has been investigated. Research has also been conducted on the physical and chemical nature of the general types of impurities which contaminate oils in use, to aid in the quest for the best means of removing them. The increasing use in lubricants of additives, particularly of the detergent type, has introduced new problems which are getting attention.

Probing the Composition of Petrolatum. The fellowship of the Chesebrough Manufacturing Co., under W. S. McClenahan, is pressing on in the fractionation and analysis of crude petrolatum stocks. The order of procedure has been to separate a residuum into its major components, which are then subjected to systematic vacuum-distillation and solvent-extraction processes. The final fractions are being analyzed to determine in so far as possible the structures of the compounds in them. These results are being correlated with practical problems related to the refining and utilization of petrolatum.

Novel Synthetic Organic Chemicals and Their Uses. The 28th year of operation of the multiple fellowship on organic synthesis, supported by the Carbide and Carbon Chemicals Corp., has followed the established pattern of development of new products and utilization of these chemicals to meet changing demands of the industries.

Investigations on the manufacture and applications of amines, detergents, lubricants, hydraulic fluids, and synthetic resins have been lengthened with success. The commercial use of a water-soluble lubricant in the processing of woolen fibers was accomplished. Means for controlling the extent of corrosion in gas-purification plants was discovered. Diaminoethyl sulfide was prepared on a semicommercial scale. Quaternary bases were studied. The utility of amines in ore flotation was



Coating cloth with Vinylite resin during formulation research on solutions of this plastic

established and production was undertaken on a pilot-plant basis. Hydraulic fluids were formulated which successfully met the exacting requirements of the aviation industry. Research on oil additives has uncovered products having marked detergent and antioxidation properties. An extreme-pressure additive, passing the government specifications for dual-purpose lubricants, has been developed. The search for successors for materials unobtainable because of the war has brought forth several promising products.

Synthetic resins and related products have received special heed. Adhesives for the bookbinding and leather industries have been developed. The use of plastic sheeting in place of leather in the footwear and luggage fields is well beyond the experimental stage. Impervious coatings for cloth and leather have been improved by the use of vinyl resins. Many plasticizers have been prepared and evaluated in coatings to meet specific requirements.

Advances in Chemical Hygiene Investigations. Serving on the multiple fellowship on chemical hygiene of the Carbide and Carbon Chemicals Corp., H. F. Smyth, Jr., and his enlarged staff of eight have broadened their studies of new organic compounds. During the year it has been possible to start research on the physiological changes caused by these materials as contrasted with their pathological effects, and some observance has been given to detoxication mechanisms. To aid in filling the need for information upon a rapidly growing list of newly important chemicals, a series of range-finding tests has been selected and standardized to bring out in the least possible time the particular health hazards of each material which must be guarded against during industrial production and utilization. The results of two studies have been published—one involving some physiological effects of the Tergitol penetrants and the other the acute oral toxicity of 60 glycol derivatives.

Answers to Questions Concerning Tobacco Moisture and Smoke. A previous report of the multiple fellowship on cigaret technology of Philip Morris & Co., Ltd., has dealt with moisture in tobacco—a problem of major importance. The phase of the subject under recent investigation by C. F. Bailey, senior fellow, and A. W. Petre has been a determination of the equilibrium moisture content of numerous blends and leaf tobaccos over a range of temperatures and relative humidities. A special laboratory cabinet has been built, which for this work has several advantages over other types of air-conditioning equipment. Means of heating, cooling, humidifying, and dehumidifying are provided, and the apparatus is flexible in operation, as will be described in a forthcoming article.

In research on smoke analysis, a method has been contrived to give an index of the total mass of cigaret smoke. The reproducibility of preparation of smoke samples to be used for examination has been increased, and thereby data on the content in cigaret smoke of another fraction of constituents have been obtained. In general the analytical work has been restricted to selected fractions, but, weighing the results, it is clear that a gain has been made in finding the requirements of cigaret smoke analysis.

Several New Foods; an Investigation on Food Flavors. For its donor, H. J. Heinz Co., the multiple fellowship on food varieties, supervised by E. R. Harding, has perfected a new type of instant baby cereal, of high nutritive value through fortification with minerals and vitamins. Comparative laboratory and clinical studies have proved its easy digestibility and nutritiousness with relation to preparations of the same general type now on the market. Two more novel products—vegetable beef stew and chopped peaches and plums—are additions to the donor's line of junior foods.

Further studies have been made on the nutritional value of the donor's products, including nicotinic acid assays by the biological method. The 10th edition of "Heinz Nutritional Charts" was issued; some important new sections were added and the data of several tables revised. The quarterly publication, *Nutritional Observatory*, now in its third volume, is being enthusiastically received by physicians, dietitians, and others interested in foods.

A new project of the fellowship is a broad survey of the whole field of food flavors, to be followed by laboratory investigations expected to lead to improvements in residual natural flavors in manufactured foods and to the development of new edible materials suitable for flavor enrichment or the production of distinctive and novel flavors upon blending with other foods.

Science in the Train of Tenderay. The Kroger-Westinghouse fellowship, which is studying problems related to the rapid tenderization of meat, has been devoting particular attention to the processing of cuts of beef for the institutional trade, hotels, clubs, and restaurants. Such beef is handled in the form of wholesale cuts, usually ribs and loins, ranging in weight from 20 to 37 pounds in the case of ribs and 52 to 78 pounds for loins. Processing for 48 hours at 68° to 70° F., with a



A tasting committee appraises the flavors of several new food varieties.

relative humidity of about 90 per cent, and in the presence of the usual irradiation with ultraviolet of wave length 2537 Å., gives results in tenderness and juiciness superior to those obtained by hanging at 34° F. for six weeks in accordance with the usual commercial practice. Shrinkage and trimming losses are reduced 88 per cent in the Tenderay process.

Since commercial operations began in March 1939, 23 Tenderay plants have been installed. The New York, New Haven, and Hartford Railroad Co. now has a Tenderay unit in its commissary department in Boston, where all beef served in dining cars on that line is processed.

The fellowship is engaged in an investigation of various forms of spoilage of raw meat that have been a continuous source of loss in the meat-packing industry. Main study is being given to the early recognition of certain spoilages of obscure origin, popularly believed to result from careless handling after slaughter. Evidence rapidly accumulating indicates that this trouble is the result of an antemortem infection, and efforts will be directed toward its detection so that development of the souring, which is nonpathogenic, can be prevented.

Another Year of Success in Cotton Research. The multiple fellowship sponsored by the nonprofit Cotton Research Foundation, technical agency of the National Cotton Council of America, entered its fifth year of activities designed to aid in solving economic problems confronting the cotton industry. The diversity of cotton products, including lint, linters, oil, hulls, and meal, and the ramification of uses into which these products go have necessitated the pursuit of a quite inclusive program of investigation by R. F. Nickerson, senior fellow, D. M. Musser, fellow, and several assistants.

The growing surpluses of raw cotton and the increasing carry-over have constituted one of the cotton industry's most serious problems, and consequently studies on the fiber have received most attention. While new uses for large quantities of cotton are urgently needed, it has been apparent that the adaptation of the fiber to present-day industrial and domestic requirements is also necessary if cotton is to retain traditional outlets. Conditions growing out of the war have momentarily distorted the normal economics, but, at the same time, have emphasized the lack of processing methods by which cotton can be modified and made available where shortages of other fibers are being encountered. Under this stimulation efforts to alter the creasing tendency and inherent harshness of cotton have been intensified. The characteristic structure of the fiber and the chemical nature of cellulose impose strong limitations on the manner in which this objective can be attained. Despite the difficulties, however, encouraging progress has been made. A study of the plasticity of cotton has also been undertaken.

The development over the past three years of a strong cotton tire cord of long flex-life and low susceptibility to heat and moisture for use in heavy-duty pneumatics culminated in the release by the Cotton Research Foundation of complete processing details to industry. A number of major companies have signed the very liberal agreement offered by the foundation.

Investigations on the practicability and on methods of adapting virgin cotton to the manufacture of high-grade papers have been continued. Some of the factors involved in the hydration, fibrillation, and sheet-strength development of all-cotton pulps have been examined in detail. In addition, the effects of pulp pretreatment, cuprammonium viscosity, and beater supplements have been examined and their relationships to sheet properties have been sought. The results of this work are being made available to the paper industry through articles already published or in preparation.

The possibility of a shortage of cotton linters for chemical purposes brought into relief the problem of converting cotton lint into a form suitable for industrial use. The long fiber presents serious difficulties in large-scale manipulation and some



Below. Evaluation of the quality of yeast by baking tests. *Left.* Part of the unit plant of the multiple fellowship on yeast technology.



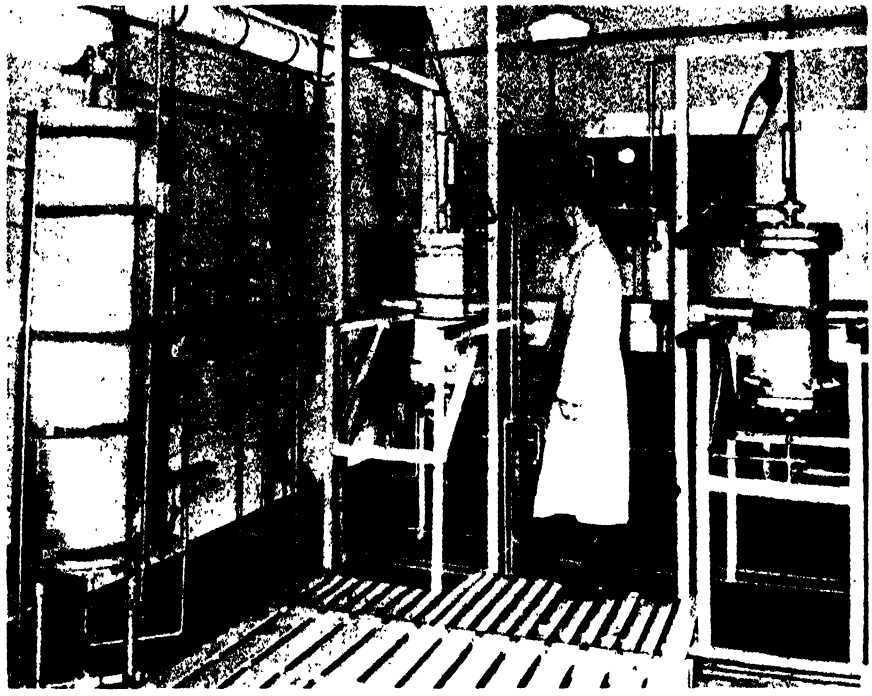
method of cutting or shortening such fiber is essential. Most of the available mechanical devices are either too inefficient where applied to cotton or so small in capacity as to make them inadequate. The studies now in progress may contribute to a solution to this conversion problem and also assist in the production from lint of cotton pulps to supplement rag stock for paper manufacture.

Fundamental research on the properties and structure of cotton cellulose and on the influence of such processes as mercerization is being conducted by novel techniques. From the kinetics of hydrolysis in a catalyzed system, new knowledge of the submicroscopic structure of cottons is being obtained. Observations made through the hydrolysis-catalytic oxidation method have been supplemented with studies on moisture regain behavior. Together these investigations are shedding new light on fiber structure and property relations. Technical reports embodying the experimental details and conclusions have appeared in the literature.

Research on cottonseed began to mature in encouraging fashion during the past year. It was shown that the cooking process generally employed in the preparation of cottonseed meats prior to oil expression has two effects on the nutritional properties of the finished meal. One, a reduction in toxicity, improves the meal, but the other, the action of heat on the protein, is deleterious. Progress has been made toward a method by which toxicity can be reduced to a minimum without the usual nutritional losses caused by heat. A direct test of its efficacy has been obtained through rat-growth studies. The literature on solvent extraction of cottonseed oil was reviewed and supplemented with new data. A complete analysis of the principal protein, globulin, isolated from solvent-extracted cottonseed meal, has been made to determine the types and quantities of amino acids; this analysis, supplemented with feeding experiments, has been published. Other investigations have dealt with the phospholipids of cottonseed; it has been shown that the lecithin and cephalin constituents are markedly different in character from the preparations now available commercially and therefore may have unique values. Further studies of cottonseed enzymes have contributed to explaining the behavior of lipase during seed storage.

Research on hulls has proceeded with the finding that activated hull carbon retains its absorbency in the presence of adhesives and therefore can be converted to pellet form. The sweeping compound previously developed from hulls is being marketed in appreciable quantities.

H. S. Olcott and T. D. Fontaine, formerly with the fellowship, transferred to positions with the U. S. Regional Research Laboratories in Albany, Calif., and New Orleans, La., respectively.



Experimental glue cookers, multiple fellowship on bone products

Achievements in the Quest for Superior Wool. Since 1939 the fellowship of the Albany Felt Co. under R. R. Fulton has succeeded in devising methods which impart to paper-machine felts and other woolen industrial fabrics markedly improved physical characteristics and resistance to chemical injury. The fellowship has also worked out a process for rendering wool and wool fabrics nonshrinking and nonfelting, and an improved system of wool scouring and scouring-room control that has brought an average daily increase in production of better than 75 per cent and more uniformly scoured, cleaner, loftier wool, without alkali damage. Another contribution of this broad research is an apparatus for the determination in 20 minutes of moisture and residual grease in scoured wool.

Well-Knit Hosiery Research. The fellowship of the Grove Silk Co., of which R. F. Stuewer is the incumbent, has made important advances in the throwing of hosiery yarn, particularly nylon. Several patent applications have been filed covering these new developments.

Raising Bone Products in Rank. The multiple fellowship of Baugh and Sons Co. (E. P. Barrett, senior fellow) has been quite busy during the past several years. New cookers for the production of glue from bone were installed at the donor's Philadelphia works. The design and operating procedure therefor were based on data obtained over a two-year period in the fellowship's pilot plant at the institute and on industrial scale experiments at Philadelphia in which the fellowship participated. The investigation brought methods for obtaining higher yields and grades of glue and for reducing production costs.

The principal project during 1941 has been a study of granular adsorbents for use in sugar refining. This research, still in progress, indicates that it may be possible to manufacture adsorbents having improved properties at a cost comparable to or lower than that of bone char.

Expansion of Rubber Program. The Firestone Tire and Rubber Co.'s fellowship, led by R. C. Briant, has been carrying on for about four years fundamental studies of underlying problems of the rubber industry. Because of the prime importance of rubber technology in the national emergency, the research is being increased through the employment of additional personnel. The Firestone Co. has collaborated with the fellowship of the Cotton Research Foundation in making practical trials of tire-cord developments.

Raolin Production and Applications. The Raolin fellowship has been establishing commercial production [see NEWS EDITION, 19, 399–400 (1941)] and looking after certain specialized commercial uses for the Raolin resins. In cooperation with Binney & Smith Co. information has been acquired on solvents and plasticizers for chlorinated rubber. During several preceding years the fellowship developed a

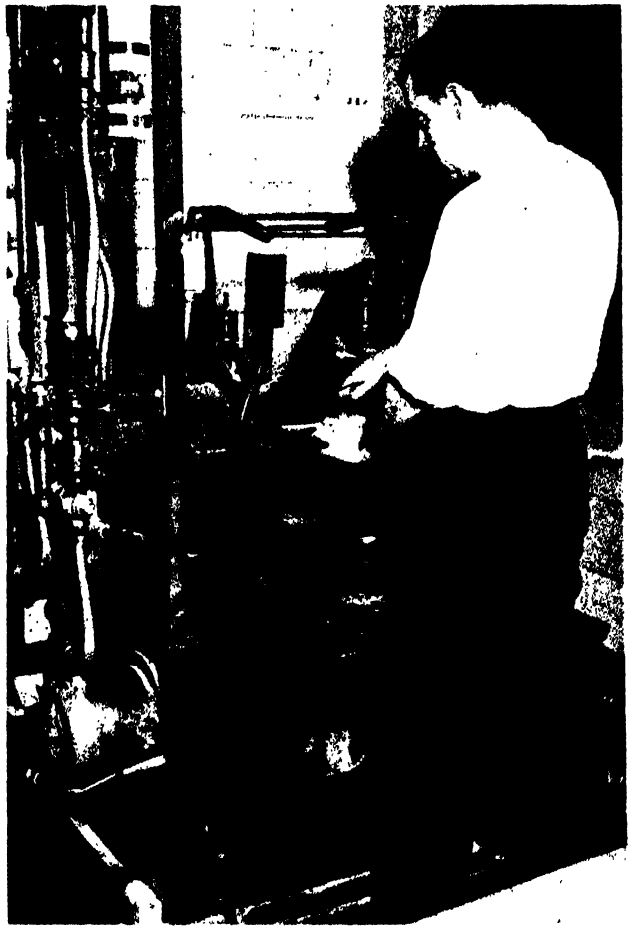
composition for employment in the manufacture of coated paper for container closure linings and devoted considerable time to gaining a suitable method of application to ensure the production of a high-grade material. During 1941 this process was carried to commercial application. The Raolin coating used for the production of this specialty paper gives a film that is translucent, colorless, tasteless, odorless, and nontoxic. It has been widely tested and has been found suitable for employment in closures on a wide variety of containers for pharmaceuticals, cosmetics, food products, beverages, and other packaged goods. This coating is resistant to mineral and vegetable oils, aqueous acids and alkalies, alcohols, peroxides and oxidizing agents, aliphatic hydrocarbons, brines, and water. The moisture transmission rate of the film is unusually low. For water and water vapor the rate at 100° F. and 5 per cent relative humidity is below 0.004 gram per sq. cm. per day. The finished product has been made available in bonded strip form or as punched liners.

A factory is operating under The Raolin Corp. patents. Early in October, however, defense requirements of chlorinated rubber had greatly exceeded domestic production, and, as a result, chlorinated rubber was placed under priority control and the entire Raolin output has since been allocated according to federal government instructions. To assist in meeting the Nation's needs, a substantial plant expansion program is under way. J. W. Raynolds, president of The Raolin Corp., is the holder of the fellowship.

Defining the Architecture of Silicon Polymers. The multiple fellowship of the Corning Glass Works (R. R. McGregor, senior fellow) is engaged in research on polymerizable silicon compounds. Consideration has been given to theoretical aspects, such as mechanism of polymerization, structure of the polymers, and molecular size. The chemical features of silicon and of carbon have often been compared, but the study of the silicon compounds has been on such a limited scale that data for fruitful discussion have been lacking. The investigations of this group are bringing to view points of similarity and dissimilarity with carbon which should be helpful in clarifying the problems. The uses of these silicon polymers are many and varied; certain applications have been proposed which have potential utility in warfare.

Novel Plastic Functioning Parts for Meters. The Pittsburgh Equitable Meter Co.'s fellowship headed by R. L. Wakeman has completed a survey of the heat resistance and long-term dimensional stability of a wide variety of plastics and has made a careful study of ways in which distortion under heat, swelling upon prolonged immersion in boiling water, thermal expansion, and impact strength of certain classes of plastics are related to compound formulation. Some of the information obtained during the course of this investigation has been published. Satisfactory performance of the functioning disk of hot-water meters exacts careful balancing of these properties with which operating conditions have been correlated. As a result of this research several plastic materials, both molded and laminated, have been developed which have shown excellent performance in service tests in boiling water for many months. Other products have been evolved for service in meters normally operating at atmospheric temperature but occasionally subjected to hot water. The work carried out in this field has led to the acquisition of data which are proving valuable in the selection of materials to take the place of rubber in meter parts where such replacement is necessitated by current exigencies.

The study of the application of plastics in water meters has been extended to other meter parts and to several types of water meters. Research on materials to use instead of leather in gas-meter diaphragms has led to a new category of resinous product, highly resistant to both aliphatic and aromatic hydrocarbons. Gas-meter diaphragms possessing high flexibility and low resilience have been fabricated from several materials of this novel class by suitable formulation and application to cloth. Such diaphragms have been given laboratory and field tests with satisfactory results; they are now being developed on a semicommercial scale. The utility of this class of resin in other fields is also being investigated.



A step in compounding Buna S in a rubber mill

Industrial Hygiene Foundation in Wartime

Battle lines in today's wars advance and retreat with production. The protection of industrial workers, who are forging the weapons, therefore becomes a supreme necessity, riveting attention on their health as never before in history. And rightly so, for increasing production tends to increase health hazards in industry. Unless successful remedies are swiftly applied, approximately 1,000,000,000 man-hours will be lost through illness in this critical year when production means protection. Public recognition of this fact is perhaps indicated by the more than 140 bills relating to occupational diseases introduced in state legislatures and in Congress during 1941.

Industrial Hygiene Foundation, a combined research and service association for health protection in industry, which maintains its headquarters at Mellon Institute, has continually warned of this urgency, which now becomes self-evident. Accordingly the foundation has been progressively active during the past year, both in its medical and engineering research on industrial health and in its services to affiliated companies. In fact the expansion of industrial health and its own growing work in this field caused the organization to change its name during the past year from Air Hygiene Foundation to Industrial Hygiene Foundation.

Medical Research. L. U. Gardner, director of the Saranac Laboratory, after

studying the effects of arc-welding fumes on susceptibility to tuberculosis, has reported as follows:

As an example of an exposure to a pulmonary irritant that has had no significant effects upon superimposed tuberculous infection, there will be cited an experiment dealing with exposure to arc-welding fumes. This was undertaken because of the increasing number of men being exposed to such fumes throughout industry. The program was carried out under a grant from the Industrial Hygiene Foundation.

The results thus far observed constitute evidence for the view that severe inflammation of the lungs does not necessarily influence the course of a tuberculous infection. They also indicate that exposure to even excessive concentrations of arc-welding fumes is unlikely to have a bad effect upon either fresh or old tuberculous foci (area) in a worker's lungs.

Research has been pursued under Eliot Clark and D. E. Haagensen, at the University of Pennsylvania, on the reactions of living tissues to silica granules as observed microscopically in the rabbit's ear chamber. There follows a summary of the findings.

The study has been extended to include the effect of a more massive dose of silica and also the effect of a second dose superimposed on the single one used in earlier observations. With silica of particle size 1 to 3 microns from material provided by L. U. Gardner a very massive dose was forced into the tissue in a chamber which had been previously subjected to a moderate dose. The chamber was then observed for 10 months. The results did not differ materially from those obtained from the smaller single doses. No definite silicotic nodules were formed.

The outstanding reaction was the phagocytosis (engulfing) of the silica particles by macrophages (wandering cells), which remained visible, with their enclosed silica, throughout the period of observation, and which showed a definite tendency to group together. Some of the macrophages merged to form giant cells which, after days or weeks, disintegrated without causing any noticeable reaction. Evidence has accumulated which suggests that in regions where many silica-laden macrophages are grouped, there is more ready reaction to mild inflammatory irritants than elsewhere. The general conclusion from all these studies is that the presence in the tissues of large amounts of fine silica does not of itself lead to the formation of silicotic nodules, but that it may produce a condition which may form the basis for an exaggerated reaction to mild inflammatory irritants.

Another foundation-supported research at the University of Pennsylvania has dealt with an evaluation of the various x-ray films for use in physical examinations in industry. This investigation, directed by E. P. Pendergrass, assisted by S. R. Warren, Jr., and D. E. Haagensen, and which will be published in full in the foundation's medical series, is given in abstract here.



Research on plastic disks for water meters

Single 14- by 17-inch roentgenograms on film and on paper and stereoscopic 4- by 5-inch and 35-mm. photographs of the fluorescent screen image were made during the summer of 1941 by Haagensen of patients chosen by Pendergrass. The subjects included a few patients whose chests were normal and many others whose chest films provided difficult diagnostic problems. After the films had been produced they were shown by Haagensen to 31 roentgenologists in Philadelphia, Washington, New York, and Cincinnati. Preliminary analyses show that those roentgenologists believe that the order of merit for survey work of the four methods is: (1) 14- by 17-inch films; (2) 14- by 17-inch paper; (3) stereoscopic 4- by 5-inch photographs of the fluorescent screen image; (4) stereoscopic 35-mm. photographs of the fluorescent screen image.

Engineering Research. Philip Drinker, of Harvard University, chairman of the foundation's preventive engineering committee, has told about foundation-sustained studies on welding.

The welding investigation at the Harvard School of Public Health has been completed and the results published. The minutes of the 1940 meeting of the foundation outlined the studies. In the final paper, however, practical details in regard to ventilation were given very fully. It will be recalled that the fellowship incumbent was B. D. Tebbens. At the request of the division of labor standards of the Federal Department of Labor, A. G. Cranch and Drinker cooperated with the government in preparing a brief illustrated pamphlet entitled "Control of Welding Hazards in Defense Industries", Special Bulletin No. 5. Without the help of the work done by Tebbens, this publication could not have contained the information needed in practice.

An item which has been of considerable aid in solving this welding problem is the table of recommended exhaust ventilation rates as follows:

Steel Electrodes (In.)	Exhaust Ventilation Rate in Cu. Ft. per Min. per Welder
5/32	250
3/16	400
1/4	700
5/16	1,200
3/8	1,500
Alloy electrodes (fluoride-coated):	
5/32 inch or less	250
Galvanized plate:	
5/32 inch	1,000-1,500

Another engineering study, in progress at the University of Pennsylvania, on the evaluation of present exhaust ventilation for the control of industrial health hazards, is being conducted by R. H. Walpole, Jr., under the supervision of T. F. Hatch.

Two important situations stand out with respect to the present procedures in designing systems of exhaust ventilation: (1) the design is almost entirely empirical; (2) the performance of systems so designed has not been extensively correlated with the degree of control which is produced. There is need for collection and tabulation of design data, the use of which will provide for more exact control of dusts, fumes, vapors, and gases * * * Recognizing the importance of the variable factors involved and the reliance which must be placed upon previous experience, it seems proper to inquire to what extent empirical data, based upon experience, can be translated into more basic data which will have more general application. One may also investigate the possibilities of reducing power consumption without sacrificing efficiency of control.

Dust and other contaminants are dispersed into the air by definite forces. The function of an exhaust hood is to establish counterforces which will prevent the escape of the contaminant. In a basic engineering approach to the design

of exhaust hoods, the forces of dispersion must be recognized and evaluated and related to hood performance. The major objective of the investigation is to establish such relationships. It is recognized, however, that many problems cannot be solved in this way and, also, that only a few of all the processes requiring ventilation can be studied. A general revision of design procedures and the complete elimination of empirical data are not anticipated. The development of a method of research will, in itself, be of value. Recent literature on exhaust ventilation has been collected and a bibliography, arranged by industry or process, is available in the proceedings of the foundation's sixth annual meeting.

An Audit of Sick Absences. W. M. Gafafer, senior statistician, U. S. Public Health Service, has set forth a brief account of the foundation's study of sick absenteeism in industry, a project started early in 1941.

In 1940 a number of member companies of the foundation, recognizing the extraordinary part played in the industrial economy by nonoccupational sickness and injuries, expressed interest in a study of sick absenteeism in cooperation with the foundation, the American Association of Industrial Physicians and Surgeons, and the U. S. Public Health Service. This action culminated in the periodic reporting to the foundation by 13 companies of pertinent data on sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer. It is purposed to present here some of the material yielded by the 6 months' period, January to June 1941. (Several other companies plan to participate, but have been delayed by emergency conditions.) Of the 13 participating companies, 8 reported throughout the 6 months, while 5 reported from 2 to 5 months.

The 8 companies, represented by an average monthly number of 42,884 male and 1,656 female employees, yielded 1,899 and 99 beginning absences, respectively, or an average annual male frequency of 89.3 cases per 1,000 and a female frequency of 120.6 cases per 1,000. The male frequency rate is about 80 per cent of the Public Health service rates, the difference reflecting principally the respiratory group of diseases. With regard to days lost, 7 of the 8 companies supplying data on the closing of nonended cases showed a loss of 51,126 days among the males. Company rates varied from 1.69 to 3.39 days per male per year, the latter rate approximating the median rate of 3.33 days experienced by companies reporting to the Public Health Service for 1935–37. It may be safely assumed that the rates as given do not present an overstatement of the sick absenteeism situation as measured in terms of 8 days or longer absences. (One company's rate was well above the average for the others and three times higher than one. An analysis showed that two thirds of this company's large total rate was caused by respiratory diseases. Hence the study reveals the main cause of the absences and this fact enables the company to take intelligent corrective steps.)

Industry is now well aware that sick absenteeism is one of the most serious bottlenecks in the production program. This report gives an indication of the magnitude of the problem in a sample of member companies of the foundation. With respect to the large numbers of new employees, night work, and overtime with its attendant fatigue, sufficient evidence has accumulated which points to an expected substantial increase in the frequency of sick absences.

In considering economic losses involved in sick absenteeism, Andrew Fletcher, vice president and treasurer, St. Joseph Lead Co., has submitted data for his firm, the largest miner of lead ores and one of the outstanding zinc producers in the United States. It has been found that only about 6 per cent of the company's absenteeism results from accidents at work, which Fletcher explains as follows:

Even though the time lost through accidents is only about 6 per cent of the total absenteeism, we cannot estimate the total absenteeism loss by multiplying the accident percentage by some fixed amount, because all operating men know that even under normal conditions there will be sickness and that therefore extra men are carried on the payroll to ensure reasonably normal operations. The direct loss of absenteeism is the amount of wages paid these extra men—just as the direct loss of accidents is the compensation and medical cost. It may therefore be reasonably assumed that in our operations possibly 2 per cent extra men are being carried; with a force of 5,000 men, there are possibly 100 extra men whose annual earnings would approximate $180,000. This figure may be considered as the "direct" loss. The "indirect" absenteeism losses are probably as great as for accidents, especially because a man works efficiently up to the time of an accident, whereas, in the case of sickness, a full day's work is probably not done before an employee is forced to lay off or just after he returns. Assuming the indirect cost of three times the direct, the sick and miscellaneous absenteeism in our operations might approximate $540,000, which with the direct loss makes a total of $720,000. It must be appreciated, however, that, no matter what precautions are taken, there will be some sickness and miscellaneous absenteeism, possibly 50 per cent. Therefore the amount that can reasonably be expected to be saved is $360,000, or about $70 per employee in a force of 5,000. If, therefore, you wish to approximate the absenteeism loss in the United States, or in your own plant, multiply the number of workers by $70 per year.

A rough approximation of the production loss can be determined on the following basis: each worker in the United States loses about 8 days per year—if we can save 50 per cent or 4 days, we save 32 hours per worker; with about 7,000,000 persons in defense industries, we would save about 200,000,000 hours of labor, which is sufficient to build 100 destroyers, or about 300 standard cargo ships.

A Study of Fatigue. R. R. Sayers, director, U. S. Bureau of Mines, and a member of the foundation's medical committee, has prepared for the organization a report on "Findings from Major Studies of Fatigue". This comprehensive analysis, especially timely in the face of labor problems, may be issued as a special bulletin in the medical series. It concludes with 38 points, some of which are:

Data on fatigue and health show the connection between fatigue and loss of working efficiency and increased accident occurrence, but there is little actual medical proof that long, fatiguing periods of work permanently affect efficiency, health, or working capacity.

Causes of fatigue may be physical or psychological. Apparently psychological and environmental factors are far more important causes of fatigue than physiological factors.

Physical manifestations of fatigue include ill health, accident proneness, and inefficiency at work.

Accidents in industries of the United States cause a loss of approximately 1,500,000,000 man-hours of production each year. If the statement is true that illness causes 15 to 20 times as many cases of absenteeism and about 7 times as much loss of time from work as accidents, the seriousness of the health problem in industry is apparent. As ill health is associated frequently with accidents, a health program in industry would seem at least as important as the safety program that has been stressed so strongly in recent years.

Chemical changes in muscle during contraction come from certain substances that depress or inhibit the power of contraction. These fatigue substances consist of the known products of muscular metabolism.

The rate of oxygen consumption of the body during exercise varies almost directly with the amount of external work performed. A man's maximum working power is determined not only by the functional capacity of his skeletal muscles but also by the supply of oxygen to the muscles, heart, and brain. The supply of oxygen is the limiting factor. The total oxygen consumption during exercise is roughly proportionate to the mass of active muscles.

Increase in employment in the defense industries of the United States may mean an increase in industrial accidents and illness, as untrained workers are more prone to suffer accidents and occupational diseases than are the trained. During 1940, with an increase of 2 or 3 per cent in total employment, there was an increase in deaths from occupational accidents of 10 per cent, although in some industries the rate was the same or even reduced somewhat.

The question "What is the optimum number of hours of work?" has not been answered satisfactorily.

The influence of fatigue on efficiency may be judged by the effect of rest pauses on the output of workers. In some instances production was 10 per cent greater during the month when workers were made to stop work for four 10-minute periods during the working day.

A solution of the problems of providing enough man power for industrial and military purposes has been suggested by an experiment in South Africa in physical training of unemployed boys and young men between the ages of 16 and 21 who were in a low state of physical fitness and unable to find employment. The results of this experiment led to the recommendation by the investigators that physical training be compulsory and that in the future clearly defined standards of physical efficiency similar to the intellectual standards be required.

Legal Developments. T. C. Waters, general counsel, discussing the question of compensation for tuberculosis as an industrial disease, has said:

Tuberculosis is not an occupational dis-

ease within the legal definitions of that term that have been incorporated into our statutes and announced by judicial decision. There should be no qualification of this conclusion except as to those cases where tuberculosis is superimposed upon a traumatic injury or other compensable disease or in cases where nurses or attendants of tubercular patients contract the disease. In view of the fact that in certain instances tuberculosis has been held to be compensable, either as an occupational disease or as an accidental injury, and the further fact that employers may be faced with common law litigation involving claims for tuberculosis injuries, it may be well for industry to give cautious consideration to the possible compensation of such injuries as if tuberculosis were a compensable occupational disease. Legislation providing compensation for tuberculosis will probably present more perplexing problems than that for any of the diseases now considered occupational and, if such legislation is to be enacted, it should be surrounded by certain safeguards.

J. D. Dorsett, Association of Casualty and Surety Executives, also a member of the foundation's legal committee, has considered various bills introduced in the legislatures and in congress during the past year.

It is gratifying to see that the trend, as far as actual enactments are concerned, seems to be toward well-considered legislation. Including the law recently enacted in Utah, there are now 25 states and the District of Columbia in which compensation is granted for occupational diseases in some form. Of these we find that 14 first enacted legislation on this subject since 1935. Enactment of similar laws in the remaining states is to be expected, probably in the near future It also seems likely that some states already having such laws will revise them in the light of added experience. In some cases, particularly among the earlier laws, sufficient knowledge was lacking to permit the enactment of a well-rounded program of occupational disease compensation. Today, it is felt, mistakes of the past can and should be avoided. Organizations such as the Industrial Hygiene Foundation, in broadening our knowledge in this field, are doing a great deal in accomplishing this end. Under proper laws, industry is less likely to be saddled with claims for which it should not be responsible; at the same time, the workman receives compensation for disabilities attributable to the hazards of his employment. But, even more important than compensation, attention is directed to prevention.

Interesting Features of the Foundation's Sixth Annual Meeting. D. W. Crombie and J. L. Blaisdell, of the Queen Alexandra Sanitorium, London, Ontario, reviewed their work on "Aluminum Powder as a Possible Preventive in Silicosis" at the sixth annual meeting at Mellon Institute, November 12 and 13, 1941. The foundation has had no direct part but is much interested in this investigation. A. J. Lanza, chairman of the medical committee, led a group of foundation representatives and other specialists who visited the Canadian scientists last summer to gain a first-hand acquaintance with the research. In relating their experimental work at the foundation's meeting, Crombie and Blaisdell said in part:

A preliminary report is made of the results obtained to date in the treatment of 14 cases of human silicosis by inhalation of metallic aluminum dust over periods varying up to about one year. Of these 14 cases, the two having received the least amount of treatment remain unchanged; two others perhaps show slight improvement, while 10 would appear to have derived some definite benefit from this form of therapy.

Particular emphasis must be directed to the fact that the original investigators, Denny, Robson, and Irwin, proposed the use of metallic aluminum dust only as a possible means of preventing silicosis in conjunction with the usual methods of dust control. Our own investigation thus far has been concerned entirely with the possible curative or alleviating action of aluminum. In thus treating cases of already-established silicosis, some of which are of long duration, we have put aluminum dust to a critical and severe test. Even if further investigation should show that permanent benefit may not result from aluminum treatment in already well-established cases, the potential value of aluminum as a preventive will not be thus discredited. We feel, however, that the results so far obtained are definitely encouraging and would suggest that a certain number of silicotics are benefited by aluminum treatment.

Although further investigation may fully substantiate our present feeling that aluminum may benefit silicotic subjects or conceivably arrest the further development of the disease, it will not restore fibrous replacement of lung structure which, as far as we know, is an irreversible transformation. The chief value of aluminum will be in the prevention rather than in the alleviation of silicosis. At present a most conservative attitude toward this work must be adopted. The widespread application of aluminum inhalation in industry is as yet unwarranted; it may be advised and undertaken only as the result of further and more conclusive observations.



Workman, preparing to sandblast magnesium castings, is protected from dangerous dust by an air-supplied helmet. The operation is confined to a tight chamber which segregates the dust from other workers.

C. E. Ralston, safety director, Pittsburgh Plate Glass Co., and chairman of the membership committee, reported that more than a dozen companies affiliated with the foundation during the past year, bringing the total membership to approximately 240 companies. In addition, a score of state and federal agencies are subscribing to foundation publications, including the monthly *Industrial Hygiene Digest*, which condenses world-literature on industrial health.

H. B. Meller, managing director, announced that in attempting to fulfill its function—keeping health precautions in step with production—the foundation is performing more and more field work for members. More than 20 such surveys were made during the year in chemical, metal, glass, refractories, and related factories scattered through seven states. Three member companies utilize the survey service on a year-round basis.

Audits of sick absences and industrial hygiene surveys are practical procedures of the first magnitude for industrial concerns today and tomorrow in conserving America's man power and in utilizing satisfactorily their personnel in manufacturing military and other matériel.

The Institute's Department of Research in Pure Chemistry

Investigations in Chemotherapy. Studies on the chemistry and chemotherapy of modified cinchona alkaloids and related synthetics have been continued by L. H. Cretcher, the department head, and his staff and their medical associates.

In the experience to date there has been found no beneficial action of quinine which cannot be accomplished equally well by hydroxyethylapocupreine, a drug which is greatly superior to quinine in pneumonia, in infections of the eye and throat, and in certain asthmatic conditions. The reports of Hegner (1941) on its effective use against bird malaria are most relevant. The drug was tested on three species of malaria parasites in three species of hosts. It has also been employed successfully in human malaria (W. W. G. Maclachlan and associates). Experimental clinical studies on malaria are being made at present in the tropics, and the results are awaited with interest. Much time has been devoted to research on the process for the production of this drug that its yield from quinine shall be the highest possible with consequent lowering of cost. The findings have been gratifying.

A general study has been made of the process of hydroxyethylation of phenolic compounds. Two new reagents have been

developed, one of which is especially effectual in the alkylation of phenols containing tertiary nitrogen atoms. Further attention to sulfonic acid derivatives of the alkaloids has led to the discovery of an interesting relationship between chemical configuration and the susceptibility of the various cinchona compounds to sulfonation.

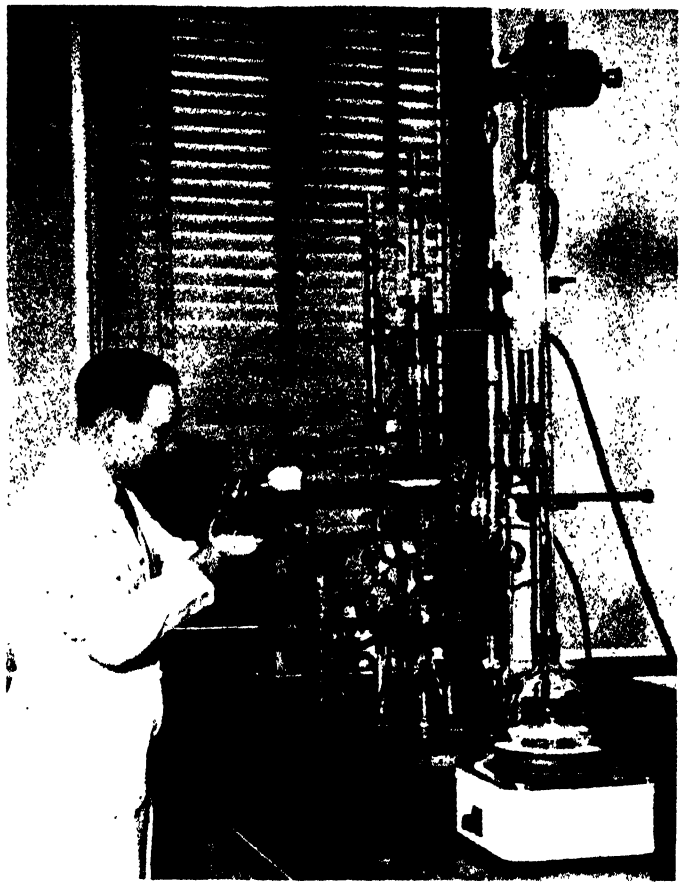
Within the past several years there has occurred a growing recognition of the social and economic importance of better control of the millions of malarial cases throughout the world. Added thereto is the significant military consideration of maintaining the health of troops occupying malaria-infested regions. In line with attempts to prepare better antimalarials, a continued study of the literature has been conducted with the view of summarizing knowledge of the relationship between chemical structure and antimalarial activity (W. W. Carlson).

Researches on sulfur-containing cinchona alkaloids have been carried forward. A series of ethers of 6'-(beta-thiolethyl) apocupreine has been prepared and tested biologically, and the results are embodied in a published paper. All the members of the group prepared exhibit bacteriostatic power against the pneumococcus, but none is superior to hydroxyethylapocupreine. The study has led, however, to an interesting observation which may act as a guide in future investigation, because the ultimate object of these chemotherapeutic researches may be regarded as the elucidation of definite methods whereby the toxicity of a type structure may be diminished while retaining or enhancing its bacteriostatic power.

It has been found that increasing the length of the aliphatic side chain at position 6' gives a graded increase in solubility in certain organic solvents and is accompanied by a corresponding progressive increase in bacteriostatic activity and toxicity to mice.

Ethylapocupreine and beta-chloroethylapocupreine have been shown to be equally toxic and to possess practically identical bacteriostatic power both *in vitro* and *in vivo*, the introduction of the chlorine being practically without effect. Substitution, however, of the hydroxyl group for the chlorine profoundly reduces the toxicity without greatly diminishing the bactericidal power. The effect of substitutions, such as by iodine and various other elements and radicals, is being studied (R. S. Tipson).

A paper describing the preparation and properties, both chemical and biological, of quaternary salts of cinchona alkaloids has come out (Mary Clapp and Alice Renfrew). The compounds are not of practical value. Reactions of 10-iodo- and 10-bromohydroquinine are under investigation (Renfrew and Clapp). The study of 6'-apocinchonidine derivatives has been continued (Carlson and Renfrew).



Extraction and desiccation of beta-chloroethylapocupreine

Because of the possible difficulty in obtaining adequate supplies of cinchona alkaloids, investigations are under way aimed at the production of simpler heterocyclic compounds which can be made from easily available materials. It is hoped that therapeutically active compounds can be prepared by the application of knowledge of the structural and biological relationships obtaining in the cinchona field (Renfrew).

Close collaboration with the clinical and bacteriological groups has been maintained through the year, and a number of new chemicals have been investigated. Further clinical studies on hydroxyethylapocupreine have been performed; they will be described later, supplementing a statistical inquiry which began in 1935.

Studies for the United States Pharmacopoeia, 12th Revision. Final action of the medical members of the Committee of Revision on the Admission of New Synthetic Organic Chemicals having been delayed until well into 1941, the past few months have been devoted largely to the evaluation of different assay procedures for these drugs (G. D. Beal and Elinor Sackter). For instance, agreement has been reached on a rapid and accurate diazo titration for standardizing certain official aromatic compounds containing a primary amino group. And it has been necessary to choose by experiment among several methods for the determination of organically combined mercury in the presence of such purine derivatives as theophylline. In the analysis of the mercurial diuretics it has been found that either wet combustion with sulfuric and nitric acids followed by titration with a thiocyanate or gravimetric determination of the sulfide precipitated directly from a solution of the drug is simple and accurate.

The introduction into the Pharmacopoeia of a large number of solutions for parenteral administration, which must be packaged sterilely in small containers, the majority of which hold unit doses, has compelled the recognition of procedures for the quick determination of chemical durability. With the collaboration of leading members of the Glass Division of the American Ceramic Society and of the Joint Contact Committee of the American Drug Manufacturers' Association and the American Pharmaceutical Manufacturers' Association, a selection has been made of chemical methods of analysis that will ensure the choice of containers of excellent quality from the standpoint of solubility. A series of long-range experiments is being planned to ascertain the individual glass requirements of pharmaceutical solutions. The same principles are being applied to the selection of containers for chemicals that are known or thought to be sensitive to light.

Research at The Western Pennsylvania Hospital

Chemotherapeutic and bacteriologic studies in the Institute of Pathology of The Western Pennsylvania Hospital by R. R. Mellon and his staff have been concerned largely with the elucidation of the effects of the sulfonamides on the tissues of the host and on the infecting agents in the tissues. These projects are subsidized by Mellon Institute as recommended by C. B. Schildecker.

Demonstrated local action of sulfanilamide in clean wounds and of sulfathiazole in local infections supported the theory

that these compounds stimulated and detoxified the tissues. Accordingly tissue culture and tissue respiration experiments have been conducted to obtain verification or denial of this explanation. Briefly it has been found that sulfathiazole, in contrast to sulfanilamide, brings about an increased uptake of oxygen on the part of certain tissues. Sulfanilamide itself has been shown to effect initial restriction of growth, but subsequent and marked differentiation and specialization of tissue cells, which are prominent factors in wound healing. Experiments to extend the knowledge of possible unfavorable clinical consequences of sulfonamide therapy have been continued and detailed reports of the incidence of certain pathologic sequelae have been published. Many compounds have been investigated, resulting in a more rational method of ascertaining the efficacy of drugs used in treating meningitis and in a more precise method for determining the concentration of the sulfanilamide-type of drugs in body fluids.

A new sulfhydryl preparation (Hydrosulphosol) has been found to have value in the treatment of burns. Its ability to stimulate rapid healing of burns and to discourage infection was demonstrated in 150 cases in which it was the treatment of choice. This compound, like the sulfonamides, not only prevents multiplication of bacteria, but also stimulates the antibacterial functions of the tissues themselves.

The fundamental bacteriological research for the year has embraced studies of active and passive immunization in mice by vaccines and serums derived from selected phase-variants. An investigation on the bacteriology of subacute bacterial endocarditis was carried through, with observations on the dissociative behavior of the isolated green streptococci and their resistance to the sulfonamides.

Studies have been continued on natural resistance and the common cold and on the role of certain enzymes involved in the metabolism of oxygen and carbon dioxide. The objective of the latter investigation is to learn something of the possible relation of these enzymes to the underlying metabolic disturbances associated with arthritis. A number of cases of arthritis have been successfully treated during the year.

Industrial Fellowships in Operation at Mellon Institute during the Fiscal Year March 1, 1941, to March 1, 1942

Fellowship Name (with inception year)	Fellows and Assistants
Abrasives (1930)	A. P. Thompson
Acid Recovery (1938)	W. W. Hodge, advisory fellow R. D. Hoak, senior fellow L. L. Friend
Air Pollution Control (1928)	H. B. Meller
Amine (1937)	R. V. Rice H. J. Spoor, from May 8
Anthracite Industries (1937)	H. J. Rose, senior fellow R. C. Johnson Miriam Griffith, assistant W. J. Lace, assistant, from Sept. 30 W. V. Hunt, assistant, from June 9 to Sept. 15 James Bateman, assistant, to June 10
Bone Products (1935)	E. P. Barrett, senior fellow J. R. West R. A. Finkle, assistant, from June 16
Bread (1930)	H. A. Kohman
Calcite Technology (1941)	W. J. Remington, from August 1 Conrad Trost, assistant, from Sept. 1
Carbon Black (1927)	W. J. Remington, to August 1
Ceramic Chemicals (1933)	E. E. Marbaker
Chain and Welding (1936)	D. F. Helm
Chemical Hygiene (1937)	H. F. Smyth, Jr., senior fellow C. P. Carpenter C. B. Shaffer, from June 23 Jane Seaton, assistant Louise Leslie, assistant R. T. Scherer, assistant Diana Dibblee, assistant Matthew Marshall, assistant, from June 9
Cigaret Technology (1932)	C. F. Bailey, senior fellow A. W. Petre
Coke-Plant Construction Materials (1941)	C. F. Pogacar
Commodity Standards (1931)	Jules Labarthe, Jr., senior fellow A. F. Tesi M. S. Morgan E. M. Cohn, assistant
Concrete (1930)	D. R. MacPherson R. S. Powell, assistant, to June 15
Constructional Resins (1939)	P. K. Porter Joseph Miller, assistant
Cork (1937)	E. G. King, senior fellow H. E. Weaver, from October 27 E. R. Frederick, assistant, from December 29 G. H. Eadie, assistant, to November 13
Cotton Foundation (1937)	R. F. Nickerson, senior fellow D. M. Musser J. A. Habrle, assistant, from July 22 J. N. Pattison, assistant, from January 6
Cottonseed Products (1930)	A. W. Harvey, to August 1
Dielectrics (1937)	R. N. Wensel H. J. Homer, assistant
Enamels (1925)	D. G. Bennett
Ethanol (1938)	H. W. Coles W. E. Tournay, assistant, to January 10
Felt (1939)	R. R. Fulton, senior fellow K. H. Slagle, from February 1 W. G. Gapcynski, assistant, to January 1
Food Varieties (1921)	E. R. Harding, senior fellow Helen Wigman L. L. Lachat G. E. Helz, from January 1 W. C. Bell, assistant J. K. Brocklehurst, assistant Daphne Land, assistant, from February 1
Foundry Practice (1940)	W. A. Pennington
Fur (1941)	A. W. Harvey, from August 1
Garment (1929)	T. H. Swan H. C. Donaldson, to January 1
Gartex (1939)	K. J. Miller, to February 15 T. R. Trevorrow, assistant
Gas By-Products (1940)	W. H. Hill, advisory fellow J. H. F. Veltman R. H. Hartigan Jane Moon, assistant, from April 1 T. E. Robbins, assistant, from June 16 Mary Joyce, assistant, from June 16 Dorothy Kibler, assistant, from January 1 R. E. Powers, assistant, to July 15
Gas Purification (1939)	J. A. Shaw, senior fellow G. E. C. Wear, from July 1 R. S. Detrick, assistant
Gypsum (1938)	H. F. Simpson J. R. McKlveen, assistant
Insecticides (1917)	O. F. Hedenburg
Insulation and Roofing (1916)	R. H. Heilman, senior fellow R. W. Ortmiller
Industrial Hygiene (1935)	H. B. Meller, senior fellow J. F. McMahon F. S. Mallette
Iodine (1939)	C. P. Keim, from February 28 H. A. Nelson, assistant F. F. Johnson, to January 1
Lead (1936)	F. J. Williams, advisory fellow J. W. Jordan, from July 28
Leather Reclamation (1941)	G. A. Harrington B. J. Haley, assistant, from January 29
Lignin (1941)	L. T. Sandborn
Lock-Nut Technology (1941)	J. A. Sauer W. G. McBurney, Jr., assistant, from October 20
Meat Merchandising (1935)	J. F. McCarthy Margaret Yarlett, from July 15 Jeanne Bernhard, assistant, from October 27 M. D. Coulter, to November 1 B. H. Gilmore, from July 15 to November 1 Elizabeth MacDonald, assistant, from July 1 to November 27
Metalworking (1939)	H. L. Anthony, III E. G. Duden, assistant
Meter (1938)	R. L. Wakeman D. L. Worf, assistant, from September 15 S. H. Fuller, assistant, to August 26
Mineral Products (1936)	G. J. Bair
Nacre (1940)	R. N. Palmer
Naphthalene Chemistry (1941)	E. E. Stahly
Natural Gas (1915)	R. W. Miller, senior fellow F. R. Holden
New Plastics (1933)	L. M. Hobbs, senior fellow, from February 1 W. I. Weaver R. D. Bright, from September 15 to February 1 J. K. Simons, senior fellow, to December 1
Nitrogen Compounds (1933)	P. J. Wilson, Jr., senior fellow J. H. Wells
Oil Cleaner (1939)	G. O. Ebrey
Organic Synthesis (1914)	E. W. Reid, senior fellow (on leave) D. C. Lewis, executive aid H. R. Fife H. D. Cogan R. G. Ruark (on leave) H. G. Goodman, Jr. Helen Wassell C. P. McClelland A. L. Wilson J. M. Russ, Jr. C. I. Spessard B. G. Wilkes R. W. Quarles R. W. Beattie E. C. Martin, assistant T. K. Maher, assistant

Fellowship Name (with inception year)	Fellows and Assistants
Organic Synthesis (continued)	Richard Shiffler, assistant
	R. T. Hull, assistant
	Frank Snyder, assistant
	T. H. Kiefer, assistant
	W. C. Jones, assistant
	R. A. Calsibet, assistant
	H. L. Harwell, assistant, from June 16
	C. D. Helm, assistant, from July 1
	R. F. Holden, assistant, from July 1
	J. R. Hulten, assistant, from July 1
	A. B. Steele, assistant, from July 1
	J. Yoder, assistant, from July 1
	F. A. Rideout, assistant, from July 1
	W. H. Millett, assistant, from July 14
	W. E. Rixon, assistant, from September 1
	S. H. Quigley, assistant, from January 1
	D. M. Clarke, assistant, to February 1
	D. H. Merry, assistant, to February 1
	R. J. Ewing, assistant, to January 9
	J. B. Harlow, assistant, from July 1 to January 1
	T. F. Grady, assistant, from July 1 to January 1
	J. K. Marshall, assistant, from July 1 to January 1
	N. F. Vandervoort, assistant, from August 4 to November 17
	F. T. Fiedorek, assistant, from June 16 to September 15
	De France Clarke, Jr., assistant, to September 1
	J. H. Drexler, III, assistant, to September 1
	Hugh Rowland, assistant, to July 1
	J. F. Luther, assistant, to July 1
	B. M. Stites, assistant, to June 21
	R. G. Metz, assistant, to June 1
	W. C. Nelson, assistant, to June 1
	L. E. Whitmore, assistant, to June 1
	A. K. Myers, assistant, to May 1
Packaging (1941)	M. D. Coulter
Paper (1928)	P. B. Davidson
Pasteurization (1936)	W. D. Claus
	E. R. Bowser, assistant
	R. M. Tomarelli, assistant, to September 1
Petrolatum (1940)	W. S. McClenahan
	Charles Steenbergen, assistant, from June 1
	P. E. Newman, assistant, to May 1
Petroleum Refining (1911)	W. A. Gruse, senior fellow
	D. R. Stevens, executive associate
	W. P. Ridenour
	John Metschl
	J. R. Bowman
	C. J. Livingstone
	W. E. Hanson
	J. E. Nickels
	J. B. McKinley
	C. L. Wolfe, assistant
	J. W. Butcher, assistant
	R. I. Wilson, assistant, from April 1
	P. E. Stewart, assistant, from July 7
	R. S. Stewart, assistant, from September 9
	Margaret Magee, assistant, from January 1
	R. T. Steinback, assistant, from January 1
	S. P. Kapff, assistant, to November 1
	W. J. Rusnack, assistant, to November 1
	Gustave Sill, assistant, to August 1
Phenol Chemistry (1941)	H. L. Stewart, senior fellow
	F. A. Schwerts
Pine Chemicals (1942)	G. B. Feild, from February 1
Plastic Metals (1929)	R. C. Buehl
	E. S. Byron
	W. E. Walker, assistant
	J. L. Young, senior fellow, to November 1
Plate Glass (1936)	F. W. Adams, senior fellow
	Lee Devol
	H. R. Letner
	P. W. French
	D. W. Rinehart, from August 4
	E. M. Reilley, assistant
	E. I. Crowley, assistant, from June 1
	R. S. Powell, assistant, from June 15
	H. F. Sutter, assistant, from June 23
	Eleanor Hill, assistant, from July 1
	B. H. Vine, assistant, from July 7
	P. H. Dewey, to October 18
	H. W. Guenther, to September 15
	Marion Maclean, to June 1
	C. A. Bishop, to June 1
	P. W. Crist, to May 17
	H. O. Farr, to May 1
	J. D. Jenkins, to April 1
	Turrell Fleman, to April 1
	J. B. McCandless, assistant, from June 17 to September 15
	J. K. Brinker, assistant to June 1
Powder Metallurgy Techniques (1941)	D. F. Helm, advisory fellow
	J. L. Young, from November 1
	A. E. Broady, to November 6
Pressing Machinery (1928)	Edgar Clark
Printing (1938)	M. W. Weiss
	J. A. Habrle, assistant, to July 5
Protected Metals (1918)	J. H. Young, senior fellow
	P. W. Jenkins
	D. S. Hubbell
	H. J. Read
	F. G. Singleton, from May 1
Protective Coatings (1935)	G. H. Young, senior fellow
	W. K. Schneider
	G. W. Seagren
	G. W. Gerhardt
	Betty Colgan, assistant, from September 1
	J. G. Howard, assistant, from June 1 to September 1
Raolin (1936)	J. W. Raynolds
Rayon (1933)	R. O. Denyes, senior fellow
	G. E. Alter, Jr.
	R. J. Reitz, from June 1
	L. F. Stutzman, from July 1
	W. B. Miller, to June 1
	B. B. Allen, to May 1
Refractories (1917)	S. M. Phelps, senior fellow
	E. B. Read
	R. W. Limes
	J. P. Maloney, assistant
	O. J. Whittemore, assistant, from November 1
	T. L. Hurst, to September 20
	G. K. Dumbauld, assistant, to February 1
Rubber (1938)	R. C. Briant
	F. C. Weissert, assistant, from August 11
	R. W. Planck, to July 14
	E. P. Shumaker, Jr., assistant, from April 1 to June 27
Safety Fuse (1930)	D. E. Pearsall
	E. P. Shumaker, Jr., assistant, to April 1
Shaving (1932)	E. J. Casselman
	G. H. Freyvogel, Jr., assistant
Silicate (1917)	L. C. Hewitt
Silk (1939)	R. F. Stuewer
Soybean (1935)	N. J. Beaber
	J. R. Crouthers, assistant, from December 1
	C. F. Goldthwait, to July 7
Special Dyes (1938)	G. B. Feild, to February 1
	F. C. Alexander, assistant, to September 15
Special Plastics (1938)	H. C. Engel, from December 9
	J. W. Estep, assistant
	W. L. Rast, to February 5
Steel (1927)	S. A. Braley, senior fellow
	Daniel Neuman
	J. R. Anderson, assistant, from April 1
Sterilamp (1939)	B. H. Gilmore, to July 15
	Margaret Yarlett, assistant, to July 15
Sugar Chemistry (1941)	G. E. Barker
	R. C. Backus, assistant, from March 17
	C. E. McKnight, assistant, from June 23
Sulfur (1931)	M. G. Mayberry, senior fellow
	H. E. Westlake
	E. J. Kendra, assistant, from June 9
	Winton Brown, to October 15
	W. E. Glausser, assistant, to June 14
Surgical Supplies (1936)	W. L. Nelson
	E. P. Hazlett, assistant
Suture (1940)	E. M. Shelton, senior fellow
	W. L. Thompson
Tape Technology (1941)	R. W. Planck
	F. S. Evans, assistant, from September 17
Tar Constituents (1941)	Wojciech Swietoslawski, senior fellow
	H. R. McGraw
Tar Distillation (1939)	W. L. Glowacki
	R. E. Muder, assistant
Tar Properties (1937)	W. F. Fair, Jr., senior fellow
	H. R. Beck
	R. H. Calderwood
Tar Synthetics (1939)	B. B. Corson, senior fellow
	Robert Johnson
	W. M. Kuts
	L. J. Brady
	G. A. Webb, from July 16
	J. A. Hinckley, from July 21
	M. J. Cerveny, assistant
	C. U. Rogers, assistant
	D. F. Ailes, assistant
	R. J. Spotz, assistant, from April 1
	G. S. Black, assistant, from May 28
	C. S. Brooks, assistant, from October 7
	H. J. Korp, assistant, from October 13
	J. E. Gleeson, assistant, from October 13
	N. P. Greco, assistant, from January 5
	J. W. Benedict, assistant, from January 12
	Elizabeth Howe, assistant, from January 12
	Mary Wilson, assistant, from January 15
	Betty Zehner, assistant, from February 9
	Monica Williams, assistant, from February 16
Tar Treatment (1939)	C. F. Winans, senior fellow
	T. H. Insinger, Jr.
	J. L. Keller, assistant
	C. G. Bragg, assistant, from July 1
	R. H. Nimmo, assistant, from December 1
	W. H. Beamer, assistant, from June 16 to October 1
Technical Glassware (1931)	R. R. McGregor, senior fellow
	E. L. Warrick
	J. T. Goodwin, assistant, from April 14
	Mary Miller, assistant, from February 4
	E. R. Mease, to April 13
Textile Finishing (1934)	R. R. Ackley
	Martha Kursdorfer, assistant, from January 19
	J. T. Seawell, assistant, from June 15 to January 1
Thread (1935)	T. A. Wilson, senior fellow
	E. R. McLean
Tube (1938)	D. F. Menard
	Mary Wilson, assistant, from August 25 to January 15
Watch Technology (1938)	R. H. Lester, senior fellow
	M. C. Cannon, from December 15
	J. B. Sutherland, assistant, from November 13
Wheat (1937)	R. J. Sumner, from October 1
	W. S. Claus, to November 1
	H. E. Bumsted, assistant, to November 1
Yeast (1935)	J. J. Enright, senior fellow
	H. E. Foote
	H. W. Wilker, assistant
	Pauline Hopfer, assistant

Flett to Receive Schoellkopf Gold Medal

To Lawrence H. Flett the Western New York Section of the American Chemical Society will award its Jacob F. Schoellkopf Gold Medal for 1942 during the May 18 meeting of the section at the University of Buffalo. Mr. Flett, a chemist with the National Aniline Division of Allied Chemical & Dye Corp., was chosen as recipient for research on detergents of the higher alkylarylsulfonate type and their application. The award committee also took into consideration his extensive work in dyestuffs and intermediates. One of Mr. Flett's more recent contributions to the pharmaceutical field has been development of an antiseptic for fungus diseases. The medal rewards accomplishment constituting a major advance in science and embodying the spirit of research in industry.

Swift & Co. Fellowship in Nutrition

The University of Wisconsin has received from Swift & Co. a grant for the year 1942 to be used to carry on a study of the significance in normal nutrition of the newer members of the vitamin B complex, especially biotin and the norite eluate factor from liver. This work will be under the direction of E. B. Hart and C. A. Elvehjem of the Department of Biochemistry. Dr. Elvehjem's outstanding discovery of nicotinic acid and its relation to black tongue in dogs and pellagra in human beings have been of great benefit in nutritional research. Dr. Elvehjem received his Ph.D. degree from the University of Wisconsin, where he is now professor of biochemistry. Professor Hart, who studied at the Universities of Michigan, Marburg, and Heidelberg, has been professor of biochemistry at the University of Wisconsin since 1906 and is one of the deans of the modern school of biochemistry.

Warner Co. Makes Research Grants

William R. Warner & Co., Inc., New York, N. Y., has established a two-year fellowship for postgraduate study in the Department of Radiology at the Long Island Medical School, Brooklyn, N. Y., and made the following grants:

To New York University Medical School for 1942, for the study of the conjugation of the sulfonamide drugs. This study will be carried out in the Pneumonia Service of the Harlem Hospital.

To Northwestern University Medical School, Chicago, Ill., for 1942, for the study of toxic factors as observed in the Department of Dermatology. This study will investigate the possibilities of detoxifying therapeutic agents used in the practice of dermatology.

To Washingtonian Hospital, Boston, Mass., for the study of alcoholism. This study will involve the blood chemistry and psychometric findings of cases while under the influence of alcohol and during recovery.

John Wilson has been promoted to the position of production superintendent of the Jessop Steel Co., Washington, Penna.

Severance Pay Fund for Employees

The United States Senate Finance Committee on March 14 was asked to revise the federal tax laws governing corporations to permit the setting up of funds to be used as severance pay for workmen who, at the end of war production activities, will find themselves out of work.

In a letter to United States Senator Bennett Champ Clark, Edgar M. Queeny, president of Monsanto Chemical Co., pointed out that his company would like to establish such a reserve, particularly for the employees of four large new plants which the company will operate for the Government. But, he said, under present tax laws money set aside by stockholders to give severance pay to dislocated employees would be penalized to the extent of 72 per cent, with even higher penalties in prospect.

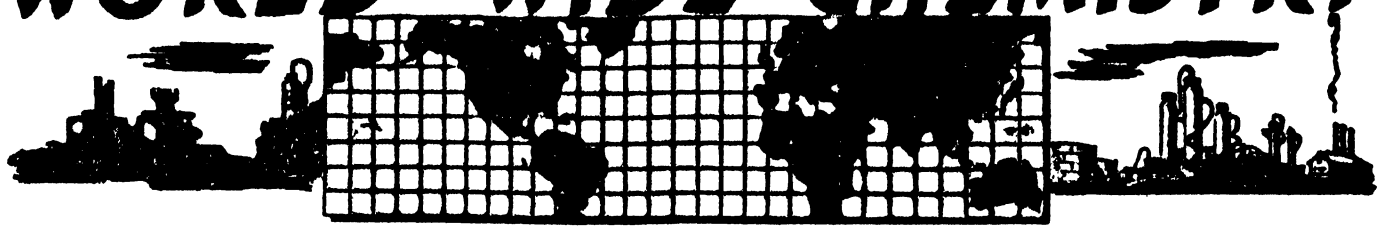
He suggested that if the tax laws were revised to permit setting up reserves of severance pay funds that such funds could be deposited irrevocably with a trust company, which would act as a third party to see that the money could not be used for any purpose other than severance pay.

Mr. Queeny cited that Monsanto has had a severance wage payment policy for many years so that "when a job is discontinued by reason of process or market change and a man cannot be placed elsewhere or when a man by temperament or other reason becomes unsuited to his job" he can be provided severance pay to help tide him over during the time he is seeking to relocate.



Student Affiliates of the American Chemical Society at Western State College of Colorado, sponsored by R. Schuhmann

WORLD-WIDE CHEMISTRY



Continental Europe

I. G. Farbenindustrie Raises Capital to 900,000,000 Marks

A capital increase to 900,000,000 marks has been announced by I. G. Farbenindustrie A.-G., the German dyes and chemical trust. The capital had been raised to 760,000,000 marks, plus 40,000,000 marks preference shares, during the war and only part of the new shares has so far been issued. An amount of 12,750,000 marks has been handed over to three French dyestuffs producers in payment of the four plants which these companies have sold to the Francolor, the new dyestuffs combine in which I. G. Farbenindustrie is interested. These shares, valued at 160 per cent of the nominal, would be equivalent to a cash payment of 20,400,000 marks. This apparently is about half the estimated value of the French dyestuffs industry, for I. G. Farbenindustrie received 51 per cent of the shares of the Francolor company against payment of 12,750,000 marks of its own shares to the French founders. Its only other contribution was the transfer of certain French dyestuffs patents.

The remaining new shares of I. G. Farbenindustrie have been used for financial purposes, it was announced. In this connection they were valued at 130 per cent of the nominal, so that a substantial profit remained for the buyer of these shares. I. G. Farbenindustrie has played a prominent part in the conversion to German ownership of industrial undertakings in various German-occupied countries, in particular in Poland, Yugoslavia, France, and Belgium, and lately it was reported that the company was interested in new chemical enterprises in Norway.

Nazi National Organization on Chemical Fibers Formed

A new organization called Reichsvereinigung Chemische Fasern has been formed in Germany as a central authority with far-reaching powers for planning production and imports, direction of sales and distribution, fixing and controlling prices of all kinds of synthetic fibers, including rayon, staple fiber, cellwool, and fibers of the type of PeCe and Perlon, the two synthetic I. G. Farbenindustrie products. Several other German firms, experimenting with production of similar synthetic fibers from organic raw materials, are said to have reached a stage where commercial developments can be expected soon. The new Reichsvereinigung will cooperate closely with other continental countries where cellwool and staple fiber factories are being built on German lines The organization is to assist in the exchange of knowledge and experience among individual producers who will have to accept a wide measure of control and official direction.

German Potash Sales Approach Figures for 1940, a Low Year

According to official reports, potash sales by the German syndicate in 1941 approached but did not quite reach the 1940 figures. The year 1940, however, was a bad year for German potash exports. Exports suffered severely from loss of overseas markets owing to the blockade, while sales in Holland and Belgium were seriously hit by military operations and the consequent disorganization of trade. It was hoped that in 1941 an improvement would result from the drive for increased food production and fertilizer consumption in Southeastern Europe and a resumption of larger shipments to the Low Countries, but apparently these hopes have not materialized. Transportation difficulties are known to hold up the delivery of many bulk commodities.

Magnesite Industry in Austria Reports Progress

Austrian magnesite deposits are one of the principal raw materials for metallic magnesium production. During the past year a joint company of Deutsche Magnesit A.-G. and I. G. Farbenindustrie A.-G., called Studiengesellschaft für Metallgewinnung G. m. b. H., has conducted research on production and treatment of magnesium metal. Another recently formed research company, Maerz Ofenbau, Planung, Beratung G. m. b. H., will investigate the use of refractory materials. Magnesite deposits owned by the Oesterreichische Magnesit A.-G. are being worked by Deutsche Magnesit A.-G., which is closely connected with the older company.

Germany Develops Standard Practice for Protection of Magnesium by Paints

Protection of magnesium and magnesium alloys by suitable paints has been studied extensively in Germany, and the standard method evolved is based on the use of zinc chromate as a grounding material. Before this is applied, the surface is prepared by immersion in a solution of either nitric acid and sodium dichromate or hydrofluoric acid (15 to 20 per cent) for 5 minutes, followed by immersion for 45 minutes in 10 per cent sodium or potassium dichromate. Aluminum paints are considered the best finishing paints, especially if small amounts of synthetic resins are added to improve water resistance. A suitable binder for the top coats is phenol resin lacquer with 1 part of linseed oil and 3 parts of tung oil.

Propane Replaces Town Gas in Increasing Amounts in Germany

Propane, produced in increasing quantities as a by-product of synthetic processes in Germany, is being used for lighting and other purposes in place of town gas, particularly in rural districts where town gas cannot be supplied. The gas, which liquefies at −42.2° C. or at higher temperatures under pressure, is transported in steel containers supplying 290 cubic feet of propane gas equivalent in caloric values to 1,625 cubic feet of town gas.

Substitutes for Lubricating Oils from Petroleum Offered

For lubricating machinery and parts exposed to the weather several substitutes are used to replace peacetime lubricating oils from petroleum. Though the alternative materials cannot compare in lubricating properties with the normally used product, they are claimed to have proved passably satisfactory. Residual oils from lignite carbonization are a red to reddish-brown material, translucent, solvent in benzene, free of water and creosote, with a specific gravity above 1.0 (at 20° C.).

EDITOR'S NOTE. Those interested in further details should address the correspondent whose name and address appear for each country, and enclose sufficient international coupons to prepay the reply. United States stamps should not be sent.

Their flash point is 175° C. and they solidify at −70° C. Tar fat oils, obtained by distillation from anthracene and other heavy coal-tar oils or from coal-tar itself, are reddish-brown to brown-black and have a specific gravity of 1.1, flash point of 120° C., and solidifying point between −5° and −15° C. They are said to be superior to lignite lubricants. Coal lubricating oils usually contain large amounts of phenolic substances and are, therefore, less suitable. Their flash point varies between 120° and 200° C. All these oils are characterized by high acid and sulfur contents and cannot be used unless changed at frequent intervals.

A lubricant material is also obtained from shale oil by repeated distillation and treatment with sulfuric acid. The intermediate product, green oil, is cooled, pressed, and filtered. It yields after removal of the paraffin the blue oil which is viscous, has a flash point of 160° to 170° C., and solidifies between −10° and −15° C. Finally, use is being made of residual oils from refineries. If these are distilled further, they yield a material with a specific gravity of 1.0 to 1.2, flash point 140° C., solidifying point for summer oil 0° C. and for winter oil 10° to 12° C. Their properties can be improved by mixture with normal lubricating oils and addition of animal oils.

Large-Scale Carbonization May Yield More Motor Fuels

Large-scale plans have been developed in Germany for production of motor spirit, marine fuel oils, and paraffin from lignite carbonization tar. It is said that preparations for systematic development on a greatly increased scale have been made for coal carbonization, and it is hoped that accumulations of residual tar in hydrogenation plants can be used for carbonization. A recent process permits the use of residual tar in conjunction with surface-active culm-coke, and this tar-coke mixture can be easily carbonized with circulation gases.

Germans Use Acrylic Acid Esters for Finishing Textiles

German textile manufacturers, forced by shortage of imported materials to look around for substitutes for finishing, have hit on acrylic acid esters. These esters are transparent, without color or odor, resistant to alkalies, do not absorb more than 2 per cent water, and can be applied in aqueous dispersions or in solutions with organic solvents. They are recommended for use on cellwool fabrics, for stiffening cuffs and collars, as a binder for pigments in textile printing, and for waterproofing brightly colored canvas. It is said materials treated with acrylic acid esters can be washed with water, soap, and soda.

Brewers' Yeast Used for Special Purposes

Waste yeast from breweries, of which some 50,000 tons are produced in Germany, was little used before the war, except for feeding animals. Two years ago experiments were begun on production of a high-grade yeast food for children and invalids. It was hoped then that eventually several big factories would be built in various parts of Germany, but these plans were postponed because construction materials and labor were needed for other purposes. Waste yeast is now used for another but "also very important" purpose which is not specified and in the manufacture of beef extracts.

Swiss Chemical Companies Concentrate on Home Market

Increasing difficulties in export markets have compelled Swiss chemical manufacturers to concentrate on development of the home market, where larger sales are already reported. The coal-tar dyes industry has suffered from shortage of raw materials imported from Germany and France, and efforts are still continued to develop a local raw material basis. Gasworks provide coal tar, and an intermediates production of larger dimensions is a goal. Shortage of raw materials is also reported by manufacturers of copper, chromium, and potash compounds. Pharmaceutical manufacturers send the bulk of their exports to countries on the European Continent. In some isolated cases exporters have used aviation to send high-class products to overseas customers.

Oil Production Program to Be Extended in France

The Société de Combustibles et Carburants Nationaux, formed in March last year with a capital of 20,000,000 francs, has now raised it to 50,000,000 francs. At the same time it was announced that production of synthetic fuel from shale and lignite, originally scheduled to reach 50 tons a day, will be raised to 100 tons a day. An agreement has been concluded between Pechelbronn and the new Société Nationale de Pétroles d'Aquitaine for a regional division of territories in which oil prospecting is to be carried on. D'Aquitaine will concentrate on the region of Lavelanet where the first drilling operations have already been undertaken, while Pechelbronn will work in the district of Languedoc where oil was found in 1925.

Potash to Be Mined in Southern France

As France has lost the potash mines of Alsace, the Compagnie des Mines de Potasse et de Magnesite has begun development work in southwestern France where potash deposits are said to exist. A shaft has been sunk at Boudigot near Landes.

Alsatian Chemical Company Goes under German Control

Société Anonyme pour l'Industrie Chimique, the Alsatian company which produces pharmaceuticals and cosmetics and specializes in synthetic dyestuffs for the Alsatian textile mills, has changed its name to Chemische Werke Dornach G. m. b. H. The company was closely connected with the Kuhlmann interests. It is now under German control, and its capital has been fixed at 2,000,000 marks.

Belgian Chemical Industries Form Central Organization

A central organization of all chemical industries has been formed in Belgium. All firms have been divided into 10 groups according to their sphere of activity, and these 10 will play an important part in the provision and allocation of raw materials which individual firms find difficult to obtain. The central organization will help in the supply of raw materials for chemical products required for the domestic market and cooperate in the development of export markets. In the future the bulk of the export trade will be directed to central Europe, even after the war. The organization is to further cooperation with German chemical manufacturers, many of whom have already acquired financial interests in Belgian firms, but it is difficult to see how this aim can be achieved in present circumstances. The Belgian chemical industry is based largely on two raw material sources, domestic collieries and coke-oven plants which provide tar, ammonia, and benzene and the copper and zinc smelters which supplied sulfuric acid, paint materials, and fertilizers as long as ores and concentrates were imported from overseas. This raw material source has been cut down, while the Belgian coal mines suffer from increased costs. Nevertheless, great efforts have been made under auspices of the German authorities to increase the output of tar and benzene.

Plant to Produce Pepsin Constructed in Denmark

A factory for production of pepsin, lecithin, cholesterol, etc., is being built at Norresundby by the Cooperative Association of Butchers in northern Jutland. It is expected that the new factory will be in operation during the summer. It will use offals from the bigger butchers' yards.

Wartime Change Continues in Norwegian Chemical Industry

Probably no other country used to sell abroad so large a part of its chemical production as did Norway in peacetime. When the country was cut off from its normal markets by the German invasion, many plants found it extremely difficult to adapt themselves to new conditions. Norsk Hydro has been looking for new productions to make use of surplus electric power which before the war was applied to the output of electrochemicals and fertilizers. While these efforts do not yet seem to have led to tangible results, it is reported that Norwegian manufacturers of coal-tar products have been able to expand their output and to commence production of new chemical articles. Crude pyridine, for instance, used to be imported but is now made in Norway. Similarly carbolic acid is manufactured on an increased scale, while coal-tar pitch and distilled tar are used for the production of roofing materials. Road tar is made in larger quantities, and one firm, Nordiske Destillasionsverker, has carried out experiments for the replacement of asphalt by pine pitch. Imports of crude tar have stopped. All requirements must now be met by local gasworks. Fresh outlets are investigated for ammonia, of which there is a surplus, but it seems to be difficult to discover remunerative uses for the material.

New Swedish Company to Manufacture Cellwool

Cellul A. B., the Swedish company which was formed recently to manufacture cellwool, intends to produce 7,500 tons a year. Its factory will be situated near Aelvenäs, 30 miles west of Carlstad, where there are suitable raw material sources. It is reported that the plant will use 8,000 tons of cellulose, 13,500 tons of sulfuric acid and 20,000 tons of sodium hydroxide.

Swedish Manufacturer Expands Chemical Output

Import difficulties have stimulated chemical manufacture in Sweden. A. B. Bofors, one of the largest producers, intends to begin production of aniline and aniline salt. Manufacture of aniline dyestuffs is not intended as economic conditions do not favor such a plan. Extensive experiments have been carried out with toluene products, but the supply of toluene from gasworks would, it is said, have to be augmented by supplies from other sources to make possible commercial production of toluene derivatives. Another new product of the company is nitrobenzene for explosives, soap, cosmetics, and aniline derivatives. Acetanilide is manufactured for medicinal use. Anhydro-*o*-sulfaminebenzoic acid, chloroamine, *o*- and *p*-toluenesulfonic acid are other organic chemicals which A. B. Bofors has recently started making.

Changes in Swedish Sulfuric Acid, Superphosphate Output

Loss of the usual raw material sources has inconvenienced Swedish producers of sulfuric acid and superphosphates, but increased use of domestic raw materials will enable the industry to cover the country's demands. Requirements of sulfuric acid increased last year as a result of larger consumption for the manufacture of cellwool, in wood hydrolysis, and for production of cellulose sulfate, but the output is also reported to have risen. Superphosphate consumption has been curtailed. About 160,000 tons will be required, and these are to be produced from apatite slick supplied by the Swedish iron ore mines. This raw material is preferred to the phosphorite deposits at Närke.

Swedish Interest in Synthetic Rubber Gains

The Industrial Commission has recommended the grant of 25,000 kroner by the government for experiments on synthetic rubber production. Experiments of this kind have been conducted for some time at the Svendberg Institute in Uppsala and various private firms, including Fotfatbolaget, Mo & Domsjö A. B., and Asea, have supported the work financially. According to the report of the Industrial Commission, a product of the type of chlorobutadiene appears to be most promising. Negotiations for the purchase of foreign licenses have been begun.

Shale Oil Production in Sweden Increasing

The Svenska Olje A. B. expects to have two ovens for the production of shale oil in operation at Kvarntop in March. Another two are to be opened in June. The total production of shale oil will be 30,000 tons a year, and the sulfur output will not be much smaller since the oil shale contains as much as 5.7 per cent of sulfur.

New Wood Products Plants Built in Finland

The Aänekoski company has erected a sulfite alcohol factory which is expected to supply 1,700,000 liters of 95 per cent alcohol yearly. The new plant is situated near the company's existing sulfite cellulose plant. Oy Meriyal has formed a subsidiary, Tervanjalostus, which is to build a wood-tar products factory, and plastics of the phenol-formaldehyde type are to be made at Korsholm near Vasa by Bakeliittituote Oy.

Polish Staple Fiber Firm Increases Capital

Zellgarn A. G., Lodz, the Polish producer of synthetic fibers, has increased its capital from 500,000 to 8,500,000 marks. The company, which is affiliated with the Thuringian cellwool company, is to use processes developed in the works at Schwarza (Thuringia, Germany) for the production of synthetic fibers, but it will specialize in threads for use in agriculture and also produce casein wool. Its main product, however, will be cellwool for which a ready outlet is assured in the Polish textile industry, now suffering from extreme scarcity of raw material.

Polish Nitrogen Factory at Moscice in Full Operation

According to German press reports, the damage done to the nitrogen plant at Moscice has been repaired after short delay, and the plant is in full operation. Output is claimed to be higher than it was under Polish management. The works at Moscice produce various chemical fertilizers, ammonia, calcium nitrate, nitrophosphates, calcium carbide, ammonium nitrate, nitric acid, and calcium chloride. The special value from the German point of view is that the works are the most easterly of all big chemical plants in central Europe and favorably situated for supplies to the eastern front

Drug Manufacturer Established in Slovakia

The Slovakian Alkaloid Chemical Factory will produce over 3,000 pounds of pharmaceuticals in a new plant at Freistadt. The bulk of the production will consist of preparations from poppies. Later other drugs will be included in the manufacturing program. The factory will cover all of the local demand and have at least half its output available for exports.

Rumania Plans Output of Synthetic Rubber

I. G. Farbenindustrie and a Rumanian rubber manufacturing company are negotiating for the formation of a new enterprise to produce synthetic rubber from natural gas. It is intended to erect a plant with a capacity of 3,000 tons annually of the Buna material.

Rumanian Oil Production Declines under German Control

Provisional figures for the Rumanian petroleum industry, based on official data for January to October and estimates for November and December, indicate that crude oil production continued to decline in 1941 from 5,750,000 to 5,250,000 metric tons. Exports declined from 3,500,000 to 3,100,000 tons, although Germany absorbed virtually the whole refinery output of gasoline and also took 80 to 90 per cent of the kerosene and gas oil production. Drilling activity was maintained near the 1940 figure of 785,000 feet, largely owing to use of equipment transferred to Rumania from other German-occupied territories, but the Kontinentale Oel-G. m. b. H., joint undertaking of German oil producers, has so far failed to increase the output. Restrictions were placed in December on motor traffic, domestic oil heating, and use of residual fuel oil by the Rumanian railways. These measures may help increase the surplus for exports.

Rationalization Necessitated in Hungary by Territorial Gains

The Hungaria company of Budapest has increased its capital from 6,020,000 to 10,600,000 pengö for the merger with Phoenix, Metallochemica, and Zorka, three chemical companies which have had their works in Hungary since the annexation of Rumanian and Yugoslavian border zones by this country. Hungaria, controlled by Verein für chemische und metallurgische Produktion of Prague (now under German regulation), is also entering into close cooperation with the mining company of Nagybanva and has formed a joint sales company. Marketing problems are largely responsible for the merger with the other three companies, for the total production of sulfuric acid, paints, and fertilizers of the three exceeds the absorptive capacity of Hungary and it is intended to concentrate production in the cheapest works.

Expansion of Fertilizer Markets in Southeastern Europe Pushed

German producers of potassic and nitrogenous fertilizers have made systematic efforts to develop in neighboring countries and in the Balkan territories a market for supplies formerly sent overseas. Last autumn Slovakia doubled the consumption of chemical fertilizers from 1940, but still is far below the level of more progressive agricultural countries. To increase sales of German-produced fertilizers in Rumania, the association of agricultural syndicates in that country has received a loan of 100,000,000 lei. In Bulgaria fertilizer imports are in the hands of the Ministry of Agriculture which has embarked on a big propaganda campaign in favor of increased use.

Italy Attempts to Recover Copper from Vitriol Spray

According to Italian press reports, experiments have been carried out for the recovery of copper from vine leaves sprayed with copper sulfate. The leaves are burned and leave traces of copper among the ashes. It is said that 8 kg. of copper have been recovered from one hectare of vineyards, i. e., 5 pounds per acre.

Search for Domestic Raw Materials Intensified in Italy

Several companies engaged in the search for domestic raw and fuel materials have recently increased their capital. The S. A. Carburanti Combustibili Autarchici has been formed to investigate local fuel materials. The S. A. Aciende Ricerche Minerali Autarchici has raised its capital 50 per cent. The recently formed Societa Metanifera Italiana will search for natural gas. The National Railway Co. has taken out concessions to look for natural gas and vapors containing boracic acid in the provinces of Pisa, Grosseto, and Siena. The Vetrocoke company intends to utilize lignite deposits in the Mercure basin for the production of ammonia and ammonium sulfate.

Synthetic Rubber Output Reported from Italy

According to Axis sources, the first of two contemplated factories for the manufacture of synthetic rubber in Italy is now in operation, and construction on the other plant is proceeding. Earlier it was reported that one Italian firm was to use the I. G. Farbenindustrie process for Buna rubber, while another firm intended to make use of an Italian method for manufacture of another type of synthetic rubber.

As for raw materials, Italy has sources of natural gas which may be used. Besides, Azienda Nazionale Idrogenazione Combustibili, the large semistate hydrogenation company, recently announced that a pilot plant for production of liquid butane has been completed. This material, however, is to be used mainly for aircraft engines.

Spanish Dyestuffs Plant to Be Opened This Year

S. A. Fabricacion de Anilinasy Productor Quimicos, the Spanish firm which was authorized to build a dyestuffs factory at Barcelona, will begin production late in 1942 or early in 1943, according to the agreement with the government. Payment for imported raw materials is to be made by exports of finished products.

Tanning Extracts to Be Made in Spain

A plant for the manufacture of tannic acid and tanning extracts with a capacity of 1,000 tons of acid a year is under construction at Oviedo. The chief raw material is chestnut wood. The government has promised to help the industry by grant of tax privileges.

Spain Authorizes New Chemical Industries

Among recent authorizations for new industrial establishments by the Spanish Government are factories for bromides, oxygen and hydrogen, cellwool, ships' bottom paints, ammonium carbonate, perfumery, resin oils, plastics, lactose, soap, acetone and butyl alcohol, alcohol, tanning materials, and superphosphates.

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February and March 1942



Demand for industrial chemicals in the British market is still very high, although further restrictions on civilian consumption and telescoping of industry tend to reduce requirements. The rationing of soap to four units a month, in which 3 ounces of toilet soap, 4 ounces of household soap, or 6 ounces of soap flakes constitute a unit, will curtail consumption of vegetable oils for this use one fifth, but demand for chemicals is unlikely to diminish by the same amount because of increased calls for water softeners, abrasives, etc. Price changes of industrial chemicals are few, and among fine chemicals there has been an improvement in one or two markets. Fertilizers are now absorbed by agriculture in the largest quantities on record in British history, but paint consumption is declining owing to completion of many government contracts. Business in coal-tar products is coming more and more under control, and creosote oil is disposed of in strict conformity with official instructions.

Chemical Control Board Is Supreme Authority in All Chemical Matters

The organization of control in the chemical industries has not changed radically during the past month, but as many more products come under control, coordination of work between individual

controllers becomes increasingly important. This essential part of organization is in the hands of the Chemical Control Board, under chairmanship of F. W. Bain. Although the staff of this office consists of only one senior officer, one personal assistant to the chairman, and one stenographer, it is the supreme authority in many matters affecting the chemical industries. Members of the Chemical Control Board are controllers for fertilizers, industrial ammonia, miscellaneous chemicals, molasses and industrial alcohol, plastics, and sulfuric acid. Other persons whose services may be required intermittently join meetings of the Chemical Control Board as occasion arises for the consideration of particular problems. All the chemical controllers have been associated before their appointment with the industries which they control. The system can be said to work satisfactorily.

New Factories Built and Products Manufactured

Azozol, 4-cyclohexyl-3-ethyl-1,2,4-triazole, a British equivalent of Azoman, is being made by Boots Pure Drug Co. At a new factory, Turner Bros. Asbestos Co., Ltd., is turning out asbestos cement roofing materials. The Yorkshire Dyeware and Chemical Co., Ltd., heretofore most interested in dyestuffs manufacture, will extend its activity to the founding of light metal alloy castings. Several new works have been and are being built for reclamation of used lubricating oils and rubber products. Production of reclaim rubber will be nearly doubled, if recent proposals are carried out.

Production of Nonferrous Minerals to Be Increased

A Controller of Non-Ferrous Mineral Development in the United Kingdom has been appointed to help develop mineral deposits in the British Isles. The most urgent task awaiting the new controller is expansion of tin mining in Cornwall where output during the past two years was around 1,500 tons yearly. A gain of 500 to 600 tons a year is expected as a result of increased working of the two operating mines, South Crofty and Geevor, for which more labor has been made available. Some of the Cornish tin mines which had to close down in recent years may be reopened, and waste piles at mineheads will be used. Nevertheless it is unlikely that the additional output during the next months will raise production much beyond 2,000 tons.

Two wolfram and one arsenic development have also been exploited with assistance of the Committee for Non-Ferrous Mineral Development, and it is expected that attention will be paid to lead mining in the north of England. Lead production from this source amounted to 54,700 tons in 1934. Output declined below 30,000 tons in 1937 and remained at that level because of low prices. There has been talk of a government subsidy for domestic mining operations, but nothing has been decided as yet.

Output of Nonmetallic Mines Is Stepped Up

Loss of continental supply sources and the desire to reduce imports of bulky merchandise to save shipping space are responsible for a great expansion of nonmetallic mining in the British Isles. This development is held up to some extent, however, by shortage of labor and available grinding machinery. Lime production has been increased beyond recognition under the food campaign, as agricultural lime is in great demand from farmers. England is also well placed for witherite, quartz, chalk which is found in many counties of southern England, slate from Wales and Cornwall, dolomite from the north of England, China clay from Cornwall, and kaolin from Dorsetshire.

China clay is now prepared as a substitute of talc and other fillers, but an impure grade of talc is produced in Banffshire so that the former imports from France and Italy can be partly replaced from this side. Ferric oxide and ochres, found extensively in the west of England, are getting attention for use instead of red oxide colors. For barites Britain used to rely on continental supplies for a light, pure product, but this is now partly replaced by domestic barites which have been bleached chemically. Large deposits of barites are available in Ayrshire, Devonshire, Shropshire, Derbyshire, and the north of England, but the output, though greatly increased, scarcely keeps step with the growing demand. Silica flour is used to extend the supply of barites. As for diatomite, a moderately good material is being worked in Northern Ireland and some low-grade earth in Westmorland. There are good but unworked deposits in Scotland, especially in Skye. A carbonaceous shale, called Bideford black, is also being mined.

New Control and License Regulations Are Imposed

Paraformaldehyde, metaformaldehyde, and hexamethylene tetramine must not be sold or bought without a license from the Molasses and Industrial Alcohol Control. Licenses are now needed for imports of shellac from Empire sources and for exports of asbestine, felspar, talc, barites, witherite, barium carbonate, barium sulfate, blanc fixe, inorganic fluorine compounds, vegetable adhesives, casein glue, animal and fish glue, gelatin and size, chlorinated rubber, and diphenyls.

Iron and Steel Institute Reports on Protective Coatings

Results of three years' research on the protection of iron and steel against corrosion have been announced by the Protective Coatings Sub-Committee, Iron and Steel Institute. In view of the comparatively low cost of the paint material as compared with the cost of labor for cleaning the surface and applying the paint (1 to 11 in some typical cases), the committee is critical of additions of extenders for the purpose of cheapening the paint, but additions for technical reasons, e. g., to prevent settling or to ease application, may be sound practice. Use of a red lead and graphite mixture instead of pure red lead is mentioned.

Specimens painted with one coat of red lead primer and one coat of red oxide of iron finishing paint have been found to be more efficiently protected than similar specimens painted with one coat of red iron oxide primer and one coat of white lead and zinc oxide finishing paint. Of paints with inhibitive properites, red lead is the most effective for general use. Chromate pigments—lead chromate, zinc chromate, and other sparingly soluble chromates—are not quite so good but give adequate protection in rural and marine atmospheres. They are inferior to red lead in industrial atmospheres. The relative efficiency of white lead, blue lead (basic lead sulfate), zinc dust, and zinc oxide has not been established with certainty. The best general finishing paints in quantity for use over red lead are red oxide of iron, white lead, and micaceous iron ore. As an alternative to linseed oil paints, especially during the war, tar paints are recommended. Their merit, especially in coastal and marine conditions, has been established. One coat of red lead followed after an interval of not less than one month by one coat of tar, neutralized with lime and treated with tallow, has been used with much success.

Firebricks Are Improved by Presence of Carbon Dioxide

The disintegrating action of carbon monoxide on certain firebricks at 450° C. is greatly decreased by the presence of 10 to 25 per cent of carbon dioxide, according to the Refractory Materials Joint Committee of the Gas Research Board and the British Refractories Research Association. If the carbon dioxide content is reduced to 5 per cent, disintegration is as great as, if not greater than, with pure carbon monoxide. A diatomite product, originally susceptible to disintegration by carbon monoxide at 450° C., was rendered inert by chlorination for 10 hours at

1,000° C. The resulting material was appreciably more refractory, it suffered less after contraction and deformation under load at 1,200° C. than the untreated brick, and was also found superior in this respect to a product which had received heat treatment without chlorine.

Plastics Find Use in New Recovery Plants at Gasworks

Plastics have played an important role as a construction material in new recovery plants built since the beginning of the war at gasworks and coke-oven installations. Synthetic resins, such as phenol-formaldehyde moldings or machined parts from laminated materials, castings from phenolic resins, urea resins, melamine, and synthetic rubbers, are recommended for structural application, in particular for towers for washing gases, low-temperature stills, frames for filter presses, and also small pieces of equipment. Phenolic resin impregnated asbestos in sheets or slabs which are lined into molds and heated, thus being converted into a hard and tough finished form, can be used as a protective lining for many purposes. Cast phenolic resin is utilized for pumps, density meters, ball valves, plugs for cocks, and many kinds of pipes. Synthetic resin cements are used for protection of brick-lined equipment for the recrystallization of salt solution.

Stable Coal Suspensions Are Tried Out at Leeds University

The Department of Coal Gas and Fuel Industries at Leeds University has studied the fluidity of coal tars and modification to give miscibility with petroleum oils. Blends have been prepared which remained stable for many months and were consumed in industrial furnaces without difficulty. They are capable of supporting pulverized coal in suspensions which appear to be permanently stable. Similar suspensions of coal have also been prepared in pitch-creosote mixtures. The investigation of the catalytic synthesis of methane has been pushed by development of a simple and not too expensive method for removing organic sulfur compounds, so as to attain the necessarily high degree of purity to avoid poisoning the catalyst. The work will be continued in a semiscale unit plant.

Temperature Measured by Range of Thermometric Colors

Temperature changes may be measured under difficult conditions by thermometric colors. I. C. I. (Dyestuffs), Ltd., is offering a full range permitting measurements between 80° and 320° C. Materials which change their color after 30 minutes at 80°, 140°, 150°, 160°, 170°, 190°, 240°, 270°, 300°, and 320° C. have been selected and the range is to be increased, but full accuracy cannot be guaranteed. On the other hand, it is possible to extend the range of observation if the available thermometric materials are exposed to temperatures for longer periods. The thermometric colors are sold in a liquid form and, besides the requisite pigment, contain a specially devised vehicle which ensures good adhesion.

Vitamin Tablets Issued to Industrial Workers

Issue of vitamin tablets containing a balanced compound of vitamins A, B, C, and D has been undertaken by a British firm, the North British Rubber Co., Ltd., as an experiment. As far as is known, it is the first of its kind in Great Britain, although vitamin tablets have been issued for some time to miners in Germany with, it is claimed, conspicuous success. The vitamin tablets are taken voluntarily by a large number of workers, but evidence is as yet insufficient to decide whether it has resulted in improved resistance to disease.

G. Abrahamson

150 Halfway St.
Sidcup, Kent
February 21, 1942

Antifreeze Compounds Not under War Restriction Needed in Canada

Canada offers a market for antifreeze compounds not falling within war restrictions, the U. S. Department of Commerce reports. Winter temperatures, there, except possibly on the Pacific Coast, make use of such compounds compulsory in all motor vehicles, and hitherto the need was met by Canadian manufacturers, with glycol-type compounds predominating in popularity and alcohol second. Since war demands have shut off the glycol type and quota restrictions on alcohol now stringently limit its use, a solution that can escape both restrictions is required.

Italy Plans Expansion of Nitrogenous Fertilizers

An extensive program of expansion for nitrogenous fertilizers is forecast from Italy, where the market is currently under supervision of the Italian Chemical Industries Corp., covering nitrogenous, phosphatic, and potassic fertilizers. It is believed 1941–42 domestic requirements of calcium nitrate also will be handled.

Production of Javanese citronella in October 1941 was 50 per cent below normal, although prices staged a recovery from an earlier decline.

Canada's High Chemical Exports Continue to Gain

Within the past calendar year Canada's already high exports in chemicals were further emphasized. Shipments to the United Kingdom predominated in Canada's chemical trade, with $23,761,000 of the $52,541,000 total for the first 11 months of 1941 going to that market. The United States absorbed $13,420,300 of this total, and at the same time continued its position as the principal supplier of chemicals and allied products for Canada. Total Canadian imports for the first 11 months of 1941 amounted to $60,006,100, of which $49,450,700 represented imports from the United States compared to $8,292,900 from the United Kingdom.

Indian Company Builds Plant to Relieve Textile Chemical Shortage

Large demands by the Indian textile industry and other mills for hydrochloric and sulfuric acids have led to a proposal by the Delhi Cloth and General Mills Co., Ltd., to erect a plant for production of these acids. The company is also said to be seeking to produce other chemicals required by their mills.

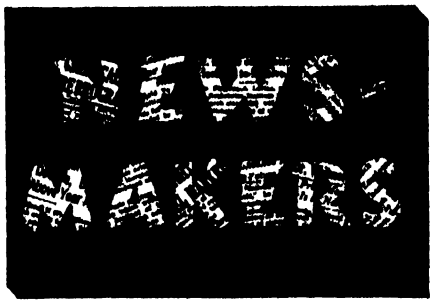
India's textile industry accounts for 90 per cent of that country's current consumption of chromium compounds, potassium dichromate, sodium dichromate, and chrome alum, the remainder being absorbed by the match industry, paint manufacturers, tanning, and medicines. Certain restrictions, operative since October 1941 on such compounds, bar use of chrome compounds in the textile industry except for goods manufactured to orders of the central government. No prohibition is placed on other industries, but handling of chrome compounds is under license.

Canada's Brewing Industry Uses $229,500 of Chemical Products

Chemical products costing $229,540 were used by Canada's brewing industry during 1940, according to official sources in that country. The list includes clarifying and filtering materials, $46,500; carbon dioxide, $70,870; lactic acid, $12,270; potassium and other salts, $21,100; anhydrous ammonia $11,600; and cleaning materials, $67,200.

Canadian Dyestuffs Committee Established

Canada has established a Dyestuffs Advisory Committee with the function of assisting in supply and distribution in the Canadian war program, according to the U. S. Department of Commerce. Among chemicals under the Controller of Chemicals there are phenol-formaldehyde resins and urea-formaldehyde resins, around which rigid restrictions have been ordered.



R. W. Aiken, formerly chief engineer with Frazier-Simplex, Inc., has been made plant engineer of the Jessop Steel Co., Washington, Penna.

L. Earle Arnow since March 1 has been director of biochemical research in the Medical Research Division of Sharp & Dohme, Inc., Glenolden, Penna. He was previously assistant professor of physiological chemistry, University of Minnesota Medical School, Minneapolis, Minn.

Allen E. Bailey, Jr., and **William D. Cockrell** have been appointed sales manager and engineer of General Electric's newly organized Electronic Control Section in the Industrial Control Division, Schenectady, N. Y. Mr. Bailey has been with G. E. since 1916; Mr. Cockrell since 1928. Both hold patents on electronic control.

Joseph S. Bates has been appointed vice president in charge of production for the General Aniline Division of the General Aniline & Film Corp., New York, N. Y. Since October Mr. Bates has been chief of the Coal Tar and Intermediate Section, Chemical Branch, War Production Board.

Tilford H. Bean has returned from Akron, Ohio, to Pittsburgh, Penna., where he will take up duties as an assistant project engineer in the Process Equipment Department, Blaw-Knox Division, Blaw-Knox Construction Co.

Murray Beebe has joined the staff of the Lea Manufacturing Co., 16 Cherry Ave., Waterbury, Conn. For many years he served in the department responsible for scientific research and development at the Scoville Manufacturing Co. of the same city.

Robert J. Bibbero is on leave of absence from the Pacific Manifolding Book Co., Inc., Emeryville, Calif., where he held the position of research engineer, and has accepted a commission as ensign in the Bureau of Ordnance, U. S. Naval Reserve. He is now stationed at the Naval Training School (Engineering), Bowdoin College, Brunswick, Maine.

Emil Ott, director of research of Hercules Powder Co., spoke on "The Chemistry of Cellulose and Cellulose Derivatives", March 20, at Western Reserve University, Cleveland, Ohio. He was the sixth speaker in a series of lectures by 12 men, each an authority in his particular field of chemistry. Dr. Ott's lecture was the concluding one in the first half of the series which was devoted to the chemistry of large molecules.

L. V. Steck has been appointed vice president of Shell Chemical Co., San Francisco, Calif., in charge of marketing. Mr. Steck is a graduate of the University of California. He engaged in chemical engineering before joining the staff of Shell Development Co. in 1930, where he specialized in market development. He was assistant director of the Shell Development laboratories until he began his new duties.

Carl D. Ulmer, who for 25 years has been associated with Koppers Co. at St. Paul, Minn., Chicago, Ill., and Pittsburgh, Penna., has returned to that organization as assistant director of research after a year's leave of absence during which he was chief of the science and technology division, the New York Public Library, New York, N. Y.



Harold Von Thaden

Harold Von Thaden, vice president of the Robins Conveying Belt Co., Passaic, N. J., recently returned from Rio de Janeiro, Brazil, where he served as a special adviser to the United States delegation to the conference.

Howard W. White has joined the research and development staff of the Bakelite Corp., Bloomfield, N. J.

J. B. Wiesel, director of sales of the Cellulose Products Department, Hercules Powder Co., has been appointed adviser to **J. B Davis,** chief of the Protective and Technical Coating Section of the WPB. Mr. Wiesel will have charge of the allocation of nitrocellulose and ethyl cellulose. He will devote half his time to the board work in Washington, and half to his work with Hercules. The company is contributing his services to the WPB.



GREYSTONE STUDIOS INC

J. B. Wiesel

Robert D. Williams has been named a research engineer on the technical staff of the Battelle Memorial Institute, Columbus, Ohio, and will assist in welding research. He was formerly a member of the faculty of the University of Illinois.

Louis E. Wise, who until lately has been a member of the staff of Rollins College, has accepted a permanent appointment at the Institute of Paper Chemistry, Appleton, Wis.

William Frederick Zimmerli has been appointed vice president in charge of research and patents of General Aniline & Film Corp. For a number of years Dr. Zimmerli was the European technical representative of E. I. du Pont de Nemours & Co., Inc., in London, and since 1939 he has been head of the development department of that company in Wilmington. His connection with the chemical industry dates back 30 years.

Smith Goes to Institute of Gas Technology

JULIAN F. SMITH is relinquishing his work as associate director of the Hooker Scientific Library, Central College, Fayette, Mo., to serve as technical librarian and editor of publications of the Institute of Gas Technology. The institute, which is affiliated with Illinois Institute of Technology, began its program of education and research in September 1941. It plans to develop a library of gas technology which will rank first in scope and in service to the gas industry.

Dr. Smith will divide his time between the Institute of Gas Technology and the Hooker Scientific Library for several months and after giving up his active work with the latter will continue to act in an advisory capacity.

POTOMAC POSTSCRIPTS

Actions of WPB

Chlorinated Solvents. General Preference Order M-41, which limits the use of chlorinated hydrocarbon solvents, has been extended to May 15, 1942. It was scheduled to expire March 31. The solvents included are carbon tetrachloride, trichloroethylene, perchloroethylene, and ethylene dichloride. They are used in charging fire extinguishers, grain fumigation, manufacture of refrigerants, processing and manufacture of food, chemicals, and petroleum.

Chlorine. The effective date of General Preference Order M-19 as amended February 25, drastically restricting use of chlorine, has been postponed from April 1 to May 1. Further study of the order has revealed a complexity of forms required in connection with certain uses out of all proportion to the amount of chlorine used in the industries involved. Changes in the order, which will permit necessary control and reduce the number of forms and reports involved, are being studied.

Chromium. Limitations on the use of chromium in chemicals are imposed in Order M-18-b. The use of chromium in the manufacture of roofing materials, ceramics, soap, and glass is prohibited. Chromium pigment is restricted to 90 per cent, by months, of the amount used in the year ended June 30, 1941. Chromic acid manufacture is restricted to 80 per cent of the base period, and chromium for leather tanning to 90 per cent. All other uses of chromium as a chemical are restricted to 100 per cent of the base period. Chromium for the preservation of wood is restricted to preference ratings of A-10 or higher. Nothing in the order restricts the metallurgical or refractory uses of chromium.

Dyestuffs. Because dyestuffs are necessary for the manufacture of military uniforms, Conservation Order M-103 curtailing civilian use of organic coloring matter has been issued. The order provides that 10 dyes, with colors ranging from orange and yellow to brown, khaki, and olive drab, be set aside entirely for war use. Civilian use of all other anthraquinone vat dyes and other derivative dyes is limited for the second quarter of 1942 to 12.5 per cent of the amount used during 1941.

No producer may export more than 8 per cent of his total dyes requiring anthraquinone or derivatives in their manufacture. He may export 3 per cent of his total production of those basic dyes set aside for war use. WPB officials expect this will make available to the Allied countries dyes for the uniforms of their armed forces.

Formaldehyde. A preference rating of B-3 to help embalmers obtain formaldehyde is granted in Amendment 6 to Order M-25. The previous rating was B-4. Amounts to be obtained by embalmers are limited, by calendar quarters, to one fourth the amount used for 1940.

Laboratory Equipment. Preference Rating Order P-62, covering material needed for production of laboratory equipment and reagent chemicals, has been extended to June 30. The order, which would have expired March 31, will probably require producers now using it to change over to the Production Requirements Plan by June 30. An amendment abolishes the report form, PD-93, which was required by the original regulations.

Oils. Use of cocoanut oil, babassu oil, palm kernel oil, and other oils with a high lauric acid content is restricted in General Preference Order M-60. Because these oils provide a high yield of glycerol, needed for war purposes, the order prohibits any use of such oils which does not produce glycerol or in which the amount of glycerol remaining in the product exceeds 1.5 per cent on an anhydrous soap basis. In April and May customary use will be permitted in each month to 50 per cent of the average monthly use in 1941. After June 1 the order goes into full effect.

Effective immediately no high lauric acid oil may be used in the manufacture of margarine, shortening, or cooking fat. No processor may saponify more than 75 per cent of his average monthly use of these oils, or fatty acids derived from these oils, for saponification in 1941.

Any person or firm that had an inventory on March 19 of more than 30,000 pounds by weight of high lauric acid oil or oil equivalent must set aside and hold, subject to the direction of the Director of Industry Operations, 25 per cent of it. Reports of such inventories must be submitted to the WPB on or before April 15 on Form PD-354. Copies of this form are available from the Washington or field offices of WPB.

Operating Supplies. Drums, containers, and other packages, and materials to be physically incorporated in them are included in "operating supplies" under terms of the preference rating order for the chemical industry, P-89, according to an official interpretation. Also included in "operating supplies", for which a preference rating of A-3 may be assigned by producers as defined in the order, are materials to be used for sealing or fastening packages.

Rapeseed Oil. To conserve the supply and direct the distribution of rapeseed oil, the Director of Industry Operations has issued General Preference Order M-77.

Rapeseed oil can be used only for the manufacture of marine engine oils, heavy machine lubricating oils, pneumatic tool oils, blown rapeseed oil, and elastic solids for compounding rubber, unless specific authorization for other uses is given.

The order contains a requirement for the setting up of 30 per cent of all inventories in excess of 50,000 pounds as a reserve. The oil will not be available in the future for either edible uses or for soap manufacture.

Rubber and Latex. To save more than 1,000 tons of crude rubber and latex a month, WPB has amended Supplementary Order M-15-b, reducing the permitted consumption of crude rubber or latex in more than 50 products and eliminating it entirely in about 20 products. Amendment 7 also transfers more than 15 products from lists which allow use of rubber up to certain percentages of a base period to lists of products for which manufacturers must have specific permission from the Rubber Branch of WPB to use rubber or latex.

The new list A of the order—that listing products for which crude may be used only up to certain percentages of the average monthly consumption for the year ended March 31, 1941—now contains 23 groups compared with the previous list of 31. List B—products for which manufacturers must have specific permission—has been increased from 10 to 27.

Steel Drums. Manufacturers of steel drums and 5-gallon kits have been requested to furnish the Containers Branch of WPB with additional information on products shipped in such containers and the end use of the products. This information, necessary for the determination of the proper preference ratings to be issued to manufacturers, is to be provided on forms which should accompany PD-1A applications for steel for the drums. The forms can be obtained from the Priority Specialist, Containers Branch, War Production Board, Social Security Building, Washington, D. C.

Price Regulations

Benzene, toluene, xylene, and solvent naphtha obtained from by-product coke ovens will continue to be sold through the second quarter of 1942 at prices prevailing during the first quarter, according

to a request from OPA to producers and sales agents. Prices in the first quarter were established following a similar request last December 15 to avert threatened price increases.

Fertilizers. In its second move to hold down costs to farmers in their all-out production of crops, OPA has imposed maximum margins which mixers and dealers may charge to farmers for sodium nitrate, ammonium sulfate, and cyanamide. These are three nitrogen materials used as fertilizers without the admixture of other chemicals. The new permanent schedule, Maximum Price Regulation 108 follows Temporary Maximum Price Regulation 1 which established, as of February 27, ceiling prices for 60 days on the retail sale of mixed fertilizers. The regulation does not affect the base price paid by the mixer.

Maximum margins for cash sales of the three fertilizers, direct or through agents to consumers, are established at $4.00 per ton; maximum margins of mixers for cash sales to dealers, $2.00 per ton; and dealers' margin on cash sales to consumers, $2.00 per ton. All transportation expenses and the cost of tax tags and attaching the tags, paid by the reseller, may be added to such margins, records of which must be kept by resellers. In the case of ammonium sulfate, the mixer's margin may be increased by $1.50 per ton when it is purchased in bulk by the mixer and resold in bags. The cost of the bags, if not included in the purchase price for the ammonium sulfate paid by the mixer, may also be added to his margin.

Maximum Price Regulation 108 does not cover sales in Washington, Oregon, California, Montana, Wyoming, Idaho, Nevada, Utah, Colorado, and Arizona. Further investigations are being carried on as to practices in these territories.

Rubber Drug Sundries. Manufacturers of rubber drug sundries, including essential hospital and medical items, have been requested not to advance prices above those in effect March 1. It was asked also that all discounts, services, quality standards, and reasonable trade practices in effect March 1 be maintained.

Purpose of the request is to keep prices from mounting pending completion of an investigation to determine proper maximum prices for rubber drug sundries.

Industrial Alcohol Program Advances

THE program of substituting grain for molasses as the base for some industrial alcohol is going forward successfully, William L. Batt, director of materials, has announced. If arrangements made thus far can be carried out during the year, a saving of the equivalent of 550,000 tons of sugar will result, he said. A recently passed bill will remove existing barriers to redistillation of 140-proof alcohol from beverage distilleries into 190-proof in the Nation's large industrial distilleries and will provide added impetus to the conversion program.

The change-over from molasses to grain has been difficult and will be carried on all during the year. In normal times the Nation's alcohol-making facilities are divided into two kinds—beverage distilleries which make whisky and other potables from corn and other grains, and industrial distilleries which make 190-proof alcohol from blackstrap molasses, a by-product of sugar manufacture. With the outbreak of war, the demand for 190-proof alcohol, used in the manufacture of smokeless powder and other munitions, increased more than 300 per cent. There was not enough blackstrap to fill the demand and high-test molasses, which would ordinarily go into sugar, had to be used in addition.

The Chemicals Branch, WPB, foresaw a possible shortage of sugar for alcohol and started last summer on a program for conversion of whisky distilleries into making 190-proof alcohol. At that time there were only a few plants in the country that could be utilized. Legal restrictions and lack of equipment barred the way.

The first step was to seek removal of legal barriers and on October 16, 1941, a bill was introduced in Congress to permit simultaneous production of industrial alcohol and beverage alcohol and also to allow these plants to operate seven days a week. This became law on January 24, 1942. WPB ordered all distilleries capable of producing 190-proof alcohol from grain to do so to the limit. While this has resulted in a great increase in grain alcohol output and has for the time being alleviated the situation, it is not a permanent solution.

The basic problem is a complex one of rejuggling existing facilities and working out transportation and storage problems, as it obviously is impossible under existing circumstances to build new plants requiring large amounts of copper, steel, and electrical equipment. Beverage distilleries generally fall into two classes and split about 50-50 as to output. The first class has facilities to produce 190-proof and these are now engaged in doing it. The others are smaller plants, larger in number but smaller in output, that are capable of producing only 120- to 140-proof and have no redistilling facilities. It is in this field that the problem of shifting equipment and facilities is complex. With passage of the new law, it will be possible to gather this low-proof alcohol and ship it to industrial distilleries for conversion into 190-proof. By 1943 this program is expected to produce double or more the amounts of industrial alcohol it will turn out this year.

Meantime engineering changes are going on at strategically located plants to increase grain alcohol facilities. Some beverage distilleries require only a small amount of equipment to produce 190-proof alcohol. These are being supplied from old and idle plants and from others which have a surplus of certain types of apparatus.

WPB Amends Maintenance Ratings for Chemical Plants

SUPPLIES necessary for the repair and maintenance of chemical processing plants are now obtained under new ratings set forth in the amended Preference Rating Order P-89 of the War Production Board. Up to the present time no company has received permission to operate under the original order because applications indicated that the order as originally issued was too broad.

The basic purpose of the order is to facilitate the acquisition, by chemical manufacturers, of sufficient operating supplies, maintenance and repair material to enable plants to continue at present rates of efficiency. It is not intended, however, to cover the acquisition of raw materials including solvents which enter into production or the product manufactured, with the single exception of catalysts. Neither does the order cover additions nor expansion of plants. Replacements are possible under the present act, however, when capital equipment is beyond repair. The privilege of high preference orders, ranging from A-1-A to A-3, does not extend to all chemical manufacturers but only to manufacturers of materials essential to the war program. In order to use the preference ratings, a manufacturer must submit to the War Production Board, in triplicate, application form PD-315, describing the type of materials manufactured. The WPB, if the application is accepted, will then issue a serial number which must be used when applying preference ratings to maintenance materials requested from a supplier.

The following preference ratings have been assigned. A-1-A to deliveries to the producer of material for repair when, and only when, there has been an actual breakdown or suspension of operations in the plant. A-1-C to deliveries to the producer of the material for repair up to the minimum required to make reasonable advance provision to avert an immediately threatened breakdown or suspension of operations in the plant. A-3 to deliveries to the producer of other materials for repair, maintenance, or operating supplies. A-3 to deliveries to a supplier of any material for repair, maintenance, or operating supplies which are to be delivered by him or by another supplier to the producer under a rating assigned or which will be used to replace in a supplier's inventory material so delivered.

Full specifications, regulations, and forms may be obtained from the War Production Board, Washington, D. C. David L. Watson is administrator of P-89.

Asbestos Industry Reaches High Point

Sales of domestic asbestos, which reached 24,391 short tons in 1941, were the highest in the history of the industry, exceeding those of 1940 by 22 per cent, according to the U. S. Bureau of Mines. Their value was 8 per cent greater than in 1940. Most of United States production is of the shorter grades of chrysotile, but long-fiber chrysotile obtained in Arizona is increasingly important. During recent years domestic production has supplied only 4 to 8 per cent of national requirements, the balance being imported. Under wartime restrictions, data on imports are available for only the first nine months of 1941, but imports for this period were unusually heavy. It is possible, therefore, that the ratio of imports to production has been approximately the same as in recent years.

Canada, as for many years, supplied most of United States imports. Canadian chrysotile, of superior quality, is a satisfactory raw material for most asbestos products. African chrysotile, imported in considerable quantity during recent years, is interchangeable with Canadian asbestos for many uses, and continuation of such imports is desirable to supplement the supply of Canadian long fiber.

Since chrysotile obtained in Rhodesia and in other African localities is very low in iron, it is preferred for manufacture of electrical tapes and other equipment designed for high electrical resistance. Canadian chrysotile contains considerable magnetic iron oxide (magnetite, Fe_3O_4) and is less suitable for the more exacting uses. Certain varieties of asbestos such as amosite and crocidolite (blue), obtainable in quantity only in Africa, are adapted to specialized uses for which Canadian fibers are less suited. Amosite can be made into insulation mattresses of exceptionally low weight per cubic foot and is well adapted for use on naval vessels. Blue asbestos is so resistant to chemical action that it is preferred for acid filters and as a constitutent of acid-resistant asbestos-cement pressure pipe. As these uses are related intimately to the military program, problems of African supplies and possible utilization of asbestos from alternate sources are under constant study.

Hershey Emphasizes Necessity for Occupational Deferments

Local boards of the Selective Service System have been asked to consider fully requests for occupational deferment of men necessary in war production, agriculture, or other essential civilian activities, in a letter to all state directors from Lewis B. Hershey, director of the system. In a large number of cases the right to appeal on occupational grounds has been overlooked, Mr. Hershey says.

To expedite final determination of occupational deferment cases and to eliminate the possibility of erroneous classification through failure to take advantage of procedural rights, a new method has been adopted. When a local board denies a request for Class II-A or Class II-B deferment in a case where there is on file an affidavit to support claim for occupational deferment, DSS Form 42A, the local board is directed no longer to send to any person who has signed Form 42A a notice of classification, DSS Form 57, but to send a notice to employer of the right to appeal, DSS Form 59.

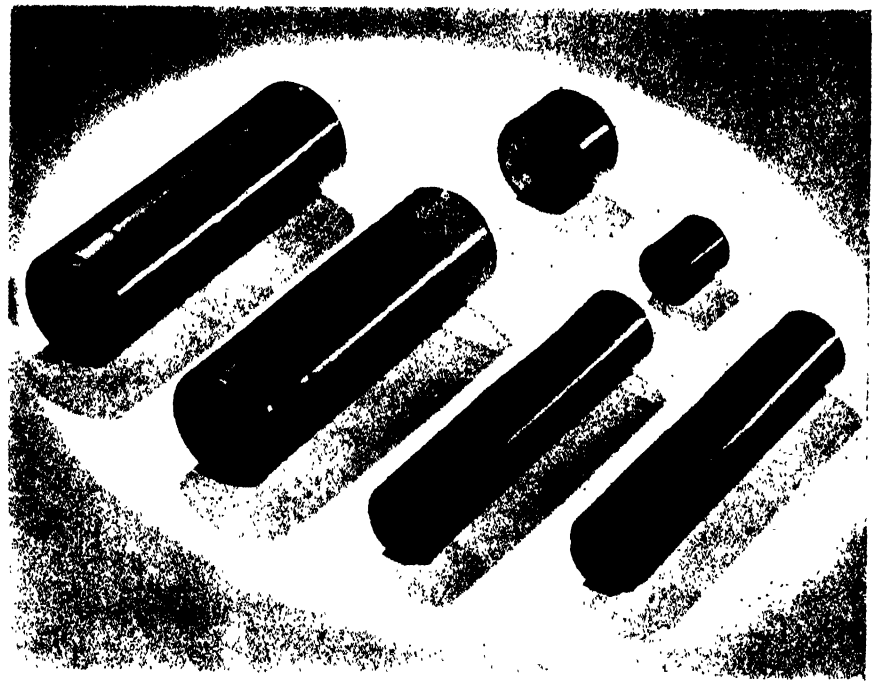
Local boards have been directed to give particular attention to cases where neither Form 42 nor 42A has been filed but in which the Selective Service Questionnaire, DSS Form 40, indicates that occupational deferment should be considered. Mr. Hershey's letter points out that efforts should be made by the local board to contact those persons likely to provide additional information or affidavits which will assist the board in determining the proper classification.

Instead of deferring from active military service reserve officers in essential occupations, the War Department is now permitting such officers to resign their commissions upon the basis of necessary occupational activity, subject to approval and acceptance by the department. In most cases these men will be immediately required to present themselves for Selective Service registation. Mr. Hershey has instructed that such claims for occupational deferment be given the same serious consideration as would claims of any other registrant engaged in a similar activity and occupation.

Felt Becomes a War Material

The use of wool felt in odd and important ways in the armament effort focuses attention on this ancient material and the ease with which various types may be manufactured to meet engineering specifications. The pictures and captions on pages 476 and 477 review the various manufacturing steps and some of the many uses.

Shortages in materials are considerably broadening the use of felt as an insulator because, as rubber, plastics, cork, and leather become scarce, felt is substituting satisfactorily in many cases. Felt lines soldiers' helmets, goes under the mounts of gun turrets in fighting planes, insulates airplane fuselages and wings, reduces vibration in army tanks, and serves in parachute landing pads, jungle pack saddles, and blackout curtains. In the automobile industry 6,000,000 pounds and 65 different types of felt are used. The success of intravenous feeding depends upon the use of a felt washer for filtering air. One of the biggest fields is in insulation for absorbing the vibration of heavy machinery.



Plastic Ammunition Rollers

On the world's fastest and most heavily armed dive bombers, ammunition is fed to machine guns over Tenite plastic rollers. Tenite, a Tennessee Eastman Corp. product, stands up under this strain of constant wear and hard blows where ordinary materials would split or shatter. Ammunition rollers are molded by Columbus Plastic Products, Inc., for Curtiss-Wright Corp., Port Columbus, Ohio. Control stick handles, instrument dials, dehydrator tubes, electric light lenses, bomber visors, and tank covers are typical of the many Tenite parts used in the aviation industry.

Reclaimed Rubber Status Discussed

THE United States faces a 1,000,000,000-pound shortage of rubber for the year 1943 and, in the opinion of P. M. Elliott, Naugatuck Chemical Co., "the reclaiming of rubber is not the answer to our problem". Occasion for Dr. Elliott's statement was the annual spring meeting of the New York Section of the Division of Rubber Chemistry of the AMERICAN CHEMICAL SOCIETY, held March 20 at the Building Trades Club in New York, and attended by more than 300.

Estimated needs of the United Nations for the year 1943 are 2,000,000,000 pounds of crude, Dr. Elliott said, and after the requirements of 1942 are met, we will have a surplus of 278,000 tons of crude with which to meet our expanded rubber needs of 1943. The Nation should import, for that year, about 135,000 tons of crude, 165,000 tons should be produced synthetically, and 1,000 tons may be had from guayule shrub. This leaves a deficit of roughly 1,000,000,000 pounds or 500,000 tons.

Rated capacity of all rubber-reclaiming plants in the United States is 360,000 tons, Dr. Elliott later revealed, but the problem is not alone in capacity. Other considerations are supply of material to the reclaimer, amount of original crude in reclaim supplies, and the type of rubber and the physical properties of the material wanted by the rubber processor.

After a brief illustrated description of the digester process, which is used by 80 per cent of all rubber reclaimers in the country, Dr. Elliott discussed the physical limitations of reclaim and the problems faced by the user of the material. The bulk of reclaimed rubber is much like regular crude in that it is vulcanizable. Users of reclaim, however, must realize that the material has somewhat different properties, and allowance must be made for these differences if the ultimate value is to be obtained. Users should select, first, the type of reclaim best suited for their purpose; selection must also be made on the basis of rubber hydrocarbon present, accelerators added must be adjusted, amount of filler added must be adjusted according to the amount already present in the rubber, and the processing qualities must be given p...

Only when these points are considered will the maximum results be obtained. The supplier is in best position to advise and supply analyses for the purchased material. Manufacturers carry stocks from which a selection for best physical properties can be made.

Many new things are being made from this rubber which a short time ago were considered impossible, said Dr. Elliott. Tennis shoes are an outstanding example, as they were formerly made of new rubber. Results now indicate that successful shoes are made with the reclaimed material.

It was also revealed that equal proportions of new crude and reclaim may be used in compounding of usual rubber objects without decrease of quality, and that, without addition of used rubber made originally from new crude, the reclaiming cycle may be carried out four or five times with good results.

The real answer of how this rubber and the industry will fit into the wartime industrial scheme rests with Washington, however, said Dr. Elliott in conclusion, as the War Production Board will determine the type of rubber to be manufactured and how much of our rubber will be used admixed with the raw crude now in our stock piles.

Dr. Mark, professor of organic chemistry at Brooklyn Polytechnic Institute, followed Dr. Elliott on the program and gave a résumé of polymerization theory.

Fertilizer Antitrust Suit Settled

THE fertilizer antitrust suit, which, with the preliminary investigation, was under way for more than three years, was terminated on March 24 in the Federal Court at Winston-Salem, N. C. Originally there were 102 defendants—two trade associations, 64 fertilizer companies, and 36 officials of the defendant corporations.

The defendants, except seven as to whom the case was nol-prossed, entered pleas of nolo contendere. Defense attorneys pointed out that defendants did not enter the pleas out of any sense of guilt but largely because of war emergency conditions and demand upon their time and energies. Judge Johnson J. Hayes commended the attorneys on both sides for reaching a solution that did not involve a long and expensive trial, and ordered that a hearing be held for taking testimony to give him information as to business operations in the industry and the issues involved in the suit. These hearings extended from March 16 to March 24, when the judgment of the Court was rendered.

The defendants who were nol-prossed are: Arkansas Fertilizer Co., F. W. Tunnell & Co., Inc., Harold F. Ayer, John F. Maybank, A. Quistgaard Petersen, E. H. Westlake, and George A. Whiting. The Court imposed no penalty upon Charles [illegible] executive secretary of the National Fertilizer Association, saying that there was no evidence to indicate any intention whatever on his part to violate the law in letter or spirit. Fines imposed on corporations range from $500 to $9,000 and on individuals from $2 to $4,000, aggregating about $255,000.

Among industry practices under attack were the exchanging of price schedules and port basing-point prices. It was pointed out to the Court that government publications show that these practices are not new in the industry but have been in existence for many years.

The settlement of the suit did not include entry of any consent decrees as to future business practices in the industry.

Occupational Questionnaire

BEFORE the end of April, many businessmen will be called upon to help the Government list the occupational skills of all men registered under the Selective Service System. This survey is to be made by the United States Employment Service in cooperation with Selective Service Boards. Questionnaires will be sent by the boards to all men between the ages of 20 and 44 who registered on February 16. This will be in two parts: one for the local Selective Service Board, and one for the United States Employment Service. Later the same questionnaire will be sent to other registrants between the ages of 18 and 64.

One purpose of this questionnaire is to obtain from each man a statement as to his occupation and skills. Accompanying the questionnaire will be a list of 225 jobs essential to war production. Every man is asked to check those in which he has had experience or training. The questionnaires must be filled out and returned to the local Selective Service Board.

That part of the form intended for the employment service will be sent to its nearest local office for examination to determine which men are already qualified or can be quickly trained for war production work. These men will then be asked to go to the office for an interview as to possible jobs.

Men with skills important to war production will be classified as follows:

1. Those who are now working in war industry and cannot be easily replaced.
2. Those who are now working in war industry but can be replaced within a reasonable time by vocational trainees or others not suited for military service.
3. Those who are not using those skills in war industry but can be shifted to a war industry job.

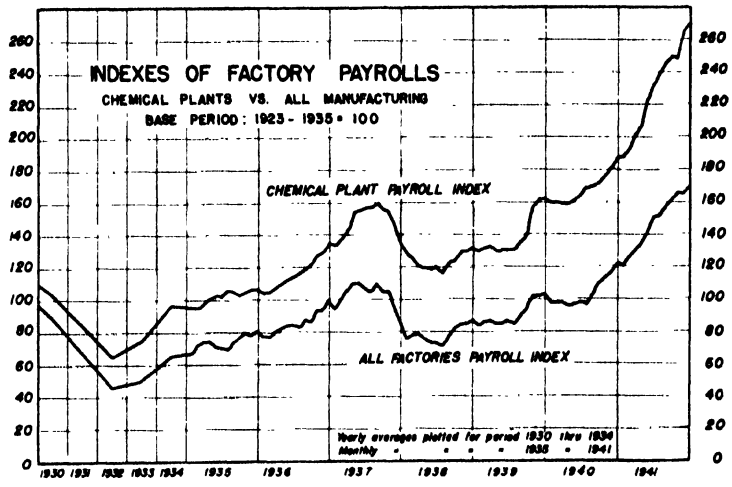
If the man who fills out the questionnaire needs help in answering any of the occupational questions, he should go to his employer. Some of the questions may be puzzling to many men, and to some the importance of listing their secondary skills and those they have used on other jobs may be overlooked. The employer is urged by the United States [illegible] Service to explain to each worker who seeks his aid the significance of the questionnaire and to help him fill it out properly.

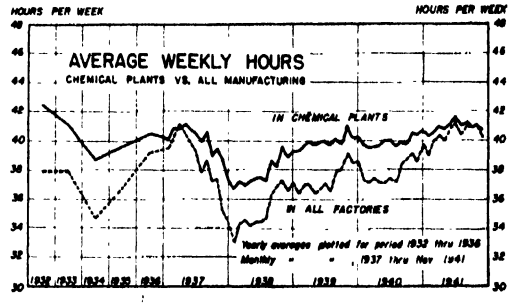
The complete listing of the skills of the Nation's manpower will be of particular advantage to employers because it will help industry to retain men with special occupational ability, as well as to obtain skilled men for war production jobs.

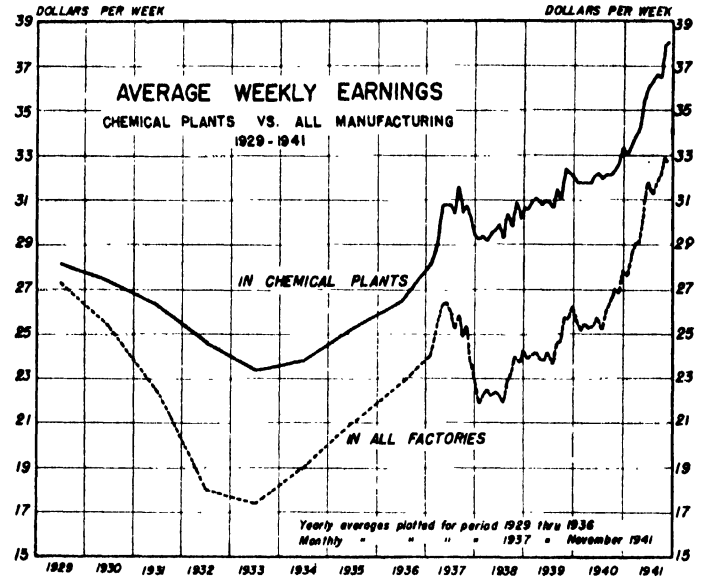


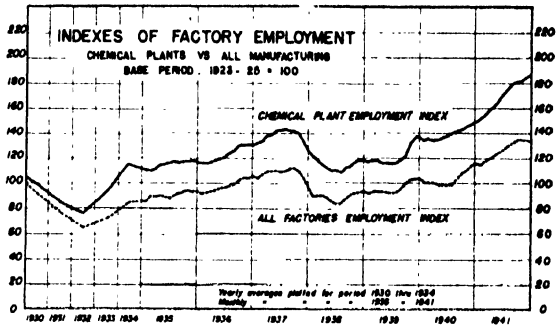
Wage, Hour, Employment, and Price Trends

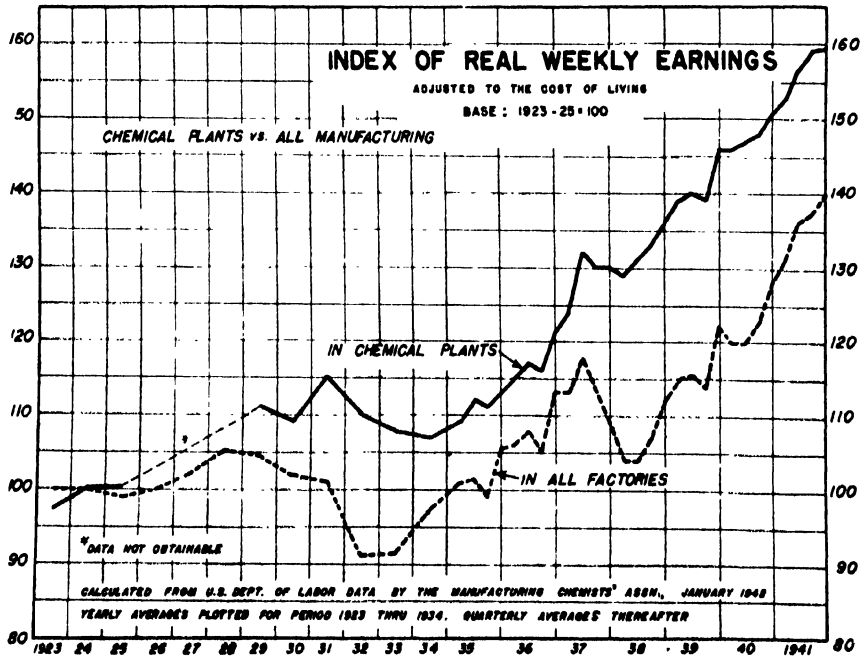
The Chemical Industry Compared with All Industry

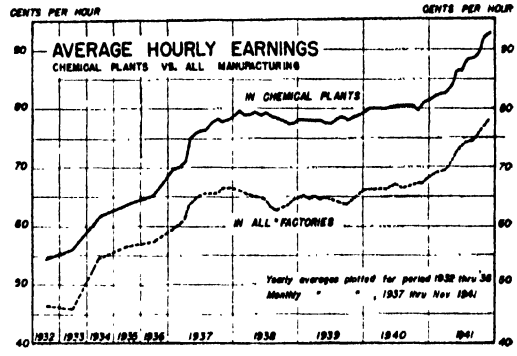












STATISTICS in these graphs were compiled from official sources by the Manufacturing Chemists' Association, 608 Woodward Bldg., Washington, D. C. The chemical graphs in this M. C. A. Statistical Report No. 18 show only the data listed by the United States Department of Labor under chemicals and do not include soap, explosives, petroleum refining, rayon, drugs, fertilizers, cottonseed oil, cake, and meal, and paints and varnishes.

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PRODUCTS for the
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Accelator Softeners & Clarifiers
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Catalysts
Chemical Feeders & Proportioners
Clarifiers & Settlers
Cooling Water Conditioners
Filter Plant Equipment
Flow Controllers
Hydrodarco Purifiers
Hydraulic Controls
Lime Slakers & Feeders
Lime-Soda Softeners
Process Water Conditioners
Silica Gels
Steam Purifiers
Water Filters
Zeolites
Zeolite Softeners

INFILCO
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(1) Firm felts are finished by sanding and brushing. (2) After the hardening operation wool felt goes to the fulling mill where, in a moist stage, it is kneaded by large power hammers and overhauled until the material acquires the required density.



Felt can be made so hard by this process that it can be turned on a lathe. (3) Instead of being spun into thread, wool for felt is carded in batts from which the felt is fabricated directly by hardening and fulling. (4) Felt is practical for blackout curtains. (5) Sheet felt, after it leaves the fulling mill, is stretched on tenter frames in drying ovens. Many tons of pressure must be applied by heavy chains and screw jacks. (6) The wool felt undergoes its first exclusive treatment in the hardening press. The batt of loosely intertwined fibers is unrolled on a blanket where it is wetted down and steamed. It is then carried under the platen, the heavy cast iron gridlike element shown at left, which is lowered to the batt, and heavy pressure applied. Violent agitation of the platen causes fibers to interlock and the batt emerges as a sheet. (7) Sheep's wool is cleaned and degreased in tubs and the fleece is picked apart by the clawlike rotating fingers. (8) Selected materials in specified proportions of each grade are run through the pickers, blown into the air, and further mixed and baffled until the fibers are uniformly interlaced.





Photographs by courtesy of the Committee on Information of The Felt Association, Inc. Use of felt in the war program is outlined on page 472.

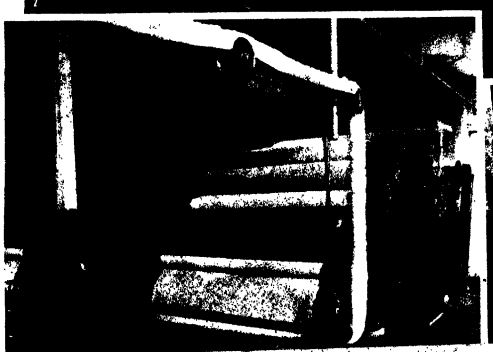


(9) From the carding operation blended wool fibers emerge as a tenuous web deposited on an endless moving blanket. Webs from other carding machines are criss-crossed over the first and pressed by a brass roller. (10) Dyed felts are dried by radiant heat in ovens banked with powerful electric lamps. (11) Stainless steel dye kettles used in dyeing felt. Modern dyehouse equipment is used throughout for the finer wool felts.











(12) Fine grade felt is finished in a shearing machine which removes all roughness and protruding hairs. The shearer is mounted on felt pads and secured to the cement floor by special adhesives. No lag screws or bolts are used.





American Chemical Society[1]

103RD MEETING. Memphis, Tenn., April 20 to 23, 1942.

104TH MEETING. Buffalo, N. Y., September 7 to 11, 1942.

105TH MEETING. Indianapolis, Ind., spring of 1943.

106TH MEETING. Minneapolis, Minn., fall of 1943.

NATIONAL CHEMICAL EXPOSITION. Stevens Hotel, Chicago, Ill., November 17 to 22, 1942.

NINETEENTH NATIONAL COLLOID SYMPOSIUM, Division of Colloid Chemistry. University of Colorado, Boulder, Colo., June 18 to 20, 1942.

Other Scientific Societies

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, Southwestern Division. Las Cruces, N. Mex., April 27 to 30. Annual meeting.

AMERICAN ASSOCIATION OF CEREAL CHEMISTS. Edgewater Beach Hotel, Chicago, Ill., May 18 to 22. Annual meeting.

AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS and AMERICAN INDUSTRIAL HYGIENE ASSOCIATION. Hotel Gibson, Cincinnati, Ohio, April 13 to 17. Annual meeting.

AMERICAN CERAMIC SOCIETY. Hotel Netherland-Plaza, Cincinnati, Ohio, week of April 19. Annual meeting.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Boston, Mass., May 11 to 13.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Chicago, Ill., June 22 to 26.

AMERICAN LEATHER CHEMISTS ASSOCIATION. Deshler-Walleck Hotel, Columbus, Ohio, June 1 and 2.

AMERICAN OIL CHEMISTS' SOCIETY. Rice Hotel, Houston, Tex., April 30 and May 1.

AMERICAN SOCIETY OF BREWING CHEMISTS. Hotel Netherland-Plaza, Cincinnati, Ohio, May 25 to 27.

AMERICAN SOCIETY OF REFRIGERATING ENGINEERS. Skytop Club, Skytop, Penna., June 7 to 9.

AMERICAN SOCIETY FOR TESTING MATERIALS. Atlantic City, N. J., June 22 to 26.

ELECTROCHEMICAL SOCIETY. The Hermitage Hotel, Nashville, Tenn., April 15 to 18.

INSTITUTE OF FOOD TECHNOLOGISTS. Hotel Nicollet, Minneapolis, Minn., June 15 to 17. Annual meeting.

NATIONAL PETROLEUM ASSOCIATION. Hotel Cleveland, Cleveland, Ohio, April 16 and 17 Semiannual meeting.

SCIENTIFIC APPARATUS MAKERS OF AMERICA. Hotel Hershey, Hershey, Penna., June 1 to 3.

[1] The list of the SOCIETY's National Officers and Directors, Editors, members of Council, Divisional and Local Section Officers, Committees, and Chapters of Student Affiliates appears in CHEMICAL AND ENGINEERING NEWS three times a year—usually February 10, May 10, and October 10. The latest list is printed on page 187 of the February 10 issue.

Local Sections

SECTION AND PLACE	APRIL	SPEAKER	SUBJECT
Central Texas, Chemistry Building 15, University of Texas, Austin	17	**Judson S. Swearingen**	High-Pressure Gas Operation
Chicago, Stevens Hotel	17	**Harry N. Holmes**	A Chemist in Medicine
Columbus, Room 100, Chemistry Building, Ohio State University	24	**H. S. Taylor**	Large Molecules through Atomic Spectacles
Connecticut Valley, Mount Holyoke College, South Hadley, Mass.	18	**Everett S. Wallis**	Rotatory Power and Constitution in the Sterols
Eastern New York, Rensselaer Polytechnic Institute, Troy	28	**John Russell**	The Acid-Base Equilibrium of Gelatin
Iowa, Chemistry Auditorium, State University of Iowa, Iowa City	16	**Albert L. Henne**	Aliphatic Fluorides
Lehigh Valley, Palmerton, Penna.	17	**Herman Mark**	Mechanism of Polymerization Reactions
Louisiana, Richardson Chemical Laboratory, Tulane University, New Orleans	17	**E. L. Dennis**	The Production of Military Explosives
Milwaukee, City Club	30	**Henry Eyring**	The Theory of Rate Processes
Minnesota, Room 100, Chemistry Building, University of Minnesota, Minneapolis	27	**Henry Eyring**	Thermodynamic Properties and Rate Processes at Surfaces
Northeast Wisconsin, Lecture Room, Science Hall, Lawrence College, Appleton	29	**Henry Eyring**	Thermodynamic Properties and Rate Processes at Surfaces
Philadelphia, Franklin Institute	16	**Howard I. Cramer**	Present Status of Synthetic Rubber
Pittsburgh, Mellon Institute Auditorium	16	**Hoyt C. Hottel**	Utilization of Solar Energy
Rochester, Cutler Union, University of Rochester	20	**Ethel L. French**	Glimpses of Mexico (Ladies' Night)
Sioux Valley, Sioux City, Iowa	25	**Henry Eyring**	
Southeastern Pennsylvania, Molly Pitcher Hotel, Carlisle	30	**G. W. Campbell**	Chemical Warfare
Western Connecticut, Hubbard Heights Golf Club, Stamford	27	**Arthur C. Cope**	Synthesis and Testing of Barbituric Acid Hypnotics
Western New York, University of Buffalo	21	**Clyde E. Williams**	Metals and the War
Wisconsin, Auditorium, Chemistry Building, University of Wisconsin, Madison	28	**Henry Eyring**	Viscosity, Diffusion, and Thermodynamic Properties of the Liquid State

Symposium on Medicinal Chemistry

AS PART of their annual joint meeting, the Virginia Academy of Science and the Virginia Sections of the AMERICAN CHEMICAL SOCIETY will sponsor a Symposium on Medicinal Chemistry. Speakers from Virginia educational and industrial institutions and from other states will present papers in this general field. The symposium will be held at the Hotel Roanoke, Roanoke, Va., Saturday, May 9, 1942, at 9 A. M. Persons interested in the various aspects of medicinal chemistry are cordially invited.

The program includes the following papers:

ALFRED BURGER. Introduction.

C. R. ADDINALL. Recent Developments in Medicinal Chemistry.

JACKSON P. ENGLISH. Sulfanilamide Chemistry.

J. STANTON PIERCE AND H. B. HAAG. Chemistry and Pharmacology of Newer Local Anesthetics.

FREDERICK BERNHEIM AND ALFRED BURGER. A Basis for the Chemotherapy of Tuberculosis.

Discussions of the prepared addresses will be opened by Luther R. Modlin, Jr., Division of Chemotherapy, U. S. Public Health Service, Washington, D. C.

Further information may be procured upon application to Alfred Burger, Department of Chemistry, University of Virginia, Charlottesville, Va.



19th Colloid Symposium

Boulder, Colo., June 18 to 20, 1942

THOSE planning to attend the Boulder, Colo., Colloid Symposium, held under the auspices of the Committee of Colloid Science of the National Research Council and the Colloid Symposium Committee of the Division of Colloid Chemistry of the AMERICAN CHEMICAL SOCIETY, are advised to make early reservations since Colorado is a popular vacation center. The University of Colorado summer session, usually enrolling over 4,000, promises to be large this summer and in addition numerous conventions are scheduled for Boulder during the summer months.

Rooms at the Boulderado, Albany, and Monticello Hotels range from $1.25 single to $4.50 double. Blanchard's Lodge is situated 3.5 miles up Boulder Canyon and has both rooms and cottages available at prices ranging from $1.25 single to $3.00 double. Estes Park and Estes Park Village are located 31 miles to the northwest of Boulder on a beautiful, paved, easy ascent mountain highway, and Denver is 32 miles southeast on a paved, plains highway. Good hotels are available at both places. The Boulder, Estes Park, or Denver Chamber of Commerce will send descriptive literature and lists of hotels and cottage camps to anyone requesting them.

Inquiries regarding housing facilities should be sent directly to the hotels; for other information address Frank E. E. Germann, University of Colorado, Boulder, Colo.

Akron Rubber Group Meets

THE spring meeting of the Akron Rubber Group was held March 20 at the Akron City Club with 200 in attendance. Mr. Weitz, General Electric Co., delivered a very interesting lecture on applications of radiations from filament and gaseous sources. He demonstrated the newer types of lighting equipment and discussed their value in everyday life. A pertinent example was color and the kinds and degree of light available for effective blackouts.

The following officers were elected to guide this group through 1942–43: *Chairman*, T. L. Stevens; *Vice Chairman*, A. E. Sidnell; *Secretary-Treasurer*, W. J. Krantz.

Chemical Club of Philadelphia

THE Chemical Club of Philadelphia at its annual meeting, March 30, elected the following officers: president, F. S. ("Jerry") Dubbs, American Cyanamid & Chemical Corp.; vice president, Charles A. Wagner, C. A. Wagner Co.; treasurer, W. R. E. Andrews, W. R. E. Andrews Sales Co.; secretary, G. B. Heckel, Jr., *The Paint Industry Magazine*.

The club has been rather inactive during the past year, but has determined to reorganize on a sound basis. A proposed new Constitution and By-Laws, modeled somewhat upon that of the New York Chemical Sales Group, was submitted for approval by John F. Kirk, General Chemical Co., and will come up for final action at the next meeting, scheduled for April 13.

Civilian Defense Talk Covers Combustion

AS THE first lecture in a series on "Citizens' Defense and Protection", sponsored by the Civilian Defense Corps in the Cincinnati Metropolitan Region on the University of Cincinnati campus, "Incendiary Bombs" was presented by Saul B. Arenson, professor of inorganic chemistry. The talk was the first on incendiaries and covered the phenomena of combustion as follows:

1. History. Discovery of oxygen by Chinese, Leonardo da Vinci, Scheele, Priestley, and Lavoisier.
   Demonstrations: Retort with mercury, bottle of mercuric oxide, crucible lid floating on a cork in water, covered by bottle of air. Samples of red and yellow phosphorus.
2. Oxidation. Definition, tie-up with rusting and utilization of food. Heat as important product in incendiary bombs.
   Demonstrations: (*a*) Candle burning under closed funnel, products of candle combustion pulled through lime water. Proof that carbon dioxide is fire extinguisher by slanting trough and candles. Breath blown through lime water.
   (*b*) Burning of sulfur.
   (*c*) Burning of magnesium ribbon, powdered magnesium, powdered iron (thrown in flame).
3. Factors controlling rate of burning (tied up with fire control).
   Demonstrations: (*a*) Degree of fineness. Powdered carbon *vs.* stick of charcoal. Powdered iron *vs.* picture wire. Powdered magnesium *vs.* big rod of magnesium (which is kept from burning). Sample of fireproofed material like celotex. Explanation of fireproofing.
   (*b*) Temperature. Oxygas blow torch to burn strip of zinc, picture wire, thick copper wire. Heating lump of calcium oxide.
   (*c*) Concentration of oxygen. Burn samples of charcoal, picture wire, and sulfur in flask of pure oxygen.
4. Gas explosions.
   Demonstrations: Diffusion of hydrogen from inverted cylinder into air below it, forming mixture which can be ignited by taper. Soap bubbles filled with hydrogen-oxygen mixture ignited.
5. Combustion in other media.
   Demonstrations: (*a*) Water. Sodium and potassium in cold water, phenolphthalein to test solution formed. Magnesium ribbon burning in steam.
   (*b*) Chlorine. Dutch metal and antimony placed in cylinders of chlorine.
   (*c*) No added material. Thermite in clay crucible. Pieces of iron to be welded. Since movies were available to show thermite bombs in operation, this sample of thermite was not ignited.
6. Fire extinguishers. Principles involved, types.
   Demonstrations: Volatility of carbon tetrachloride, sodium carbonate–hydrochloric acid mixtures with and without gelatin.

These typical freshman demonstrations and explanations are somewhat similar to those performed by Wm. Lloyd Evans, Ohio State University, for the State Civilian Defense Commission of the State of Ohio.

The evening following Dr. Arenson's demonstration, the discussion covered "Control of Incendiary Bombs" and was given by George Rieveschl, Jr., instructor of chemistry, and William Licht, Jr., instructor in chemical engineering, Chemical Engineering Department, University of Cincinnati.

A. I. CH. E. Student Chapter at Tufts

THE 79th A. I. Ch. E. Student Chapter at Tufts College was inaugurated by Sidney D. Kirkpatrick, president of the American Institute of Chemical Engineers, March 17, at the Engineers' Club in Boston with about 70 of the new members present. A banquet at which Dean Harry P. Burden was toastmaster preceded the inaugural. Other speakers were John T. Blake, director of research of the Simplex Wire and Cable Co.; Gustavus J. Esselen, vice chairman of the Massachusetts Board of Professional Engineers; Leonard Carmichael, president of Tufts College and head of the National Roster of Scientific Personnel; and Kenneth Bell, chairman of the Boston Section of the institute.

The officers of the new chapter are: president, William Page; vice president, Thomas Pritchard; secretary, Arthur Waddell; treasurer, Edwin West; councilor, M. E. Othmer.

At a recent election, the following men were chosen to hold office next year: president, James Kelley; vice president, Henry Der; treasurer, David Swig.

Foster D. Snell, Inc., Holds Annual Dinner

FOSTER D. SNELL, INC., held its annual staff dinner on March 20 at The Brooklyn Club with 36 members present. The guest speaker, Harold St. L. O'Dougherty, a well-known Brooklyn attorney who for many years was United States District Attorney for the Eastern District, kept his audience amused with his narration of incidents in his career. Tracking down counterfeiters involved many unusual experiences which made excellent after-dinner speech material. Following the speech movies were shown. The entertainment concluded with a general community sing.



On the Reading of Scientific Papers[1]

Audience Enemies Numbers 1 to 6

EUGENE F. DuBOIS

Department of Physiology, Cornell University Medical College, New York, N. Y.

A FEW years ago a large international congress was held in one of the most beautiful cities of Europe. The committee on arrangements had planned every detail to perfection. The university buildings were new, the lecture halls ample. Each platform was provided with a two-foot clock that not only pointed out the elapsed time but also turned on a red light at eight minutes and a big flashing light at 10 minutes. When the meeting started, one could say "Every prospect pleases".

Only man was vile. One hour after the opening, members realized that the distinguished chairmen of the sections were not holding the speakers to the 10-minute limit so carefully stipulated in the programs. Therefore, every speaker counted on talking 15 or 20 minutes. Of course he saved his most important slides until the end, and they were shown in competition with the flashing light plus an obviously nervous chairman.

In addition, there were all the other minor and major human defects best calculated to torture an audience. Most of the speakers mumbled their words or else turned and lectured to the lantern screen. This was particularly annoying, since the papers were delivered in four different languages, each with its local variants. Most of the lantern slides were photographs of typewritten sheets crowded with data, and few speakers were content to show less than 20. The main points were carefully concealed until the last minutes, by which time the audience had lost all interest.

This meeting was perhaps an extreme example, and in our country most of the papers are carefully prepared and carefully delivered. There are, however, enough poorly delivered papers to warrant a discussion of what may be called "audience enemies":

1. The Mumbler, who drops his voice to emphasize important points or else talks to the lantern screen instead of to the audience.
2. The Slide Crowder, who packs his slides with typewritten data and shows too many slides.
3. The Time Ignorer, who talks beyond the limit specified in the program or justified by common courtesy.
4. The Sloppy Arranger, who jumbles his material.
5. The Lean Producer, who has poor material.
6. The Grasping Discussor, who when he gets talking stays talking.

Of course there are many other ways in which a speaker may cause discomfort, but the ones that I have selected are chosen because they can be remedied either by the head of the department or by strict self-examination.

Number 1, the Mumbler, is handicapped by poor habits of speech, an incorrectly placed voice, or else an inherent nervousness. In other cases bad delivery is caused by lack of consideration in a man who is more interested in excreting words than in conveying information. When he turns to the screen and talks at the chart he is paying more attention to his own achievements than to the audience. This is particularly disastrous if he wanders away from the microphone.

Number 2, the Slide Crowder, wishes to show just as much of his data as possible and thus demonstrate his industry. He prepares many slides from typewritten sheets, because this is the easiest method. He ignores the fact that the typewriter has the worst possible type for display at a distance. Has any one ever seen such type used on advertising billboards? If he would only have his slides drawn with India ink the very labor involved would cause him to limit his material to the essentials, and these would be legible. It is a simple matter to calculate for a 10-minute paper just how many seconds each slide will be exposed on the screen and how much can be read and understood while thus exposed. Every nonessential word or figure distracts the eye from the small fraction that is essential. A good slide needs no pointer or verbal explanation.

The ideal method of competing with a slide is to employ one of the modern flashlights with a bright arrow that dances all over the screen and ceiling. There is nothing in black and white that has a chance of holding the eye when a bright arrow swoops and darts like a hornet.

Number 3, the Time Ignorer, who exceeds the limit set by the program is purely selfish or else overimpressed with the idea that his paper is much more important than the program committee had imagined. He may have planned deliberately to go overtime but more probably did not take the trouble to rehearse his paper with a watch. If he did use a watch he forgot that it always takes several minutes longer to deliver a paper from a platform than to read it in an empty room.

Number 4, the Sloppy Arranger, selects the method of presentation best calculated to confuse the audience. He may have in the back of his head the idea that he can lead up to a climax and hold the audience in breathless suspense until in the very last sentence he can prove that the venous blood of the wimpus contains only 3 mg. of gadgetyl chloride instead of 4 mg. Would it not be kinder to the audience if he followed newspaper technique and gave in a headline, early in the talk, some idea as to what and wherefore?

Number 5, the Lean Producer, is only relatively lean. If he has one fact to exhibit and does it modestly he has made a contribution. If he does not recognize his paucity of material he does more harm than good. The real audience enemy is the man whose paper consists of trivia, errata, omissia, et cetera; mostly et cetera.

Number 6, the Grasping Discussor, can spoil almost any meeting. If he has been invited to open the discussion he has probably prepared a nice little paper of his own with scant reference to the paper of the evening. There is another type of discussor who happens to have in his pocket some lantern slides that he would just like to show for two minutes.

In the face of all these enemies the audience itself can do but little. The chairman, however, can do a great deal. Perhaps instead of chairman he should have the title of "Sole Protector of the Audience". If he has established a reputation for keeping people within their time limits they will take the trouble to arrange their material and lantern slides and bring out their main points in a decent manner. The faults of poor delivery, poor slides, and poor material are the responsibility of the head of the department. He should guard the reputation of his institution. Unfortunately, some heads of departments exhibit in their own deliveries many of the faults enumerated.

The time to start training is when a man is young. In one medical school this has been tried successfully with the fourth-year students taking their clerkship in the medical dispensary. Every Saturday morning a group of clinical clerks have gathered to hear four 15-minute papers delivered by members of their class. The students have been warned that the papers are limited strictly to 15 minutes and that in rehearsal they must not take more than 12 minutes. They are advised to talk to the men in the back of the room, since these are the most difficult to keep interested. They are taught that time spent in listening to a dull lecture, poorly delivered, is not wasted if they study the faults of the speaker and consider the methods by which they may be avoided. In a few sessions they develop a technique of delivery that is much better than the average found at scientific meetings. This allows the speakers and the audience to forget the delivery and concentrate on the subject matter.

The man who goes overtime, uses crowded slides, and mumbles his words is seldom more than 50 per cent audience enemy. If his paper comes in the middle of the session it does not affect the first half of the program, even though he talks

[1] Reprinted from *Science*, New Series Vol. 95, No. 2463, page 273, March 13, 1942

far beyond his limit. If his slides are crowded, half of the material can be read by the front half of the room. The same front half can usually hear him, even though he mumbles his words. He would not dream of saying, "The public be damned". He just damns the rear half.

New War Program at N. Y. U.

CONSULTATION with government and industrial officials has led the faculty of the College of Engineering at New York University to adopt a new accelerated war training program that is believed to be the first of its kind in the Nation. The plan will free trained junior engineering students for four months' service with war industries by mid-May.

Third-year students, who have completed all basic engineering studies, will be released about May 15 to work with war industries for four months during the all-out production drive this spring and summer; and the academic program of all undergraduates will be accelerated by the elimination of most regularly scheduled holidays during the academic year. Some 250 present seniors will complete their studies in April.

The plan follows urgent appeals by the President and Donald M. Nelson for a production speed-up during the spring and summer of this year. "One man in war production this spring and summer is worth five next year".

Under the continuous summer study program adopted by many engineering schools, no additional engineering personnel will be available much before next February. Approximately 1,100 engineering students will be affected by the war program at New York University College of Engineering, with 250 juniors and some sophomores available to war industries this summer.

An important aspect of the newly adopted program will be the availability of the college classrooms and laboratories during the summer for defense research and for the continuance and expansion of the various government training programs being conducted for the Army Air Corps, Ordnance Department, Signal Corps, Weather Bureau, Navy, U. S. Office of Education, and other government agencies. In one instance alone, this will make possible an increase of 150 per cent in the training of personnel for an important military bureau.

The New York University accelerated engineering plan includes an academic speed-up from September to April, makes the third-year students available for work in war industries this summer, and yet graduates the class of 1943 only two months later than does the modified speed-up, or continuous summer study program, adopted by many institutions. The four months' summer work experience will familiarize students with industrial procedures and practices, making them more valuable after graduation in April.

The students, after completion of summer work in war industries, will resume classes about September 15, 1942, and the returning fourth year men will be graduated in April 1943. The present sophomores, according to the plan, will be available for the next four-month employment period by May 15, 1943.

This plan does not affect students in the Evening Division and Graduate Division, where approximately 1,500 students, most of whom are employed, are being trained.

J. J. Mattiello Scholarship Committee

A NEW scholarship committee, the J. J. Mattiello Scholarship Committee, has been set up to establish fellowships for graduate study. The funds of the committee are obtained from the proceeds of Dr. Mattiello's work on "Protective and Decorative Coatings", recently published by John Wiley & Sons. The Scholarship Committee consists of Dr. Mattiello, technical director of the Hilo Varnish Co. and a member of the Chemists' Club, L. W. Ryan of the United Color & Pigment Co., J. J. Bradley, Jr., of Bird & Son, Inc., with R. J. Moore of the Bakelite Corp. as chairman.

The first two-year fellowship has been established at Polytechnic Institute, Brooklyn, under the guidance of Raymond E. Kirk, head of the Department of Chemistry, and H. Mark. The first designated fellow is Sidney Siggio, a graduate of Queens College. His subject, "Water-Dispersible Binders for Protection and Decorative Coatings", will deal with the fundamentals of emulsions and their stabilities.

J. T. Baker Fellowship Award

THE J. T. Baker Chemical Co. Fellowship in Analytical Chemistry (Midwestern Division) for 1942–43 has been awarded to Arnold J. Veraguth, who will work under G. Frederick Smith at the University of Illinois.

Check the Experiment

CITING his home city of Los Angeles as an example, Carl Omeron, a dentist whose hobby is scientific research, claims that most American cities can scrape up plenty of rubber in the present automobile tire shortage. Pointing out that approximately 1,000,000 motor vehicles are registered in the Los Angeles metropolitan area, Dr. Omeron asserts that each vehicle deposits at least 1 pound of rubber from each tire on city streets and highways during a one-year period. This rubber, worn off and skidded from tires, is found principally at boulevard stops and on curves. Since each vehicle has at least four tires, this totals to about 4,000,000 pounds of rubber a year.

Dr. Omeron estimates that 25 per cent of this scraped-off rubber can be reclaimed effectively to give about 1,000,000 pounds of rubber a year. He says it is an easy job to separate the rubber from oil, tar, and other residue scraped up with it, and that the resultant rubber, added to chloroprene, would increase the tensile strength and longevity of retreading material and make an effective contribution to the defense effort. Dr. Omeron suggests the scraping operation be done by large wire brushes attached to motorized sweepers, now used in all large cities. The sweepings would be scooped into a special hopper or drum.



WIDE WORLD PHOTOS

Dr. Omeron scraping and measuring rubber from a street intersection

NECROLOGY

Weyman S. Crocker

WEYMAN S. CROCKER, chief chemist for Crocker, Burbank & Co., paper manufacturer, Fitchburg, Mass., died on March 14 at the age of 47.

M. R. Dinkelspiel

M. R. DINKELSPIEL, associate editor of The Merck Manual of Therapeutics and Materia Medica died March 13 at the age of 68.

Dr. Dinkelspiel became associated with Merck & Co., Inc., in 1929 and in addition to his work on the sixth and seventh editions of The Merck Manual he made many contributions to the company's professional literature. He was a member of the New York County Medical Society, New York State Medical Society, American Medical Association, American Society of Tropical Medicine, and the American Association for the Advancement of Science. He was a medical officer in the first World War.

Francis D. Dodge

FRANCIS D. DODGE, chief research chemist of the Dodge & Olcott Co., died March 15 at the age of 74.

Dr. Dodge was born in Washington, and was graduated from the Brooklyn Polytechnic Institute in 1884 and the Columbia University School of Mines in 1888. After attending Heidelberg University for two years, he obtained his Ph.D. degree at Columbia University in 1891. He was an instructor at Columbia for a year before joining the Dodge & Olcott Co. in 1891. He was a member of The Chemists' Club (New York), and had belonged to the AMERICAN CHEMICAL SOCIETY since 1901.

Francis I. du Pont

FRANCIS I. DU PONT, former vice president and director of E. I. du Pont de Nemours & Co., Inc., died March 16 at the age of 68.

Mr. du Pont was born in Wilmington, Del., December 3, 1873. He entered the University of Pennsylvania, then transferred to the Sheffield Scientific School, Yale University, from which he was graduated in 1895. He began work for the du Pont company as a chemist at the smokeless powder works at Carney's Point. In 1903 he established the company's research and experimental station, and was soon elected to a vice presidency and membership on the board of directors. He built his own experimental laboratory in 1917 and operated it as the Delaware Chemical Engineering Co. Here he developed processes leading to the organization of the Ball Grain Explosives Co., which manufactured fuses in the World War, and also perfected the minerals-separation process. He held more than a hundred patents, and was known chiefly for his work in the field of smokeless powder and his development of the "sink and float" process for the separation of minerals.

In 1931 he entered the financial field in New York, founding the investment company of Francis I. du Pont & Co., of which he was senior partner. He had been a member of the AMERICAN CHEMICAL SOCIETY since 1915.

Lloyd B. Edgerton

LLOYD B. EDGERTON, vice president of the Philadelphia Quartz Co., Philadelphia, Penna., died March 15 after a long illness. He was 55 years of age. Born in Barnesville, Ohio, Mr. Edgerton graduated from Ohio State University, class of 1909. He then became associated with the General Electric Co. at Schenectady, N. Y., in the Steam Turbine Testing and Service Department. In 1913 he entered the employ of the Philadelphia Quartz Co., assuming charge of the Engineering Department. He was appointed works manager in 1930, director in 1934, and vice president in 1935. He was a member of the American Society of Mechanical Engineers and the Engineers' Club of Philadelphia.

Mr. Edgerton is survived by his wife, two sons, and a daughter.

John J. Johnston

JOHN J. JOHNSTON, formerly department head in the Chemical Products Division, Bayway Refinery, Standard Oil Co. of New Jersey, died March 17 at the age of 76.

Mexico Supplies Bulk of U. S. Arsenic Imports

MEXICO continues as the chief foreign source of arsenic used by the United States, recent figures disclose. Production by that country in the first eight months of 1941 amounted to 8,507,818 kg. with a value of 3,166,925 pesos. Exports in the same period were 8,302,000 kg. Of the 13,000,000 pounds of white arsenic the United States imported during this time, 11,300,000 pounds came from Mexico. Canada and Japan shipped the remainder.

ORGANIZATION of the Compania Anonima Electroquimica de Caracas, Venezuela, to produce chlorine was completed in September, according to advices received in the United States. Operations are to start as soon as the necessary equipment is received.



Assault Boats for the Marines

Assault boats constructed in a Goodyear actory are shown preparatory to being delivered to the United States Marines at undisclosed locations. While designed for tough, rugged, abusive service, these boats are the ultimate in compactness when deflated, are extremely light in weight in relation to the loads they will carry.



This Chemical Age—The Miracle of Man-Made Materials. *Williams Haynes.* 1st ed. 381 pages + xxix. Alfred A. Knopf, New York, N. Y., 1942. Price $3.50.

It is an unusual chemical book whose author boasts: "I am rather proud how little chemistry there is in this book which deals with all the new synthetic chemical products". The reader is disarmed, and perhaps charmed, by being told that in the first two chapters he will learn all the chemistry he needs in order to "enjoy" the rest of the book. The first chapter is almost entirely an account of the life of Cavendish and of the proof of the composition of water. How easily the author evades being didactic is shown by the opening sentences of the chapter:

> Almost everybody knows that water is H_2O. You may test this for yourself quite easily by a sort of personally conducted Gallup poll. But do not ask only such likely people as taxi drivers, butchers, and manicurists. Ask distinguished members of the bar and of the League of Women Voters. Ask also college professors of English or Latin who disdain the sciences as a chemist shuns Greek verse. It is surprising how many people can tell you that H_2O means water in the chemical language.

In this breezy style the author writes simplified chemistry, not because that is the only kind he knows, but because his appeal is to those whose sole knowledge of the subject is contained in the quotation, or is even less. He studied chemistry at Johns Hopkins University, is the author of other chemical books, and was the editor of *Chemical Industries*. The last experience gave him an excellent chance to become acquainted with the development of chemical technology during recent years. The reader gets the benefit of this acquaintance in a series of chapters on significant developments, beginning with Chapter III, Black Tar to Bright Dye, which is chiefly an account of Perkin and his accomplishments. Instead of saying that dyes, medicinals, and perfumes are "extracted" from coal tar, he says that the production of any of these "is a building-up process, far different from the popular notion that by some sort of magic all these different substances are picked out of the mysterious black tar". If he deserves commendation for this he falls from grace by saying that some of the new plastics are made from "coal, air, and water", which is just as misleading as extracting dyes from tar. Then to make the matter worse: "that the pretty blue cups and saucers in the picnic hamper are made literally out of four gases is a practical joke almost beyond the realm even of miracles". What he means is a urea-formaldehyde plastic. The urea comes from ammonia and carbon dioxide. The formaldehyde is made by oxidizing methanol prepared by the hydrogenation of carbon dioxide. This last is not a misprint, for it is "the gas of soda water".

There are very readable chapters on the German dye cartel, on explosives, perfumes and flavoring substances, on medicinals—the sulfanilamide family has a whole chapter—celluloid and other plastics, rayons, rubber and its rivals, and petroleum.

On the whole the book is well written and accurate in chemical matters, but because a reviewer is supposed to be captious a few mistakes must be pointed out. Some may be misprints, for instance "positons" in text and index. This cannot be said of the relation between water, methyl alcohol, and dimethyl oxide by the replacement of first one and then the second hydrogen atom by a methyl, C_2H_5, group. "Pontinac", used six times on five consecutive pages, cannot be a misprint. Crude turpentine as it exudes from the tree is not the "sap", and Hevea latex is not "rubbery sap". It is hardly fair to say that the producers of carbon black willfully make it "by igniting natural gas in faulty burners".

The reviewer cannot check the statistics given here and there in the book, but was surprised by some of the arithmetic. It is said that the 26,000,000,000 gallons of gasoline produced in a year would fill Great Salt Lake twice over. The author incautiously adds that the lake is 80 miles long, 20 to 30 miles wide, and has an average depth of 13 feet. Taking the width as only 20 miles, the reviewer found that the lake holds more than 4½ trillion gallons. Any reader who is so inclined can calculate from the basic figures given on page 26 how many times an electron revolves around a proton in 0.000,000,001 second.

The occurrence of a number of mistakes that can be corrected in the second edition does not detract seriously from the value of the book. The author has given us a breezy, interesting, and essentially correct account of the more important achievements of chemists, without which our daily life would be far different from what it is. The lay reader and many chemists can profit by reading it.

C. E. Waters

Glass. The Miracle Maker. *C. J. Phillips.* 424 pages. Pitman Publishing Corp., 2 West 45th St., New York, N. Y., 1941. Price, $4.50.

This book is primarily for the user of glass and should be very valuable, particularly to those who are not glass technologists and who want to know something of the chemical and physical properties of this material which has come to the industrial forefront lately. One of the sad things about the former use of glass has been the almost total ignorance of scientists, technologists, and engineers of the properties of glass. Because of this a great deal of technical work of no value has been reported. Often the engineer has omitted to use glass because of a lack of understanding of the physical and engineering properties of the material.

Mr. Phillips does a first-class job of giving the story of glass from both the technologist's and engineer's viewpoint. It contains enough of glass manufacture to indicate both its limitations and possibilities; it includes the chemical and physical properties; it goes into the various methods of making glass and the type of machines used; and it includes the proper testing.

The last half gives a brief story of various places in which glass has been used—in architecture, art, electrical transmission, illumination, manufacturing processes, and research.

The book is written primarily from the outlook of the Corning Glass Works, a proper recognition of its unique position in the field. It is indexed, has numerous good representative pictures, is very well printed and bound, and is easy reading.

It is unusual to find a book full of so much technical information that is so readable, even occasionally being mildly humorous.

F. C. Flint

Modern Plywood. *Thomas D. Perry.* 1st ed. 366 pages. Pitman Publishing Corp., 2 West 45th St., New York, N. Y., 1942. Price, $4.50.

Thomas Perry, who has long been a notable contributor of articles on plywood to technical publications, now carries his work forward with a timely book. Plywood, says the author, has been revolutionized with the development of resin adhesives. Certainly it is a subject

which has historical, technical, and popular interest.

The technical details begin with the advantages of plywood—that plywood is economical, that its strength is distributed in two directions, that it is available, and that it is easy to fabricate. After that there follows the process of cutting veneers, the adhesives used in plywood, the manufacture of high-density plywood, the ins and outs of the trade. And what gives a special interest to the book is the chapter on Plywood in Industry. Here is learned its use in aircraft, barrels, boats, furniture, sporting goods, building construction, and many other fields.

The book is written in the style of a textbook; students may be its largest users. A glossary of terms used in the plywood trade introduces the subject and a bibliography of considerable size completes the last chapter. The book is well supplied with charts, tables, and illustrations, and as a further indication of the versatility of the subject, the book is bound with plywood covers.

In the resin adhesive field, where research and development are making such rapid strides, it is exceedingly difficult for an author to make a book up to date. However, this book furnishes a foundation for plywood information which certainly renders a service to our advancing technical knowledge. For the reader in search of a background on plywood, this volume offers a great deal.

HENRY GRINSFELDER

Chemical Engineering for Production Supervision. *David E. Pierce.* 1st ed. 232 pages. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York, N. Y., 1942. Price, $2.50.

IN THE words of the author, this book was written "for the man who wants to analyze difficulties in operation, check efficiencies, and utilize the equipment to the best advantage". It will surely fill a long-felt need for production men in chemical industries because it presents basic principles in a simple, straightforward manner, for the practical men who lack a technical education, for supervisors and foremen, and for engineers who have lost their intimate contact with technology and the complicated problems of modern chemical industrial equipment.

The first chapters present the groundwork of chemistry, physics, and thermodynamics. The properties of matter, the theoretical aspects of change of state, and the behavior of matter in solution are all outlined simply and directly, with the obvious purpose of providing the necessary background for the mathematical handling of the common phenomena of chemistry and physics. The basic gas laws and the extremely important laws of thermodynamics and thermostatics are also outlined and illustrated, with the emphasis merited by their value to the engineer. Many well-chosen problems are presented, some with solutions, for the definite purpose of making clear to the nontechnical man the utility and scope of the information being presented. Ability to make use of data and methods of calculation should be the primary aim of every reader and student who uses this book.

A chapter on the transformation of energy explains with simple mathematical means the various commonly encountered changes of the state of energy from potential sources to dynamic utilizations. The combustion of fuels, condensation of vapors, transformation of mechanical and electrical energy, work, and heat are all given a simple and reasonable treatment. This is carried on into the mathematical treatment of heat and enthalpy, and a thorough discussion of methods of heat transfer. Conduction, convection, radiation, and combinations of the three methods are discussed and their mathematical approach explained. The simpler methods of using heat-transfer coefficients, over-all coefficients, the means of obtaining coefficients, and proper ways of handling uncomplicated problems are clearly outlined. An excellent discussion of mean and average temperature differences and their use is the high light of the heat-transfer explanation.

In the last chapters these basic principles of engineering are applied to the specific computation of the problems of equipment in the four unit operations of chemical engineering—Evaporation, Distillation, Drying, and Flow of Fluids. An extreme simplicity of technical approach, combined with a thoroughly practical viewpoint, characterizes these chapters. The main emphasis is placed on equipment, its operation and repair, utilization, and limitations. Theory is subordinated, although the important basic applications of mathematics are outlined briefly. This way of treating the subject matter seems new because it is so seldom encountered, but it enhances the value of the discussions for the practical man and for the engineer whose scope lies in the field of general production supervision.

The book's only weakness is its lack of completeness, and this was probably intentional in order to further its object of simplicity. It does seem unfortunate, however, that the author did not include at least a simple discussion of the basic concepts of diffusion and the many applications to absorption, desorption, and material transfer. A short explanation of the mathematics involved in the derivation of one or two basic equations would further the understanding and acceptance of the many formulas and equations which are presented without any indication of their background.

The particular merit of the book lies in its basic soundness, simplicity, and practical approach. The inclusion of many excellent problems, which are not difficult but which cover the field adequately, makes the book invaluable as a review text. The tables, charts, and diagrams throughout the text and in the appendix are well chosen and help in the solution of many problems. The book is highly recommended for intensive and recurrent study by practical men, production supervisors, and chemical engineers in need of review.

HARVEY M. MERKER

Petroleum Refinery Engineering. *Wilbur L. Nelson.* 2nd ed. 682 pages. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York, N. Y., 1941. Price, $6.00.

NELSON'S "Petroleum Refinery Engineering" is well known throughout the industry and technical schools because of the excellence of the first edition of 626 pages which appeared in 1936. The second edition follows the same plan and includes substantially the same material.

Three chapters have been added to include modern developments not treated in the first edition. Chapter 18 of 26 pages on Rebuilding Hydrocarbons includes a brief thermodynamic treatment of equilibrium relations, a discussion of reaction velocity, and a description of the chemistry of alkylation, dehydrogenation, sufficient for the average student or reader of general interest. The sections of the desalting of crude oil and waste water disposal constitute the new material in the new Chapter 20 titled Auxiliaries to Processing. Chapter 27, 10 pages, on Solvent Treating is entirely new.

Perhaps the most important additions are the inclusion of more modern relationships in the physical properties of petroleum and the abbreviated petroleum tables included as an appendix. These additions greatly improve the book as a text and make it far more useful to the practicing engineer.

Other charts have been revised with corresponding improvement in accuracy. The inclusion of a rather complicated procedure for calculating fractionating towers operating on petroleum is interesting in view of the complete omission of any method for calculating the columns operating on complex volatile hydrocarbons, widely used in the natural gasoline industry and in the production of the pure compounds required for alkylation and similar reactions.

Nelson's is the only book of its kind—a proved complete text and reference book brought up to date in the second edition. It should find as wide use as the first edition which set a new standard for petroleum-refining texts.

GEORGE G. BROWN

Price, Priority Index Published

OFFICIAL texts of over 600 OPA and WPB price schedules, limitation orders, allocation rulings, preference ratings, amendments, and interpretations have been made available by the *New York Journal of Commerce* for distribution. A "Price and Priority Index" of all existing government regulations covering a wide product range from acetone to zinc has been compiled for handy reference purposes.

OPA price schedules were inaugurated in the machine tool industry over a year ago and are now in effect on well over 100 products. "M" orders regulating the flow of materials came along shortly afterward and remain in effect despite the abolishing of OPM. Limitation orders restricting the output of manufactured goods were first applied on motor trucks in August 1941. Adjustment to a wartime economy hit its peak in mid-February when as many as 18 different orders were issued by the various government agencies on a single business day.

Individual texts as published in the columns of the *Journal of Commerce* are available in single copies or bulk quantities. Copies of the complete index may be had without charge by addressing the *New York Journal of Commerce*, 63 Park Row, New York, N. Y.

Priorities as Related to the Chemical Industry

A NEW technical bulletin, "The Priorities System as Related to the Chemical Industry", has been issued by the Calco Chemical Division, American Cyanamid Co. The bulletin summarizes the various controls which have been established by the War Production Board, and contains an index of the commodities on which M, P, L, and price schedule numbers have been issued.

Copies of this bulletin may be obtained by writing Calco's Advertising Department, Bound Brook, N. J., and asking for Technical Bulletin 648.

Journal of Physical Chemistry for March

THE *Journal of Physical Chemistry* for March contains the following articles:

ROBERT LIVINGSTON. The Indirect Estimation of Critical Temperature and of Molar Refractivity.

RALPH G. VERDIECK AND L. F. YNTEMA. The Electrochemistry of Baths of Fused Aluminum Halides. I. Aluminum as a Reference Electrode.

E. E. MARSHALL AND L. F. YNTEMA. The Electrochemistry of Baths of Fused Aluminum Halides. II. The Deposition Potentials of Chromium, Molybdenum, and Tungsten.

RAYMOND R. ROEPKE. The Thermoelectric Method of Measuring Vapor Pressure.

CECIL C. LYNCH. The Ternary System Lithium Chloride-Dioxane-Water.

W. G. EVERSOLE, H. M. KINDSVATER, AND J. D. PETERSON. The Diffusion Coefficient of Cupric Sulfate from 0.0 to 0.35 Molar at 25° C.

JULIAN C. SMITH. The Solubility Diagram for the System Benzene-Pyridine-Water.

J. H. SIMONS AND ROBERT KINSEL SMITH. The Entropy of Vaporization and Density of Liquids at Their Boiling Points.

H. T. BRISCOE AND WILMER T. RINEHART. Studies of Relative Viscosity of Nonaqueous Solutions.

ANDREW VAN HOOK AND J. C. AHLBORN. The Rate of Nucleation of Silver Chromate in Supersaturated Solutions.

BRUCE LONGTIN. Heats of Mixing in the Ternary System Ethanol-Acetic Acid-Ethyl Acetate by a Rapid Approximate Method.

FRANCOIS OLMER. Decomposition of Carbon Monoxide by Ferromagnetic Metals.

SYDNEY ROSS. Orientation of Micelles in Soap Fibers.

TERRELL L. HILL. General Theory of the Isoelectric Point.

C. W. LEGGETT, JR., R. D. VOLD, AND J. W. MCBAIN. The Solubility of Sodium Palmitate in Organic Liquids.

Journal of Chemical Education for April

THE *Journal of Chemical Education* for April contains, among others, the following articles:

E. BERL. Some Personal Recollections of Alfred Werner.

DAVID DAVIDSON. Acids and Bases in Organic Chemistry.

HARRY A. CURTIS. Nitrogen Fixation.

H. S. VAN KLOOSTER. Hugo Rudolph Kruyt.

AUSTIN M. PATTERSON. Chemistry Teachers and the War.

LAWRENCE H. AMUNDSEN. Sulfanilamide and Related Chemotherapeutic Agents.

BART PARK. The Region of Maximum Buffer Capacity.

FOSTER DEE SNELL. Soap and Glycerol.

P. W. SELWOOD. Magnetism and Molecular Structure.

HARRY A. CURTIS. Ammonia.

RAYMOND M. FUOSS. Electrical Properties of Solids, Part I.

W. A. HELBIG. Activated Carbon.

Annual Report of Explosives Division

SINCE the mineral industries consume approximately 72 per cent of all industrial explosives manufactured in the United States, prevention of mine accidents involving explosives has been a chief concern of the U. S. Bureau of Mines since 1910, according to the annual report of its Explosives Division. The scope of such investigations has been widened in the past two or three years to include many factors directly connected with national defense and the war program. Report of Investigations 3602, "Annual Report of the Explosives Division, Fiscal Year 1941" by W. J. Huff, may be obtained by writing to the Bureau of Mines, Washington, D. C.

Conservation of Journals

THE American Library Association has created the Committee on Aid to Libraries in War Areas, headed by John R. Russell, librarian of the University of Rochester.

One of the most difficult tasks in library reconstruction after the first World War was completing foreign institutional sets of American scholarly, scientific, and technical periodicals. The committee is now endeavoring to avoid a duplication of that situation.

Many sets of journals will be broken by the financial inability of the institutions to renew subscriptions. As far as possible they will be completed from a stock of periodicals being purchased by the committee. Many more will have been broken through mail difficulties and loss of shipments, while still other sets will have disappeared in the destruction of libraries. The size of the eventual demand is impossible to estimate, but requests received by the committee give evidence that it will be enormous.

With a paper shortage imminent, attempts are being made to collect old periodicals for pulp. Fearing this possible reduction in the already limited supply of scholarly and scientific journals, the committee hopes to enlist the cooperation of subscribers to CHEMICAL AND ENGINEERING NEWS in preventing the sacrifice of this type of material to the pulp demand. It is scarcely necessary to mention the appreciation of foreign institutions and scholars for this activity.

Questions concerning the project or the value of particular periodicals to it should be directed to Wayne M. Hartwell, Executive Assistant to the Committee on Aid to Libraries in War Areas, Rush Rhees Library, University of Rochester, Rochester, N. Y.

Manual on Phosphates

FOR those interested in superphosphates and other phosphorus carriers, "A Manual on Phosphates" by Vincent Sauchelli presents facts and data from many reliable authorities in nontechnical language.

The 94-page booklet contains a brief discussion of phosphorus as plant food, sections on mineral, organic, and by-product phosphates, reviews of experiment station results showing the importance of phosphorus in high value crops, a section on granulation which quotes several leading agricultural authorities on the subject, and three articles on practices and processes of the fertilizer industry reprinted from trade journals. The book concludes with miscellaneous information supplied in question-answer form.

Originally compiled for its own organization, the manual has now been published by the Davison Chemical Corp., Baltimore, Md., for complimentary distribution.

G. E. Introduces New Power Distribution System

A NEW electric power distribution system for industrial plants which will save the Nation many tons of vital copper and other strategic materials and enable defense plants to make speedier installations of power equipment was announced by the General Electric Co. at a meeting of business paper editors in New York, January 23. The new system, named the load-center power distribution system, would save the Nation upwards of 5,000,000 pounds of copper and steel if it were installed in all expansions proposed and underway for 1942.

On a medium-size factory with a power demand of 3,000 kv.-amp., using its voltage at 480 volts supplied from two utility 13,200-volt lines, it has been estimated that 7,800 pounds of steel, 11,500 pounds of copper, and 1,300 pounds of other materials can be saved—all vital to the war program. This means a saving of $12,000, or 21 per cent over the more complicated, outmoded systems.

The load-center power distribution system is characterized by the distribution of electric power directly to the production area, or load center, and is there stepped down to the voltage at which it is used. Short secondary cables then feed power to motors, lamps, and other equipment.

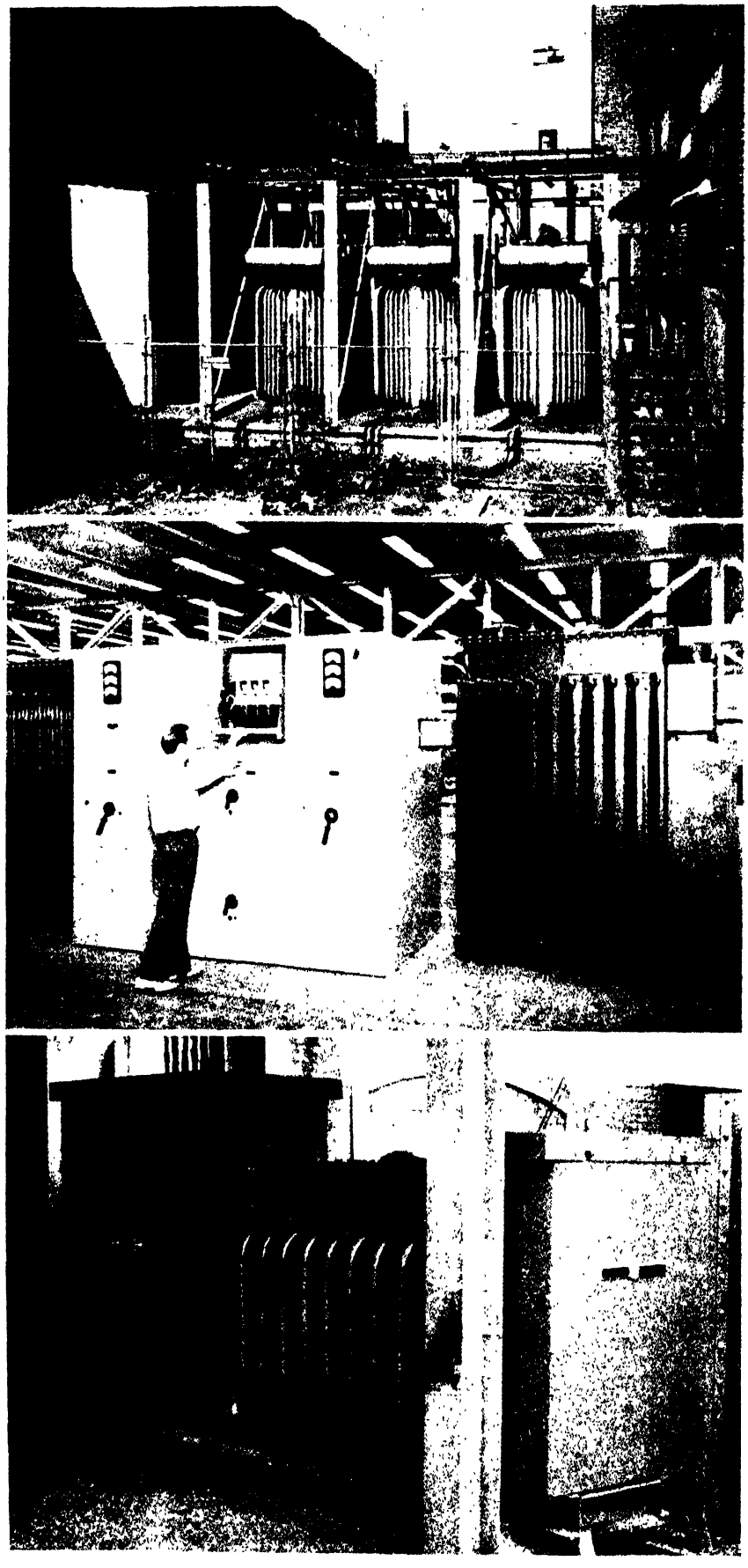
Other distribution systems usually employ a large substation to transform power from high voltage, ranging from 2,300 to 15,000 volts, down to the voltage at which it will be used. Long, heavy, low-voltage power cables then distribute the power throughout the factory to where it is to be used.

With the new system, a plant in which the total power load exceeds 1,000 kv.-amp. has several small load-center unit substations distributed throughout the plant, each near the center of its load area. This arrangement does away, largely, with the high cost and the voltage drop incidental to long, heavy, low-voltage circuits.

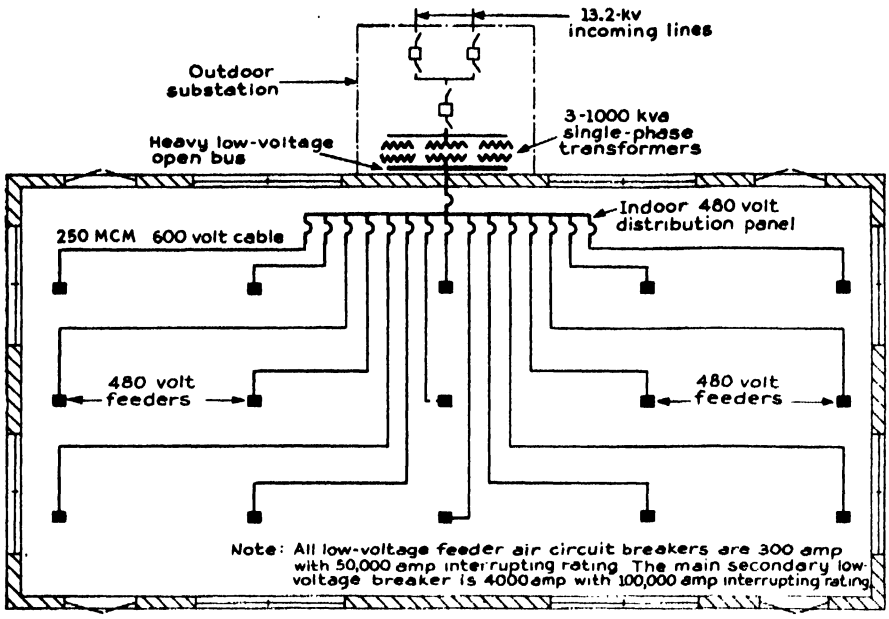
The two outstanding fundamental principles of load-center power distribution therefore are:

Power is distributed at high voltage to the load centers. There it is stepped down to utilization voltage and distributed to the load via short secondary feeders.

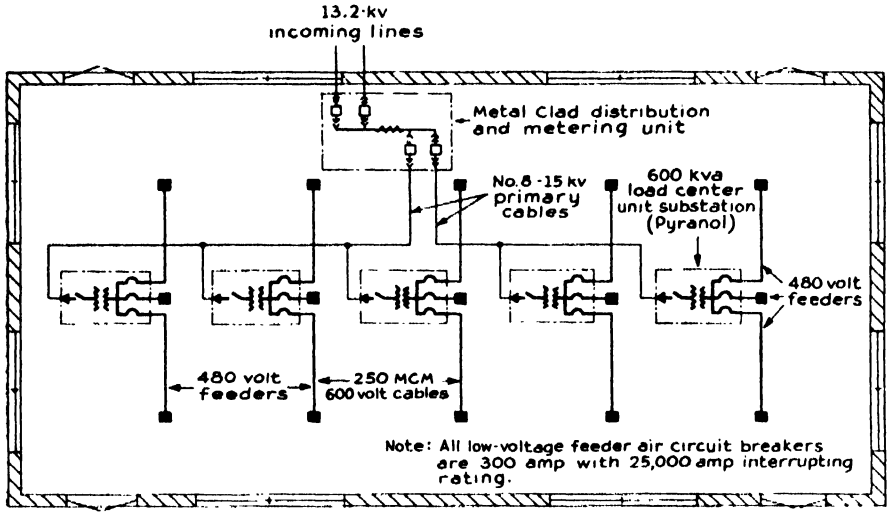
When the total load exceeds 750 to 1,200 kv.-amp., several small unit substations are used rather than a single large substation. Each small substation is located near the center of the load area, thus



Top. Old substation design, such as this installed outside industrial plant, frequently requires long secondary feeders of heavy copper originating at a considerable distance from the load center. *Center.* Load-center unit substation installed in an ordnance plant. Easily removable draw-out type secondary air circuit breakers are shown. *Bottom.* Even in outdoor installations, compactness of equipment has important advantages, as in the case of this 150-kv.-amp. load-center unit substation.



Floor plan of typical installation having a large outdoor substation in which large blocks of power are transformed from high voltage to distribution voltage and then are transmitted throughout the factory through the long, heavy, low-voltage feeders.



Floor plan of a load-center power distribution system

largely eliminating the high cost and voltage drop of long, heavy, low-voltage circuits.

Though load-center power distribution as such is not new, having been used successfully in the utility field, the recent development of standard fully enclosed and protected substation equipment, specially designed for installation in production areas, has opened the way for industrial use of this flexible, material-saving system.

Several factors combine to effect material savings. Because the low-voltage feeder runs are short, less secondary cable is needed. The transmission of power from a large substation to the production area by low voltage, as in the old system, requires many times the copper needed to supply the same amount of power by high voltage to the load-center unit substations. Since the smaller transformers of the load-center unit substation need less secondary short-circuit current, smaller feeder breakers can be used. Instead of an outdoor switching station, a small, compact, metal-clad structure is used.

In times of rapid plant expansion, as characterized today, it is often necessary for the power system to be in and working before expansions or new plants are completed. In the new system unit substations are completely wired and built in the factory and reach installation sites practically ready for operation. The old power systems require accurate forecasting of the location and magnitude of the load, to determine the best location for the large outdoor substation. It is also necessary to provide a "cushion" for future load growth. With the new load-center equipment, units can be placed right on the production floor where needed and additional units added when and where wanted disturbing the operating system. The load-center unit substation can be moved easily from one location to another to cope with changes in electrical demands which accompany changes in manufacturing technique.

Savings in Material with Load-Center Distribution

	Apparatus	Cable	Total
	Pounds		
Steel	4,800	3,000	7,800
Copper	400	11,100	11,500
Others	−1,200	2,500	1,300
Total	4,000	16,600	20,600

Savings in Cost with Load-Center Distribution

	Old	Load Center	Load Center Savings
Primary switchgear	$12,000	$13,100	−$1,100
Substations	34,400	27,500	6,900
Cable[1]	10,100	3,900	6,200
Total	$56,500	$44,500	$12,000

[1] Includes primary cable.

Substitute for Chlorinated Solvents Developed

An improved wetting and emulsifying agent, Dresinate, for use with all types of alkaline metal cleaners has been developed by the Research Department of Hercules Powder Co., Wilmington, Del. The new material assists aqueous alkaline solutions in certain applications to replace some of the chlorinated solvents, now scarce because of the chlorine shortage, and is cited by the company as a possible response to WPB's recent request that metal fabricators investigate cleaning methods which use no chlorinated solvents.

The penetrant, a finely divided, uniform powder, is available in practically unlimited quantities at a lower cost than the common emulsifying agents used by the metal cleaning industry, the company says. Addition of 3 to 15 per cent of Dresinate to an alkaline cleaning solution, while it reduces the alkalinity slightly, nevertheless increases the detergency of the solution. The material can be mixed with alkaline cleaners without special equipment since it is a dry powder, readily and completely soluble in water. Alkaline solutions containing the material are rapidly rinsed from metals, speeding the time required for the cleaning operation, according to Hercules.



Business Statistics

We are indebted to the Manufacturing Chemists' Association, 608 Woodward Bldg., Washington, D. C., for the following figures showing business conditions.

Monthly Statistical Report on Business Conditions

	Seasonally Adjusted			Without Adjustment		
	Feb. 1942	Jan. 1942	Feb. 1941	Feb. 1942	Jan. 1942	Feb. 1941
(Base 1935-39 = 100)						
Industrial production[a]	173[b]	171	144	168[b]	165	140
Chemical production	157[b]	154	124	157[b]	153	124
Steel production	210	208	187	210	208	187
Pig iron production	187	189	176	187	189	176
Freight car loadings	136	140	124	126	129	115
(Base 1923-25 = 100)						
Construction contracts, residential	91[b]	82	76	81[b]	68	68
All other	128[b]	147	118	109[b]	119	100
Department store sales, value	125[b]	138	103	99[b]	108	82

	Feb. 1942	Jan. 1942	Feb. 1941
Index of factory employment[c]:			
All manufacturing	132.9[b]	132.4	117.8
Chemicals	187.8[b]	185.9	155.1
Drugs	154.5[b]	151.6	119.3
Fertilizers	163.9[b]	124.8	113.2
Compressed gases	151.1[b]	147.9	128.0
Index of factory pay rolls[c]:			
All manufacturing	176.9[b]	173.5	126.8
Chemicals	277.1[b]	275.7	193.9
Drugs	186.4[b]	187.4	136.4
Fertilizers	159.5[b]	120.9	92.8
Compressed gases	203.3[b]	194.4	143.9
(Base 1926 = 100)			
Wholesale price indexes:			
All products (except farm products and foods)	94.9	94.6	84.4
Chemicals	96.3	95.3	85.7
Drugs and pharmaceuticals	126.5	126.3	96.9
Fertilizer materials	79.3	78.6	70.4
Purchasing power of the dollar:			
All products (except farm products and foods)	$1.053	$1.058	$1.185
Chemicals	1.039	1.049	1.168
Drugs and pharmaceuticals	0.790	0.792	1.032
Fertilizer materials	1.261	1.272	1.420

[a] Source of statistics in first seven items: Federal Reserve Board.
[b] Preliminary figures.
[c] U. S. Department of Labor.

Cuba Exports Crude Glycerol, Imports Refined

Cuba exports crude glycerol to the United States and imports the refined product from this country, Argentina, and Mexico. The largest consumption in Cuba is in toothpaste manufacture.

Although no official Cuban import figures on refined glycerol are available, exports of the crude product to the United States showed an annual average of 1,272,600 pounds for 1937-40. In 1940 such imports from Cuba by the United States amounted to 2,950,700 pounds valued at $219,600, while for the first nine months of 1941 imports stood at the same figure as for the whole of 1940 and had a value of $223,100.

The board of directors of the Swedish Norrbottens Jarnverk AB has recommended erection of a basic slag plant to produce approximately 10,000 metric tons annually.

Chemical imports valued at $275,000 were reported from the Gold Coast of Africa for the first eight months of 1941, compared with $288,700 for the same period of 1940, according to the U. S. Department of Commerce.

Sulfuric Acid Used Widely by Industries of Ecuador

Wide use of sulfuric acid in the industries of Ecuador is reported by trade advisors in that country, who add that formerly Germany and the United Kingdom supplied all imports. The acid is used in tanning, shoe manufacture, bleaching and dyeing cotton cloth, dyeing woolen yarns, drug manufacture, deoxidation baths for metal plating, and manufacture of small tin and other metal objects.

U. S. Is British Kenya's Top Pyrethrum Customer

Kenya, British African colony, shipped 620 tons of pyrethrum flowers in October 1941. Only about 40 tons went to destinations other than the United States. Shipments during July through October amounted to 2,246 tons, of which 1,880 were exported to the United States.

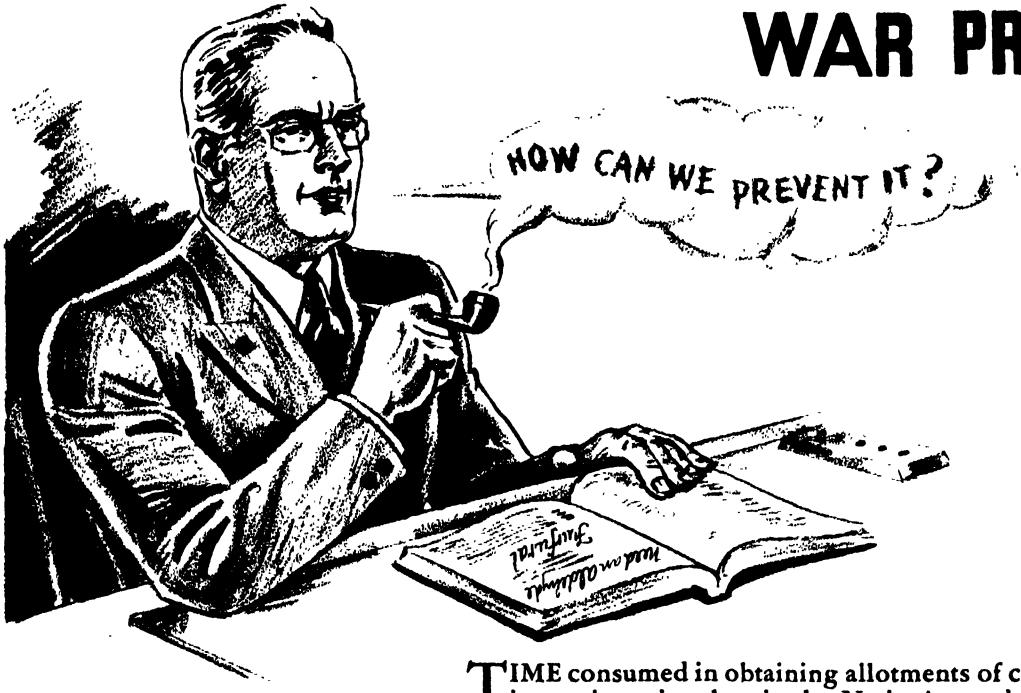
New Plaskon Laboratory

Newest among laboratories in the plastics industry, the research and engineering building of the Plaskon Co. was formally dedicated in Toledo on February 27, in the presence of 165 leaders of the industry. E. R. Weidlein, director of Mellon Institute, made the principal opening address.

The laboratory, which is under the direction of A. M. Howald, sets several new standards. The proportion of its space, 42.5 per cent, which is devoted to engineering and pilot plant is unusually large. Separate laboratories all open directly off the central engineering space. Special accommodations have also been built for engineering on customer problems. Pure research will be prosecuted in its own department. The technical library of many thousand volumes is the only one in its field in this region. The laboratory has 15,000 square feet and 250,000 cubic feet. Twenty-five technologists will staff it.



ARE MATERIAL SHORTAGES HINDERING YOUR WAR PRODUCTION?



TIME consumed in obtaining allotments of critical and strategic materials is precious time lost in the Nation's production effort. Your patriotic duty is to bend every resource to ease the strain on those strategic materials. So it is time to get acquainted with —

Furfural

The Furans

FURFURAL
FURFURYL ALCOHOL
TETRAHYDROFURFURYL ALCOHOL
HYDROFURAMIDE

Here is a ***plentifully available*** aldehyde made in the center of the Nation from domestic raw materials. In many cases it proves to be more than a mere substitute. For example, enterprising resin manufacturers find that in phenolic resins, Furfural makes a pound of phenol go further.

Typical properties of this compound include:

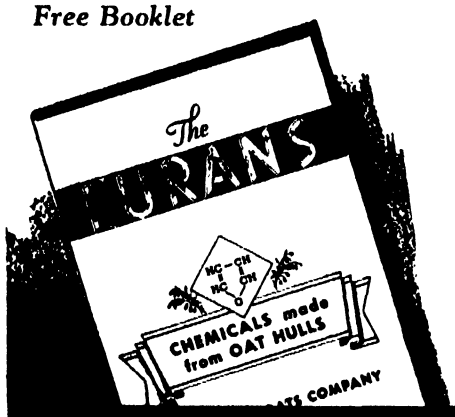
Boiling point	157–67 °C.
Specific gravity	1.161 (20/20)
Freezing point	—37 °C.
Flash point (open cup)	56 °C.
Color	Straw yellow to amber

It is miscible with most organic solvents except petroleum hydrocarbons and glycerol. Water solubility at 20 °C. is 8.3%. It disperses cellulosic derivatives such as nitrocellulose and cellulose acetate.

Properly handled Furfural is amazingly stable. To many individuals it comes as a surprise that in at least one field of application it is heated repeatedly to temperatures of 400 °F. and above without decomposition of consequence.

As a selective solvent, resin ingredient, preservative, general solvent, light sensitive agent, adhesion improver, wetting agent, stain, and resin dispersent you must not overlook Furfural.

Write for this Free Booklet



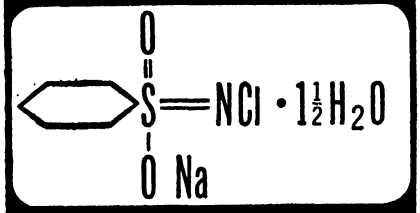
The Quaker Oats Company

TECHNICAL DIVISION 1-3

141 W. JACKSON BOULEVARD . . CHICAGO, ILLINOIS

FURFURAL - FURFURYL ALCOHOL - HYDROFURAMIDE
. . . TETRAHYDROFURFURYL ALCOHOL . . .

CHLORAMINE-B



Sodium N-chlorobenzenesulfonamide

PROPERTIES:

White flat glistening plates, free flowing, and containing 29+% available chlorine. The solid material is stable to light, air, and moderate heat.

The water solubility at 20°C. is 20%, and solutions are stable if protected against direct sunlight. Chloramine-B is almost neutral in character, but is compatible with alkalies, both as solid mixtures and in solution.

Highly effective as a germicide, but not appreciably toxic or irritating to living tissue. Adapted for use in aqueous solutions, particularly at temperatures above 45°C.

AVAILABILITY:

At the present time Chloramine-B can be furnished from our pilot plant in small quantities for use in research and development work. Commercial quantities are expected to be available in the future.

SAMPLES AND INFORMATION:

We will welcome the opportunity to furnish samples and additional information. Write to:

THE SOLVAY PROCESS COMPANY

Product Development Section

40 Rector Street, New York, N. Y.

THE WALL STREET OF CHEMISTRY

	Year's Earnings		Per Common Share	
	1940	*1941*	*1940*	*1941*
Advance Aluminum Castings	$ 102,727	$ 103,146	$0.64	$0.64
Air Reduction Co.	6,446,680	7,116,677	2.38	2.62
Allegheny Ludlum Steel Corp.	3,722,107	5,062,709	2.78	3.86
American Commercial Alcohol Corp.	57,847	1,052,122	0.22	4.03
American Cyanamid Co.	6,629,729	6,766,292	2.44	2.42
American Hard Rubber Co.	456,457	495,087	4.73	5.50
American Rolling Mill Co.	7,642,714	11,228,475	1.96	3.21
American Smelting & Refining Co.	12,735,204	15,742,662	4.21	5.59
American Zinc, Lead & Smelting Co.	596,305	766,500	0.38	0.63
Basic Refractories, Inc.	445,890	450,592	1.27	1.29
Bristol-Myers Co.	2,523,642	2,377,860	3.73	3.56
Callite Tungsten Corp.	145,352	205,208	0.36	0.51
Canadian Celanese, Ltd.	1,341,429	1,853,039	2.21	3.99
Canadian Westinghouse Co., Ltd.	1,203,382	1,418,312	2.20	2.60
Climax Molybdenum Co.	6,039,373	8,954,104	2.40	3.55
Columbian Carbon Co.	3,068,799	3,529,159	5.71	6.57
Eastman Kodak Co.	20,076,739	21,588,790	7.96	8.57
Fansteel Metallurgical Corp	215,540	363,154	0.86	1.58
International Nickel Co.	35,544,772	34,356,401	2.30	2.22
Jones & Laughlin Steel Corp.	10,277,029	16,274,983	..	..
Koppers Co.	3,934,832	6,656,860	2.73	5.46
Link-Belt Co.	2,514,380	2,913,059	3.37	3.95
Magma Copper Co.	1,132,908	1,492,255	2.78	3.66
Merck & Co., Inc.	2,463,683	3,155,538	7.28	2.88
National Refining Co.	227,804[a]	596,329	..	0.40
Newport Industries	311,230	707,895	0.50	1.14
North American Rayon Corp.	1,781,426	1,832,831	3.18	3.34
Parke, Davis & Co.	8,187,712	8,006,462	1.67	1.64
Pittsburgh Plate Glass Co.	13,793,937	14,989,178	6.30	6.82
Pratt & Lambert, Inc.	444,925	567,173	2.29	2.92
Revere Copper & Brass, Inc.	2,916,001	4,066,616	2.52	2.64
Union Carbide & Carbon Corp.	42,247,274	42,041,624	4.55	4.53
U. S. Graphite Co.	184,652	269,744	1.15	1.69
U. S. Smelting, Refining & Mining Co.	5,950,175	4,916,260	8.16	6.20
Vulcan Detinning Co.	504,592	559,688	..	..
Weston Electric Instrument Corp.	734,842	937,638	4.57	5.84

[a] Loss.

The **Air Reduction Co.** reports the largest sales in its history, amounting to $53,566,687 and a 47 per cent increase over 1940. Federal, state, and local taxes aggregated $8,923,715 ($3.29 per share), compared with $3,607,861 ($1.33 a share) in 1940. In March 1941 the company and the U. S. Industrial Alcohol Co. joined with the Continental Oil Co. in forming Petroleum Chemicals, Inc., which has erected a research and development plant in Baltimore. In view of the large cash requirements for the company's expanding volume of business, on February 10, 1942, the company borrowed from four banks a total of $10,000,000, of which $2,500,000 is payable in four annual installments, and the remaining $7,500,000 is due at the expiration of the fifth year.

Sales of the **American Rolling Mill Co.** for 1941 amounted to $169,178,239, the largest in the company's history. Sales in 1940 totaled $112,363,529. Shipments of steel were 44.5 per cent above 1940. Cost of enlargements and new plants financed by Armco and the Defense Plant Corporation for war production will be $51,000,000.

The **Blaw-Knox Co.** reported a new high record in sales, mostly to meet demands of the war effort. Net sales were $30,799,560 in 1941, compared with $18,481,802 in 1940. Working capital was increased during the year by $1,229,355 to a total of $6,376,153, while the funded debt was reduced by $283,000, leaving a total of $2,717,000.

Sales of the **Columbian Carbon Co.** for 1941 established a new high record, an increase of 30.8 per cent over 1940. Earnings before taxes were at a peak, but there was a 146 per cent increase in federal taxes. Total sales for the first two months of 1942 have exceeded the corresponding months of 1941. Capital expenditures of $4,555,441 in 1941 exceeded those of any previous year except 1929.

The net sales of the **Fansteel Metallurgical Corp.** increased 216 per cent over 1940, while the sales of the **Vascoloy-Ramet Corp.** rose 368 per cent over the same period.

Merck & Co., Inc., during 1941 split stock 3 for 1. Production at all the company's plants reached an all-time peak by the end of the year. Consolidated net sales amounted to $39,615,121, compared to $23,766,375 the previous year. In June 100,000 shares and in December 53,690 shares of 4.5 per cent preferred stock were sold; company used $3,000,000 of proceeds to pay off bank loans.

VINSOL* RESIN

A LOW-COST EXTENDER FOR SHELLAC

The recent O.P.M. order controlling shellac sales has focused unusual interest on Vinsol Resin—a dark-colored, hard, high-melting, rather insoluble resinous material which is currently available in very large quantities at an attractive price.

Vinsol Resin is a true thermoplastic, with a melting point between 112° and 115°C., an acid number of 93, and is available in three forms: as a fine, non-caking powder, in lamellar flakes, and in lump form.

Blended with reduced quantities of shellac, in existing formulations, Vinsol Resin is already functioning to conserve shellac and to reduce over-all material costs for a few makers of plastic objects. Present limitations on purchase of shellac call for consideration of a similar step on the part of all who use this material in molding.

Vinsol Resin may provide the answer in your case. You can readily find out by mailing the coupon below. You will incur no obligation, since we feel that one vital part of our present-day responsibility to all industry is the most effective use of our materials and knowledge.

NAVAL STORES DEPARTMENT
HERCULES POWDER COMPANY
INCORPORATED
923 MARKET STREET WILMINGTON, DELAWARE





HERCULES POWDER COMPANY Wilmington, Delaware

Gentlemen:

Please indicate ways in which we can conserve our supplies of shellac.

We are using it for_____

(please be as specific as possible)

Signed _____ Title _____

Company _____

Address _____

LL-64

*Reg. U. S. Pat. Off. by Hercules Powder Company



A Story—

WE DARE NOT TELL!

The scene might be in the Western Plains Country, or it might be somewhere near sea water, but regardless of location, it is a story that can't be told now. Never have such water systems been constructed. The idea is entirely new and is of major importance to the armed forces.

One fact worthy of note is that Layne was called on to drill the wells, furnish and install the pumps and to fulfill other important missions. In record time, everything has gone through on schedule. The task, though entirely new and very complicated, was handled by Layne engineers as if their usual methods had been employed.

It is characteristic of Layne to meet and conquer unusual well water supply problems. Layne engineers are trained for unforeseen eventualities. To fulfill the requirements of the Government was difficult, but promptly and satisfactorily accomplished.

Your water supply system may not involve any such highly secretive plans, but whether in the conventional or of an entirely new nature, Layne can serve you. For literature address

LAYNE & BOWLER, INC.
Memphis, Tenn.

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PUMPS & WELL WATER SYSTEMS

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Layne-Arkansas Company	Stuttgart, Ark.
Layne-Atlantic Company	Norfolk, Va.
Layne-Central Co.	Memphis, Tenn.
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Layne-Louisiana Company	Lake Charles, La.
Layne-New York Co.	New York City.
Layne-Northwest Company	Milwaukee, Wis.
Layne-Ohio Company	Columbus, Ohio
Layne-Texas Company	Houston, Texas.
Layne-Western Company	Kansas City, Mo.
Layne-Western Co. of Minn.	Minneapolis, Minn.
Layne-Bowler New England Corp.	Boston, Mass.
International Water Supply, Ltd.	London, Ont.

New Members Elected February 1 to March 1, 1942

Total Membership as of March 1—29,560

Akron Section. Wayne F. Anderson[1], Seward J. Averill[1], Charles E. Feasel, Jr.[1], Vernon L. Folt[1], David H. Johnson, Max H. Keck[1], Laurel G. Parkinson[1], C. R. Parks[1], Robert M. Pierson[1], Arthur L. Robinson[1], Carl Snyder[1], J. Arnold Weatherford.

Alabama Section. W. H. Baxley, Jr., John B. Fenn, William F. Prosch, Edwin M. Trigg[1], David S. Weddell.

Ames Section. Walter A. Gregory[1], R. Wayne Hannah[1].

Baton Rouge Section. Raymond C. Glowaski, Thomas Houtman[1], Walter A. Roth[1].

Binghamton Section. Andre Schoen.

California Section. William H. Alderson, Glenn C. Brock, Theodore E. Fullmer, John A. Gordon, Jr., Charles R. Grau[1], Jack R. Hannaman[1], Howard W. Hill, Whitney E. Lawrence[1], Fred J. Leitz, Jr.[1], William E. Lewis, Masami Nakamura[1], E. Nielsen[1], Douglas G. Norton[1], Louis G. Oleari, Jr., Fremont F. Radcliffe, Lowell O. Russell, Frank J. Sevigne[1], Roy L. Shaw, Jr.[1], Theodore Vermeulen, Robert D. Walker, Douglas L. Watkins, Glenn E. Welde[1], Herbert W. Zimmermann.

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Cincinnati Section. Charles F. King, Richard K. Leininger[1], Carl W. Lundgren, Eldred A. Mode[1], Stephen G. Sevougian[1].

Cleveland Section. Woodrow W. Abrams[1], Wilbur W. Ferris, Duane S. Hall, Robert H. Helle[1], Frederick C. Herot[1], William W. Hosler, John K. Jacobs, Aaron D. Johnson, Fred E. Kendall[1], Walter T. Olson.

Colorado Section. Elmore W. Easter[1], Lance H. Hoop, Russell Morris, Virginia Patterson[1], Bernard R. Stock[1], Edward Twieg[1], Norman F. Witt.

Columbus Section. John R. Boyd, Oscar J. Hassel, Eugene C. Kerr[1], Donald F. Swinehart[1], Robert W. Terry.

Connecticut Valley Section. Charles L. Boyce[1], Paul Doigan[1], Alfred T. Marinaro[1], Norman C. Reed[1], Donald Wood.

Cornell Section. Fred W. Billmeyer, Jr.[1], Alfred T. Blomquist, Hugh K. Clark, Robert Ehrenfeld[1], Floyd W. Green[1], Daniel S Sears[1], Oscar J. Swenson, Ernest H. Wood[1].

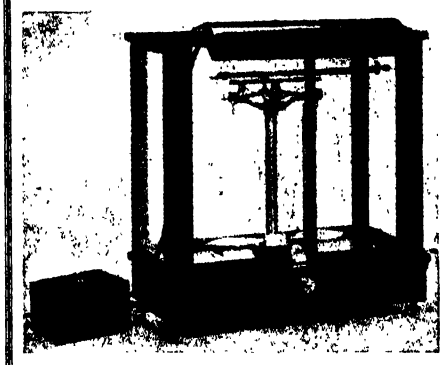
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It was also observed at an early date that sometimes fruit juices underwent another type of change which resulted in the development of sourness. Milk was also found to become sour on storage. Since the resulting products found practical use, empirical methods of regulating these alterations were developed.

Not until the investigation of Pasteur was it recognized that these changes were due to the growth of various microscopic organisms. It had been noticed earlier, however, that the development of visible organisms, termed molds, also resulted in changes of the medium on which they grew.

Since Pasteur a large number of experimenters have developed methods not only of preventing, but also of encouraging, the growth of these organisms, both visible and microscopic. Others have studied the chemical changes brought about by them. It is now recognized that these reactions are similar to, or in many cases the same as, those occurring during the development of a fruit or vegetable and are natural vegetative processes.

As a result of some of these researches a considerable variety of products of industrial importance is now being manufactured by the careful cultivation of a number of these organisms. Since this is a comparatively new field, it can safely be assumed that with time the number of compounds produced by such methods will be greatly enlarged. The probability of this is increased by the fact that the raw materials for such processes are generally of American agricultural origin, thus removing any dependence on foreign products.

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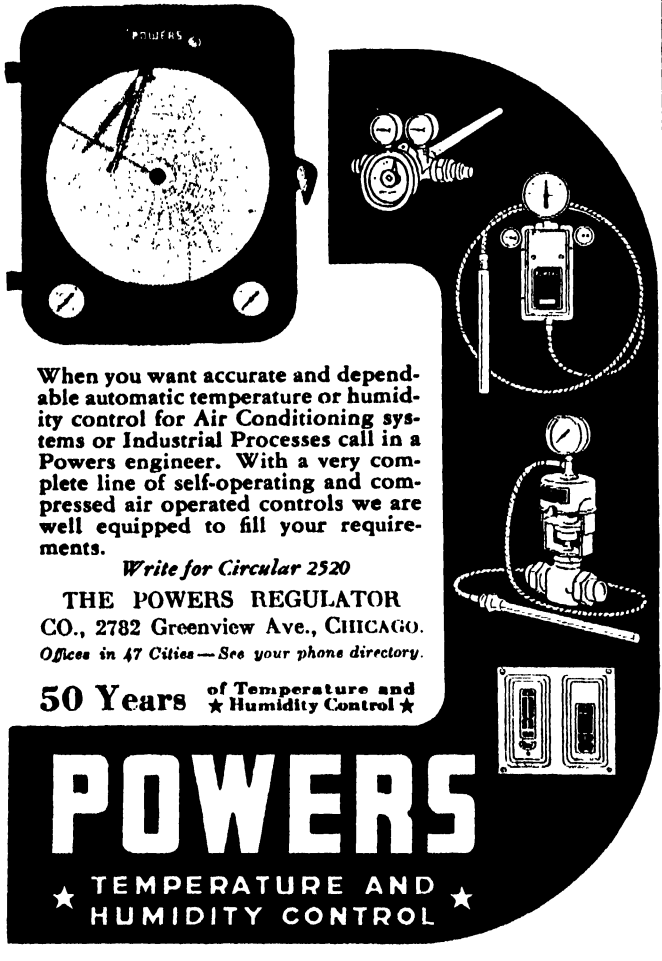
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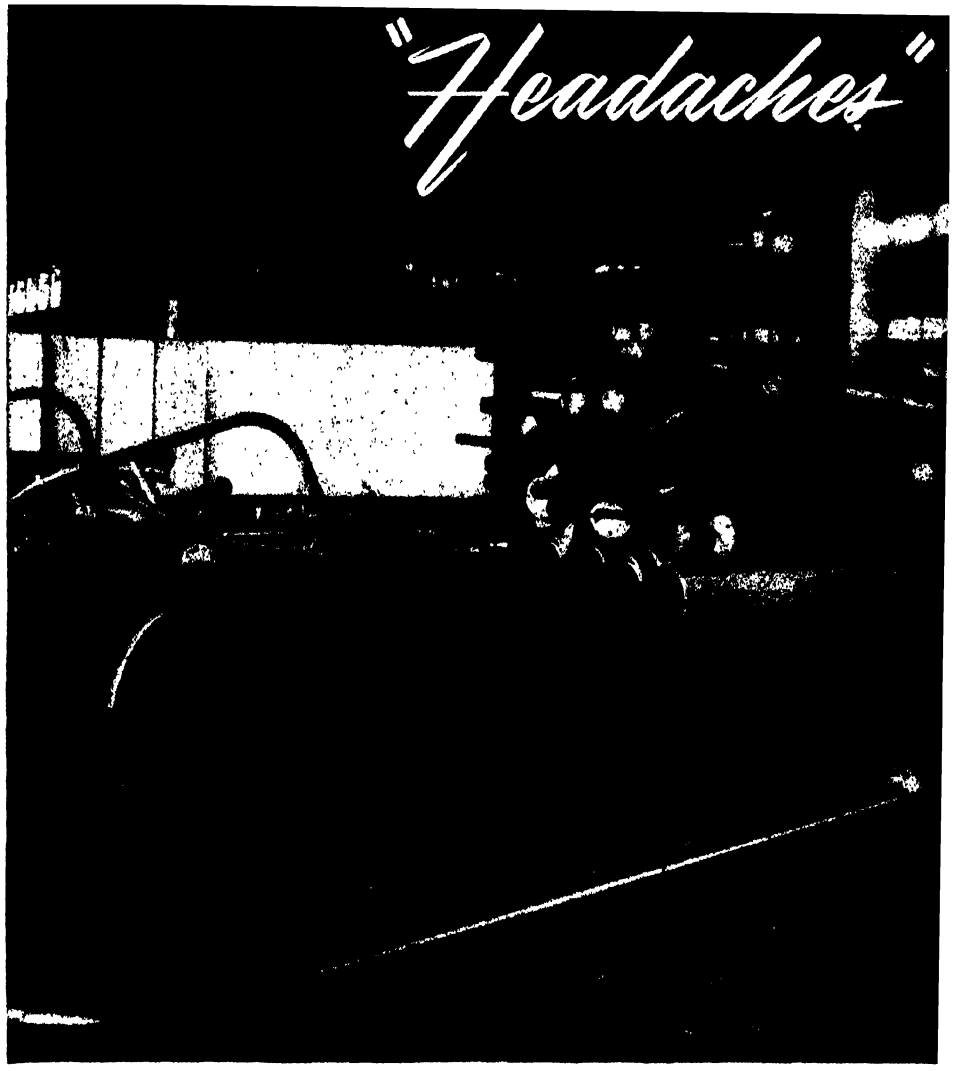
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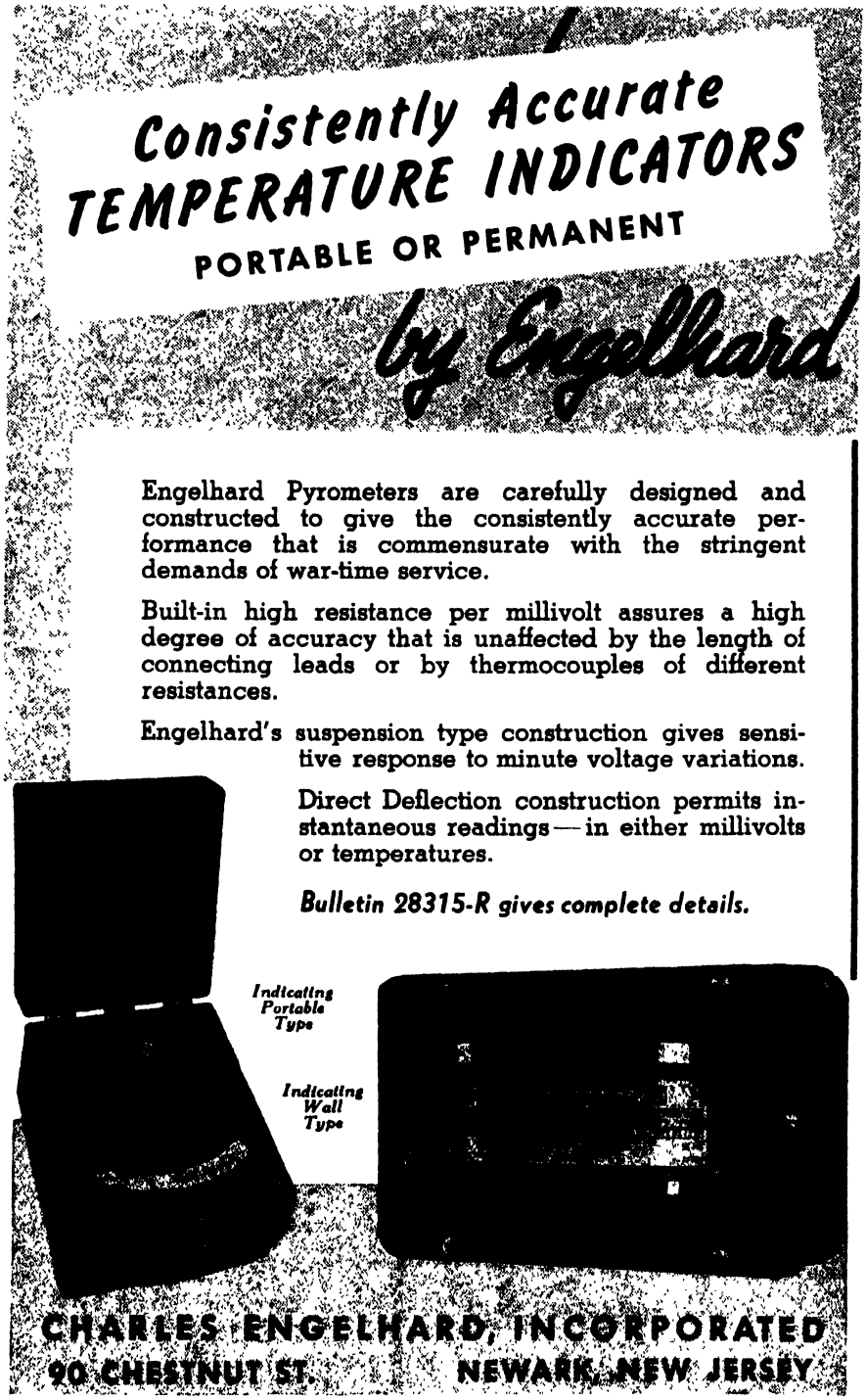
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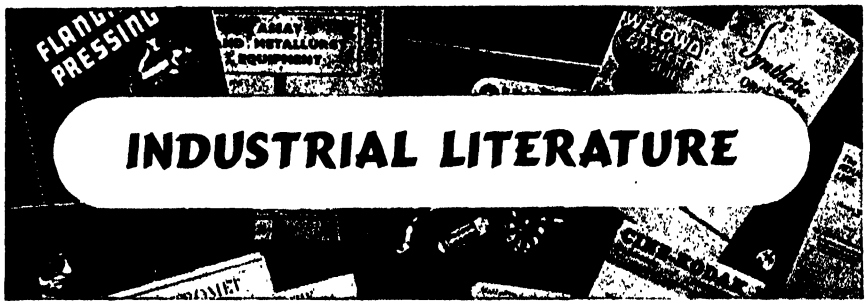
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Boiler Mounting and Insulation. This 16-page illustrated booklet is devoted to the installation of horizontal return tubular boilers. Various methods for laying firebrick are discussed. *Form 20E4 CEN.* Ramtite Co., Division of S. Obermayer Co., 2563 West 18th St., Chicago, Ill.

Brass and Bronze Castings Data. A 20-page bulletin gives physical and metallurgical properties related to various casting formulas. *Practical Data on Brass and Bronze Castings Bulletin CEN.* Hammond Brass Works, 1844 Summer St., Hammond, Ind.

Centrifugal Castings. A 4-page pamphlet discusses centrifugally cast products of ferrous and nonferrous alloys. The effect of casting centrifugally is somewhat the same as that obtained through hot-forging or rolling. Among the products covered are heat-transfer tubes, conveyor rolls, digester tubes, and pump plungers. *Bulletin 4227-C CEN.* Duraloy Co., Scottdale, Penna.

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Fine Chemicals. A 19-page booklet briefly describes properties and uses of 39 chemicals. *Fine Chemical Products Booklet CEN.* Seydel Chemical Co., 225 Mercer St., Jersey City, N. J.

Freight Cars and Fabricated-Plate Equipment. This 32-page brochure describes the products and activities of this manufacturer of freight cars and welded-plate equipment. Among the various features discussed is the method of making pressure vessels out of hot-formed rings that require the welding of a single joint, a process said to reduce internal strain. *General American Transportation Brochure CEN.* General American Transportation Corp., 135 South LaSalle St., Chicago, Ill.

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Metal-Cleaning Compounds. A 32-page leaflet describes a line of cleaning, degreasing, and stripping compounds for the metal industries, cleaning compounds and solvents for the automotive industry, and cleaning compounds for maintenance, etc. *Leaflet CEN.* Fidelity Chemical Products Corp., 430 Riverside Ave., Newark, N. J.

Pneumatic Differential Pressure Transmitters for indicating, recording, and controlling meters are the subject of a 4-page pamphlet. Principles of operation, construction details, capacity, applications, and prices are given. *Pneumatic Differential Pressure Transmitter Bulletin CEN.* Moore Products Co., H and Lycoming Sts., Philadelphia, Penna.

Pyrometers. Greater sensitivity is said to be attained within these pyrometers by use of photoelectric cells and mirror galvanometers for both recording and controlling. This 36-page catalog illustrates construction of the instruments and many typical cases of installation. *Catalog 1101 G CEN.* C. J. Tagliabue Mfg. Co., Park and Nostrand Aves., Brooklyn, N. Y.

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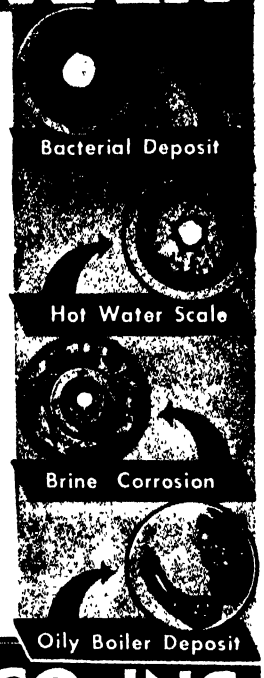
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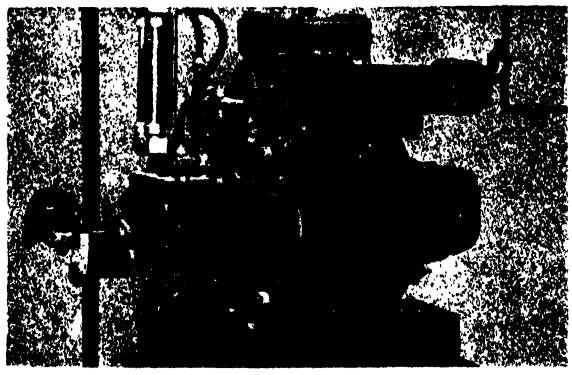
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March 25, page 390

Industrial Literature

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EVERLASTING VALVE CO., 49 Fisk St., Jersey City, N. J.

Rotary Dryers and Kilns. This 55-page catalog is a treatise on rotary equipment. Its many illustrations show various types of equipment and constructional details. Several pages of physical properties are included. *Bulletin 89 CEN.* C. O. BARTLETT & SNOW CO., Cleveland, Ohio.

Safety Equipment. A 4-page pamphlet describes such items as carboy trucks and tilters, eyeshields, respirators, goggles, gloves, and aprons. *Safe Handling of Acids and Chemicals Pamphlet CEN.* PULMOSAN SAFETY EQUIPMENT CORP., 176 Johnson St., Brooklyn, N. Y.

Standards for Fans and Blowers. This 12-page booklet, now in its third edition, contains revised standards for centrifugal fans and blowers manufactured by 10 companies. Included are air density ratios for various altitudes and temperatures and charts comparing fans made by various manufacturers. *Form X-12 CEN.* NATIONAL ASSOCIATION OF FAN MANUFACTURERS, 5–208 General Motors Bldg., Detroit, Mich.

Steam Plant Operation. A 20-page booklet covers maintenance and operating procedures necessary to keep a plant in shape to handle safely emergency loads. *Bulletin 16 CEN.* BAILEY METER CO., Cleveland, Ohio.

Tachometers. A 4-page pamphlet describes heavy-duty, American-made hand tachometers, available for speeds from 200 to 2,000 r. p. m. Also shown are vibrating-reed tachometers and frequency meters. *Bulletin 1710 CEN.* JAMES G. BIDDLE CO., 1211–13 Arch St., Philadelphia, Penna.

Thermostatically Controlled Valves. This 8-page catalog describes a temperature-controlled valve which is entirely self-acting, requiring no air or electricity for its operation. This valve finds application on portable equipment such as Diesel engines as well as many items of plant equipment. *Catalog 38R CEN.* TAYLOR INSTRUMENT CO., Rochester, N. Y.

Vitreous Silica. Eight 4-page pamphlets give properties, sizes, applications, and prices of a line of Vitreosil equipment. Included are VCM crucibles and other items for the coal chemist, electric immersion heaters and containers for heating acids, gas-sampling tubes, hydrochloric acid equipment, special transparent apparatus and equipment, Thermal alumina ware, pipes and fittings, industrial crucibles, dishes, muffles, pots, retorts, tanks, and trays. *Bulletins 1 to 8 CEN.* THERMAL SYNDICATE, LTD., 12 East 46th St., New York, N. Y.

Window Guards. Several types of industrial window guards are shown in this 4-page pamphlet. *Form 592 CEN.* BUFFALO WIRE WORKS CO., INC., 320 Terrace, Buffalo, N. Y.

Second Edition—Thoroughly Revised and Enlarged

MANUFACTURE OF SODA

by TE-PANG HOU, Ph.D.

A. C. S. Monograph No. 65

THE present acute shortage of soda ash and the consequent rapid expansion of existing plant facilities make the publication of this volume an event of the first importance not only to the soda industry itself, but to others closely related to it. New plants will be brought into production, older ones enlarged, and every effort will be made to attain maximum operating efficiency from all. It is in this connection that this book will be of particular value, for it constantly stresses the importance of efficiency, and explains precisely the best methods of attaining it.

Since the first edition was exhausted, there has been a constant demand for its revision and enlargement. With this in mind, the author has not limited himself merely to bringing it up to date, but has expanded it to embrace the entire field of soda manufacture, to such an extent that the second edition is in reality a wholly new book. This is evidenced by the fact that the revised edition contains nearly twice as many pages as the first.

No effort has been spared to include the fullest details about all the methods of soda manufacture—LeBlanc, Trona, Solvay, and electrolytic. Production statistics, analytical methods, and detailed calculations are given in such form that they will be of ready use to plant engineers, production supervisors, and industrial executives. Special attention has been given to the mechanical requirements of the modern soda-ash plant, including one entire chapter on their layout and design, and another on the use of centrifugal pumps in the industry. Such important operating details as conditioning and control of boiler feed water and generation of power are thoroughly treated.

Dr. Hou has supervised the installation of many soda-ash plants in China, and is largely responsible for the development and modernization of the industry in that country.

Chapters

Introduction. Historical Survey of Alkali Industry and Relation of LeBlanc Soda Industry to Development of Other Chemical Industries
Natural Soda
History of Ammonia Soda Process: Statistics
Preparation of Brine: Rock Salt and Sea Salt
Purification of Brine
Burning of Limestone
Ammoniation of Saturated Brine
Carbonation of Ammoniated Brine
Working of Carbonating Towers or "Columns"
Filtration of Crude Sodium Bicarbonate (Ammonia Soda): Composition of the Bicarbonate
Composition of Mother Liquor From Carbonating Towers
Phase Rule in Tower Reactions: Graphical Representation of Ammonia Soda Process
Decomposition of Sodium Bicarbonate by Calcination
Recovery of Ammonia—Efficiency of Operation in Ammonia Still
By-Products From Distiller Waste
Allied Products of Ammonia Soda Industry
Position of Ammonia Soda Industry
Manufacture of Refined Sodium Bicarbonate
Manufacture of Caustic Soda—Chemical Process
Manufacture of Electrolytic Caustic, Chlorine, and Chlorine Products
Wet Calcination of Sodium Bicarbonate
Generation of Power for Ammonia Soda Plants
Boiler Operation and Conditioning of Boiler Feed and Cooling Water in Ammonia Soda Plant
Special Requirements of Ammonia Soda Industry
Control in Ammonia Soda Process
Losses and Consumption of Raw Materials in Ammonia Soda Process
Modifications and New Developments of Ammonia Soda Process
Chemical Analyses and Tests in Alkali Industry
Behavior of Soda Ash in Storage
Layout, Design and Location of Ammonia Soda Plant
Centrifugal Pumps Applied to Ammonia Soda Industry
Appendix, Index

590 Pages **182 Tables** **149 Illustrations** **Price $9.50**

REINHOLD PUBLISHING CORPORATION, 330 W. 42nd Street, New York, N. Y.

Tin Recovery

A process for recovering tin and steel from used tin cans, requiring no preparation of the cans on the part of the householder or other users of canned commodities, can now be applied to large-scale production, according to an announcement by the Metal & Thermit Corp., 120 Broadway, New York, N. Y. This company has been operating a test plant at San Francisco for the past five years.

The pilot plant is a complete unit with a capacity of over 6,000 tons. From its operations, suitable methods have been worked out for the recovery of about 24 pounds of tin oxide and almost a ton of scrap steel per ton of discarded cans. The tin oxide is readily smelted to a grade equivalent to Straits tin, the grade formerly secured from the Malay Peninsula, now in Japanese hands.

The San Francisco plant handles cans collected from the city of Oakland and nearby communities. The processing unit comprises unloading equipment, inspection station, rotary screens for dirt removal, incinerator for charring cans to destroy fat, paper, lacquer, and other combustibles and to separate the carbonaceous residue, shredding and pre-washing equipment, storage facilities, and complete equipment for continuous detinning by the alkali process.

Rough estimates indicate that about 2,500,000 tons of tin cans are discarded annually in this country and that about 1,000,000 tons of these could be economically collected and detinned, yielding about 11,000 tons of tin and 900,000 tons of scrap steel.

Detinning of tin plate clippings obtained from can companies and other sources has been a well-established industry for more than 30 years, but detinning of used cans has been impractical in peace times. The principal problems involved are those of collection, preparation, and transportation of cans.

IS YOUR DRYING PROBLEM SIMILAR TO THESE TURBULAIRE* APPLICATIONS?

These products are being satisfactorily handled by Turbulaire Spray Dryers.

WASTE RECOVERY
Molasses Residue
Stick Liquor
Pickle Liquor
Packing House Waste
Blood
Distillery Slop
Sulphite Liquor
Black Liquor
Gas House Sulphur
Sludge
Waste Brewery Yeast
Winery Residues

FOOD PRODUCTS
Egg Yolks
Baby Foods
Ground Vegetables
Gelatin
Grain Products
Yeast
Whole Egg

TECHNICAL PRODUCTS
Aluminum Sulphate
Ammonium Phosphate
Barium Sulphate
Calcium Arsenate
Calcium Carbonate
Calcium Chloride
Calcium Hypochlorite
Carbon Black
Lithopone
Magnesium Carbonate
Copper Arsenite
Dextrin
Dextro-maltose
Phthalic Acid
Glue
Insecticides
Lead Arsenate
Lime Sulphur Solution
Pigments
Rosin Size
Magnesium Hydrate
Manganese Sulphate
Metallurgical Chemicals
Magnesium Chloride
Salt
Sodium Arsenite
Sodium Sulphate
Synthetic Resins
Synthetic Rubbers
Tannin Solution

Turbulaire Spray Drying successfully recovers solids dissolved or suspended in liquids to meet today's production requirements. Materials recovered are fine particles of uniform size, having identical physical and chemical characteristics—ready for packaging or further processing.

● A one pint sample of your product is sufficient for a preliminary examination to determine the advisability of Spray Drying it. A test incurs no obligation.



Turbulaire Spray Dryer, bottom driven atomizer type.



Write TODAY! Send for this Bulletin giving complete information on Turbulaire Spray Dryer.



Flow diagram of Turbulaire closed cycle operation.

TURBULAIRE*
*TUR'-BU-LAIRE
SPRAY DRYERS

WESTERN PRECIPITATION CORPORATION
Engineers, Designers and Manufacturers of Equipment for Collection of Suspended Materials from Gases and Liquids
Main Offices: 1814 W. Ninth St., Los Angeles, Cal.
New York: Chrysler Bldg., N. Y. C. • Chicago: 140 S. Dearborn St., Chicago, Illinois • San Francisco: Hobart Bldg., San Francisco, Calif.
PRECIPITATION COMPANY OF CANADA, LTD.
Dominion Square Building, Montreal

Texas Gulf Sulphur Co. Announces Record Year

According to the United States Bureau of Mines, production of crude sulfur in the United States in 1941 attained a new record of 3,139,253 long tons, a 15 per cent gain over 1940. Mine shipments increased about one third and were the largest on record—3,401,410 long tons compared with 2,558,742 tons in 1940.

With reference to operations of the Texas Gulf Sulphur Co. during 1941, Walter H. Aldridge, president, in his annual report says:

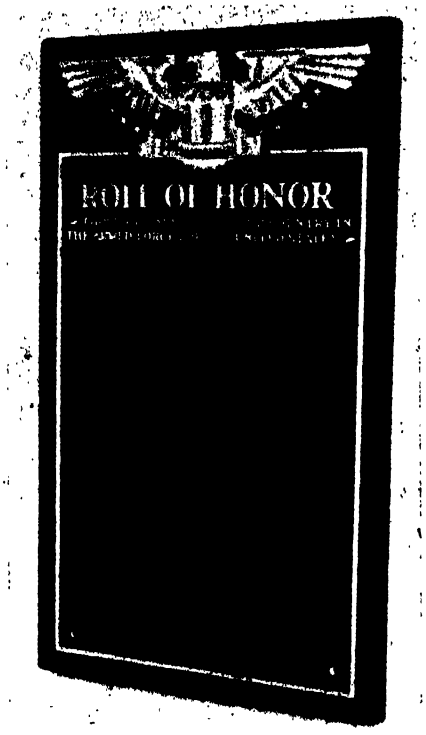
Notwithstanding shipments of more than 2,000,000 tons of sulfur during 1941, the largest in the history of the company, the stocks of sulfur above ground at the mines today are at virtually the same tonnage as a year ago. Total stocks of the company at all points, including the mines, remain in excess of 3,000,000 tons, and exceed by about 5 per cent the corresponding figure at the beginning of 1941. The Texas Gulf Sulphur Co. is prepared to produce sulfur at a materially higher rate than that of 1941, if the demand should make such an increase necessary.

Motion Pictures on Arc Welding

Six one-reel, all-color sound motion pictures designed to help speed war efforts through the faster and better training of welding operators are now under way for the General Electric Co., Schenectady, N. Y. Titled "The Inside of Arc Welding", the films are being produced by the Raphael G. Wolff Studios, Hollywood, which have evolved a new technique for picturing this difficult subject.

When completed the pictures will be made available to public, private, and industrial welding schools, as well as to other interested groups. The first of the pictures, covering the fundamentals of arc welding, is scheduled for general release about April 20. The other pictures will be available about June 1, and will deal with technique of arc control and electrode manipulation for all welding positions, using both direct- and alternating-current equipment.

Glass Used for Roll of Honor Plaque



THE new Roll of Honor plaque designed by the Pittsburgh Plate Glass Co. for plants, offices, and other organizations having employees or members serving in the armed forces of the United States provides both a temporary and permanent record of names of those serving their country.

The plaque is made of polished black Carrara glass on which the emblem is sand-carved and painted with varnish-protected gold leaf. The name of the individual company or organization is inscribed at the bottom. As employees or members depart for service their names are painted on the plaque with white or gold paint. When the list is complete, the names can be inscribed permanently by sand-blasting, rearranging them in alphabetical order if desired.

Use of glass instead of metal releases critical metals for more important war needs. The glass provides a permanent memorial that is impervious to the elements, retains its sparkling finish, does not craze, and cannot tarnish.

Anthracene Output in United Kingdom Tripled

A RAPIDLY strengthening industry based on anthracene is reported for the United Kingdom, where the output is expected shortly to triple the prewar level. Extensions under way are expected to bring production to four times the peacetime rate, with developments in the intermediate industry which will make it a competitive influence even when Continental products are again available.

Does BECKMAN pH CONTROL Pay?

Does it!

Read What Happened in Chicago!

Today minutes are priceless . . . *and so are materials!* So anything that will speed up production . . . anything that will save time in process operations . . . anything that will reduce waste and increase output, merits your immediate investigation. Beckman pH Control is doing these things—NOW . . . in thousands of different fields, ranging from electroplating aircraft parts to refining sugar . . . from speeding up chemical processes to reducing costs of waste disposal.

Trial



Sometime ago the Sanitary District of Chicago made a trial installation of Beckman Automatic pH Control in their large Stickney Plant. Months of rigid testing proved, conclusively, that Beckman pH Control makes important savings in chemicals, increases plant efficiency, reduces waste, saves time!

Repeat

So profitable was the initial Beckman installation, that the Sanitary District ordered a second Beckman Automatic pH installation for its Calumet Plant to control pH of the treating operations there.

Repeat

And now the District has ordered a THIRD Beckman Automatic pH installation for still another location in its large municipal system. There's no mistaking conclusive evidence like that!

And it is doing its job so well that one installation leads to another. For example, the Sanitary District of Chicago tried Beckman Automatic pH Control on the chemical end of its sewage-treating operations . . . found it saved not only time and chemicals, but increased plant efficiency and decreased operating costs so successfully that a *second* installation was ordered for another plant . . . and now a THIRD installation has been ordered for still another location. *Clear-cut evidence like that tells its own story!*

WHAT ABOUT *Your* PLANT!

Do you use water or water solutions *anywhere* in your plant? . . . in chemical or electro-chemical processes? . . . in boiler feed? . . . in waste disposal? . . . *anywhere?* Then investigate NOW what Beckman pH Control can do toward helping you do your job better — faster — with less waste! Our research staff will gladly study your problem and can perhaps suggest how others in your field are now using Beckman pH Control to cut costs . . . *save time!*

NATIONAL TECHNICAL LABORATORIES • SOUTH PASADENA, CALIFORNIA

WORLD'S LARGEST MANUFACTURER OF GLASS ELECTRODE pH EQUIPMENT

Beckman THE LEADING NAME IN pH

Acoustic Fences Aid Guards

TINY robot sentries, many times more efficient than men in weather where visibility is low, are aiding human guards along the miles of high wire fences that enclose some of the country's greatest war production plants. In addition to extending the hearing range of guards, the acoustic fence apparatus provides an ever-ready checking-in system. A watchman need only step up to the fence and report in an established code by tapping. The messages can be received through a loud speaker, made to record themselves silently on moving tape or drum showing the exact time, arranged to ring a bell, or relayed automatically to police or military headquarters. The system, invented by a du Pont engineer, is being manufactured for general use by Automatic Alarms, Inc., Youngstown, Ohio, where all inquiries should be sent. Its cost is said to be such that even small factories may install it.

New Chemicals Manufactured

MANUFACTURE of thioglycolic acid and its salts in quantity at commercial prices is announced by Martin Laboratories, Inc., 117 West 63rd St., New York. The chemicals, made by an entirely new process, patents applied for, are thioglycolic acid, sodium thioglycolate, monoethanolamine thioglycolate, and calcium thioglycolate.

Foster D. Snell, Inc., Expands Laboratory Facilities

INCREASING laboratory space by more than 50 per cent in the past year, Foster D. Snell, Inc., Brooklyn, N. Y., has added substantially to its facilities for consulting and research services. Aside from additional unit laboratories, the space is devoted to an enlarged constant-temperature room, additional photographic and photomicrographic equipment, another animal room which permits the handling of almost double the number of experimental animals, an enlarged library, and additional facilities for handling sensitivity tests on human subjects.

Present plans call for another laboratory outside of New York devoted solely to furniture and furniture finishes.

New Invention Permits Tight Seal between Iron and Glass

NEED for nickel and cobalt, critical war metals, is eliminated by a new development for making tight seals between iron and glass, patented by Albert W. Hull and Louis Navias of the General Electric Research Laboratory, Schenectady, N. Y.

Platinum was used in the first electric lamps, since it has nearly the same rate of expansion as the glass then employed. Various substitutes for platinum were devised, satisfactory for lamp seals although not adapted to the large seals used for powerful vacuum tubes. Dr. Hull and others developed special nickel-iron-cobalt alloys for this latter application.

The new invention of the G. E. scientists permits tight seals to glass without drawing on the limited supplies of nickel and cobalt. They have devised a series of glass compositions which can be used with iron and certain iron alloys. One consists of 45 per cent silicon dioxide, 14 per cent potassium oxide, 6 per cent sodium oxide, 30 per cent lead oxide, and 5 per cent calcium fluoride. The rate of expansion is very close to that of iron.

In seals using this series a further and separately patented invention of Dr. Navias also proves useful. When a glass containing lead is sealed in contact with iron, some of the lead atoms migrate from the glass into the metal. This weakens the joint and may let air leak into the tube. Dr. Navias proposed placing a thin layer of lead-free glass directly over the metal, then sealing the lead-containing glass to that. The thin glass layer prevents the lead from reaching the iron, yet it is not thick enough to crack.



THESE two tanks in the plant of Carnegie-Illinois Steel Corp., Duquesne, Pa., were lined with two courses of acid-proof brick laid entirely in Penchlor Acid-Proof Cement.* They are used for pickling steel bars where the mechanical as well as the chemical action is especially severe.

Due to their large size—45′ x 5′ x 4′—both tanks were built with expansion joints in their lining. Inspection after a year's constant use showed absolutely no signs of permanent expansion of the lining. Both bricks and cement are still in perfect condition.

This is typical of the way Penchlor Acid-Proof Cement stands up in tough service. It is inert to all acids except hydrofluoric. It adheres strongly to such materials as brick, steel, glass, carbon, lead, and rubber. Quick-setting and self-hardening, it speeds up acid-proof construction.

For extremely abrasive conditions, or where thermal shocks are extreme, Asplit Cement* provides utmost durability and prevents spalling of bricks. It is a synthetic resin that far outlasts other types of acid-proof construction.

Penn Salt has been engaged for a great many years in the manufacture of acids and alkalies. We have naturally had considerable experience in the use of cements to resist corrosion, and are in a position to give technical advice. We will welcome inquiries on your problems.

***Fully protected by *existing* patents.**



PENNSYLVANIA SALT MANUFACTURING COMPANY
Chemicals

1000 WIDENER BUILDING, PHILADELPHIA

NEW YORK · CHICAGO · ST. LOUIS · PITTSBURGH · WYANDOTTE · TACOMA

Dangers of Blasting Caps Emphasized

ALL users of explosives are asked to cooperate in protecting children from the dangers of playing with blasting caps. Although warnings against allowing these caps to fall into the hands of children are contained in each box of caps, records show that many of them are left lying carelessly about. Those who use explosives can make themselves the most important factor in the movement to save children from injuries and sometimes death by making sure that the caps are carefully stored where boys and girls cannot get them.

Accidents to children from playing with blasting caps decreased in 1941 as compared with 1940. The desire this year is to eliminate these dangers as completely as possible. A limited number of posters and explanatory folders are available from the Institute of Makers of Explosives, 103 Park Ave., New York.

General Motors War Program

THE General Motors Co., Detroit, Mich., has announced a three-point program to keep the planes, tanks, and guns of the United Nations at the highest possible efficiency. The company will help train mechanics required to keep the force in action by maintaining schools for Army and Navy instructors, place its own engineers in the field to expedite reports on operating experience, so that its war products can be improved constantly, and assist the Army and Navy in having replacement parts on the spot when needed.

The training job calls for expenditures totaling not less than $5,000,000 for the current year and will involve training thousands of instructors throughout the country.

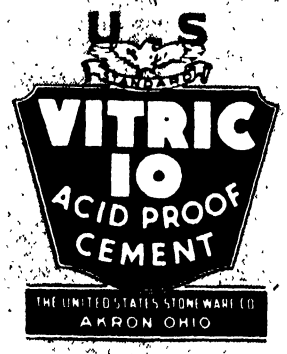
New Process for Latex

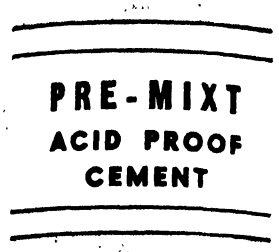
A NEW method of processing is said to extend the volume of latex from 50 to 300 per cent (depending upon the use to which it is to be put), while retaining the major characteristics of the original product as well as a good proportion of its natural strength. After being extended by this new process, normal (38 per cent) latex is returned to its owner in the form of a 37 per cent concentration, and concentrated (60 per cent) latex is returned in the form of a 55 per cent concentration.

Developed in the laboratories of the Union Bay State Co., 50 Harvard St., Cambridge, Mass., the process makes use of a filler material of fine size that blends extremely well with the rubber particles. This, together with the filler material's many points of similarity to latex, makes the extended product readily adaptable to most cementing, impregnating, and coating operations.

ACID-PROOF CEMENTS

Save You Days







"Vitric-10" Quick-Setting Acid-Proof Cement hardens by internal chemical set into a strong, acid-proof, granite-like structure of permanent durability. Initial set occurs in 25-30 minutes.

All Are Self-Hardening

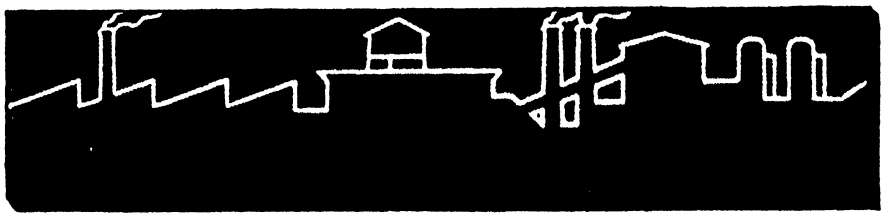
"Pre-Mixt" comes in powder form and requires only mixing with water on the job. From the standpoint of convenience and general utility, "Pre-Mixt" is without equal.

All Are Quick-Setting

"Super-Vitric" hardens thruout the mortar joint by chemical reaction rather than evaporation. Forms dense, porcelain-like structure of minimum porosity.

"U. S. Stoneware" Acid-Proof Cements adhere strongly to brick, steel, glass, lead and rubber.

THE U. S. STONEWARE CO.
WORKS (SINCE 1865) AKRON OHIO



Diglycol Stearate S

NICKEL alloys can be drawn, stamped or formed, and annealed without cleaning by using a dispersion of Diglycol Stearate S in water, reports the Glyco Products Co., Inc., 230 King St., Brooklyn, N. Y. Diglycol Stearate S is a white, waxlike solid, dispersible in water, with a melting point of 51 to 54° C. It will fire off completely at any annealing temperature (400° F. minimum) in an atmosphere of oxygen or hydrogen.

For example, an alloy composed of 78 per cent nickel, 4 per cent manganese, copper, and iron was drawn with a 2 per cent dispersion of Diglycol Stearate S, as follows:

Flat plate approximately 5 inches square
First draw: 2 inches deep, 1 1/2 inches in diameter (anneal)
Second draw: 3 inches deep, 1 inch in diameter (anneal)

For drawing and stamping, a 1 per cent concentration sprayed is usually sufficient as a lubricant. Even lesser concentrations can generally be used to replace sulfonated oils which are used as coolants in stamping. In all cases there was no residue on firing.

Solenoid-Operated Butterfly Valve

AN APPLICATION of the butterfly valve for emergency duty is announced by the R-S Products Corp., 4530 Germantown Ave., Philadelphia, Penna. This solenoid-operated valve provides two-position control, either automatic opening or wedge-tight shut-off in case the electric power fails or is turned off in any war emergency. In an open position the butterfly vane is held open by the magnetic action of the solenoid. In case of fire due to incendiary bombing, for instance, the valve in a gas or chemical line would be set for automatic closing. Should explosive or poisonous gases escape, automatic opening of an air-pressure line would minimize the danger of personal injury or property damage. The valve itself can be constructed of any metal alloy and in various sizes for air, gas, steam, oil, hydraulic, and other services.

Motors and Control Slide Rule

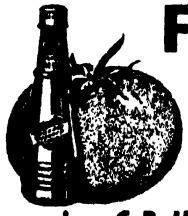
A POCKET-SIZE "slide rule" selector for electricians, plant maintenance men, and others interested in the selection of electric drive equipment has recently been announced by the Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penna.

To guide in the selection of the proper type of motor for each of 44 industrial applications, a convenient table lists the various uses and indicates which of the four principal types of alternating-current motor should be selected. The specifications, performance ratings, and control classes for the required type are readily determined by making the corresponding setting on the slide.

Tung Oil Substitute for Wrinkle Finishes

ADAPTATION of Kellin, new tung oil substitute, by New Wrinkle, Inc., makes it feasible and economically possible for the first time to produce a satisfactory commercial wrinkle finish from a linseed oil base. This new formulation was developed and tested within two weeks following announcement of Kellin by Spencer Kellogg & Sons, and in the face of years of varnish manufacturing practice and a general opinion in the paint industry that linseed oil was inferior to tung oil as a base for wrinkle finish. The new formula was developed by William A. Waldie, technical director, New Wrinkle, Inc., in the laboratory at Dayton, Ohio.

Use of Kellin for the production of wrinkle finish is particularly significant at this time because wrinkle is specified as standard for many pieces of war equipment. Thus thousands of gallons of tung oil, a critical material now that importations from the Far East have been discontinued, can be released for other purposes. The new Kellin-Wrinkle formula has been announced by New Wrinkle, Inc., to its more than 160 manufacturing licensees.



Faster Heat Speeds Catsup Processing at P. J. RITTER plant

using C-B High Pressure Condensate Return

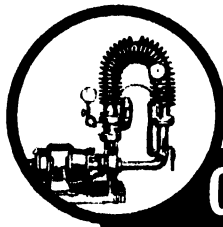
The P. J. Ritter Co., of Bridgeton, N. J., produces a well known line of catsups, tomato products and other foods. The recent application of two Cochrane-Becker high-pressure condensate return systems to their coil cookers has resulted in (1) saved process time; boil reached in half the time and concentrating time reduced 15 percent (2) improved color and better quality control (3) more even boiler operation (4) higher steaming capacity of boilers (5) 13 percent less fuel.

Write for publication on 3025



Two C-B units installed at P. J. Ritter Co. plant at Bridgeton, N.J.

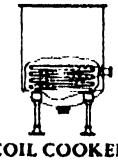
The Cochrane-Becker System is based on the action of an eductor, which is constantly energized by a jet from a specially designed pump and given balance and continuity by a loop, forming a closed circuit to insure positive priming. Condensate is therefore returned to boiler at high pressure and temperature.



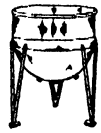
COCHRANE CORPORATION
3132 N. 17th St. Philadelphia, Pa.

COCHRANE-BECKER
SYSTEM OF
HIGH-PRESSURE CONDENSATE RETURN

The Cochrane-Becker system can improve results obtained from this kind of equipment



COIL COOKERS



JACKETED KETTLES



JACKETED MIXERS



DRYING ROLLS



DRYERS

Pneumatic Differential Pressure Transmitter

A PNEUMATIC differential pressure transmitter has been developed by Moore Products Co., H and Lycoming Streets, Philadelphia, Penna., to provide a simple method for accurately measuring and amplifying small differential pressures and pneumatically transmitting this amplified value to a receiving meter calibrated in the units measured. The most important characteristic of the method is the true linear function and constant ratio of amplification. The ratio may be varied to suit specific requirements, but depends only on a fixed ratio of bellows areas and does not use any levers or sliding members which might cause friction errors.

The differential sealed-in unit is made with phosphor bronze or stainless steel welded bellows. A separate pilot is provided where long distances of transmission are required.

In operation a high pressure tap connects with the inside of a large bellows and a low pressure tap connects to the opposite side. Regulated and filtered air is admitted through a removable restriction screw into a small bellows chamber inside the large one, and this air discharges through the exhaust nozzle in the small bellows. Any increase or decrease of differential pressure across the large bellows moves it to or from the exhaust nozzle, causing an increase or decrease of the air balancing pressure in the small amplifying bellows. This pressure automatically maintains all the bellows in a position of

CONTINUED ON PAGE 508

INVESTIGATE *Resin and Lacquer Emulsions* as LATEX SUBSTITUTES

—Extenders and Modifiers

Resin and Lacquer Emulsions have been finding an ever-widening use in many industries. They have proved invaluable in replacing other materials in adhesives, modifiers, binders and fillers, grease proofing, waterproofing, sizing, impregnating, coating, color dispersions and innumerable other uses.

In the Rubber Industry these emulsions are being used today as *Latex Modifiers* and *Complete Latex Replacements* to extend, thicken, stabilize, increase penetration, improve resistance to acids, oils and solvents, and to mechanical coagulation, etc.; *in Coatings* to produce adherent pigmented coatings and as intermediate coats for lacquer on rubberized cloth; in *Rubberizing* textiles; in *Latex Treated Papers* to increase strength and improve ageing; in *Adhesives*, for paper, for leather to cloth, and cloth to cloth.

These are just a few of the known applications in the rubber field. Undoubtedly in your own plant you will find many uses for these emulsions to improve your products and extend the supply of the vital materials, LATEX and RECLAIMS.

Our Technical Staff will be glad to make recommendations to meet your specific problems. Write today for additional information.

AMERICAN RESINOUS CHEMICALS CORPORATION

Coatings • Pigment Dispersions • Resin, Wax, Lacquer Emulsions

MAIN OFFICE and LABORATORIES, PEABODY, MASS.

Factory Branches: Newark, N. J. and Chicago, Ill.

A Few of Our Products of Interest to the Rubber Industry

•

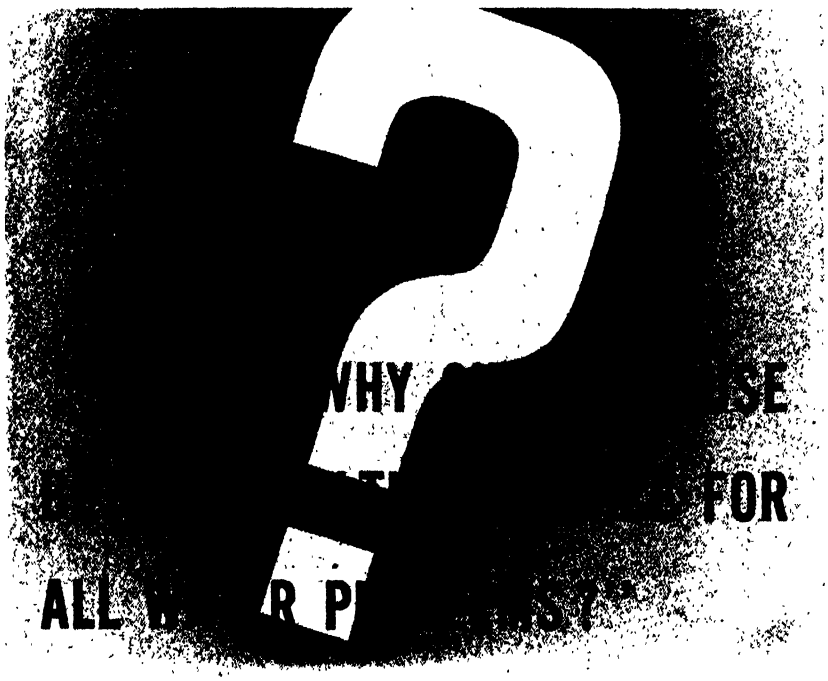
ALKYD 17-B A permanently tacky, alkyd type resin emulsion containing 40% solids. When mixed in equal proportions with normal latex, the mixture for all practical adhesive purposes is indistinguishable from latex.

ALKYD 18 An alkyd type resin emulsion which is non-yellowing and non-oxidizing. Film is water-white and non-tacky. Preferred where slight oxidizing action may be considered harmful to rubber. Extender for latex in coating, combining and impregnating processes.

EMULSION 58-8 A series of emulsified elastometers containing up to 65% solids. Recommended for use as full latex replacements in impregnation and combining.

PIGMENT BASES Concentrated aqueous dispersions of pigments in resin bases, available in all shades and viscosities, suitable for spreading, spraying, etc.

Also Acrylic, Vinyl, Maleic, Phenolic, Hydrocarbon, Ethyl Cellulose, Cellulose Acetate and Nitrate emulsions and solutions for various applications.



THAT is a fair question to which we give this answer. Water is neither a standard raw material nor a standard product. It is rarely suitable for either power or processing needs without conditioning before use. The solution of all problems relating to the conditioning and use of water is the business of the Betz Consulting Division whose services include:

- **Analysis of requirements**
- **Plant design**
- **Preparation of Specifications**
- **Procurement of bids**
- **Supervision of erection**
- **Acceptance test runs**
- **Operating instruction for plant personnel**
- **Service maintenance**

Chemical engineers and others normally concerned with the problems of water requirements for power, plant and process are now confronted with extraordinary demands upon their time. The Betz Consulting Division will assume entire responsibility for this part of their work. Betz service is available for a complete plant or for any single step in design or operation.

Write for information, giving us details of your specific water problems.

W. H. & L. D. BETZ

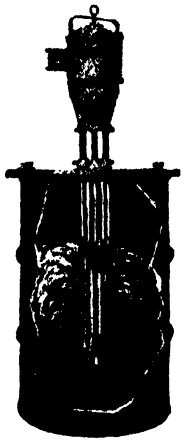
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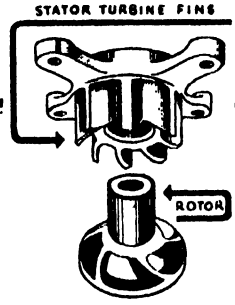
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Industrial News

CONTINUED FROM PAGE 506

equilibrium with respect to the exhaust nozzle. This pressure is transmitted to the indicating, recording, or controlling meter which may be located at a remote point.

Stainless-Clad Steels Replace Sheet Brass

How stainless-clad steels are helping to relieve shortages in certain types of metals is illustrated by the case of the Cherry-Burrell Corp., Chicago, Ill., manufacturers of milk-handling equipment. The Cherry-Burrell Corp. developed an ingenious conveyor chain at their Little Falls, N. Y., plant. Links in this chain were made from sheet brass, but when brass was classified as a critical material the manufacturer was forced to find a suitable substitute or discontinue its manufacture.

Tests on samples of Silver-Ply stainless-clad steel, supplied by the Jessop Steel Co., Washington, Penna., convinced engineers at Cherry-Burrell that this material was the solution. Stainless-clad steel was found to possess the nontarnishing and corrosion-resisting properties of the brass sheets formerly used, while at the same time it permitted material costs to be held to a reasonable figure.

Stainless-clad steel can be used extensively during the present emergency as a substitute for solid stainless because the relatively thin layer of stainless in the clad product requires less alloy and effects the desired corrosion resistance. A 20 per cent clad sheet or plate of stainless-clad steel, for example, saves four fifths of the stainless steel required in a comparable sheet or plate of solid stainless. Continued acceptance of stainless-clad steel during peacetime is predicted by Jessop Steel because of its lower costs as compared to solid stainless steel.

Dynamite Cartridge

A new dynamite cartridge which will expand under tamping to fill the bore hole and concentrate the charge has been developed by the Explosives Department of Hercules Powder Co., Wilmington, Del. The new cartridge, called "Tamptite", eliminates the necessity of slitting cartridges, and permits concentration of a charge within the hole with little or no spillage of powder.

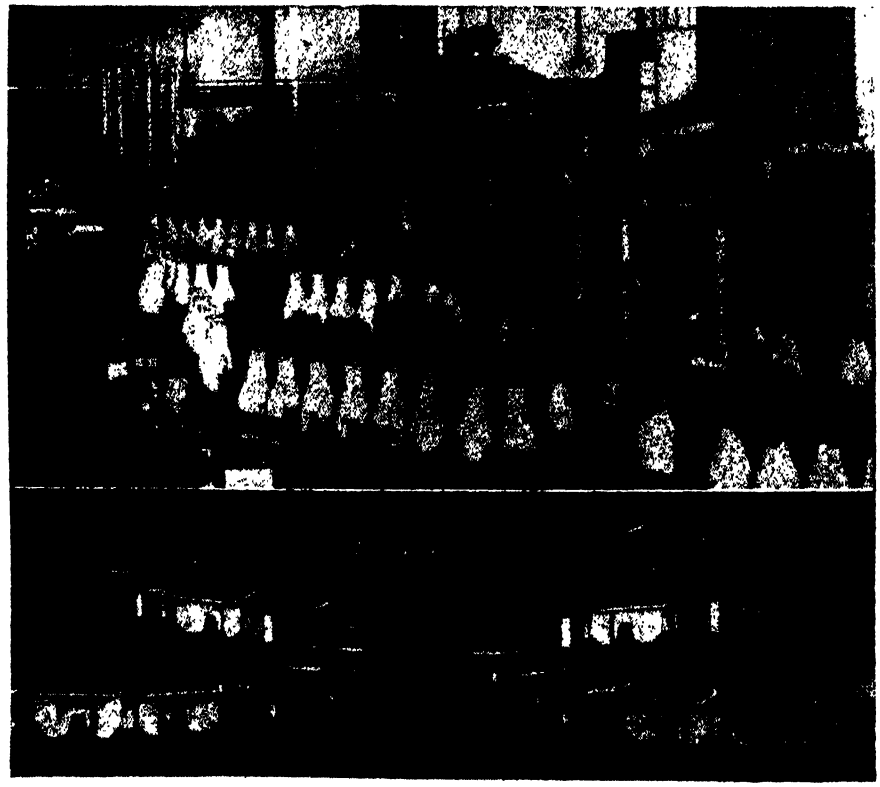
The dynamite is packed in a waxed paper shell having a line of perforations spiraled around the dynamite stick. The line of perforations is located between inner and outer layers of paper so that there is no direct track through which moisture might enter or ingredients leak out. When tamped in a bore hole, the cartridge does not open as a slit cartridge does, but unwraps slightly as it expands to fill the hole. Splitting along the perforated line permits the dynamite to be telescoped to a shortened length while it expands to the diameter of the hole. Even in upper holes where dynamite in slit cartridges often spills, little or no spillage occurs with the new cartridge.

All the Hercules brands and grades commonly used in mining, quarrying, contacting, and underground work in sizes up to 1.75 inches in diameter are available in the new shell.

New Type of Asphalt Tile

The development of a new type of asphalt tile designed to prevent the accumulation of static electricity has been announced by the Building Materials Division of the Armstrong Cork Co., Lancaster, Penna.

The new material, which will be known



Links in this chain, formerly of sheet brass, are made from stainless-clad steel.

KODAK

NEW EASTMAN CHEMICALS

5156	p-n-Amoxybenzoyl Chloride BP 158-161°/6 mm.	100 g.	$5.00 C
P 5267	N,N-Di-(γ-phenyl-n-propyl)-p-toluidine (Pract.) BP 220-225°/1 mm.	100 g.	8.00 C
P 5298	2-Hydroxy-3-methoxybenzaldehyde (Pract.) MP 38-42°	500 g.	3.00 D
5308	Tetrahydrofuran BP 64-67°	10 g.	1.50 A
4283	Tetramethylene Bromide BP 194-197°	10 g.	2.00 A
T 5305	Trimethylbenzylammonium Hydroxide (38%) (Techn.)	1 kg.	2.40 E

Write for *Eastman Organic Chemicals, List No. 32*

EASTMAN KODAK COMPANY, *CHEMICAL SALES DIVISION*, ROCHESTER, N. Y.

as Armstrong's conductive asphalt tile, provides a surface condition which results in less than 0.1 megohm resistance to static electricity under certain specific conditions. An additional safety feature of this flooring is that no open flames are required during installation or repair work.

Camouflage Paints

THE Truscon Laboratories, Detroit, Mich., announce a new product, Truscon camouflage coating, based on U. S. Army specifications for camouflage or visual deception for industrial areas.

The coating is put up in nine colors, plus black and white. Colors are dead flat and do not show any high lights even when viewed at sharp angles.

A new material devised by the Truscon Laboratories, given the name of VD glaze, has the useful property of immediately blotting out reflection from specular surfaces. It may be applied to glass, steel, concrete, brick, terra cotta, over paint, etc.

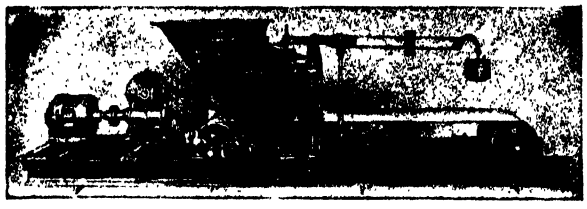
If applied to the outside of windows on a southern exposure, it keeps out the glare of bright sunlight where it is not wanted and reduces temperature within the work room.

Though the tints are translucent and admit daylight, when viewed from the outside the glass appears to be opaque.

Lanolin Substitute

LANOLIN for industrial purposes can in many cases be successfully replaced by Sublan, recently introduced by the Glyco Products Co., Inc., 230 King St., Brooklyn, N. Y. Sublan is made from domestic raw materials and is freely available for civilian use. In appearance it closely resembles lanolin, being a light-colored stiff paste. It has a melting point of 55° to 60° C., and a surface tack similar to that of lanolin. Sublan is insoluble in water, glycerol, and most water-soluble liquids. It is partially soluble in alcohol and vegetable oils. It is soluble in toluene and mineral spirits in the cold, and

CONTINUED ON PAGE 516



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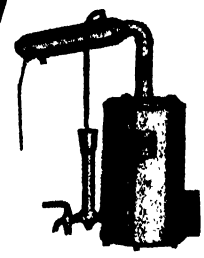
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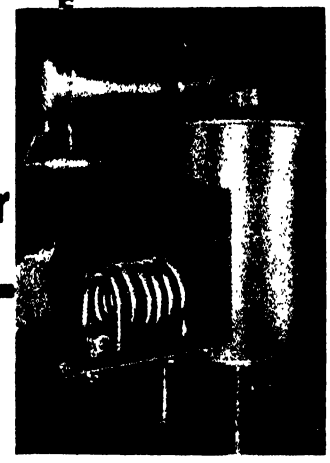
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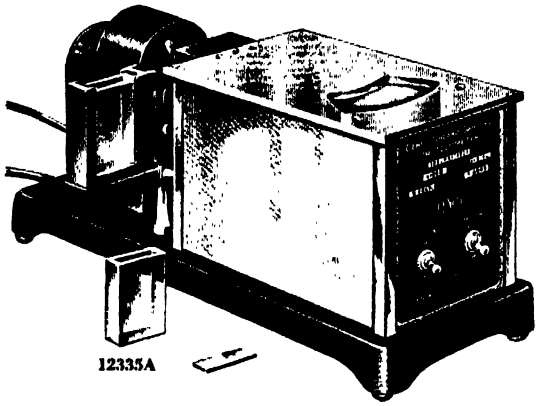


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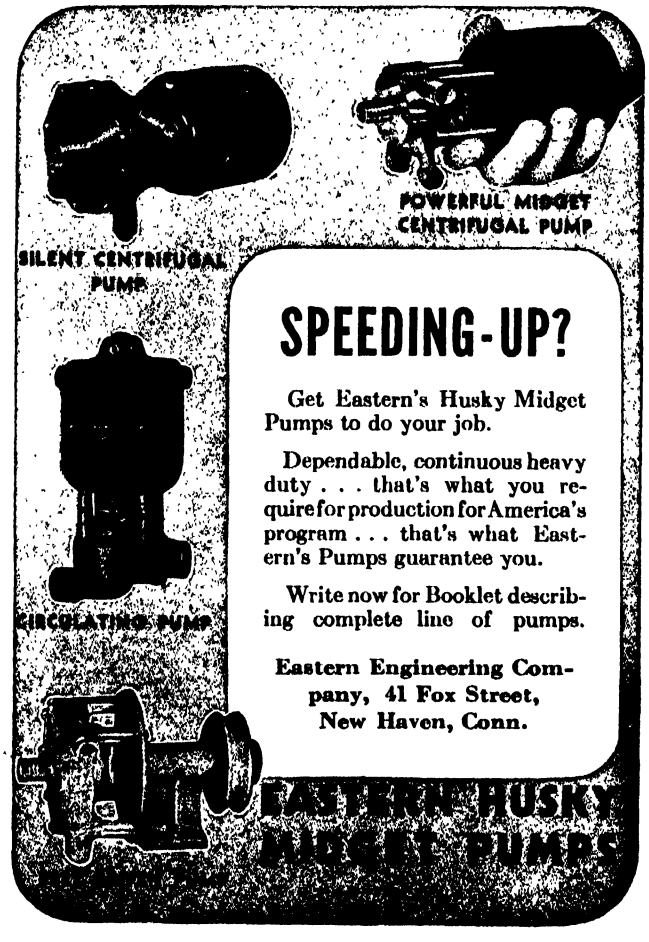
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CHEMICAL MARKET PRICES

March 27, 1942

Compiled from weekly current price listings in the *Oil, Paint and Drug Reporter*, with permission of the publisher under its copyright. These prices, unless otherwise specified, are those prevailing in the New York market for technical grades in usual large commercial quantities.

Acetaldehyde, drums, c/l., wks.	lb.	.11
Acetamide, tech., kegs, 500-lb. lots, works	lb.	.30
Acetanilide, tech., powd., bbls.	lb.	.27
Acetic anhydride, drums, c/l., frt. allowed	lb.	.11½
Acetone, c. p., drums, c/l., dlvd.	lb.	.08½
Acetophenetidin, bbls., 1000 lbs.	lb.	1.00
Acetophenone, drums, 100 lbs.	lb.	1.55
Acid, abietic, drums, c/l.	lb.	.08¾
Acetic, 28%, bbls., c/l.	100 lbs.	3.38
56%, bbls., c/l.	100 lbs.	5.58
Glacial, synth., drums, c/l.	100 lbs	9.15
Glacial, U. S. P., drums, c/l.	100 lbs.	10.95
Acetylsalicylic, U. S. P., bbls.	lb.	.40
Anthranilic, tech., bbls.	lb.	.95
Battery, cbys., c/l., E. wks.	100 lbs.	1.60
Benzoic, tech., bbls.	lb.	.43
Boric, tech., gran., bags	ton	99.00
Butyric (99%), drums, c/l., wks.	lb.	.22
Chloroacetic, mono-, tech., bbls. wks.	lb.	.17
Chlorosulfonic, drums, c/l., wks.	lb.	.03
Chromic, 99%, drums	lb.	.16¼
Cinnamic, bottles	lb.	3.50*
Citric, cryst., bbls., c/l.	lb.	.20
Cresylic, H. B., 210–215°, drums, c/l., wks., frt. equal	gal.	.81
Formic, 90%, cbys., f. o. b. works, c/l.	lb.	.10½
Gallic, tech., bbls.	lb.	1.10
Hydriodic, 57%, 5-lb. bot.	lb.	2.90
Hydrobromic, 34%, cbys.	lb.	.35
Hydrochloric, 20°, tanks, wks.	100 lbs.	1.15
Hydrofluoric, 30%, bbls., wks.	lb.	.06
60%, lead cbys.	lb.	.14
Hydrofluosilicic, 30%, bbls., wks.	lb.	.09
Hypophosphorus, U. S. P., 30%, 5-gal. demis.	lb.	.75
Lactic, dark, 22%, bbls.	100 lbs.	2.90
Light, 22%, bbls., wks.	100 lbs.	3.90
Maleic, powd., drums	lb.	.30
Mixed, tanks, wks. N unit.	lb.	.05
S unit.	lb.	.0085
Naphthenic, 220–230, drums	lb.	.10
Nitric, c. p., cbys.	lb.	.13
36°, cbys., c/l., wks.	100 lbs.	5.00
Oxalic, bbls., wks.	lb.	.11¼
Phosphoric, U. S. P., 50%	lb.	.10½
Picramic, kegs	lb.	.65
Picric, bbls.	lb.	.35
Pyrogallic, tech., bbls.	lb.	1.45
Salicylic, tech., bbls.	lb.	.33
Stearic, distilled, d. p., bags, dlvd.	lb.	.1580
Sulfanilic, tech., 250-lb. bbls.	lb.	.17
Sulfuric, 66°, cbys., c/l., E. wks.	100 lbs.	1.50
66°, tanks, E. wks.	ton	16.50
60°, tanks, E. wks.	ton	13.00
Oleum, 20%, tanks, E. wks.	ton	19.50
Tannic, tech., bbls.	lb.	.71
Tartaric, U. S. P., cryst., bbls.	lb.	.70½
Tungstic, pure, 100-lb. pkg.	lb.	2.86
Alcohol, ethyl, 190 proof, from molasses, drums, c/l.	gal.	8.19
Amyl, from pentane, tanks	lb.	.131
Butyl, normal, tanks, frt. allowed	lb.	.12½
Cinnamic, bottles	lb.	3.00
Denatured, C. D. 14, drums, c/l., wks., E.	gal.	.65
Diacetone, tech., drums, c/l.	lb.	.11
Furfuryl, tech., drums, c/l., wks.	lb.	.20
Isobutyl, ref., drums, works	lb.	.0860
Isopropyl, ref., 91%, drums, c/l., f. o. b. dest	gal.	.40½
Wood, *see* Methanol		
Aldol, 95%, drums, c/l., wks.	lb.	.12
Alpha-naphthol, bbls.	lb.	.52
Alpha-naphthylamine, bbls.	lb.	.32
Alum, ammonia, lump, bbls., wks.	100 lbs.	4.25
Chrome, bbls.	lb.	.12½
Potash, lump, bbls., wks.	100 lbs.	4.50
Soda, bbls., wks.	100 lbs.	3.25
Aluminum, metal, 98–99%, drums, c/l.	lb.	.15
Chloride, anhyd., commercial, drums extra, c/l., wks.	lb.	.08
Stearate, bbls., c/l.	lb.	.23
Sulfate, comm'l, bags, c/l., wks., frt. equal	100 lbs.	1.15
Iron-free, bags, wks.	100 lbs.	1.75
Ammonia, anhydrous, fertiliser, f. o. b. wks., frt. equalized	ton	90.00
Pure, cyls.	lb.	.16
Ammonia, aqua, 26°, tanks (on NH_3 content), f. o. b. wks.	lb.	.04
Ammonium bicarbonate, drums	lb.	.0564
Bifluoride, bbls.	lb.	.15½
Bromide, bbls.	lb.	.31
Carbonate, tech., bbls.	lb.	.08¼
Chloride, gray, bbls.	100 lbs.	5.50
U. S. P., gran., bbls.	lb.	.12
Iodide, 25-lb. jars	lb.	3.65
Linoleate, 80%, anhyd., bbls.	lb.	.12
Nitrate, tech., bags, c/l., wks.	100 lbs.	4.35
Oleate, bbls.	lb.	.14
Oxalate, kegs	lb.	.23
Persulfate, cases	lb.	.21
Phosphate, dibasic, tech., bbls.	lb.	.07¼
Sulfate, bulk, c/l., f. o. b. cars, ports contract	ton	29.00
Sulfide, liq. 40–45%, basis 100%, tanks, dlvd.	lb.	.07½
Amyl acetate, from pentane, tanks, frt. allowed	lb.	.14½
Chloride, mixed, tanks, wks.	lb.	.06
Mercaptan, drums, l. c. l., wks.	lb.	1.10
Oleate, drums, l. c. l., wks.	lb.	.31
Stearate, drums, l. c. l., wks.	lb.	.32½
Amylene, tanks, wks.	lb.	.09
Anilin oil, drums	lb.	.15
Anthraquinone, subl., bbls.	lb.	.70
Antimony, chloride, soln., cbys.	lb	.17
Needle, Bolivian, 67%	lb.	.18½
Oxide, bags, c/l.	lb.	.15
Salts, 65%, bbls.	lb.	.34
Argols, test 75–80%, basis 100%, f. o. b. Spanish ports	100 kilos	105.00
Arsenic, metal, kegs	lb.	No prices
White, c/l., kegs	lb.	.04
Arsenous chloride, cans	lb.	4.85
Barium carbonate, natural, 99%–200 mesh, bags, c/l., wks.	ton	43.00
Chloride, tech., cryst., bgs., c/l.	ton	77.50
Dioxide, drums, wks.	lb.	.10
Hydroxide, bbls., wks.	lb.	.06
Nitrate, casks	lb.	.11
Barytes, floated, 350-lb. bbls., wks.	ton	27.65
Benzaldehyde, tech., drums	lb.	.45
Benzidine base, bbls.	lb.	.70
Benzol, tanks, frt. allowed E. of Omaha	gal.	.15
Benzoyl chloride, carboys	lb.	.23
Benzyl acetate, F. F. C., drums	lb.	.55*
Beta-naphthol, tech., bbls.	lb.	.23
Beta-naphthylamine, tech., kegs	lb.	51
Bismuth, metal, ton lots	lb.	1.25
Bismuth nitrate, cans	lb.	1.30
Oxychloride, kegs	lb.	3.10
Subnitrate, powd., barrels	lb.	1.20
Blanc fixe, dry, bags, c/l.	ton	60.00
Bleaching powder, drums, wks.	100 lbs.	2.25
Bone black, 4, bbls., c/l., frt. allowed E.	lb.	.11
Borax, tech., gran., bulk, c/l., frt. allowed	ton	41.50
Bordeaux mixture, drums	lb.	.11
Bromine, cases	lb.	.25
Bromoform, cbys.	lb.	1.42
Butyl acetate, drums, c/l., frt. allowed	lb.	.14½
Aldehyde, drums, l. c. l.	lb.	.16½
Lactate, drums	lb.	.26½
Stearate, drums	lb.	.31
Cadmium, metal, ingots, cases	lb.	.90
Bromide, 25-lb. jars	lb.	1.65
Sulfide, boxes	lb.	1.35
Caffeine, 100-lb. drums, 10,000 lbs. or more	lb.	2.60
Calcium acetate, bags	100 lbs.	3.00
Arsenate, bgs., c/l.	lb.	.07
Carbonate, precip., bags, 50 lbs., c/l., wks.	lb.	.02⅞
Chloride, bags, flake, c/l., dlvd.	ton	18.50
Gluconate, U. S. P., bbls., 150 lbs.	lb.	.52
Phosphate, dibasic, 38–40% P_2O_5, bags, Atlan. pts.	unit-ton	No prices
Tribas., bbls.	lb.	.0635
Calomel, bbls., kegs, 50 lbs. or more.	lb.	2.95
Camphor, synthetic, gran., powd., drums, ton lots	lb.	.42
Carbasole, 95%, drums, ton lots, wks.	lb.	.70
Carbon bisulfide, drums, c/l.	lb.	.05
Black, reg., uncomp., bgs., c/l., works	lb.	.03625
Dioxide, liq., cyl.	lb.	.06
Tetrachloride, drums, c/l., frt. allowed	gal.	.73
Casein, dom., 20–30 mesh, bags, c/l.	lb.	.21
Cerium oxalate, bbls., wks.	lb.	.35
Charcoal, willow, powd., bbls.	lb.	.06
China clay, bulk, c/l., wks.	ton	7.60
Chloral hydrate, drums	lb.	.90
Chlorine, liq., c/l., cyl., dlvd.	lb.	.05¼
Tanks, wks., frt. equal.	100 lbs.	1.75
Chlorobensene, mono-, drums	lb.	.07
Chloroform, tech., drums	lb.	.20
Chromium acetate, 24%, powd., bbls.	lb.	.22
Sulphate, pearls, dms.	lb.	.40
Coal tar, crude, bbls., c/l., wks.	bbl.	7.50
Cobalt oxide, black, kegs	lb.	1.84
Copper carbonate, 52–54%, bbls.	lb.	.18
Chloride, bbls.	lb.	.20½
Cyanide tech., bbls.	lb.	.34
Metal, elec.	lb.	.12
Oxide, black, bbls., tons, wks.	lb.	.19½
Sulfate, bbls., c/l., wks.	100 lbs.	5.15
Copperas, cryst., bulk, c/l., wks.	ton	14.00
Cream of tartar, bbls.	lb.	.57½
Cresol, U. S. P., drums, c/l., wks.	lb.	.11
Crotonaldehyde, 97%, c/l., wks.	lb.	.15
Cyanamide, 22% N, pulvd., dlvd., contracts	Nitrogen unit	No prices
Diamylamine, drums, c/l., wks.	lb.	.61
Diamylene, tanks, wks.	lb.	.09½
Diamyl phthalate, tanks	lb.	.21
Diatomaceous earth, dom., bags, c/l., Pacific Cst.	ton	22.00

Dibutylamine, drums, l. c. l., wks.	lb.	.64
Dibutyl phthalate, drums, c/l., dlvd.	lb.	.21
Tartrate, drums	lb.	.87
Dichloroethyl ether, drums, c/l., wks.	lb.	.15
Diethanolamine, drums, c/l., wks.	lb.	.23½
Diethylaniline, drums	lb.	.40
Diethylene glycol, drums, c/l., wks.	lb.	.14
Monobutyl ether, drums, wks.	lb.	.22½
Monoethylether, drums, c/l., wks.	lb.	.14½
Diethyl phthalate, drums, c/l.	lb.	.21½
Sulfate, tech., drums, wks.	lb.	.13
Diglycol oleate, light, bbls.	lb.	.17
Dimethylaniline, drums	lb.	.23
Dimethyl phthalate, drums, c/l., dlvd	lb.	.20
Dinitrobensene, tech., drums	lb.	.18
Dinitrochlorobensene, bbls.	lb.	.14
Dinitronaphthalene, bbls.	lb.	.35
Dinitrophenol, bbls.	lb.	.22
Diphenyl, bbls., c/l., wks.	lb.	.15
Diphenylamine, bbls.	lb.	.25
Diphenylguanidine, bbls.	lb.	.35
Epsom salt, tech., bags	100 lbs.	1.80
Ether, conc., drums	lb.	.11
Nitrous, bots., 100 lbs.	lb.	.73
Ethyl acetate, 85-90%, tanks, frt. allowed	lb.	.11
Acetoacetate, drums, c/l., wks.	lb.	.37½
Bromide, drums	lb.	.50
Chloride, drums	lb.	.18
Formate, drums	lb.	.27½
Methyl ketone, drums	lb.	.09
Ethylene dichloride, drums, c/l., wks., frt. allowed	lb.	.0742
Glycol, drums, c/l.	lb.	.14½
Monobutyl ether, drums, wks.	lb.	.16½
Monoethyl ether, drums, wks.	lb.	.14½
Monoethyl ether acetate, drums, wks.	lb.	.11½
Monomethyl ether, drums, wks,	lb.	.15½
Feldspar, 20 mesh, bulk, wks.	ton	9.75
Film scrap colors, dk., cs., 1000 lbs., E. wks.	lb.	.14
Fluorspar, 95%, bags, f. o. b. mines	ton	33.00
Formaldehyde, bbls., c/l.	lb.	.05½
Fuller's earth, bags, c/l., mines	ton	8.50
Furfural, tech., drums, contract, works	lb.	.10
Glauber's salt, bbls., c/l.	100 lbs.	1.05
Glycol phthalate, drums	lb.	.38
Stearate, drums	lb.	.26
Hexamethylenetetramine tech., drums	lb.	.32
Hydrogen peroxide, 100 vol., cbys., c/l	lb.	.16
Hydroquinone, kegs	lb.	.90
Indigo, synth., liq., bbls.	lb.	.16½
Iodine, resubl., jars	lb.	2.00
Iodoform, drums, 100 lbs.	lb.	3.95
Iron acetate, N. F. IV, cbys.	lb.	.15
Iron chloride, tech., cryst., bbls., wks., frt. allowed	lb.	.05
Isopropyl acetate, tanks, frt. allowed	lb.	.07½
Lead acetate, white, broken	lb.	.12¾
Arsenate, bbls.	lb.	.11
Metal, N. Y.	1 lb.	.0650
Oxide, litharge, bbls., 20-ton lots	lb.	.0790
Peroxide, powd., tech	lb.	.23
Red, bbls., 20-ton lots	lb.	.09
Sulfate, bbls.	lb.	.0725
White, basic carb., bbls.	lb.	.0825
Lecithin, edible, grade 1, drums, c/l.	lb.	.45
Tech., Grade 1, dms., c. l.	lb.	.35
Lime, live, chemical, bulk, wks.	ton	7.00
Lime-sulfur, dry, bags, c/l.	lb.	No prices
Lithopone, ordinary, bbls.	lb.	.04½
Magnesite, caloined, dom., bags.	ton	80.00
Magnesium carbonate, tech., bags, c/l.	lb.	.06¼
Chloride, drums	ton	32.00
Fluosilicate, cryst., bbls.	lb.	.20
Oxide, light, bbls.	lb.	.26
Manganese chloride, bbls.	lb.	.14*
Dioxide, 85-90%, bbls., c/l., wks.	ton	74.00
Sulfate, anhyd., bbls., wks.	lb.	.10½
Mannitol, commercial, bbls., wks.	lb.	.35
Menthol, nat., cans	lb.	13.50
Mercury bichloride, cryst., drums, 50 lbs. or more	lb.	2.39
Mercury, flasks, 76 lbs., mines	flask	191.00
Meta-phenylenediamine, kegs	lb.	.65
Meta-toluylenediamine, kegs	lb.	.70
Methanol, synthetic, drums, frt. allowed, c/l.	gal.	.34½
Tanks, frt. allowed	gal.	.28
Methyl acetate, 97-99%, tanks	gal.	.09½
Chloride, cylinders	lb.	.32
Formate, l. c. l., drums	lb.	.89
Hexylketone, drums, tech., wks.	lb.	.60
Salicylate, drums	lb.	.35
Monoamylamine, drums, c/l., wks.	lb.	.61
Monobutylamine, drums, l. c. l., wks.	lb.	.51
Monoethanolamine, drums, wks.	lb.	.24
Naphthalene, crude, dom., 74 deg., bags, c/l., wks.	100 lbs.	2.50
Nickel salt, single, bbls.	lb.	.13
Niter cake, bulk	ton	16.00
Nitrobensene, drums	lb.	.08
Nitrocellulose, alcohol-sol., bbls., wks.	lb.	.28
Nitrogen solution	unit	1.2158
Octanol, normal, drums	lb.	.85
Oil, castor, No. 3, tanks	lb.	.12¾
China wood, dms.	lb.	.40½*
Coconut, crude, tanks	lb.	No prices
Cod, Newf., bbls.	gal.	.85
Corn, crude, tanks, mills	lb.	.12¾*
Cottonseed, cooking, bbls.	lb.	.16¾
Linseed, raw, tanks	lb.	.1100
Menhaden, crude, tanks, f. o. b. Baltimore	gal.	.6660
Neat's-foot, pure, bbls.	lb.	.17¾
Oiticica, bbls.	lb.	.25¼*
Oleo, No. 1, bbls.	lb.	.13¾
Olive oil, denat., bbls.	gal.	4.40
Edible, Calif., drums	gal.	5.00
Palm, Niger, bbls.	lb.	.09¼*
Sumatra, bulk	lb.	No prices
Peanut, crude, tanks	lb.	.13*
Perilla, drums	lb.	.2460
Rapeseed, tax incl., bbls.	gal.	.15½*
Red, bbls.	lb.	.1330
Soy bean, crude, tanks	lb.	.12½*
Sperm, 38°, bbls.	lb.	.1301
Whale, bbls., natural, refined	lb.	.1070*
Ortho-dichlorobensene, drums	lb.	.06
Ortho-nitrochlorobensene, kegs	lb.	.15
Ortho-nitrotoluene, drums	lb.	.09
Ortho-toluidine, bbls.	lb.	.19
Para dichlorobensene, drums, c/l.	lb.	.11
Para-formaldehyde, drums	lb.	.23
Paraldehyde, tech., drums	lb.	.12
Para-nitraniline, drums	lb.	.45
Para-nitrochlorobensene, drums	lb.	.15
Para-nitrotoluene, bbls.	lb.	.30
Para-phenylenediamine, bbls.	lb.	1.25
Para-toluidine, bbls.	lb.	.48
Paris Green, 250-lb. kegs	lb.	.24
Perchlorethylene, drums, c/l., wks.	lb.	.08
Phenol, drums, c/l., wks.	lb.	.12½
Phenolphthalein, yellow, drums, ton lots	lb.	.80
Phenylethyl alcohol, bottles	lb.	2.10
Phloroglucinol, tech., tins, wks.	lb.	15.00
C. P., tins, wks.	lb.	20.00
Phosphorus, red, cases	lb.	.40
Oxychloride, 175-lb. cylinders	lb.	.15
Trichloride, cyl.	lb.	.15
Phthalic anhydride, bbls., c/l.	lb.	.14½
Platinum, metal, solid	os.	36.00
Potash, caustic, solid, drums	lb.	.06¼
Potassium acetate, tech., bbls.	lb.	.28
Bicarbonate, gran., bbls.	lb.	.14
Bichromate, casks, c/l., wks.	lb.	.09½
Bromide, U. S. P., gran., bbls.	lb.	.27
Carbonate, 80-85%, calc., casks.	lb.	.06½
Chlorate, cryst., kegs	lb.	.11*
Chloride, tech., cryst., bgs.	lb.	.08*
Cyanide, drums	lb.	.55
Meta-bisulfite, bbls.	lb.	.18
Muriate, fert., bulk	K_2O unit	.53½
Permanganate, tech., drums	lb.	.19¾
Prussiate, red, casks	lb.	No prices
Yellow, casks	lb.	.17
Pyridine, denat., drums	gal.	1.71
Pyrocatechin, C. P., drums	lb.	2.15
Quinine, 100-os. cans	os.	.97½
Resorcinol, tech., kegs	lb.	.68
Rochelle salt, powd., bbls.	lb.	.43½
Saccharin, drums	lb.	1.45
Salt cake, bulk, wks.	ton	15.00
Saltpeter, gran., bbls.	100 lbs.	8.20
Silica, amorph., 96%, 325 mesh, bags, c/l., wks.	ton	20.00
Silver nitrate, vials	os.	.26½
Soda, ash, 58%, light, paper bags, contract, wks.	100 lbs.	1.05
Caustic, 76%, solid, drums, contract, wks.	100 lbs.	2.30
Sodium acetate, flake, 60%, bbls.	lb.	.05
Alginate, drums	lb.	.69
Antimoniate, bbls.	lb.	.15
Benzoate, U. S. P., bbls.	lb.	.46
Bicarbonate, U. S. P., powd., bbls., c/l., wks.	100 lbs.	1.85
Bichromate, c/l., wks.	lb.	.07½
Bisulfite, bbls.	100 lbs.	3.00
Bromide, U. S. P., bbls.	lb.	.27
Chlorate, cryst., bags	lb.	.06¼
Chloride, bags	ton	15.70
Cyanide, 96-98%, dom., drums	lb.	.14
Fluoride, white, 90%, bbls., c/l., frt. alld.	lb.	.08
Metallic, untrimmed bricks, drums, f. o. b. Niagara Falls	lb.	.15½
Metasilicate, gran., bbls.	100 lbs.	2.50
Naphthionate, bbls.	lb.	.50
Nitrate, crude, bulk, works	ton	27.00
Nitrite, bbls.	lb.	.06¾
Perborate, bbls.	lb.	.14¾
Phosphate, disodium, cryst., bags, c/l., wks.	100 lbs.	2.55
Phosphate, trisodium, bags, c/l., wks.	100 lbs.	2.70
Picramate, kegs	lb.	.65
Prussiate, yellow, bbls.	lb.	.11
Silicate, drums, c/l., 40°	100 lbs.	.80
Silicofluoride, dom., bbls.	lb.	.12
Stannate, drums	lb.	.33½
Sulfate, anhyd., bags	100 lbs.	1.70
Sulfide, cryst., bbls.	100 lbs.	2.40
Solid, 60%	100 lbs.	3.15
Sulfocyanide, C. P., bbls.	lb.	.55
Thiosulfate, reg., cryst., bgs.	100 lbs.	2.25
Tungstate, tech., kegs	lb.	No prices
Strontium carbonate, tech., bbls.	lb.	.25*
Nitrate, bbls.	lb.	.07¾
Sulfur, bulk, mines	ton	16.00
Chloride, drums	lb.	.03
Dioxide, commercial, cyl., wks.	lb.	.07
Tetrachloroethane, 50-gal. drums.	lb.	.08
Thiocarbanilid, bbls.	lb.	.24
Tin, Straits	lb.	.52
Crystals, bbls.	lb.	.39
Oxide, bbls.	lb	.55
Tetrachloride, anhydrous, drums, bbls.	lb.	No prices
Titanium dioxide, bags	lb.	.14¾
Toluene, tanks	gal.	.28
Triamylamine, drums, c/l., wks.	lb.	.98
Triamylborate, drums, l. c. l., wks.	lb.	.33
Tributylamine, drums, c/l., wks.	lb.	.78
Trichloroethylene, drums, wks., frt. allowed	lb.	.08
Tricresyl phosphate, tech., drums.	lb.	.25
Triethanolamine, drums, c/l., wks.	lb.	.19
Triphenyl phosphate, barrels	lb.	.31
Tungsten, tech., powder	lb.	2.60
Urea, dom., 46 + % N., bags, f. o. b. wks. or seaboard	ton	80.00
Vanillin, 25-lb. tins	lb.	2.35
Whiting, comm., dry-grd., bags, c/l., wks.	ton	18.00
Xylene, 10°, tanks	gal.	.30
Xylidine, drums	lb.	.35
Zinc ammonium chloride, bbls.	lb.	.0565
Chloride, tech., fused, drums	lb.	.05
Dust, bbls., c/l.	lb.	.1035
Metal slabs, at N. Y.	lb.	.0865
Oxide, Amer., bags	lb.	.0725
Stearate, tech., bbls.	lb.	.30
Sulfate, cryst., bgs., c/l., wks.	100 lbs.	3.60

* Nominal.

EMPLOYMENT INFORMATION

RATES to be paid in advance. Standard setting 5c a word, minimum charge $2.00 each; include 8 words for box address. Exceptions see ⟶ Display, $10.00 per column inch. 2 inches maximum, larger units at regular display unit rates. No discounts or allowances.
SEND advertisements with remittance to INDUSTRIAL AND ENGINEERING CHEMISTRY, 332 West 42nd St., New York, N. Y., to reach there not later than 10:00 A.M. on the 10th and 25th, closing dates for NEWS EDITIONS of the 25th and 10th, respectively. Insertions made in order of receipt provided necessary remittances are complete.
Employers are requested to mention in their announcements the section of the country in which the open position is located to ensure replies only from those who are geographically available.
In printing these advertisements the SOCIETY assumes no obligations as to qualifications of prospective employees or responsibility of employers.

Unemployed members of the AMERICAN CHEMICAL SOCIETY seeking employment for themselves are allowed in one calendar year 3 free announcements, one per issue, set in standard style and limited to 50 words each, including 8-word box address. Excess words 5c each. Additional standard announcements 50% of regular rate.

Employed members of the AMERICAN CHEMICAL SOCIETY seeking new positions are permitted 3 standard announcements during the calendar year at 50% of the regular rate—include 8 words for box address.

Employers seeking chemists and chemical engineers are permitted 3 standard announcements, not to exceed 50 words each including box address and not more than one per issue, during the calendar year without charge, provided they agree in writing to acknowledge all replies (excess words 5c each), otherwise full rate applies.

The AMERICAN CHEMICAL SOCIETY is vitally interested in the welfare of its members and in seeing that the chemical industry is manned with competent chemists and chemical engineers. These pages are part of our service in that connection. In addition most of the larger sections of the AMERICAN CHEMICAL SOCIETY and several of the smaller ones have active employment committees. Local section secretaries in your area will inform you as to any employment aids that may be available locally.

An Employment Clearinghouse is operated at each national meeting of the SOCIETY for the purpose of bringing together representatives of industry looking for chemists and members and student affiliates in attendance wishing to make such contacts. For further details, consult the preliminary and final programs as printed in the NEWS EDITION prior to each meeting.

In the New York area, special employment facilities are offered by the Employment Bureau of the Chemists' Club, 52 East 41st St., New York, N. Y. In the Chicago area, the Chicago Section maintains an employment service at 413 Stevens Hotel, Chicago, Ill.

Those replying to announcements should be careful to send copies and not original documents. Advertising circulars will not be forwarded and to that end all letters will be opened at the forwarding office.

SITUATIONS OPEN

Those announcements in which the letter "P" is part of the address key have paid in full and are not committed to acknowledge replies. The Society regards acknowledgment by employers of all applications as an act of common courtesy but can assume no responsibility for their failure to do so.

EXECUTIVES, CHEMICAL ENGINEERS AND CHEMISTS with exceptional backgrounds of experience should use our confidential and individual method of contacting responsible employers. No limit to territory. We negotiate all overtures. Established 1915. The National Business Bourse, 20 W. Jackson Blvd., Chicago, Ill.

RESEARCH FELLOWSHIPS in Wood chemistry available September 1942 for M.S. candidate. Full time research and study. Stipend $50 per month for nine months. Bachelor degree in chemistry or chemical engineering required. Address applications to Dean D. S. Jeffers, University of Idaho, Moscow, Idaho

CHEMICAL ENGINEER, assistant to plant superintendent in organic chemical manufacturing, principally pharmaceuticals. Location—New Jersey. Age preferred—30 to 35 yrs., with 10 years' experience in production work. Furnish photograph, complete personal data including draft status, nationality, experience, education, and several references.
Box 42-N-3, Ind. & Eng. Chem., Easton, Pa.

PLANT CHEMIST wanted: Graduate chemist with plant experience in the manufacture of organic dyestuffs or dyestuff intermediates. Location, northern New Jersey. In first letter of application, state experience, education, marital and draft status, age, and give references.
Box 81-N-3, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMISTS, Ph.D's., with thorough training in laboratory research methods as well as in the fundamentals of organic or physical chemistry for positions as project leaders in research laboratory of major petroleum company of southwest. Recent graduates preferred. Give personal data and details as to scholastic training, salary expected, and references. Enclose recent photo. Advise if plan to attend Memphis meeting of A. C. S
Box 86-NP-3, Ind. & Eng. Chem., Easton, Pa.

FOOD CHEMIST wanted for bakery products control laboratory: Applicant must have college degree in chemistry and several years' experience in general food chemistry. Should have ability to supervise laboratory work and analyse flour, shortening, milk, eggs, and other products used by a bakery. Apply by written application only, giving personal and technical qualifications, experience, draft status, age, references, recent photograph, and salary desired. Application will be treated in strict confidence. The Great Atlantic and Pacific Tea Company, National Bakery Division, 420 Lexington, New York.

WANTED by CHEMICAL plant in Pennsylvania, draft exempt chemist for routine analytical and supervisory work. Please state age, training, experience, draft status, and salary expected.
Box 15-NP-4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST: At least ten years' diversified industrial experience. Take complete charge modern industrial research and development laboratory for small, well-known, well established manufacturer of organic chemical specialties. New York City district. Good salary and bonus. Work includes special war production problems. All replies should give full data and will be held in strict confidence. No discrimination because of race, creed or color.
Box 17-N-4, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST

to conduct investigations for well known manufacturing organization involving further development of its product for emergency use and post war expansion as well as problems relating to war contracts in process. Ph.D. or other graduate training in chemical engineering and several years' chemical research experience in electroplating or electrochemistry preferred. Send resume of experience including age, place of birth, education, earnings record and salary desired.
Box 21-NP-4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST with at least 3 years' experience in plant production of fine organic chemicals. Please state past experience and qualifications in detail. Permanent position with a growing concern. Plant located near New York City.
Box 22-NP-4, Ind. & Eng. Chem., Easton, Pa.

INSTRUCTOR in CHEMISTRY. South Dakota State School of Mines. Recent Ph.D. (or Master) with major in Physical Chemistry and minor in Organic (or reverse). Give educational history, scholastic grades, experience, age and other personal data including recent photo. State minimum salary acceptable for twelve month school year starting June 1.
Box 23-N-4, Ind. & Eng. Chem., Easton, Pa.

GRADUATE ASSISTANTSHIPS, Chemical Engineering, University of Rochester, beginning September 1, completing M.S. program in one year. Stipend $700 plus tuition. Request further information or apply by sending complete personal data, photograph, transcript and two reference letters to Howard S. Gardner, Dept. of Engineering, University of Rochester, Rochester, New York.

CHEMICAL ENGINEERING professor desired by accredited institution. Rank and salary dependent upon qualifications. Man desired with doctorate and teaching or industrial experience but others may be considered. Give photograph, references and complete details including rank and salary expected in first letter.
Box 27-N-4, Ind. & Eng. Chem., Easton, Pa.

WANTED
RESEARCH CHEMIST

as acting head of department for old established upstate New York Manufacturing firm whose research director has been called to national service. Company normally makes soaps, cleaners, automotive chemical service materials, and is currently converting to war production as rapidly as possible. Good after-the-war possibilities for able man. Give complete account of training, experience, salary requirements and position in respect to military service. If possible enclose phot.

Box 28-NP-4, Ind. & Eng. Chem., Easton, Pa.

SENIOR CHEMISTS and Chemical Engineers are required for responsible positions in Research and Process Development by an established firm engaged in the manufacture of organic chemicals. Candidates having M.S. or Ph.D. degrees, or 3-5 years' significant experience are preferred. Please make a detailed application and include a small non-returnable photograph. Applications will be held confidential; our employees have been notified of this advertisement.
Box 50-NP-4, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST with training in Organic and Biochemistry for library position in New Jersey company. Duties include abstracting, indexing and searching of literature and patents. State courses taken, typing ability, languages, experience.
Box 49-N-4, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEERS. Positions open for young M.S. or B.S. well grounded in chemistry or chemical engineering for development work with major oil company. Applicant should submit details concerning education, scholarship, experience, personal data, references, and recent photograph. State salary expected.
Box 54-N-4, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER for process development, work on present and proposed plant operations. Inorganic pigment production. Plant location Virginia. Prior experience not essential. State age, experience, education, and enclose photograph if available.
Box 57-NP-4, Ind. & Eng. Chem., Easton, Pa.

COLLOID CHEMIST, Ph.D. and several years' experience in this field. Particular consideration will be given to a man with knowledge of surface chemistry. Knowledge of organic chemistry desirable. In reply give full information regarding training and experience, draft status and salary that you would consider. Mid-western location.
Box 60-NP-4, Ind. & Eng. Chem., Easton, Pa.

YOUNG PHYSICIST or engineer with detailed knowledge of applied physics wanted by Rayon manufacturer for research work. Woman, or man with deferred draft classification. Not over about 30 years of age. Give summary of education, experience, personal data, salary required. References and recent non-returnable photograph or snapshot. Location southeast.
Box 62-NP-4, Ind. & Eng. Chem., Easton, Pa.

FOOD CHEMIST wanted. Experienced Analyst who can handle bacteriological examination wanted for Mid-Western food concern. In replying state previous positions held, exact nature of duties performed, and salary desired.
Box 73-NP-4, Ind. & Eng. Chem., Easton, Pa.

AN EXPERIENCED petroleum chemist-engineer is wanted to carry on marketing research and development activities for a chemicals manufacturer with Eastern head offices. Sound technical training, wide industrial acquaintance, specialized knowledge of chemical additives, and ability to assist in the direction of related laboratory investigations are essential. Submit full particulars, including salary requirements, and an inexpensive photograph. Application will be treated in confidence.
Box 74-NP-4, Ind. & Eng. Chem., Easton, Pa.

GRADUATE ASSISTANTSHIP in woman's college of southern university. Work for M.S. degree. Qualifications: B.A. or B.S. with adequate training in physics and mathematics as well as in chemistry.
Box 99-N-4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST. Patent work: Chemical graduate well grounded in organic chemistry, as Junior Assistant to Patent Attorney connected with reasonably large chemical manufacturer. Excellent opportunity for young man interested in learning Chemical Patent work, particularly patent searches and analyses, with a view to permanent specialization. Previous patent experience not essential but applicant must have some imagination. Deferred draft position necessary.
Box 102-NP-4, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 514)

Address communications to the box number indicated and Mail to Easton, Penna.

The American Chemical Society has no information concerning the position advertised, or in regard to those seeking employment.

(Situations Open Continued)

CHEMIST-ENGINEER is wanted to carry on marketing research and development activities in the West Coast area for a major chemical manufacturer with Eastern head offices. Applicant should have a few years' experience and fairly wide industrial acquaintance, particularly on the West Coast. Submit full particulars, including salary requirements, and an inexpensive photograph. Replies will be treated in confidence.
Box 103-NP-4, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(A.C.S. MEMBERS)

WOMAN Ph.D. (Physical) with eight years' successful teaching experience in General, Analytical, Organic, and Biochemistry. Desires responsible teaching or industrial position. Now teaching. Excellent references. Interviews at Memphis meeting.
Box 15-N-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., with some engineering training, age 35, married, Protestant, Anglo Saxon, 10 years' research experience, naval stores, terpenes, resin acids, olefin polymerisation and hydration, catalytic vapor phase oxidation. Wishes position teaching, research, development, plant operation.
Box 33-N-3, Ind. & Eng. Chem., Easton, Pa.

CHEMIST — PLANT Executive. 25 years' experience. Full responsibility for plant operation, maintenance, chemical control and pilot plant development. Experience covers wide variety of chemical processes and equipment. Developed two new products now being marketed. Expert analytical chemist. Interested in supervision of manufacture or laboratory.
Box 52-N-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Austrian Ph.D. 1933, post graduate work, 8 years' industrial experience, 2½ years in synthetic resins and waxes, emulsions, surface active agents, oils and fats. Literature research in French, Italian, German, 3 years' in U. S. A. and here employed. First citizenship papers, age 33, married, references.
Box 63-N 3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. 1939. Desires research position in the middle-west, in the field of synthetic organic chemistry. Resin experience. Presently employed, available within reasonable time. Draft deferred. Single.
Box 68-N-3, Ind. & Eng. Chem., Easton, Pa.

COLLEGE TEACHING or research, Ph.D., 1928, with ten years' experience in teaching general, inorganic, analytical chemistry. Publications. Abstractor for the encyclopedia of chemical reactions. First rate references. Age 37, single. Ex-Austrian. Employed. Available within reasonable notice. Location immaterial.
Box 69-N-3, Ind. & Eng. Chem., Easton, Pa.

ENGINEER with exceptional training and ability. Degrees in chemical and industrial engineering leading universities. Successful record in research and development on plastics, cellulose paper, lignin, extraction and engineering economics; would prefer production. Fluent French, Spanish. Single, 24, draft deferred, immediately available.
Box 11-T-3, Ind. & Eng. Chem., Easton, Pa.

KNOWN INDUSTRIAL Biologist, for many years active in the food and fermentation industries in his former research laboratories. Wishes to contact progressive concern which is interested in the development of new products and the utilization of by-products. The connection should be consultant and advisory based upon mutual understanding.
Box 12-T-3, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, M.I.T. graduate plus business training with twenty years' diversified experience directing (often as consultant) research and development on products, processes, equipment; cooperating in design and initial operation of million dollar plants; solving production problems; increasing morale and efficiency of men. Recently in pulp and paper; earlier in rubber chemicals, varnishes and heavy coatings, gas and by-products.
Box 34-T-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. 1940 research in Friedel-Crafts alkylation. Thesis and publications. Sigma Xi and Phi Lambda Upsilon. Research experience in petroleum chemistry, manufacture medicinal white oil and petroleum sulfonates. Employed, draft deferred.
Box 15-T-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. Experienced in industrial research and organic synthesis. Also thorough and practical background in analytical and physical chemistry. Honor societies. Publication. Now profitably employed but seeking responsible position which offers greater opportunity for advancement.
Box 19-T-3, Ind. & Eng. Chem., Easton, Pa.

PROFESSORSHIP, by Ph.D. Ten years' teaching experience, chiefly general, some physical, organic, analytical. Five years' experience in industrial research laboratory where now employed. Age 36, married, four children, Protestant, honorary societies. South preferred.
Box 24-T-3, Ind. & Eng. Chem., Easton, Pa.

CHEMIST B.SC. in Chemistry, May 1942 prefers employment within 100 miles of Philadelphia, but will go anywhere. Scholarship student (I.Q. 150), with summer experience in control laboratory. Basically trained in inorganic, organic, analytical and physical chemistry, also in microanalysis.
Box 38-T-3, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST, B.Sc. May, 1942. Standard training in main divisions of chemistry, including microanalysis and chemistry of foods and drugs. Scholarship student, college laboratory assistant, summer experience in petroleum industry.
Box 40-T-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, research, development. M.A. eastern university 1942. Teaching fellow. B.A. far western university 1938. Two years' experience in mid-west in synthetic resins, coatings, plastics, and related products. Persistent worker. Age 25. Selective service 2-A. Available June.
Box 58-T-3, Ind. & Eng. Chem., Easton, Pa.

THOROUGHLY TRAINED chemist. M.S. Iowa State; B.S., Ph.D. Cornell. Research: plant pigments, vitamins, bioassays, balance studies, feed and food analyses, mineral nutrition. Experience; two years' industrial, one year head of chemistry department small college. Phi Kappa Phi. 26, married. Desires teaching with opportunity for research.
Box 66-T-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST Ph.D. Industrial experience in synthetic medicinal research, hydrogenation. Working knowledge of pharmacology. High scholastic standing, fellowships, college teaching. Patents, publications. Young, married, draft deferred. Desires pharmaceutical research position in East.
Box 67-T-3, Ind. & Eng. Chem., Easton, Pa.

NUTRITIONAL CHEMIST. Assistant Professor of Biological Chemistry in large University desires new position, either academic or industrial. Numerous research publications. Location immaterial. Available immediately.
Box 69-T-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST. Ph.D. Wide experience in theoretical and synthetic organic chemistry. Undergraduate and graduate study, academic and industrial Post-doctorate appointments, and instructorship, at large Eastern University. Phi Beta Kappa, Sigma Xi. Publications, independent research. Employed. Desires industrial or academic position.
Box 76-T-3, Ind. & Eng. Chem., Easton, Pa.

NEW PRODUCT? Could I suggest or work out with you that new product? Biochemist, Ph.D. with industrial plant and laboratory experience in vitamins and vitamin products, nutrition, foods and bioassays. Desires supervision of production or research with progressive company. Married.
Box 79-T-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D.; Sigma Xi; wishes part-time literature or laboratory work in New York City area; now employed; own laboratory; synthesis and analysis; prefers small active firm.
Box 82-T-3, Ind. & Eng. Chem., Easton, Pa.

METALLURGIST CHEMIST: desires teaching or industrial connection. Five years' metallurgical and chemical college teaching experience; worked four years steel mills. Experience includes physical testing, analysis, melting, inspection. Age 34, married, now employed.
Box 10-N-4, Ind. & Eng. Chem., Easton, Pa.

PROFESSOR, PHYSICAL, inorganic, colloid, at an institution which encourages research; Ph.D., age 40, married; uninterrupted, wide experience research in above fields with some teaching; many publications and patents; administrative ability.
Box 11-N-4, Ind. & Eng. Chem., Easton, Pa.

PRODUCTION and SALES increases constitute direct evidence of achievement in laboratory product development, factory installation, and sales engineering by head of small laboratory who desires a better opportunity. M.S., 6 years' experience.
Box 12-N-4, Ind. & Eng. Chem., Easton, Pa.

SYNTHETIC ORGANIC chemist. M.S. leading University. Young, personable, responsible. Excellent organic training. Research and industrial experience. Desires organic research position in a metropolitan area, preferably New York or Chicago. Presently employed.
Box 14-N-4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC RESEARCH chemist. Ph.D. 1937. Age 29. Employed, married. 5 years' industrial experience in synthetic, analytical, developmental aliphatic and aromatic chemistry. Good technician. Keen student of scientific literature. Vital defense development position sought. Salary $4500.
Box 16-N-4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. (June), desires industrial research position. Ph.D. research on synthetic estrogenic substances. Publications, commercial fellowships. Draft deferred. Prefer location in East. Immediately available.
Box 19-N-4, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST Ph.D. 1942 from large eastern university, desires industrial position. Minor organic chemistry. Four years' experience in college and university teaching. Thoroughly experienced in new physico-chemical techniques. Organic and physical publications. Age 25. Phi Beta Kappa, Sigma Xi, Phi Lambda Upsilon. Honors. Available June.
Box 25-N-4, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST and Metallurgical Engineer, D.Eng., 15 years' experience in research and control of fuels, oils, gas, water, metals, plastics, rubber. Desires research in corrosion of metals and its prevention. Prefer metropolitan area.
Box 20-N-4, Ind. & Eng. Chem., Easton, Pa.

ATTENTION — COLLEGES and Universities. Do you need chemistry instructors for your summer session? Here's one with five years' experience at a Grade A college. Ph.D. honor societies. Married. Available May 25 to Sept. 15.
Box 24-N-4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, B.A. 1941, post-graduate work towards Masters (evenings). Desires position in organic chemistry with opportunity in research. Draft deferred; approximately one year experience. Location immaterial.
Box 29-N-4, Ind. & Eng. Chem., Easton, Pa.

SUPERINTENDENT or FACTORY Manager. Accustomed full responsibility. B.S., M.S., Ch.E. Plant design, pilot, layout, development, installation; operation, maintenance, production planning, costs, chemical economics, mass production, packaging, personnel and sales relations. Solvent recovery, distillation (including vacuum), oleum handling. Inorganic and synthetic chemicals, alcohols, alkaloids, plastics, solvents. Age forty, married, American ancestry, Protestant; consulting experience, patents, publications, references. Available immediately, war production preferred.
Box 30-N-4, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Ph.D., 1935. Six years' industrial experience in enzyme and fermentation research. Married. Publications, Sigma Xi.
Box 33-N-4, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST, M.S. in Physical Chemistry. Two years' graduate work toward Ph.D. with research in Ceramics and high temperature physical chemistry. Experience in physico-chemical measurements, refractories, electrode-potentials, use of petrographic microscope, X-ray, spectroscope. Excellent record, references. Favorable draft status.
Box 35-N-4, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST, M.S. Wide experience in analytical chemistry. Research in Agri. Ex. Sta. Major fields biochemistry and organic. Age 26, married.
Box 36-N-4, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL ORGANIC Ph.D. 1935. Seven years' industrial and development research. Specialist in catalytic processes. Married and draft-deferred. Now employed. Desire academic opportunity or chance to apply knowledge in new industrial fields.
Box 37-N-4, Ind. & Eng. Chem., Easton, Pa.

LIBRARY CHEMIST, now so employed, several degrees, honors, seeks new connection. Experience in searches, translations, library organization, research. Interested in patents. German, French perfect. Several other languages. Young, efficient personality. Location immaterial.
Box 38-N-4, Ind. & Eng. Chem., Easton, Pa.

FOOD CHEMIST thoroughly trained in bacteriology and physical chemistry desires new connection. Now director of laboratories for a large concern manufacturing dairy products. Broad experience in laboratory control, sanitation, research and process development. Good personality. Executive ability. Publications in both food chemistry and bacteriology.
Box 39-N-4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.S. with work toward doctorate desires research and development, able to organise and direct research; experience in: organic synthesis, literature search, patents, dyestuffs, inks, paints. Age 29, class 3A, employed, location south or midwest.
Box 40-N-4, Ind. & Eng. Chem., Easton, Pa.

COLLEGE TEACHING. Ph.D. in June, midwestern university. Organic major, physics minor. Three years' experience teaching general, analytical and organic chemistry in junior college. Several years industrial experience. Married. Protestant. Age 32. Alpha Chi Sigma.
Box 41-N-4, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL CHEMIST, 1940. Experienced in pilot plant operation. Wide knowledge of plastics including molding technique, plastic formulations, selection of molding compounds and production. New England location preferred.
Box 43-N-4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. in Chemical Engineering, Columbia. Research experience: industrial synthetic intermediates, electrochemistry, vitamin extraction. Age 33, married. Member Phi Lambda Upsilon, Sigma Xi. Permanently employed, head college chemistry department. Available for summer months only.
Box 45-N-4, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 515)

(Situations Wanted Continued)

SYNTHETIC ORGANIC Chemist. 3 years' in academic research and over 4 years' in industrial research and development. B.S. Chemical Engineering, M.S. Chemistry. Now employed but wishes to change to position of more responsibility where abilities can be more fully utilised. A metropolitan area is preferable.
Box 46-N-4, Ind. & Eng. Chem., Easton, Pa.

DRUG RESEARCH and development. Ph.D. organic chemistry, registered pharmacist. 15 years' experience in all phases of industrial pharmaceutical research and manufacturing. Write leading ethical firms. Experienced Food & Drug rules. Many publications and patents. Produced several outstanding new synthetic and biological medicinals. Interested in executive position only.
Box 42-N 4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST-Chemical Engineer, Ph.D. Organic and Chemical Engineering, August 1942; B.S. 1939; M.A. in organic and analytical, 1940; Ph.D. course work complete in May. Research on Phenanthridine in progress. Excellent background in thermodynamics, theory of plastics, and organic synthesis. Possesses initiative, ambition, and ability to work with people. Want responsible position in industrial development or university teaching. Unmarried, good health, honor societies. Draft classification 2-A. Age 23. Available September 1942.
Box 47-N-4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.A. in chemistry 1941. Will complete year of graduate work in June. Prefer organic position; rubber or plastics. Graduate studies and research in rubber chemistry at University of Akron. Single. Eastern location preferred.
Box 48-N-4, Ind. & Eng. Chem., Easton, Pa.

DEVELOPMENT CHEMIST, M.S. Five years' successful experience developing photoengraving specialties. Can formulate surface coatings, metal sensitizers, acid resists, silver emulsions, and photographic chemicals. Age 32, married. Now employed.
Box 51-N-4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST (organic and plastic) Ph.D. experienced in manufacture organic chemicals and molding powder from synthetic resins, pressing commercially available plastics, especially molding metal powder with synthetic resin. Have shown originality and obtained practical results. Married, 45, available immediately because restrictions on manufacture.
Box 53-N-4, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST, B.S. Chemical Engineering. Some graduate work completed. Experience in pulp and paper manufacture and control, clay and ceramic analysis, prefer inorganic, minerals, or control chemistry. Married, 24, draft deferred. Available for interview at Memphis meeting.
Box 55-N-4, Ind. & Eng. Chem., Easton, Pa.

SUMMER TEACHING position desired by assistant professor at accredited eastern college. Ph.D. 34 years' old. Will teach general, analytical or physical chemistry. Eastern location. Will consider permanent position with opportunity for advancement.
Box 58-N-4, Ind. & Eng. Chem., Easton, Pa.

TEACHING POSITION in general, analytical or physical chemistry. 8 years' enjoyable teaching experience in liberal arts college and large university. Publications in educational analytical, and physical chemistry. Ph.D. degree. Employed. Family.
Box 59-N-4, Ind. & Eng. Chem., Easton, Pa.

PETROLEUM TECHNOLOGIST, M.S., broad experience in supervising oil refining operations, manufacture of petroleum specialties and related operations; law graduate; extensive patent experience, also sales research and development; desire technical management work in petroleum or related chemical industry.
Box 63-N-4, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Ph.D., with good background in organic and physical chemistry. Teaching and industrial experience. Three years' research in vitamins with publications. Now employed. Age 29, married. Research or teaching position desired in East. Available on short notice.
Box 65-N-4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.S. Available June 1. Graduate research with organometallics at leading midwest university. 3 years' teaching experience, desires to go into organic research in industry. Some experience with dyes, organic syntheses. Single, 23, Protestant, draft 2-A. Location immaterial. Now located in Iowa.
Box 66-N-4, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST. Ph.D. 1935, Midwestern University. Now employed. Desires change in position where opportunities in teaching and research are available. Six years' teaching experience in analytical, organic, general and physical chemistry. Chemical microscopy and X-ray crystallography are possible fields. Age 37, family.
Box 68-N-4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, AGRICULTURAL, M.S. Age 32. Major—soil, plant and analytical chemistry. Seven years' experience. Also interested in fertilizer work. Location immaterial. Now employed. Protestant. Draft 3A. Available 30 days.
Box 70-N-4, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER. Chemist M.Ch.E., A.C.S. approved university, 27, single, 3-A draft, courses in analytical, organic, inorganic dyes and intermediates, physics, technology, engineering. E.S.M.D.T. course fuels and lubricants. Desire lab. or plant assistant, junior chemist position with chance for advancement. Preferably N.Y.C. or vicinity but consider anywhere. Available on short notice.
Box 64-N-4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST and DEVELOPMENT Chemical Engineer. Last five years' experience development and control fused magnesium oxide for calrod electrical heating industry, previous four in general analytical chemistry and special methods development. B.S. Ch.E. Purdue 1932. Graduate physical chemistry Union College. Age 35, married, three children.
Box 67-N-4, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST Ph.D. 1942 (June). Vitamins and nutrition Good foundation in organic and physical chemistry and physiology. Research on vitamin B complex and protein requirements. Publications. Five years' teaching biochemistry, general and physical chemistry. Desires research or teaching.
Box 69-N-4, Ind. & Eng. Chem., Easton, Pa.

RESEARCH or PRODUCTION executive. 13 years' experience in industrial research, chemical engineering development and production supervision. B.S. in chemical engineering. Ph.D. in physical chemistry. Now employed in executive capacity by large corporation. Desire broader opportunity to apply demonstrated ability in development and operation of chemical engineering processes and equipment.
Box 71-N-4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC PH.D. Nine years' experience in research and development of synthetic medicinals, pharmaceutical specialties, food products and processes, control methods. Capable analyst, working knowledge of bacteriology, physiological chemistry, and pertinent medical sciences. Experience in arranging clinical trials of new medicinals. Understands commercial aspects of research work. Thorough knowledge of Food and Drug Laws. Administrative ability. Laboratory facilities available if desired. Publications. Employed. Married.
Box 72-N-4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., June 1942 from large Eastern University, desires research position in medicinals, plastics or natural products. Thorough training in Organic, Physical, Colloids, and Bacteriology. Five years' teaching experience in technical school. Research experience in organic synthesis, nitrogen heterocycles, medicinals. Protestant, age 28, married. Attending Memphis meeting.
Box 75-N-4, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL CHEMIST & Chemical Engineer; extensive experience production, research, development, control work, specification writing. Employed by Government and Industrial companies. Experience in food, fuel and building materials industries. Good references, employed, available on short notice.
Box 76-N-4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.S., desires research position. Research experience in organic synthesis, analysis, production of sterols, aminoacids, synthesis of phenols. Familiar with organic micro-technique, pH control, spectrophotometry, micro-biological methods. Draft deferred, dependency.
Box 78-N-4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, ORGANIC, Ph.D. in 1942 from Eastern university. Available June 1. Desires position in research or development. Research on mechanism of organic reactions and organic synthesis. Publications. Well grounded in physical and analytical. 4 years' experience in teaching organic and inorganic. Age 26, single. 2A in draft. Sigma Xi. Will attend Memphis meeting.
Box 79-N-4, Ind. & Eng. Chem., Easton, Pa.

ACADEMIC POSITION in Biochemistry or Bacteriology desired by Ph.D. 1940, with two years' post-doctorate experience in vitamin and enzyme research. Publications. Sigma Xi. Married, Class 3. Currently employed, but desirous of position with opportunity for teaching. Available August 1942 or sooner if necessary. Attending meetings at Memphis.
Box 82-N-4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, BIOCHEMIST, Bacteriologist. A.B., 16 years' experience in foods, biological and bacteriological products, plant management including production, maintenance, personnel, and accounting. Successful research and sales records. Patent experience. Age 39, married, Protestant. Continental U. S. preferred.
Box 83-N-4, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, B.S. Univ. of Penna. 1934. Experienced in supervision of production, handling union labor. Four years' experience fermentation, distillation of alcoholic beverages. Three years' experience soap, inedible oils, crude glycerine. Minor experience heavy chemicals, petroleum refining. Seeks position as superintendent of production operations. Salary proportionate to responsibility. Available on reasonable notice. Metropolitan location in North or East preferred but not essential. Native American, Protestant, age 30, married, draft status 3-A.
Box 87-N-4, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, Ph.D. Age 35. Several years' experience process equipment design, pilot plant development, pilot plant layout. Familiar with organic and physical chemistry. Not an abstract theorist. Desire permanent position as development director or group leader. $5000. Draft deferred.
Box 88-N-4, Ind. & Eng. Chem., Easton, Pa.

RESEARCH and INDUSTRIAL Chemist, Ph.D. in physical. Thoroughly trained and capable of organizing and directing research. Several years' industrial experience in high polymer chemistry, synthetic fibers, viscose rayon and nitrocellulose. Generally familiar and experienced with colloids, emulsions, surface chemistry, synthesis, literature and economic surveys and patents. Married, 33, Protestant. Draft deferred. Employed, available on reasonable notice. Desire broader opportunity in research, development or production.
Box 89-N-4, Ind. & Eng. Chem., Easton, Pa.

TEACHING POSITION, College or University, for Ph.D. Successful experience in teaching Biochemistry. Organic and Inorganic. Married. Protestant. Now teaching but desire a position with greater future. Primary interest is teaching.
Box 92-N-4, Ind. & Eng. Chem., Easton, Pa.

CELLULOSE CHEMIST, M.S., 1937, age 34. Eight years' research and analysis cellulose and derivatives, production economy, analytical methods, detergents, water, plastics. Good scholastic and production record. Married. Attending Memphis meeting.
Box 93-N-4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S. in Chemistry, Massachusetts Institute of Technology graduate. Two and half years' experience in textiles, some experience in dyestuffs. At present employed in industry vital to national defense but wish to change to research or development work. Necessary for position to be connected with national defense in order to be allowed to transfer. U. S. Citizen, unmarried, will go anywhere but prefer Northeastern or Middle-Eastern United States.
Box 94-N-4, Ind. & Eng. Chem., Easton, Pa.

INORGANIC CHEMIST. Ph.D. (1939). Seventeen years' University teaching experience. Honor societies. Publications. Age 40. Married. Employed but desires change.
Box 96-N-4, Ind. & Eng. Chem., Easton, Pa.

EXPERIENCED WOMAN vitamin and biochemist. B.S. & M.S. degrees. 2½ years' research experience in high potency yeast concentrates and fluorometric assaying of thiamin and riboflavin. Interested in research.
Box 100-N-4, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, M.A., 1942, large Eastern university. Physical chemists major; inorganic minor. Selective service classification, 4F; age 31, single, Phi Beta Kappa.
Box 106-N-4, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(NONMEMBERS)

CHEMICAL ENGINEER, young, B.Ch.E. cum laude; M.S.Ch.E.; experience all phases petroleum refining and research and development; asphalts, road oils, fuel oils. Graduate research product development & agricultural by-product. Will consider any chemical engineering industry. Location immaterial. 1B classification.
Box 52-T-3, Ind. & Eng. Chem., Easton, Pa.

BACTERIOLOGIST—CHEMIST. Graduate of large middlewestern college, with two years' of graduate work. Three years' of experience in industrial fermentations of EtoH; BuoH, acetone and EtoH. Have complete knowledge of most commercial fermentations, including chemical analysis. Both plant and laboratory experience.
Box 56-N-4, Ind. & Eng. Chem., Easton, Pa.

EXECUTIVE with broad experience in sales, development, export, financing, office management, purchasing, negotiating contracts. Desires to enter chemical field. Business degree. Native citizen, 43, married. Protestant. Speaks French and Dutch. References. Connection with progressive company manufacturing or distributing war products essential but one with good peacetime prospects.
Box 77-N-4, Ind. & Eng. Chem., Easton, Pa.

GRADUATE CHEMIST, female, age 33, languages, knowledge medical and engineering phraseology, with diversified business experience and solid scientific background, seeks active type of work. Combination of research with laboratory or business routine acceptable. Not interested in stenographic or straight literary research work.
Box 81-N-4, Ind. & Eng. Chem., Easton, Pa.

EXPERIENCED Ph.D. desires position as group research leader on project requiring thorough knowledge of organic and pharmaceutical chemistry. Capable of carrying suitable project into manufacturing stage.
Box 91-N-4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, M.S. Organic and biochemical research, synthesis and analysis. Experience in foods, beverages, oils, pharmaceuticals, proteins, carbohydrates and blood chemistry. Knowledge of German, Russian and French. Married. Citizen, deferred. Good references.
Box 97-N-4, Ind. & Eng. Chem., Easton, Pa.

MISCELLANEOUS

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MICRO-ELEMENTARY ANALYSES: C, H, N, S, P, Halogens, Methoxyl, Mol. wt., etc., U.S.P. and other official tests, Purity tests, Microinorganic assays, Spot tests, Micro-distillations, Toxicological investigations, and typical micro-chemical research work. Dr. Carl Tiedcke, 366 Fifth Avenue, New York, N. Y.

INDEX MEDIA for Chemical Microscopists and Petrographers. Supplied to leading institutions throughout the world for many years. Research Set, Nd 1.41–1.78, steps .01, in applicator bottles with leatherette case $31.50. Everything practicable in liquid and solid media. J. T. Rooney, Box 358, Buffalo, N. Y.

NATIONAL MANUFACTURING and selling organization doing several million dollars annually, now catering to department and chain stores, is interested in acquiring patents and processes of products that do not require drastic equipment changes. Entirely open-minded, but especially interested in emulsions or dispersions as substitutes for rubber and/or latex and suitable for dipping on forms.
Box 44-N-4, Ind. & Eng. Chem., Easton, Pa.

BIOLOGICAL ASSAYS of vitamins and hormones, some microbiological and chemical assays and related research projects. Prices moderate for the high level of precision and the limited amount of work that is undertaken at one time.
Box 98-N-4, Ind. & Eng. Chem., Easton, Pa.

ABBE TYPE Refractometer standard Bausch and Lomb, practically new, for sale $250 range 13,000 to 17,000. Heatable prisms, thermometer, case, standard test plate dispersion compensator and measuring scale. See Eimer and Amend No. 30400. Immediate delivery.
Box 18-N-4, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Journal, abstracts, decennial indexes, English Chemical Society. 1890–1940 inclusive. Bound 1890–1921 (105 volumes). Unbound 1922–1940. As new $240. Delivered purchase's address; carriage, insurance, paid to quayside New York. Dr. Henstock, Theta, Exmouth, England.

WE OFFER: 10 kilos Indium Chloride, 5000 pounds Cerium chloride, 1000 pounds Sodium uranate, 1000 pounds Titanium carbide, 500 pounds Iron carbonyl, 2000 pounds Columbite, 500 pounds Samarskite, 150 tons Black Oxide Iron, 5000 tons Volcanic ash.
Box 80-N-4, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Laboratory apparatus, Hanovia Quarts Ultra Violet lamps, B & L Colorimeters, Dubosq microscopes, Gaertner Spectrophotometer, Schmidt Haensch Polarimeter, Gaertner Cathetometer, L & N Potentiometer, Galvanometer, Eppley Standard Cells, Analytical Balances, Barnstead Water Stills, Edwards Gas Density Balance, International Centrifuges, Size 1, type SB, Horizontal Autoclaves, Laboratory Hydraulic 6 x 6 presses, Muffle Furnaces, Pyrometer, Drying ovens, Incubators, Water Baths, Beckmann Thermometers, etc. Write us your needs we cheerfully quote on all inquiries. The Laboratory Exchange, 24 E. 21st Street, N. Y. C.

FOR SALE: 50 laboratory balances, pulp, for general laboratory routine, 100 gr Capacity, in polished mahogany case with drawer, Counterpoised sliding door, sensitivity 1 mg. (Unused). We have obtained a quantity of these and are selling them very rapidly at $27.50. We suggest ordering promptly to assure delivery. The Laboratory Exchange, 24 E. 21st Street, N. Y. C.

FOR SALE: "American Chemical Society, Journal": Vols. 1–61 (1879–1939) bound (will not break set); "Chemisches Zentralblatt": 1890–1912, 1916–1923, 1928–1932; "Journal of Biological Chemistry": complete set, bound. A. Calvert, 221 Seaman Ave., New York, N. Y.

FOR SALE: Journal Society Chemical Industry years 1903 to 1935. Beilstein organische Chemie 3 edition, complete. Annalen Physik 1894 to 1904 Journal American Chemical Society 1914 to 1941. Friedlaender, Teerfarbenfabrikation 1 to 12.
Box 95 N-2, Ind. & Eng. Chem., Easton, Pa.

WANTED: Small quarts spectrograph (Hilger model 484 or similar) with sector photometer and accessories for ultraviolet spectrophotometry.
Box 31-N-4, Ind. & Eng. Chem., Easton, Pa.

WANTED: Liebigs Annalen der Chemie, vols. 1–524; Kolloid Zeitschrift, vols. 33–81; Kolloidbeihefte, vols. 25–48; Helvetica Chimica Acta, vols. 1–21; Textile Institute Journal and Transactions, vols. 1–15; Georgia School of Technology Library, Atlanta, Georgia.

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WANTED to BUY: We are very much in need of all laboratory equipment such as Polarimeters, Refractometers, Microscopes, Spectroscopes, Micrometer Microscopes and measuring instruments. We are able to offer very high prices for equipment in fine condition for prompt purchase. Offers immediately made. Send us your list of surplus apparatus. The Laboratory Exchange, 24 E. 21st Street, N. Y. C.

WANTED IMMEDIATELY, new or second-hand "High Frequency Ceramics" Albers-Schonberg.
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Industrial News

CONTINUED FROM PAGE 509

soluble in mineral oil when heated. Mineral oil solutions form soft gels on cooling.

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CHEMICAL AND ENGINEERING NEWS
HARRISON E. HOWE, Editor
PUBLISHED BY THE AMERICAN CHEMICAL SOCIETY
VOLUME 20 APRIL 25, 1942 NUMBER 8

Industrial Development of Synthetic Vitamins[1]

RANDOLPH T. MAJOR Merck & Co., Inc., Rahway, N. J.

MUCH is written, both scientific and unscientific, in the papers and magazines of this country today about vitamins. In spite of this it might be well to define the word "vitamin" first. In the large unabridged dictionary in the writer's home, on the page where the word "vitamin" should be, may be found such words as "visitatorial", "vitaceae", "vitellarian", "vitelin", and "vitex"—but no word "vitamin". Later it was found listed in a separate place among new words. The front page of the dictionary shows that it was published in 1930. This observation gives some concept of the speed with which vitamins have become common knowledge.

As recently as two years ago, some people did not know the nature of vitamins. The purchasing agent of a large company which has a fine scientific laboratory visited us at that time. The discussion turned to vitamins. He said, "I am interested in vitamins, but I suppose no one has ever actually seen and handled a vitamin. Vitamins are something like electricity, aren't they?" He was taken into one of the laboratories and shown a bottle full of crystalline vitamin B_1. He was amazed.

For the purpose of this discussion vitamins might be defined as organic substances normally present in minute quantities in certain foodstuffs, the absence of which in the diet leads to well-defined morbid states.

The older so-called natural vitamins, vitamins A and D, will be mentioned very briefly. As you know, vitamins A and D, found in fish liver oils, are used in the treatment of rickets, especially in children and in the winter, for the development of proper teeth, for the treatment of night-blindness, and for building up resistance to infection. Tablets and capsules of concentrates of these vitamins in irradiated foods are available today. These vitamins have not been synthesized as yet, at least on a commercial scale. Certain individuals have claimed that they have synthesized concentrates of these vitamins, but they are not available generally.

Vitamin C or ascorbic acid was the first synthetic vitamin to be introduced commercially. It is used in the treatment and prevention of scurvy, some types of dental caries, and other disorders. It is available on the market in various pharmaceutical forms, and is put into beverages, confectionery, and certain special foods.

When interest was aroused in vitamin C a number of years ago, a little synthetic vitamin C was shown to a leading biochemist in an eastern university and he was asked, "What good do you think this will have?" His remarks, based upon his work in biochemistry over a good many years were as follows: "I think that it will find a place on the museum shelves of a number of universities, particularly of the biochemical departments. I think a few biochemists and a few pharmacologists will be interested in examining it. I do not think there will be any business in it. There is plenty of vitamin C available naturally in fruits, particularly in citrus fruits."

In contrast to this the United States Tariff Commission reports that in 1940 17 tons of vitamin C were produced synthetically in this country. From a reliable source comes the information that very shortly there will be 80 to 100 tons of vitamin C synthesized in this country annually.

In Figure 1 is shown what happened to the price of vitamin C from the time natural ascorbic acid became commercially available in 1934 at something like $213 per ounce to the present when synthetic ascorbic acid may be had for $1.65 an ounce. Figure 1 also shows the tremendous drop in price when synthetic vitamin C first became available in 1937.

Vitamin B_1 or thiamine is used in the prevention and treatment of beriberi, of lack of appetite in children, and of neuritis of various types. It is available in the various pharmaceutical forms, as well as in medicinal foods. Moreover, a new use for vitamin B_1 has developed which was not anticipated until recently. It is used in the enrichment of flour of which it is reliably stated that 40 per cent of the flour used in our homes and 35 per cent of

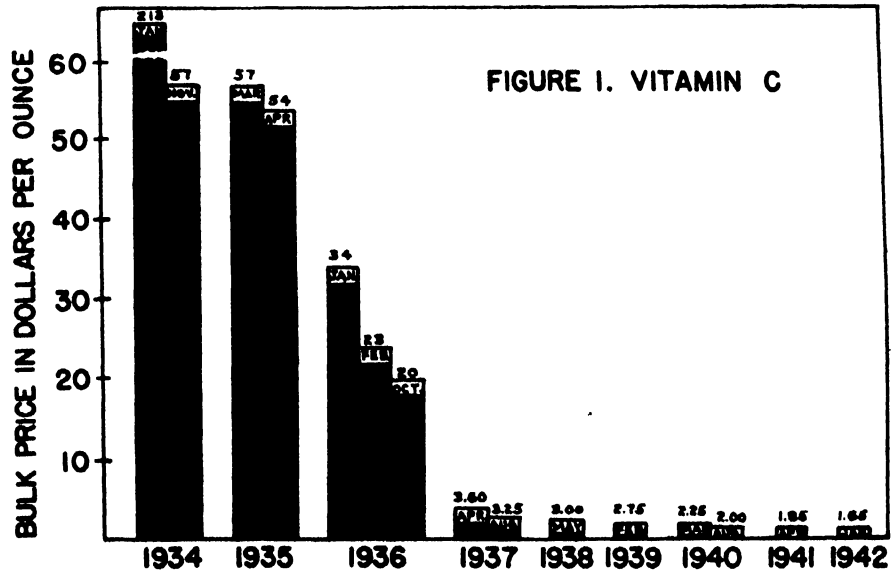


FIGURE 1. VITAMIN C

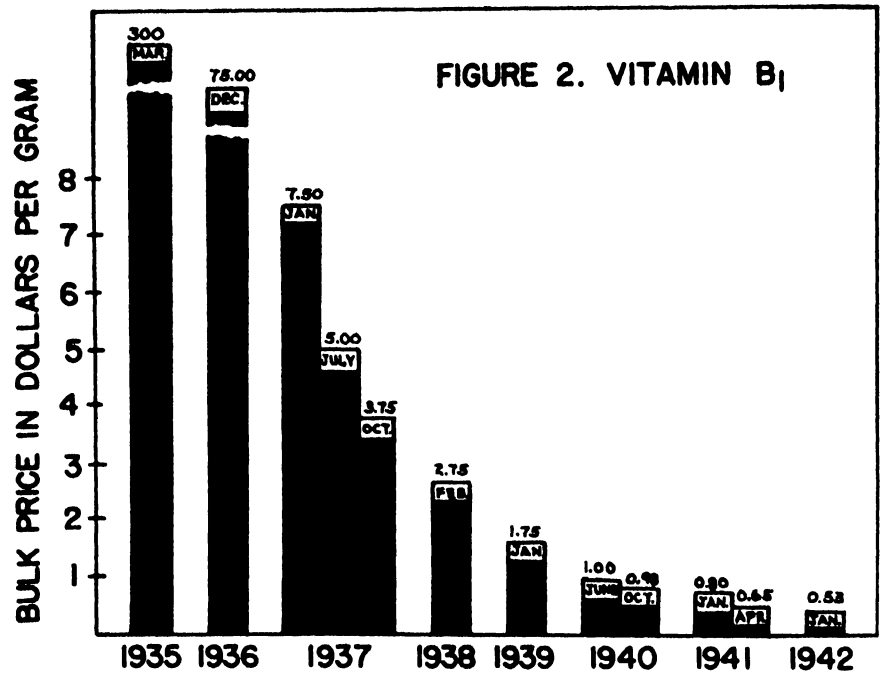
[1] Presented at a meeting of the American Section of the Society of Chemical Industry, March 27, 1942.

the bakery flour used in this country is being enriched with vitamin B_1 today. Each pound of that flour must contain not less than 1.66 mg. of vitamin B_1.

Vitamin B_1 was not introduced into flour without encountering difficulties. One such difficulty is illustrated by the case of one of our good Jewish friends. When he heard that synthetic vitamin B_1 was being put in bread, he was greatly worried and inquired whether Jewish people might eat this bread. In other words, was it "kosher". Fortunately for the enrichment program and also for our Jewish friends, it was determined to be kosher.

Carolina has recently passed a law that requires the enrichment of all white flour used in the state.

Vitamin B_1 became available only in very recent years. Figure 2 illustrates the remarkable decrease in price that has occurred as the use of vitamin B_1 has grown. In 1935 when natural vitamin B_1 became available, it cost about $300 per gram. In 1937 when the synthetic vitamin was first sold, the price dropped to $7.50. The drop has continued until it is now being sold for $0.53 per gram. It is reliably stated vitamin B_1 will soon be made in this country at the rate of 25 to 30 tons annually.



Another commercially important vitamin is nicotinic acid, or niacin, as it is called for the benefit of those who object to consuming nicotinic acid because they associate the name with nicotine. It is used in the cure and prevention of pellagra and is available on the market in various pharmaceutical forms, sometimes in combination with other vitamins and sometimes alone. It is available in medicinal foods and is added to all the enriched flour previously mentioned, in connection with vitamin B_1. Each pound of enriched flour must contain not less than 6 mg. of niacin.

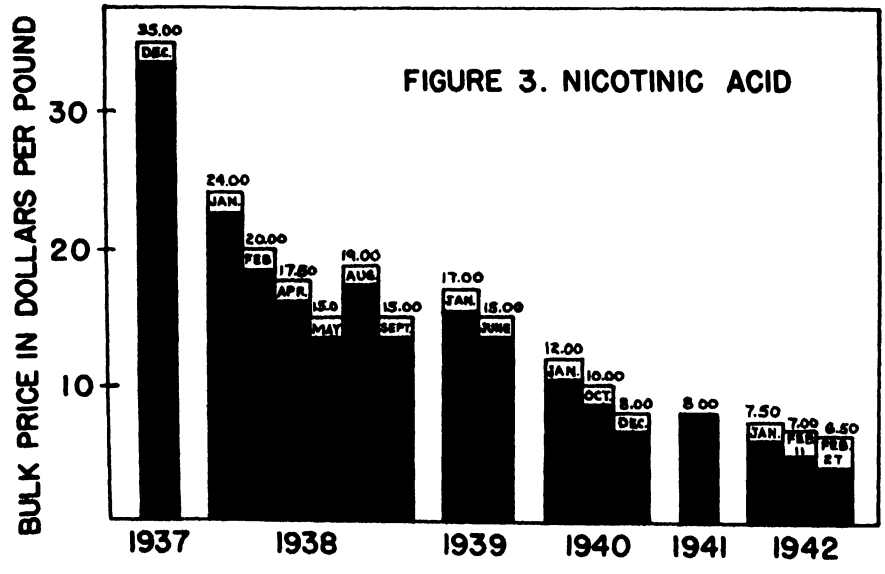
The trend of the price of nicotinic acid since 1937 is shown in Figure 3. The price of nicotinic acid in bulk has dropped from $35 per pound in 1937 to $6.50 per pound in February 1942. The decrease in price has not been so marked as in the case of some of the other vitamins, since nicotinic acid is an old, well-known compound. It is interesting, however, that increasing volume of production along with chemical and engineering studies has made it possible to decrease the price to the figure indicated, especially in times of generally rising prices.

Riboflavin (vitamin B_2) is used in the treatment of certain fissures of the lips and keratitis, a certain type of inflammation of the eyes, and also in the poultry industry to stimulate egg production. It is available in pharmaceutical preparations and in medicinal foods. Beginning July 1, 1942, it will be required in enriched flour if sufficient riboflavin is available then to enrich the enormous quantity of flour needed in this country. This requirement may have to be deferred for a few months because of a shortage of riboflavin

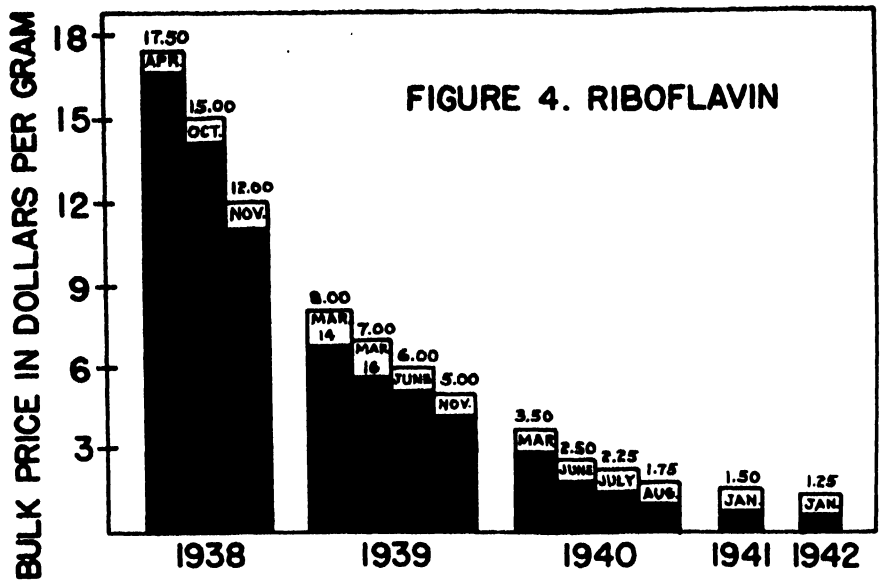
Some may wonder why an effort is being made to enrich white flour rather than to encourage more widespread use of whole wheat flour. That is too long a story to discuss here, but the following quotation from Oscar Wilde's "De Profundis" may prove interesting. In describing a man who had been in jail for some time, he wrote:

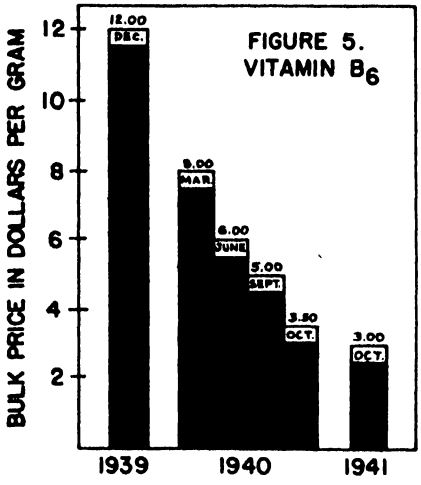
Some six weeks ago I was allowed by the doctor to have white bread to eat instead of the coarse black or brown bread of ordinary prison fare. It is a great delicacy. It will sound strange that dry bread could possibly be a delicacy to anyone. To me it is so much so that at the close of each meal I carefully eat whatever crumbs may be left on my tin plate.

The Army and Navy have specified that the bread baked for the soldiers and sailors must all be enriched. South



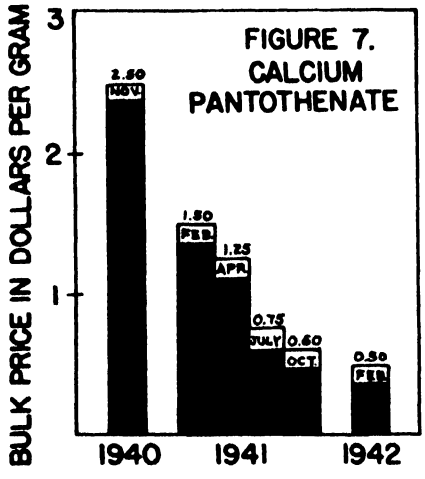
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owing to the difficulties that have been encountered in obtaining equipment necessary for its manufacture in sufficient quantity. For the enrichment of flour 1.2 mg. of riboflavin are required per pound of flour. The interest in riboflavin has also grown rapidly. In Figure 4 is presented the history of the bulk price of riboflavin, beginning in 1938 when synthetic riboflavin in bulk first became available at $13.50 per gram to the present time when it may be had for $1.25 per gram. This picture is not so striking as in the cases of vitamin C and vitamin B_1 since riboflavin has not yet been produced in as large quantities. Undoubtedly, however, the price of riboflavin will be lowered as production increases.

All of the vitamins discussed in the preceding paragraphs have very definite, well-defined uses. The value of the next two vitamins to be discussed is not so well known. There are indications that the first of these, vitamin B_6, may be of value in the treatment of certain muscular rigidities, in paralysis agitans, and perhaps for other conditions. In spite of this, however, there is considerable interest in this vitamin, the synthesis of which was first reported in 1939. Figure 5 presents the effect of increased production on its price since 1939.



As is the case with vitamin B_6, the biological and medical value of the next vitamin, calcium pantothenate, is poorly defined. However, everywhere one goes the value of pantothenic acid in the cure and prevention of white or gray hair is discussed.

In Figure 6 is shown a black rat whose fur has turned gray owing to a deficiency of pantothenic acid in its diet. Administration of pantothenic acid would change this fur back to its natural color. The Good Housekeeping Institute has published a statement that it is possible to change a human being's gray hair back to normal by the use of pantothenic acid. On the West Coast calcium pantothenate is being added to a large proportion of the milk sold. Pantothenic acid in the form of its calcium salt is available in various pharmaceutical forms. In Figure 7 is presented the change in price of calcium pantothenate that has occurred with increasing use. Note that it was first made available just two years ago—in 1940.



Figure 6

There are a number of other vitamins that may be termed parts of the vitamin B complex. Among them are inositol which Dr. Woolley, of the Rockefeller Institute, observed has certain effects on the hair of mice, *p*-aminobenzoic acid which was proposed as a vitamin by another New Yorker, choline, and biotin. There are others, but they appear to be of still less importance, at least at this time.

Two fat-soluble vitamins have been synthesized. One of these, vitamin K, is generally used in two forms—first as vitamin K_1, and second as 2-methylnaphthoquinone. Both of these compounds decrease the clotting time of the blood and are used in patients before operations, particularly in people suffering from jaundice, and also at childbirth.

The other synthetic fat-soluble vitamin, vitamin E, or α-tocopherol, is essential for proper reproduction in rats, but its value in humans is quite uncertain. It may be of value in the correction of human sterility; and it may be important in the treatment of certain neuromuscular disorders.

Development of Our Knowledge of Synthetic Vitamins

Scurvy, a disease caused by lack of vitamin C, has been recognized for many, many years. It was a scourge to those who traveled long distances by boat until quite modern times. Many sailors and passengers on long voyages before the 19th century died of this disease before they reached their journey's end. But in 1804 the regular issue of a ration of lemon juice was made compulsory in the British Navy and thereafter scurvy was a comparatively rare disease among British sailors. However, before vitamin C was isolated, the whole concept of some diseases being due to the lack of certain so-called accessory factors had to be recognized by scientists and much experimental work on animals performed. It was found that the guinea pig suffered from scurvy and was a suitable experimental animal for these studies. Using this animal as an indicator of activity it was possible by various methods of fractionation and separation to isolate crystalline vitamin C.

Vitamin C was isolated and first recognized as a vitamin by two American biochemists, Waugh and King, in 1932. After they had isolated vitamin C, using the

guinea pig as an indicator of the activity of their fractions, it was found that the same material had been isolated from adrenal glands previously by a Hungarian, Szent-Györgyi, in 1928. However, Szent-Györgyi had not recognized that he had had vitamin C in his hands. Subsequent to the successful isolation of vitamin C, chemists became interested in its structure and synthesis. In 1933 chemists in various parts of the world had synthesized vitamin C after the structure had first been determined. One of these early syntheses is due to Reichstein, in which xylosone is converted to a nitril, hydrolyzed to the 2-keto sugar acid, and finally converted to ascorbic acid. This did not prove a very satisfactory commercial synthesis, because it started with xylose or lyxose, both of which are not readily available. A more successful synthesis also due to Reichstein used the readily available sugar, glucose, as raw material. Glucose was hydrogenated to sorbitol, converted to sorbose, then to diacetone sorbose, and then oxidized to 2-keto-*l*-gulonic acid which was converted into vitamin C. Among the other scientists who did considerable work on the synthesis of this vitamin are Karrer, Haworth, von Euler, and Micheel.

The first manufacture of natural vitamin C in this country took place in 1934. It was made from gladiolus leaves, which had been found to contain a relatively high per cent of vitamin C. Fields of gladioli were planted in the vicinity of the author's company's factory. Many difficulties were encountered in collecting and extracting the plants on the day that they were cut.

Synthetic ascorbic acid was first made available in the United States in 1937.

Beriberi, the disease caused by the lack of vitamin B_1, was also recognized many years ago. Because so many people in the Orient have suffered from this disease, the attention of medical scientists was attracted to it at an early date. Most of the early work was carried on in the Orient. Takaki, the director-general of the Japanese Navy Medical Service, was able to banish beriberi from the Japanese Navy in 1882 by increasing the allowance of vegetables, fish, and meat in the navy diet and by using barley instead of polished rice. He recognized that beriberi was caused by



Figure 8

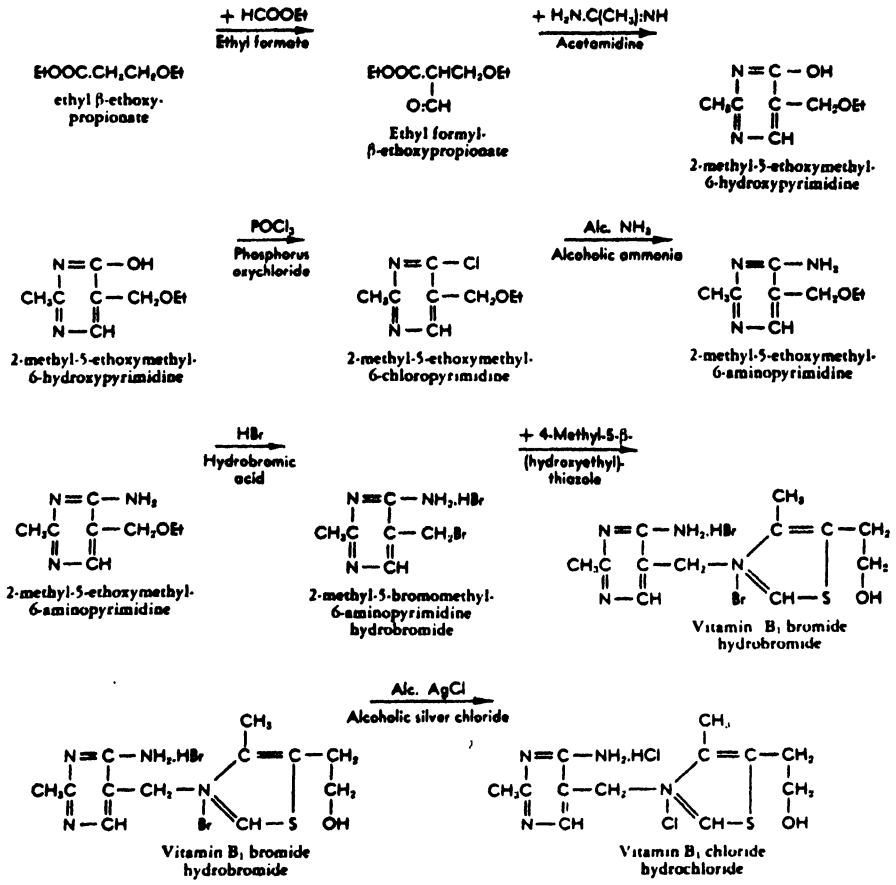


Figure 9. Williams and associates synthesis of Vitamin B_1

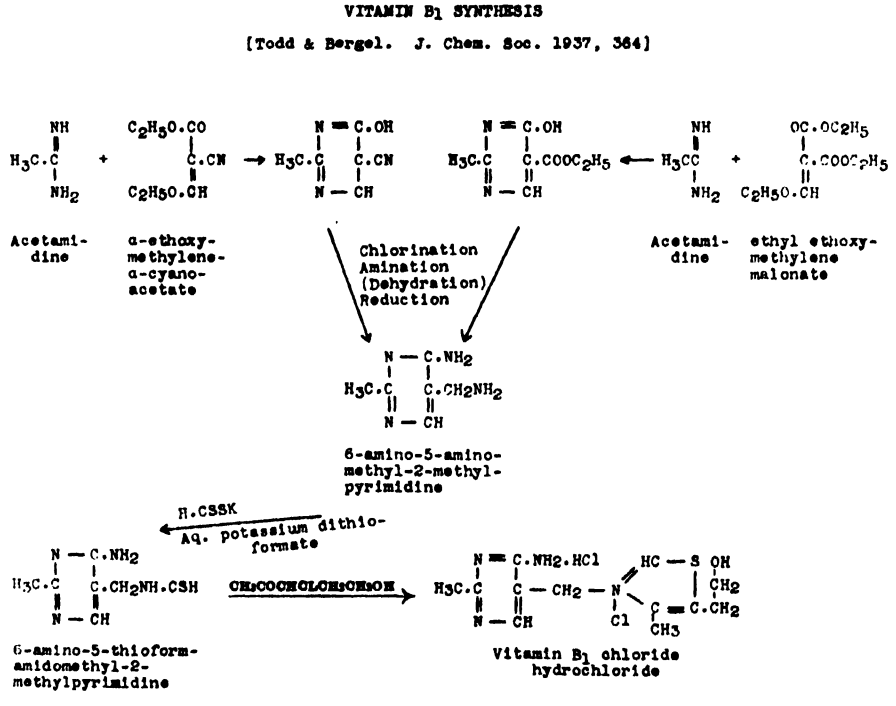


Figure 10. Todd and Bergel synthesis of vitamin B_1

a badly balanced diet, but that is as far as his studies carried him.

In 1897, a Dutchman named Eijkman, working in Batavia, Java, found that beriberi resulted from continuous consumption of decorticated rice. He used the pigeon (Figure 8) as his test animal. In 1928, Jansen and Donath, working in the same laboratory as Eijkman, first isolated vitamin B_1 in minute quantities from rice polish. R. R. Williams, who started work some thirty years ago on the same problem in the Philippines, developed a practical method of isolating larger quantities of

vitamin B_1 a few years later. However, it was soon obvious that large-scale equipment and chemical engineering skill would be required to produce the quantities of vitamin B_1 that were required to settle the structure of this vitamin. Dr. Williams turned to the author's laboratories for help on his problem. Larger quantities of vitamin B_1 were isolated and the structure of the vitamin was definitely established. Dr. Williams had previously carried out a crucial experiment, in which he had found that with sodium sulfite the vitamin could be split into two parts, a nitrogen-containing sulfonic acid and a sulfur-containing alcohol. In collaboration with Hans Clarke of Columbia University the latter was shown to be a thiazole derivative. After considerable additional work, the structure of the remaining fragment was determined by Dr. Williams and by Dr. Cline of our laboratory, and the synthesis was accomplished following an earlier synthesis of the thiazole moiety by Buchman and by Clarke and his associates. Independently the vitamin was synthesized by others, among them being Grewe, Andersag, and Westphal, and Todd and his associates. Two of these syntheses are graphically shown in Figures 9 and 10.

A good many strictly technical difficulties have been encountered in the manufacture of vitamin B_1. The synthesis of the vitamin involves a good many reactions, some of which are very complex.

Other troubles were also encountered in its manufacture. One particular step, in days gone by, was especially afflicted by its accompanying odor. One man was finally moved to quit. When asked the reason, he claimed that his girl left him in the middle of the dance floor! His odor had overcome his charm! Many people leaving work would have a slight but definite odor of "burnt rubber". One supervisor, on going to a movie, was somewhat embarrassed when the lady next to him rose and informed the manager that there was a short circuit or something burning near her. The manager, ushers, the lady, and others gave the area a careful inspection to find what was burning. However, the man was resourceful—he got down on his hands and knees and joined the search.

In 1915 Goldberger, a United States Public Health official, recognized that dietary deficiencies might play an important role in the development of pellagra, a disease that was common in our southern states. It is reported that 400,000 to 500,000 people suffered from this disease every year. Investigations by Elvehjem led to his demonstration in 1937 that nicotinic acid would cure black tongue in dogs, a condition analogous to pellagra in man. Previous to 1937 nicotinic acid had been isolated from rice polish, liver, etc., but no one had recognized the significance of these findings. In 1938 Spies and his co-workers reported that nicotinic acid (niacin) was effective in the treatment of human pellagra, and its use naturally has spread rapidly.

SYNTHESIS OF RIBOFLAVIN

[Karrer & Meerwein. Helv. Chim. Acta, 18, 1130 (1935)]

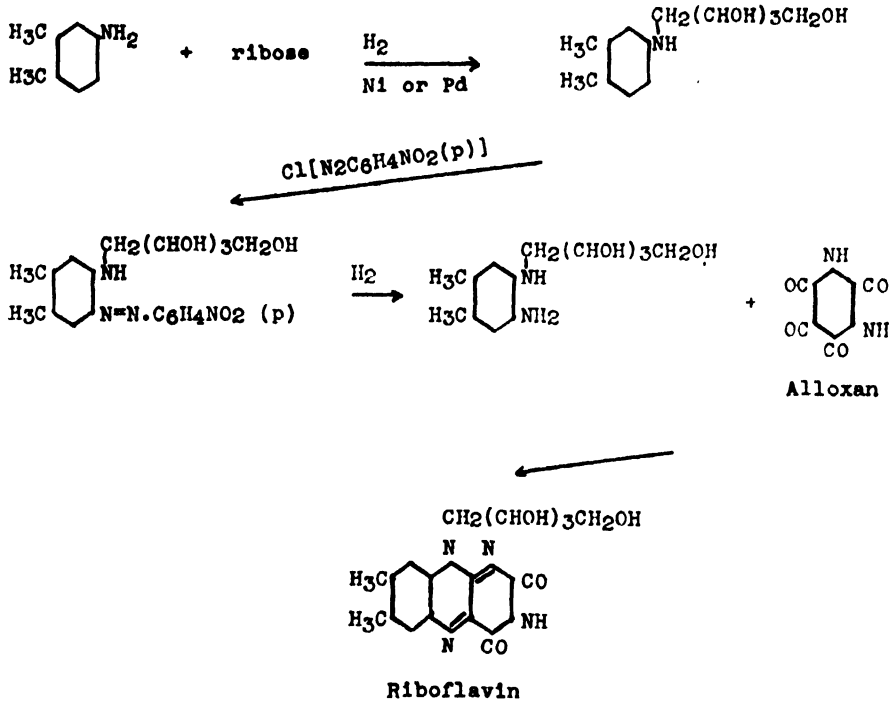


Figure 11

Nicotinic acid was first prepared in 1867 by Huber by the oxidation of nicotine with potassium chromate and sulfuric acid. Later it was found that nitric acid could be used as the oxidizing agent. Nicotinic acid may be made also by other methods, such as the oxidation of quinoline or β-picoline or by the bromination of pyridine, followed by its conversion to the nitril of nicotinic acid and then by hydrolysis. Nicotinic acid is made in large quantities by processes such as these.

Early in the work on the vitamins, it was recognized that there were at least two water-soluble so-called B vitamins, one stable to heat and the other unstable. The latter was designated vitamin B_1, and the second, the heat-stable factor, was termed vitamin B_2. Later it was found there were several heat-stable factors, all essential for the growth of the rat. Using this animal in his tests, Kuhn and others showed in 1933 that one of the heat-stable factors, later termed "riboflavin", was the same as a widely distributed and previously described yellow pigment in milk, liver, etc. He isolated the pigment from egg white and determined its structure. Both Kuhn and Karrer synthesized riboflavin in 1935. Karrer's synthesis is shown in Figure 11. Other methods have been developed in this country for the synthesis of riboflavin.

Medical interest in this vitamin dates from the work of Sebrell and Butler in 1938 who found that it prevented and cured certain fissures in the corners of the mouths of humans. Two years ago Sydenstricker found that it prevented and cured a certain type of keratitis. Recent examinations with the so-called slit lamp indicate that there may be a very widespread deficiency of riboflavin in the diet in this country.

In the manufacture of riboflavin the principal difficulty encountered has been the production of the ribose part of the molecule. Of course ribose is a very rare sugar. It has involved much work by night and by day, including Saturdays and Sundays, to find a good manufacturing process for riboflavin. It is one thing to make such a compound in the laboratory when one is interested in making perhaps a gram or two of it, but quite another thing to do it on a large scale with reasonably good yields. The manufacture of these vitamins is carried out in typical manufacturing equipment, although it is not made on anywhere near the scale to which our friends in the heavy chemical industry are accustomed.

During the course of Goldberger's work on the pellagra-preventing factor, he was able to produce a syndrome in rats which was called "rat pellagra" when the rats were fed on diets deficient in this pellagra-preventing factor. However, in 1935 György showed that rat pellagra was not caused by a deficiency of the pellagra-preventing factor but by a deficiency of a separate factor which he termed vitamin

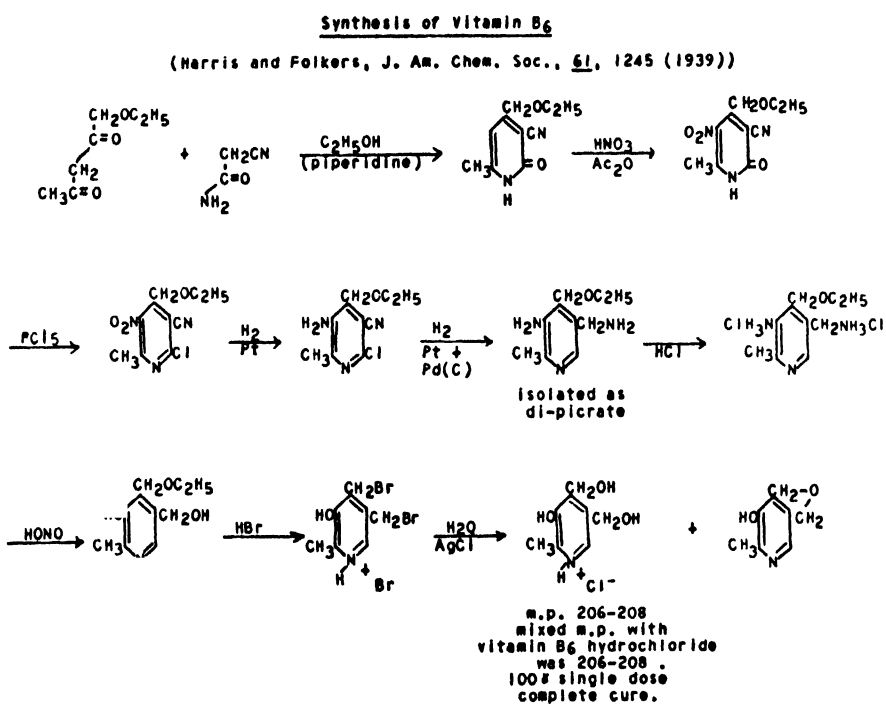


Figure 12

B_6, now known as pyridoxine. This compound was isolated by Drs. Keresztesy and Stevens in the Merck Laboratories and at about the same time in other laboratories by Lepkovsky, Kuhn, and Ichiba and Michi. Its synthesis was accomplished in the Merck Laboratories in 1939 by Drs. Harris and Folkers. As may be seen from Figure 12, the synthesis is not simple, but in spite of this a number of good classical organic reactions have been used in its preparation.

In 1933 R. J. Williams discovered an acidic substance which occurred in many natural products that would stimulate the growth of yeast. In the meantime other workers had found that chicks bred under certain special dietary conditions developed a dermatitis which was attributed to the lack of a so-called "filtrate factor". In 1939 Elvehjem and Lepkovsky and Jukes found that highly active concentrates of pantothenic acid would cure this chick dermatitis (Figure 13). Previously Williams had isolated a somewhat crude preparation of pantothenic acid from natural sources. He had shown that pantothenic acid was formed by the combination of β-alanine with a hydroxy acid. After the announcement of the probable identity of pantothenic acid with the so-called "filtrate factor" for chicks the collaboration of our laboratory was enlisted in the investigation of the structure of this acid. First the hydroxy acid was isolated from natural sources in the form of its lactone. This was shown to be the levo form of α-hydroxy-β,β-dimethyl-γ-butyrolactone. It was soon synthesized. Pantothenic acid was obtained by combining this lactone with salts of β-alanine or its ester followed by hydrolysis. Synthesis of pantothenic acid made it possible to establish without further question the identity of the chick "filtrate factor" with pantothenic acid.

As was mentioned previously, there has been a growing demand for calcium pantothenate and it is being manufactured in relatively large quantities.

In a study extending from 1929 to 1934 Dam and his associates described a deficiency disease of chicks which was characterized by a marked tendency to bleed. It was shown that the clotting time of the blood of chicks suffering from this disease was greatly prolonged. Dam found that hog liver contained a fat-soluble factor which would correct this condition. He termed it vitamin K. Subsequently Almquist obtained highly potent concentrates from alfalfa. Later Doisy and his associates succeeded in isolating what they termed vitamin K_1 in alfalfa and K_2 in fish meal. The structure of the more important of these, vitamin K_1, was found to be 2 - methyl - 3 - phytylnaphthoquinone. Doisy, Fieser, and Almquist synthesized it in 1939. Subsequently it was announced by Fernholz and Ansbacher that 2-methylnaphthoquinone was as active or possibly more active than vitamin K_1 or vitamin K_2. The manufacture of vitamin K_1 for use in medicine is not great. Larger amounts of the cheaper 2-methylnaphthoquinone are used.



Figure 13

In a study dating back to 1922 Evans and his collaborators have found that a dietary constituent is necessary for normal reproduction of rats. It was found that wheat germ oil was a rich source of this factor which has been termed vitamin E or tocopherol. It was present in other natural oils also. Concentrates of these oils were made and crystalline derivatives of vitamin E, or α-tocopherol as it has become known, were prepared. Subsequently other tocopherols—namely, β- and γ-tocopherols—were found which differ from α-tocopherol in the number of methyl groups contained about the chromane nucleus of the molecule. The structure of α-tocopherol was determined by Fernholz in our laboratory and the synthesis was accomplished by Karrer in Switzerland, Todd in England, and Lee I. Smith of the University of Minnesota in this country.

The importance of cooperation among academic laboratories, research institutes, and industry and the need for a friendly understanding by each of the needs, goals, and problems of the others cannot be emphasized too much. The growth of modern industry is almost entirely dependent upon the great advances in pure science. Industry too has contributed much. It has made the findings of the pure scientist available to society. Discoveries in pure science are apt to become and remain sterile from the point of view of society unless industry makes use of them in some way. Examples of the great developments in industry based upon pure science are found in the great electrical industry which is so largely based upon the work of Faraday and other great pure scientists, or in the development of the dye industry which is based upon the work of the organic chemists of this country and abroad. This list could be increased almost ad infinitum.

Industry contributes to pure science by financially supporting research in universities and research institutes. It has made special chemicals, facilities for large-scale work, bioassays, and other expensive analyses and assays available to academic workers. It is very important that this work be continued, and it is very important too that it be continued to the mutual satisfaction of both the parties concerned. To attain this it is essential that the two groups understand what each is trying to achieve. The primary purposes of the academic institutions, of course, are the training of youth and the expansion and extension of man's mental horizons. These purposes are significant and im-

portant. The purpose and reason for the existence of the manufacturing industries are, of course, to manufacture and sell something that people want and need—in other words, to satisfy demands for some article or material. In doing this patents play an extremely important role. Patent protection on a new process or product is often necessary to obtain the money necessary for the equipment and facilities required to begin manufacture. Many writers state that the American patent system is responsible in no small measure for the remarkable development of American industry. However, the subject of patents is one on which the views of many academic investigators and industrial research investigators and business men differ widely. To achieve any real cooperation it is most important that both academic and industrial scientists achieve as thorough an understanding as possible of the purposes, benefits, and limitations of our American patent system.

In conclusion some general comments on the significance and social value of this food accessory business, the manufacture of synthetic vitamins, may be of interest. Through Claude R. Wickard, Secretary of the U. S. Department of Agriculture, the Government has issued a little pamphlet entitled "Food Will Win the War and Write the Peace". It states, "Food is a whole arsenal of weapons in this struggle for human freedom. It is the driving force behind high production by munition workers, and top-notch performances and strong morale among soldiers and sailors."

Somewhat in the same vein, Russell M. Wilder of the Mayo Clinic and former chairman of the Committee on Food and Nutrition of the National Research Council has written, "Famine has always contributed to defeat of armies and subjugation of nations. This has long been recognized, but in the past it was mistakenly thought that famine could be prevented if only the supply of food sufficed. The newer knowledge teaches that the nutritive quality of the foods supplied is of the utmost importance. . . . Caloric energy is needed, but no more than much else in food. . . . The new knowledge of nutrition has emphasized particularly the importance of what once were called accessory factors, namely salts and vitamins. . . . Vitamin deficiencies constitute the principal 'hidden hungers', subclinical abnormalities which until lately, for the most part, were unrecognized."

This new industry in synthetic vitamins is making it possible to satisfy many of these "hidden hungers" and to improve the nutrition and well-being of our people.

In comparing the contributions of the nutrition workers of the 20th century with those of earlier workers in the 19th century, such as Pasteur and Lister, from whose work came a recognition of the bacterial origin of disease, we may conclude that the social value of the present work in nutrition would appear to be as significant as that of the 19th century investigators to whom mankind owes so much.

"Flash of Genius" Patent Doctrine and the Chemist

THOMAS CIFELLI, JR., 3 Clarendon Place, Bloomfield, N. J.

THE United States Supreme Court has recently sanctioned a doctrine of patent law which, it is thought, will vitally affect the chemical industry and the future of industrial research in America. In the case of the Cuno Engineering Corp. *vs.* the Automatic Devices Corp., U. S., 62 Supreme Court 37; 51 *United States Patents Quarterly* 272 (1941), the court held that the test of patentability is whether a "flash of creative genius" is revealed by the alleged invention. The high court proclaimed that, unless a strict application of this test reveals the presence of such a flash, a patent is invalid for want of invention.

The matter is deemed sufficiently important to the chemical profession to warrant a note on certain aspects of the situation even though others (*2*, *3*) have already delineated the significance of this principle of law. The hope is expressed that the chemists of the Nation will clearly see the situation as it affects them and their entire industry and will take proper action to protect their legitimate interests.

The new test of patentability, if adhered to, will necessarily result in the invalidation of most chemical patents. These patents are in great part the result of planned, scientific research. It is not seen how the chemical inventor, along with other technically trained inventors, can qualify under a strict application of the Cuno case test in the majority of cases. In this connection it may be well to consider the remarks of one of the ablest present-day jurists on patent law, Judge Learned Hand of the Second Circuit Court of Appeals, who in Ruben Condenser Co. *vs.* Copeland Refrigeration Corp., 85 F. (2d) 537 (1936) stated:

> Especially in chemical and electrical experiments happy solutions may be reached by testing out variants reached merely by permutations of old elements. Possibly the patent law should protect such industrial achievements, but it does not; the work of the well-equipped laboratory which by trial and error checks off a series of formulas may be the proper path of industrial advance, as the Germans found it to be before the Great War; but it does not demand what we call "invention".

Thus, although no line of cases in point is as yet available in aiding one to grasp an intelligent idea as to how the test will be applied in practice, it seems likely that a strict application of the test as called for by the Supreme Court will result adversely to chemical inventors.

In view of the long line of statements (e. g., *4*) to the general effect that the United States patent system is one of the most important factors in the development of industrial research as we know it, the significance of the impact of the new test of patentability on the future of industrial research is apparent. If industry finds it all but impossible to acquire valid patent protection on inventions, will industry continue to expend large sums of money on research? Here the problem touches the chemist, inventor or no, for with retrenchments in research a decrease in the number of chemists employed in industry would appear to follow. Of greater importance is the adverse effect the test, which will likely discourage inventiveness, will have on the "progress of science and the useful arts" in the United States—for which quoted purpose the Federal Constitution empowers Congress to legislate on patent matters.

Before considering what part the chemical profession can play in combating the new threat to the future of research, it might be well to consider the foundations upon which the Cuno case test rests. It is believed that no foundation can be found in the United States Constitution or in any of the patent statutes. The conclusion one arrives at is that the test is based on a concept which is the product of the juristic mind. The judges have decided that the drafters of the Constitution and the statutes did not intend to reward inventors other than those of the "genius" type.

One is entitled to give thought to

whether the new test is even calculated to reward inventors who actually contribute to the progress of science and the useful arts. Demma (*2*) points out that Edison's incandescent lamp, Marconi's wireless, Morse's telegraph, and Bell's telephone inventions were all the result of hard work and tireless effort; none were creatures of "flashes of genius". No one can seriously contend that the manner in which an invention springs into being bears any relation to its contribution to progress. Consequently, it is not understood how the Cuno test meets the constitutional directive that inventors are to be rewarded for their contributions to society. It seemingly leads to the conclusion that even the outstanding inventions above are not entitled to patent protection and it stresses form—how the invention comes into existence—to the exclusion of substance—what the invention contributes to progress.

Having recognized the stake of chemists in the situation, what can they do about the matter? The answer appears to lie in helping to educate the general public on the true relationship between patents and industrial progress (*2*). The problem is essentially one which involves public rights. The courts actually believe that they are protecting those rights by applying a test such as the "flash of genius" doctrine. The general public knows practically nothing about the effect of the patent system on its economy and hence is not in a positition to know whether its rights are even remotely involved in patent matters. So long as this condition prevails, the public cannot be aroused to make its voice heard when actions, supposedly taken to protect its rights, actually affect them adversely. There is already practically conclusive evidence, if any be needed, of the results which can be obtained when an informed public acts through democratic processes. One may feel confident that if the public is permitted to realize the true part that the patent system plays in the Nation's economy, a doctrine such as the "flash of genius" concept, which appears to bear no relation to the progress of science and the useful arts, will soon find its resting place with other discarded doctrines.

Education of the public is a task that, it would seem, can best be accomplished by responsible representatives of the groups from which most inventors come, working in collaboration with the patent bar. A committee of the Patent Section of the American Bar Association has already presented such a suggestion (*1*), but as yet no definite action by this body has been taken on the matter.

At the same time, since education of others presupposes knowledge in the ranks of the teachers, the advisability of grasping a clear concept of the fundamental principles and philosophy of the United States patent system might well be considered by the chemists and by other large inventor groups. The principles concerned are relatively few and easy but it is nevertheless true that many chemists, even those who have obtained several patents, have misconceptions concerning these principles. Probably many chemists believe that a patent gives the patentee the right to practice his invention. This is not so. The patent merely gives the patentee the right to use the federal courts to try to exclude someone from practicing the patentee's invention. The patentee himself may not be entitled to practice his own invention. The reason for this state of affairs lies in the fact that the patentee, by practicing his own invention, may infringe an adversely-held broader or dominating patent.

Education of chemists in patent matters may proceed along several directions. One would involve the sponsorship by professional and scientific organizations of more talks on the patent system. Practicing chemists should find these talks of interest. As for the chemists of tomorrow, colleges and universities might offer special courses in patent law for chemists or include some lectures on the patent system in another course given in the senior year.

Another task with which the chemical profession might concern itself is a fair and critical study of Monograph 31, T. N. E. C. (*5*). This monograph is believed to bear a close relationship to the subject at hand. It is a strong indictment of the patent system for many of its alleged abuses. The monograph contains a number of proposals for changes in the system. An inkling of its importance is indicated by the fact that the Temporary National Economic Committee's recommendations for changes in the patent system seem to be based entirely on this monograph. Also it might be well to consider the similarity between the "flash of genius" doctrine enunciated by the Supreme Court and the following excerpt from page 156 of the monograph which, it may be added, was cited with apparent approval in the Cuno case:

> An insistent task is a definition of "patentability". All inventions derive from common knowledge; they differ in the quality and magnitude of their contribution to the industrial arts. As respects origin they fall into three rather distinct classes: first, creations which exhibit individual insight; second, derivative processes, worked out by professional staffs, equipped with laboratory facilities . . . The mark of the first is genius; of the second professional competence . . . It was patience on the part of the man of genius which the Constitution wished to reward; the mere display of capacity to contrive has been repeatedly frowned upon by the United States trails which need to be followed.

It is perhaps proper to point out that new machinery which may result in placing the patent system on a proper foundation is probably even now beginning to function. A new five-man National Patent Planning Commission has recently been set up by the President to make a complete study of the patent system and to present its recommendations for proposed changes therein, with particular regard to matters relating to postwar conditions. The personnel of the commission is outstanding, including Charles F. Kettering, chairman, Owen D. Young, Chester C. Davis, Edward F. McGrady, and Frances P. Gaines. However, it is hoped that the chemical profession will not permit any complacency, arising out of the creation of this investigatory commission, to interfere with the profession's task.

Literature Cited

(1) American Bar Assoc., Rept. of Committee on Corrective Publicity, Section of Patent, Trade-Mark and Copyright Law, *J. Patent Office Soc.*, **23**, 851 (1941).
(2) Demma, S. A., *Ibid.*, **24**, 32 (1942).
(3) Littell, N., *Ind. Eng. Chem.*, **34**, 88 (1942).
(4) National Research Council, Rept. of Patent Committee, *Ibid.*, **11**, 250 (1919).
(5) Temporary National Economic Committee, "Patents and Free Enterprise, Investigation of Concentration of Economic Power", Monograph 31, Washington, D. C., U. S. Govt. Printing Office, 1941.



NEWS-MAKERS

Osborne Bezanson, general manager of the Texas Division of the Monsanto Chemical Co., was elected a vice president of the company at the regular monthly meeting of the board of directors.

Lieutenant George B. Campbell, until February 1 a patent attorney with Allied Chemical & Dye Corp., is assistant port intelligence officer for the Boston Sub-Port of Embarkation.

French E. Dennison, in charge of the Small Commercial Refrigeration Development Department, York Ice Machinery Corp., has been called by the War Department to serve as chief inspector for the Philadelphia Ordnance District.

L. A. Du Bridge, director of the Radiation Laboratory, Massachusetts Institute of Technology, addressed a joint meeting of the New York Section of the American Institute of Electrical Engineers and the New York Electrical Society on April 15 on "Science and Engineering in the War Effort".

Cyrus G. Dunkle, for several years a chemist in the Research Section of the Chemical Laboratories, Picatinny Arsenal, Dover, N. J., has been ordered to active duty in the Chemical Warfare Service. Captain Dunkle is serving at present as assistant chemical officer, Headquarters Ordnance Training Center, Aberdeen Proving Ground, Md.

In recognition of his "untiring devotion to the advancement of science", **H. A. B. Dunning,** president of Hynson, Westcott & Dunning, Inc., Baltimore, Md., was awarded the degree of doctor of laws *honoris causa*, by The Johns Hopkins University at commemoration day exercises, February 23, 1942. Dr. Dunning is a member of the Advisory Committee of the university's Department of Chemistry.

Harry B. Feldman, Chemical Engineering and Chemistry Department, Worcester Polytechnic Institute, is now on active duty as a captain in the Chemical Warfare Service, U. S. Army, at the Chemical Warfare School, Edgewood Arsenal, Md.

Charles F. Fisk, who for several years has worked as development chemist at the Providence plant of the U. S. Rubber Co., was transferred in January to the Munitions Division, Des Moines Ordnance Plant, Department of Product Quality Control.

R. G. Forsberg has been appointed purchasing agent of the Jessop Steel Co., Washington, Penna.

William F. George, associated with *Chemical Industries* for many years, has joined the sales organization of the Hooker Electrochemical Co. Mr. George will be in charge of the New York office in the Lincoln Building, 60 East 42nd St. He will devote his efforts generally to trade contacts in the Metropolitan New York area.

Horace J. Grover has been named a research physicist on the staff of the Battelle Memorial Institute, Columbus, Ohio, and has been assigned to research in industrial physics.



H. B. Higgins

H. B. Higgins, who has been associated with the Pittsburgh Plate Glass Co., Pittsburgh, Penna., since 1905, has been elected executive vice president of the company. Mr. Higgins is a director and has been a vice president since 1928.



Louis A. Hoffman

Louis A. Hoffman has been elected president and general manager of the Hilton-Davis Chemical Co., Cincinnati, Ohio, succeeding the late **A. B. Davis.** Mr. Hoffman has been associated with the company since its inception in 1922, first as research chemist and since 1936 as vice president and treasurer. **James F. Thompson, Jr.,** was elected vice president in charge of research and **George Nieder,** vice president in charge of sales.

Robyn M. James has joined the bacteriological staff of the Commercial Solvents Corp. and is working at the research laboratories in Terre Haute, Ind.

Alfred Kauffmann, B. A. Gayman, and **J. Reece Lewis** have been re-elected directors of the Link-Belt Co., Chicago, Ill., for three years. Two new directors were elected: **Clarence Tolan, Jr.,** and **William C. Carter.**

Chris P. Keim has left the Hygrade Sylvania Corp. to become an industrial fellow at Mellon Institute, Pittsburgh, Penna., for the Iodine Educational Bureau, Inc.

Alfred Kent, formerly Dallas, Tex., representative of Manning, Maxwell & Moore, Inc., Bridgeport, Conn., is now on active duty as an ensign in the U. S. Navy.

Raymond J. Kepfer has been transferred by the Grasselli Chemicals Department, E. I. du Pont de Nemours & Co., Inc., from his position as research chemist at the Cleveland research laboratory to a position as a sales service technologist at the Chicago sales office.

Harry C. Kremers, The Harshaw Chemical Co., Cleveland, lectured on "Synthetic Optical Crystals" at the University of Illinois, March 26, before a joint meeting of the Alpha Chapter of Phi Lambda Upsilon and the Beta Chapter of Alpha Chi Sigma.

Frederic I. Lackens, advertising manager, The Hays Corp., Michigan City, Ind., was appointed vice president of the National Industrial Advertisers Association at a meeting of the board March 27 in Cleveland.

Gordon MacLean, sales manager of the Turbo-Mixer Corp., New York, is leaving to join the Allied Molasses Corp., as technical director.

Samuel H. Maron, since 1938 assistant professor of physical chemistry in the Department of Chemistry and Chemical Engineering, Case School of Applied Science, Cleveland, Ohio, has been promoted to associate professor of physical chemistry.

James Wellford Martin has given up his consulting practice in the field of solid carbon dioxide and refrigeration for the

duration of the war and has accepted a position with Sanderson and Porter as chief engineer on construction of the Pine Bluff Arsenal, near Pine Bluff, Ark.

J. Strother Miller, technical adviser of the Barber Asphalt Corp., Perth Amboy, N. J., retired April 15 after 33 years of service in all phases of the technical activities of the company. He will continue his interest in asphalt as a consultant.

Allan d'Apery Mills has joined the laboratories of the Quaker Chemical Products Corp., Conshohocken, Penna., as organic research chemist. He was previously associated with Röhm & Haas. **J. Perzanowski,** formerly connected with the laboratories of the United Gas Improvement Co., has also joined the company as organic chemist, working on special assignment. **Ruth Smock,** a graduate of Temple University, has been employed in the control laboratory.

James F. Olsen has been appointed sales manager of the Turbo-Mixer Corp., New York.

Paul D. Peterson has been appointed director of agricultural research for the Freeport Sulphur Co., to head the company's development of new agricultural uses of sulfur. Headquarters will be in New Orleans

Henry D. Ralph, for 15 years head of the Washington Bureau of the *Oil, Paint, and Drug Reporter,* has been forced by ill health to terminate his connection. He has been succeeded by **Ralph Cherry,** recently chief of the Washington Bureau of the *Journal of Commerce.*

Warren H. Reinhart has been detailed by the National Institute of Health to the Louisiana State Health Department, New Orleans, La., as an industrial hygiene engineer to help establish industrial hygiene work in Louisiana.

Charles A. Rhodes has accepted the position of sales representative in the Poultry Feed Department, Special Products Division, The Borden Co., Springfield, Ohio. He was formerly employed by the Mountain City Mill Co., Inc., of Chattanooga, as chief chemist and director of products control and development.

V. L. Sanderson and William Bradford have been appointed sales representatives of the Cochrane Corp., Philadelphia, Penna.

Jerome Schaul, Jr., has accepted a position as supervisor, physical testing laboratory, United States Rubber Co., Des Moines Ordnance Plant, Des Moines.

William S. Shipley, chairman of the board of the York Ice Machinery Corp., was presented a special Citation of Merit at the fifth annual award dinner of the National Association of Publicity Directors, for work of the highest value in the building of national defense.

J. O. Small, formerly vice president and technical director of the Arco Co., Cleveland, Ohio, has joined the Synthetics Department of Hercules Powder Co., Wilmington, Del. He will be engaged in technical development work in the use of synthetic resins and rosin esters, particularly in their application to war materials.

Joseph J. Thomas, formerly on the research-sales staff of the Röhm & Haas Co., has joined the research department of the S. D. Warren Co., Cumberland Mills, Maine.



R. B. Tucker

R. B. Tucker, director of glass sales of the Pittsburgh Plate Glass Co., has been elected to the board of directors of the company, succeeding **H. A. Galt** of Akron, Ohio, who is retiring from the company after more than 40 years of continuous service. Mr. Tucker has been associated with the Pittsburgh Plate Glass Co. since 1929 when he was appointed manager of glass sales. Previous to that time he was president of the Standard Plate Glass Co.

J. D. Van Valkenburgh has been appointed assistant to the president of Irvington Varnish & Insulator Co., Irvington, N. J. For the past several years Mr. Van Valkenburgh has been associated with the Johns-Manville Corp., New York.

Wm. Lloyd Evans to Receive Award

At the annual meeting of the American Institute of Chemists, May 16, 1942, at the Claridge Hotel, Atlantic City, N. J., the institute's medal, presented annually for outstanding service to the science and the profession of chemistry in America, will be awarded to William Lloyd Evans, chairman of the Department of Chemistry 1928 to 1941, and now professor emeritus, Ohio State University, and Past President of the American Chemical Society.

The award is made in recognition of Dr. Evans' outstanding accomplishments in the field of oxidation of organic compounds, particularly in the oxidation of carbohydrates, and for his contributions to the profession as an educator.

Herty Medal Award

The Department of Chemistry, Georgia State College for Women, Milledgeville, Ga., has set May 2 as the date for awarding the Herty Medal to Townes R. Leigh, dean of the College of Arts and Sciences, University of Florida, in recognition of distinguished services as a teacher and his research in plants and soil. After presentation of the medal, Dr. Leigh will give a talk on "The Spirit of Science".



KAIDEN-KEYSTONE

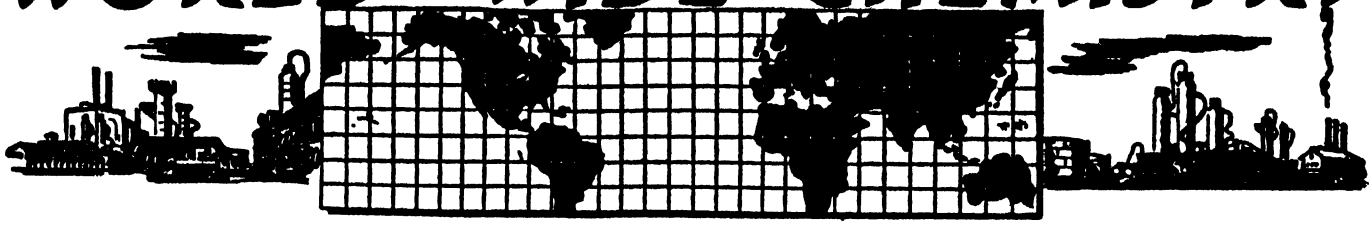
R. M. Curts



E. M. Kolb

E. M. Kolb, with American Potash & Chemical Corp., New York, since 1932, has been appointed manager of potash sales. R. M. Curts becomes manager of borax sales and continues, as formerly, to handle sales of bromine, bromides, and lithium salts. Mr. Curts has been with the company since 1931.

WORLD-WIDE CHEMISTRY



Demand for industrial chemicals is still increasing in the British market, and manufacturers are busy making deliveries on old and new contracts. Evidence of difficulties faced by suppliers of merchandise in strong demand is provided by several new orders dealing with the sale of chemical products. A license is now required for the disposal of coal-tar naphtha and xylene, and the Secretary of Mines has been authorized to give directions on their distribution, treatment, use, and blending. Use of zinc oxide and lithopone in production of rubber footwear is controlled, and that of lamp black and titanium oxide prohibited.

No ethylene glycol, glycerol, or ethyl or methyl alcohol is released for the manufacture of antifreeze mixtures for internal combustion engines, and manufacturers of antifreeze mixtures have been requested to inform the authorities of the chemical composition of their products before undertaking production. For essential transport and civil defense ethylene glycol and glycerol are allocated by the Ministry of War Transport. The system of export licensing has been extended to lead acetate, sodium acetate, synthetic rubber, and iodine compounds. A British Varnish Gum Merchants' and Graders' Association has been formed for consultation with the Ministry of Supply, especially with regard to the implementing of the recent order imposing the license system on purchase, use, and disposal of dammar, copal, gum dammar, and gum copal.

Tendency to Utilize Products Formerly Wasted Increases

The Department of Scientific and Industrial Research has pointed out possible sources of earth colors in Great Britain. A colliery at Wigan could produce 1 ton of ocher a week, if the water from its pumps were tanked and the ocher allowed to settle. The Severn Valley Gas Corp. is recovering a carbon paste during the manufacture of gas in a new Jones tar gas plant, and this is being used in the manufacture of camouflage paints. The white sludge from locomotive water softening plants is used as a fertilizer by market gardeners. These examples reflect a tendency to utilize waste products formerly ignored.

New Process Improves Tar Extraction from Peat

The London Chamber of Commerce reports a new process for extraction from peat of over three times the quantity of tar obtained with existing methods. The process gives a correspondingly larger yield of Diesel and other oils. It is also hoped to obtain about 2 per cent of carbohydrates from the tar water, yielding acetone for the manufacture of cordite. The new method for carbonizing peat has not been applied on a commercial scale.

Micaceous Hematite Is Used for Arc-Welding Rods

An Empire substitute for Swedish magnetite, formerly used for arc-welding rod coatings, has been discovered in the form of micaceous hematite from Sierra Leone. Part of the hematite is obtained in the form of micaceous concentrates which must be briquetted or sintered before they can be smelted in the iron industry. As the British sintering capacity is fully occupied, experiments were undertaken to develop alternative uses. In arc-welding rod manufacture the material has proved successful. Use in the paint industry was also attempted, but the flakes were too thick.

Use of Vermiculite In Insulation Gains

Increasing quantities of vermiculite are used for heat and sound insulation. Supplies of suitable material have been located in the Union of South Africa and Tanganyika. African vermiculite is being used in Great Britain, while Australian material finds an outlet in the local market.

Magnesite from Africa Replaces Greek Supplies

To make up for the loss of Greek magnesite British users have had to rely on various deposits in West and South Africa, and substantial tonnages are being received. In Kenya also a magnesite deposit has been opened up, and a calcination plant has been erected.

Dyeing Problems Examined by Technical Advisory Committee

The Technical Advisory Committee of the Society of Dyers and Colourists, appointed last December, is in full action. Consisting of 55 members, it works by means of small panels on water supplies and treatment; general chemicals including auxiliary agents; raw materials, intermediates, and coloring matters; chemistry and physics of fibers, fibrous materials, and plastics; preparatory and finishing processes; dyeing and printing; and testing and standardization.

Economies in Dyeing Cotton Investigated

Economies in dyeing cotton with mineral khaki by impregnation with chrome alum and iron alum followed by development with potassium chromate have been studied by E. Race, F. M. Rowe, and J. B. Speakman of the University of Leeds. They report that, if after each developing operation the sulfuric acid formed is neutralized with sodium hydroxide solution, the developing liquor can be used about five times without appreciable change in shade of the dyed cotton and about ten times before the potassium chromate is exhausted. When pH value, chromate content, and volume of the developing solution are adjusted to their original values after each development, the liquor can be used indefinitely as a standing bath. However, the deposits of chromium and iron chromates and ammonium and sodium sulfates must be removed when their presence interferes with the successful working of the material in the developing liquor.

Nonfelting Wool Production Creates New Chemical Outlets

Government specifications for uniform cloths and utility clothing have stimulated production of nonfelting wool, a material

EDITOR'S NOTE. Those interested in further details should address the correspondent whose name and address appear for each country, and enclose sufficient international coupons to prepay the reply. United States stamps should not be sent.

chemically treated so as to reduce or eliminate shrinkage on washing and milling. A variety of processes for nonfelting wool are used in British textile mills. The original wet chlorination process is generally applied in developed forms using organic hypochlorites, sulfuryl chloride, or nitrosyl chloride. Thionyl chloride, sulfur trioxide, concentrated sulfuric acid, oleum, sulfur monochloride, or sulfur dichloride are also used. For washing wool after nonfelting treatment, a bath containing a weak alkali solution may be used. Instead of sulfuryl chloride its components, sulfur dioxide and chlorine, are used in a closed chamber to generate sulfuryl chloride. An improved process based on sulfuryl chloride, which uses isocyanates as an addition, is said to counteract harsh and unattractive handle and to permit treatment of the wool at higher temperatures.

Great progress has been made in British woolen mills with the alkali process of nonfelting wool. Normally sodium or potassium hydroxide is used with butyl alcohol as a solvent, while neutralization may be carried out in an aqueous solution of sulfuric acid. Another process is using alkali sulfides, polysulfides, or hydrosulfides in organic solvents. This method is said to have proved very successful for the treatment of materials which contain wool in mixtures with other fibers.

Although it is not yet known which of these processes will ultimately prove most successful, the nonfelting industry will absorb large quantities of various chemical products. Possibly the consumption per rate of production will decline as improved methods for the recovery of nonfelting chemicals are developed, but the demand as a whole is likely to increase, especially if the nonfelting wool treatment is extended to cloths for strictly civilian use. Nonfelting wool requires special attention in dyeing. It seems to take up more dyestuffs than untreated material, although the absorption can be rectified by shortening the time of dyeing, and the effects obtained were not always the same as for untreated wool. Nevertheless the problems are not insurmountable, and the handle and appearance can be improved if small amounts of untreated wool are added to the nonfelting material.

Enforced Tin Economies May Help Lacquer Industry

Loss of eastern sources of tin has caused British authorities to introduce several measures intended to save tin for essential purposes. Where tin is used as a metal in soldering and bearing alloys, certain economies will be effected by increased use of lead. Lead tubes are likely to be used on a substantial scale in the place of tin-coated collapsible tubes. Cadmium and bismuth will be used in solders and bearing metals for special purposes, although these materials are not in too plentiful supply. As food cans are seldom stored for more than a year, it is hoped that substantial use can be made of lacquered plate instead of tin plate in the canning industry, and lacquered sheets will also be used for oil containers, etc.

National Fertilizer Rationing Scheme under Consideration

Distribution of chemical fertilizers to British farmers will undergo an important change when the national rationing scheme being prepared by the Ministry of Agriculture is introduced. Sales of chemical fertilizers containing potassic and phosphatic materials were heretofore subject to certain restrictions intended to ensure that the limited supplies of these substances are used to the best benefit. Only those farmers who grow crops reacting strongly to additional supplies of potash are permitted to use these salts and only on the crops for which allocations have been made. In Norfolk and East Sussex rationing schemes for other fertilizer materials have been introduced, and these seem to have worked so successfully that this system will be extended to the whole country. Farmers will receive fertilizer coupons calculated on the basis of the 1943 crop program which must be approved by the authorities so that equal distribution of available supplies and utilization for crops in greatest need of fertilizer is guaranteed. The Ministry of Agriculture has in the past paid considerable attention to the question of chemical fertilizers, especially as applied to new crops, and an experienced staff of experts is at the disposal of British farmers to advise them on the need of manuring in fields which, as part of the wartime farming program, have been changed over to different crops.

New Outlets for Coke Developed

Increasing demand for liquid motor fuels, solvents, chemicals, and gas from coke-oven plants and gasworks has boosted research in this sector of the coal manufacturing industry. Many developments of importance have taken place, but details are not available for publication. Generally it has been found that the normal relation in the demand for gas, coke, and liquid products has been disturbed so that there is at times a surplus of coke as well as heavy coal-tar derivatives. The problem of disposing of surplus coke has therefore received great attention, particularly since it is believed that this change in demand for various gasworks products will remain effective after the war. New outlets for coke have been discovered, and may be developed, in crop drying, soil warming, heavy-duty cooking, and in various transport services—for gas producers and steam wagons—as well as in stationary gas producers and special furnaces for high-temperature processes. The calcium carbide industry, established in the British Isles during the war, may provide an important outlet for coke. If in the future greater reliance must be placed on motor fuels derived from coal, coke may be used for the production of water gas. On the other hand, the chemical industries may help coke producers to extend existing markets, e. g., by alkali-activation which will permit use of coke instead of bituminous coal in ordinary open-grate fires.

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March 18, 1942

Continental Europe

Germany Ships Quantities of Chemical Products to Finland

Under a recent trade agreement between Germany and Finland, German chemical manufacturers have begun to send large quantities of chemical products, fertilizers, salts, and coke to Finland. The amount of goods sent from Germany to Finland is substantially larger than that shipped in the opposite direction so that long credits have been granted by German financial institutions. Finnish deliveries to Germany consist largely of wood products.

Institute for Chemical Technology of Synthetic Fibers Founded at Breslau

An institute for chemical technology of synthetic fibers, the first of its kind in Europe, has been opened at the Technical College of Breslau, Silesia. At the formal opening Director-General Dörr, who plays an important part in the German synthetic fiber industry, said that many hundred thousand tons of chemical fibers are being produced in the country. Among urgent technical problems to be solved he mentioned broadening of the raw material basis by use of pine wood and annual plant materials, e. g., straw, and profitable use of hemicellulose which is now carried through the plants as ballast but could supply over 100,000 tons of protein as well as resin and fatty acids, pectin, vanillin, and waxes. In view of the growing importance of transport and transport costs, recovery of sodium hydroxide, sulfuric acid, and carbon disulfide receives special attention even if requiring additional expenditure. Profits of the industry, he stated, have been improved by introduction of the almost completely continuous production process, while different purposes are served by different viscose fibers adjusted in production to their future use. More complete utilization of wood is being achieved by prehydrolysis.

New Process for Casein Fiber Production on Commercial Scale

Thüringische Zellwolle A.-G., Schwarza, Thuringia, claims that a new process for the manufacture of casein fiber developed in its plant has considerable advantages over the original Italian process. Production, now on a commercial scale, starts from rennet, yielding fodder whey as a by-product. The rennet casein is made water soluble by treatment with a lye, undergoes a fermentation process, is precipitated as a fiber into a bath generally containing sulfuric acid and sodium sulfate, passes through sodium chloride and aluminum sulfate baths, and is finally treated with cold and hot formaldehyde.

New Synthetic Resin Glue Permits Easy Application

Henkel & Cie., Düsseldorf, are manufacturing a new synthetic resin glue which is marketed as a dry powder and can be mixed with cold water without any of the auxiliary products normally used. It is described as a low-molecular condensation product of melamine and formaldehyde.

Hardwood Substitute Made of Straw, Grass, and Resin Binder

Straw, grasses, and sawmill waste are used as raw material for a new hardwood substitute, claimed to be rot- and mildew-proof. It is made from a mixture of felted organic fibers and a hardening resinous binder. The strength of the material is the same in all directions. Two types are manufactured, one for ordinary purposes and another to replace imported hardwood. Both types are available in a special water-resistant finish.

Iodine Is Conserved by Use of Phenolic Solution

To save iodine, tincture of iodine is being replaced in many cases by a 5 per cent solution in alcohol of chlorated alkylated phenols in conjunction with quarternary ammonia salts.

Acid-Resistant Mortars, Cements Take Place of Imported Materials

A large variety of acid-resistant mortars and cements have been placed on the German market in recent years. Asplit, a synthetic resin material, gives considerable protection against acids, including mixtures of 95 per cent sulfuric and 75 per cent fluoric acid, withstands liquid penetration, and owing to good adhesion is used extensively for timber and concrete structures. Aristogen, a bituminous emulsion, is used as an insulation material against ground water. It can be applied at normal temperatures on wet surfaces. · Asfluid is a bituminous substance which possesses great resistance against dry heat, salts, and acids, and is used mainly for protective coats on roofs, chimney joints, tar-free insulation materials, etc. Höchst is a water-glass mastic used to give protection against all acids except fluoric acid, chlorine, and bromine up to temperatures of 1,000° C., water and steam, and neutral solutions of salts.

Lithopone Satisfactory for Luminous Painting Purposes

Although zinc sulfide has been found an excellent material for luminous paints, it is too expensive for use on large surfaces. A white lithopone paint has been developed which is economical and gives sufficient afterglow for 4 hours after lights are turned off. One pound is said to be enough for 20 to 30 square feet. For signs and other purposes where special visibility is required, zinc sulfide paints are still being used in Germany.

Furnace Sizes in Coke Oven Industry to Be Standardized

Since construction of hydrogenation and synthesis plants for the production of coal oil requires a long time, Germany has been studying possibilities for the expansion of light oil production by carbonization. The necessary increase of producing capacity in coke ovens and gasworks is to be achieved by use of standard sizes for new chamber furnaces.

Company Formed for Sale, Distribution of Liquid Gases

Propan G. m. b. H. has been formed by members of the propane syndicate to take over sale and distribution of liquid gases and derivatives, such as propane, butane, propylene, butylene, isobutane, and isobutylene. The main supply sources are the Fischer-Tropsch synthetic oil plants which produce 10 per cent of their entire output in the form of hydrocarbon gases. The new arrangement for distribution of liquid gases must be regarded as evidence of continued expansion in the German coal-oil industry, though the increasing shortage of steel containers for the transport of liquid gases (these containers have now been brought under the Chemical Control) also made new arrangements advisable. Smaller amounts of gases are obtained from carbonization plants. The gases are extracted by adsorption with activated carbon. If the mixture contains propane and butane in equal parts, it is used direct as a motor fuel. Otherwise the constituent gases must be separated and mixed in specified proportions. Liquid gases are claimed to show a number of advantages as a motor fuel, including quick start in cold weather, absence of smoke, smell, and soot, and absence of deposits on pistons, etc. Liquid gases are distributed to rural districts where there is no adequate supply of town gas to act as a substitute for lighting and cooking, but this new outlet seems unprofitable in most cases.

Coking Coal Supplies Extended by Mixtures

Only one third of the German coal production consists of coal suitable for use in coke ovens and gasworks. Most of this comes from fields in western Germany; the central and eastern regions have for some time suffered from a serious shortage of coking coal. Experiments to overcome this shortage show that the supply of rich coking coals can be increased if use is made of coals with similar properties and their deficiencies are made good by mixture with coals deficient in other respects. Coals of recent formation which are similar to gas coal can be made to yield a good coke if the plasticity is diminished by addition of fine coking coal or coke dust. Compensating grades of coal need not be present in the mixture in proportionate quantities. Comparatively small additions are claimed to have resulted in appreciable improvement of inferior coals. However, great attention must be paid to continuity of supply of coal mixtures in suitable quality, and a special committee has been formed to lay down rules for grinding and blending coals for use in coke ovens and gasworks.

By-Product Recovery Process Saves Construction Material

The increase in the long-distance distribution of compressed gas in Germany has led to a simplified process of gas purification and by-product recovery under pressure. The savings in construction materials is estimated at 1,000,000 marks for a plant with a daily output of 2,000 tons of coke. In a plant installed at the coke-oven works Hansa, the gas reaches the compressor direct from the precooling and ammonia plant. While the gas which is retained in the plant for heating is passed from the ammonia washer to the benzene washer, exhauster, and storage tank, the gas destined for long-distance distribution is going from the compressor to the naphthalene washer, benzene washer, purification and drying plant. Since it is in a compressed state all these installations must be built of stronger material, but the increased cost is insignificant compared with savings in plant capacity. As the gas is compressed, the contents of benzene, sulfur, naphthalene, etc., are correspondingly larger per volume, so that these substances can be recovered more easily and completely.

Francolor Takes French Raw and Finished Dyestuffs Stocks

Francolor, the new French dyestuffs combine in which I. G. Farbenindustrie holds 51 per cent of all shares and the three French dyestuffs producers share in the remaining, has taken over all stocks of raw materials and finished products in the French dyestuffs factories. The raw materials have been bought for the prices at which they were originally acquired by the present holders, while the finished products have been valued at the cost prices of the first six months of 1939 plus 13.5 per cent premium, transport, and insurance. At the same time French dyestuffs prices have been raised by another 25 per cent and are now 41 per cent above 1939 prices. A list of patents handed over by I. G. Farbenindustrie to Francolor has been issued. It is reported that I. G. Farbenindustrie has financial interest in Société Alsacienne des Produits Chimiques, Mulhouse, Alsace, a subsidiary of which is St. Clair, one of the three French dyestuffs producers.

France's Light Metal Industry Increases Capital

Increasing operations in the French light metal industry are reflected by several recent capital transactions. L'Aluminium Français has raised its capital from 30,000,000 to 100,000,000 francs and Société de Duralumin from 63,000,000 to 126,000,000 francs. Péchiney has issued new debentures to the extent of 340,000,000 francs.

Shale, Sulfur to Be Mined in Southeastern France

Société Languedocienne de Recherches des Exploitations Minéures, a subsidiary of Potasse et Engrais Chimiques, equipped with a capital of 55,000,000 francs, has received a license for exploitation of sulfur and shale deposits north of Narbonne in southeastern France. The concession extends over 5,000 acres, and mechanical baggers have been ordered for large-scale production.

Plants for Synthetic Fuel Oil Proposed for France

French motor fuel policy during the past 12 months aimed at maintaining a minimum production of substitute fuels from various sources at a level consistent with essential demands. During the current year it is hoped to expand output substantially by extension of the shale oil factory at Autun, ultimately to produce 2,500 tons daily. Two plants for treatment of lignite are to be constructed in the Departments of Bouches du Rhône and Landes, and an annual output of 50,000 tons is anticipated but unlikely to be realized before 1945. A pilot plant for manufacture of synthetic oil is operating at St. Hilaire, and a commercial plant will be built there. Considerable additions to the French motor fuel supply are also expected from extension of the use of gas generators, while 60 per cent of the demand for lubricants is to be covered by domestic materials.

Vanadium to Be Recovered from Oil Residues and Bauxite

The growing shortage of alloy metals has caused A. M. M. I., the semiofficial company for promotion of mining in Italy, to develop a scheme for construction of a plant to recover vanadium from oil residues. Vanadium traces are also found in bauxite, and this source is to be utilized.

Grapeseed Oil Used as Linseed Oil Substitute

Progress has been made in Italy with the extraction of grapeseed oil. This is carried out with gasoline ether and, on a larger scale, in plants for the treatment of olive residues with carbon disulfide. It is stated that 9 to 10 per cent of the weight of dried seeds can be recovered. Grapeseed oil is used in the place of linseed oil, and its high viscosity is claimed as a special advantage. The industry is also to be introduced into Serbia.

Castor Oil Substitutes for Tung Oil in Hungary

Castor oil is used extensively in various parts of the European Continent as a substitute for tung oil. Castor oil is dehydrated and generally subjected to other treatment, and in Hungary the plant is cultivated on more than 20,000 acres. It is also used as a plasticizer in the lacquer industry and for alkyd resins. Saponified pure castor oil finds an outlet in the manufacture of stearin ointment.

Hungary Plans Extensions in Aluminum Industry

Ungarische Bauxitgruben A.-G., a company formed five years ago with a capital of 2,000,000 pengö, has raised its share capital from 10,500,000 to 16,800,000 pengö for the financing of plant extensions. The company intends to build an alumina plant capable of an annual output of 20,000 tons and an aluminum plant for 10,000 tons yearly. Bauxite production was increased by half in 1941, but the additional supply was sent to Germany. No date has been set for completion of the extension work; payments in advance on construction are shown in the balance sheet as 17,150,000 pengö.

Insulin Production to Be Increased in Sweden

Of an annual consumption of 245,000,000 units of insulin, 165,000,000 units were hitherto covered by the factory of Apoteksvarucentralen Vitrum, while the remainder was imported, mainly from Denmark. Difficulties in imports have led to plans for careful collection of pancreatic glands in all big slaughtering yards. The material will be used in existing factories to fill the entire local demand.

By-Product Metals to Be Recovered from Oil Shale

Expansion of shale oil production at Närke has made possible execution of plans for the recovery of vanadium, molybdenum, tungsten, cobalt, nickel, and uranium—all found in traces in the shale. A sulfur plant will soon be built at Kvarntorp to utilize the sulfur residue available from the oil refinery. Output is expected to be large enough to replace all imported sulfur.

New Oxygen Factory to Begin Operations in August

Nordiska Syrgasverken A.-G. are building an oxygen factory at Kneippbaden near Norrköping which will begin operations in August. The existing factory at Motala is no longer able to meet the entire demand.

Swedish Government Forms Control Company for Cellulose Industry

The Swedish Government has formed the A. B. Statens Skogsindustrier to exercise control over the state-owned sawmills, cellulose factories, and distillation plants. The more important are the cellulose factory at Karlsborg and the distillation plant at Pitea.

Nitrogenous Fertilizers from Lignite of Southern Italy

A. L. I. and Vetrocoke have developed plans to utilize lignite deposits found at Mercore in southern Italy for the production of ammonia and nitrogenous fertilizers.

Methane Gas Used as Railway Fuel in Italy

Italian methane gas production amounted to 5,000,000 cubic meters a month at the end of 1941, according to Silvio Gai, president of the Methane Gas Corp. Seven hundred thousand

cubic meters are used for technical purposes. A new big outlet for methane gas compressed to 300 atmospheres overpressure has been found in railway operations. The first methane gas-fed railway engine, of 120 horsepower, is being used on the route from Rovigo to Chioggia (Venice), and more methane gas locomotives will be put into operation.

March 26, 1942

Sweden Extends Its Physical-Chemical Research for Substitutes

EXTENSIVE research is going on in all fields in Sweden to find substitutes for products which can no longer be imported, the Swedish-International Press Bureau, Stockholm, reports. One of the most important centers for this work is the physical-chemical institution of Uppsala, headed by the famous Swedish scientist and Nobel Prize winner, The Svedberg.

A recent article in the Stockholm paper *Dagens Nyheter* gives glimpses of the present work at this institution which, in addition to Professor Svedberg, has among its co-workers several other of Sweden's foremost scientists. The institution has lost all foreign investigators who used to study there, with the exception of one Swiss, but nevertheless the staff has been doubled. Extensions have been made particularly in departments dealing with the many current supply problems.

The work with different kinds of synthetic resins and cellulose derivatives is progressing on a large scale. Experiments are being made on finding some way to replace imported hard wheat, formerly used to improve the baking qualities of bread made from native Swedish soft wheat. Investigations on synthetic rubber have proceeded so far that the product has been evolved in the laboratories of the institute, although it is too early yet to predict whether domestic production can be started. The raw material is acetylene, i. e., calcium carbide, and the experiments have been conducted independent of the mass of available formulas, patent descriptions, and literature on the subject.

One of the foremost technical means of assistance is the Svedberg ultracentrifuge. The rotor of this centrifuge is given a speed of up to 70,000 revolutions per minute by a number of oil turbines. The institution also houses such famous instruments for research as one of the world's most gigantic electromagnets and a neutron generator, an atom cannon for hydrogen-gas radiation, both Swedish-constructed instruments. In the biochemical section the experiments for locating and cultivating infantile paralysis virus and tuberculin, on the basis of a new method for analyzing mixtures through molecule splitting, are carried on under the direction of a well-known Swedish scientist, Arne Tiselius, who devised this procedure. The prime object is preparation of a pure form of virus. Stoppage of import of apes for these experiments for a while threatened the researches with loss of indispensable test animals, but it is said that replacement with rats has proved acceptable.

Disruption of the earlier lively connections with American research institutes, engaged on the same problems, has been a serious disadvantage to the Swedish institute, but in spite of all difficulties the scientists are carrying on energetic and successful research on old and new problems.

German Products Dominate Market for Drugs in Bolivia

AMERICAN exporters' neglect of the Bolivian market for drugs and pharmaceuticals has resulted in German products dominating the market, not only in normal years but even since the outbreak of war. Large inventories were stocked by dealers there, according to the U. S. Department of Commerce.

The general lack of interest in the Bolivian market which is being shown by exporters of drugs and pharmaceutical supplies is encouraging continued purchases of German products of this nature, a report warned.

Supplies in Bolivia of German drugs and pharmaceutical products have been adequate to supply the market ever since the war began, it was added. In some cases these supplies have been known to have been transported from Germany via Lati, the former European-dominated air service in Latin American countries, and in other cases shipments have been made from factories in Argentina and Chile.

Products of certain German firms are so well known in Bolivia, it was pointed out, that in most cases practicing physicians in Bolivia prescribe them. As long as no American products replace them or compete, it is feared, purchases of German products of this kind will continue provided supplies are available from that country.

Chilean Importance as U. S. Supplier Increases

CHILE has recently assumed an important position as a supplier of argols and wine lees to the United States, according to the U. S. Department of Commerce. The country also furnishes quantities of calcium tartrate to the United States.

Although Chile formerly imported from 15 to 20 per cent of its tartaric acid supply from the United States, the country now produces so much that during the first nine months of the past year no imports were taken at all. This compares with 1940 when 3,000 pounds were imported and 1939 which saw imports of 23,000 pounds.

Switzerland Cuts into Already Reduced Rations of Soap

DRASTIC rationing of collective consumers of soap and cleaning materials have been put in effect in Switzerland by the War Industries and Labor Office, tightening restrictions already in operation on production, rationing, and use of soap and all kinds of cleaning materials. The first quarter of the present year finds government offices, office buildings, boarding houses, cafes, etc., receiving 20 to 30 per cent of the amount used in 1938 and 1940. Hotels, restaurants, factories producing foodstuffs, and pharmacies are limited to 30 to 50 per cent of the former consumption, and hospitals, physicians, dentists, and similar users will be allowed the maximum, 80 per cent of 1940 consumption.

India's Chemical Expansion Program Is Well under Way

CONTINUED expansion of the chemical industry of India was noted by the U. S. Department of Commerce in analyzing reports from that country for the past year.

The chairman of Tata Chemicals, Ltd., a large chemical producing corporation, recently reported that most of the machinery and other equipment needed for the expansion program under way already was in hand from United States and United Kingdom plants, with the remainder en route or scheduled for early delivery.

Increased financing was stressed by firm officials as the need of the moment, due to rising costs of labor, raw materials, freight, and equipment.

Copper Sulfate Imports by Argentina Increase

COPPER sulfate, largely originating in the United States and United Kingdom, has been imported in increasingly larger amounts by the Argentine, as indicated by imports into that country of 5,200,000 pounds in the first nine months of 1941 compared to the average yearly figure of 3,700,000 pounds between 1936 and 1940. Increased purchases are attributed to stoppage of domestic production in 1940 and a desire to accumulate reserve stocks against any sudden appearance of plant diseases and insects.

Uruguay Stops Exports of Tartar, Tartrates, Wine Lees

EXPORTATION of tartar, tartrates, and dried lees has been completely stopped by a decree of the Government of Uruguay. Uruguay has made small quantities of tartaric acid for some years but not enough to supply the domestic demand. Annual imports amounting to 138,000 pounds each year were necessary between 1937 and 1939.

Peruvian Industries Constitute Fairly Large Soda Ash Market

A NUMBER of Peruvian industries constitute a rather large market for soda ash according to the U. S. Department of Commerce. Glass factories, mining companies, washing soda manufacturers, cotton mills, sugar refineries, wool mills, and a number of smaller industries form the largest manufacturing consumers.

The United States and the United Kingdom have been the leading suppliers of soda ash in this market for some years. Imports by Peru of this commodity were 1,955 metric tons in 1936, dropped to 1,817 in 1937, but rose to 2,542 metric tons the following year. They were 3,277 metric tons in 1939, dropping to 2,919 in 1940, and for the first nine months alone of 1941 gaining to 3,112 tons.

Canada Rules Use of Synthetic Vitamins in Bread Adulteration

CANADA has adopted regulations which stipulate that the use of synthetic vitamins in the manufacture of flour or bread for sale for consumption in that country is expressly an adulteration of food. The new Order-in-Council under this heading prescribes standards for flour and bread containing a high proportion of vitamin B complex naturally occurring in the original wheat. Except for such flour or bread, it is stated, labels or descriptions using the word "vitamin" or any other word, symbol, or device suggestive of any vitamin shall not be used as a part of the name or in immediate conjunction with the name. These regulations became effective April 1 for flour and will go in to effect April 15 for bread.

U. S. Prime Shipper of Peru's Expanding Imports of Borax

EXPANDING imports of borax by Peru in the past few years are reported by the U. S. Department of Commerce. These imports have ranged from 19 metric tons in 1936 to 32 in 1937, 28 in 1939, 43 in 1940, and for the first nine months of 1941, 42 tons. Larger demands from the principal users, gold mining companies and the Peruvian glass industry, are said to account for increasing imports. The United States has been the leading shipper since 1940. Up to that time this country shared the market with the United Kingdom, with the latter selling the major part.

Guatemala's Sole Source of Naphthalene Is U. S.

SINCE 1940 the United States has become the sole source of naphthalene for Guatemala, where formerly this country shared the market with the United Kingdom and Germany. Imports by Guatemala during 1937–41 averaged 2,450 pounds annually. Pharmacists are the principal importers, selling naphthalene to the public for insecticidal and medicinal or laboratory uses.

Guatemalan Sulfuric Acid Imports Come from U. S.

ALL the sulfuric acid imported by Guatemala has come from the United States since 1941. Imports between 1937 and 1941 averaged 10,700 pounds annually, with considerable amounts coming from Germany during 1937–39. Some local production is reported but imports are essential, according to the U. S. Department of Commerce. Guatemala uses the acid for tanning, in manufacture of batteries and pharmaceuticals, and in garages and the textile industries.

Agriculture of Palestine Awaits Shipments of Ammonium Sulfate

ANTICIPATED arrivals of ammonium sulfate shipments from abroad are expected to help Palestine's agricultural situation, reported to have suffered during the latter part of the past year from the shortage of chemical fertilizers prevailing in parts of the world dependent on imported quantities of this product.

The government is said to be supporting a new enterprise for producing superphosphates locally, using sulfuric acid from the oil refinery and phosphate from Trans-Jordan. This production is estimated as sufficient for the country's needs.

New Zealand Amends Food and Drug Sale Regulations

UNDER a recent amendment to New Zealand's Food and Drug Sale Regulations, lactic or phosphoric acid to a limited degree may substitute for tartaric or citric acid. A regulation provides that citric or tartaric acid may be used in preparation of any food, and that not more than 50 per cent of citric or tartaric acid may be replaced by an equivalent quantity of lactic or phosphoric acid.

Britain's Bone Salvage Campaign Successful

GREAT BRITAIN'S salvage campaign for bones has amounted to a value of £54,000 since it was launched in November 1939. Household bones are considered particularly valuable, being adapted to complete use in a number of commodities—glycerol, fertilizers, glue, and feeding stuffs. Large collections of organic fertilizers also have been reported.

COSTA RICAN imports of other than United States origin in the last quarter of 1941 included potassium chlorate, antimony sulfate, zinc oxide, phosphorus, and sulfur from Mexico, all in relatively small quantities.

Imports of Methanol from U. S. to Argentina Fluctuate

THE United States is virtually the only source for imports by Argentina of methanol, since there is no domestic output, according to a trade survey. These imports fluctuate, but in recent years have been generally upward. Only 9,000 pounds were imported in 1934 and the following year 30,300 pounds, declining in 1936 to 18,500 pounds. Average annual imports in 1936–40 amounted to 63,900 pounds. Total imports in 1940 were 107,200, and the first half of 1941 saw 19,600 pounds brought in.

Belgian Congo Mining Industry Increases Use of Explosives

THE mining industry of the Belgian Congo uses explosives in quantity, which are both imported and produced locally. Domestic output in 1939 amounted to 457 tons, according to official figures from the Belgian Congo. Direct exports of this product from the Union of South Africa to that section of the Congo were valued at £3,400 in 1940, compared with only £202 in 1938.

Ecuador's Imports of Sodium Hydroxide High

WHILE statistics on Ecuador's imports of sodium hydroxide in 1941 have not been furnished, official observers anticipate that these have greatly exceeded the 431 metric tons imported in 1940. This is interesting to the American trade since this country, with Great Britain, has furnished the bulk of Ecuador's sodium hydroxide requirements, except for the period 1937–39 when Germany participated to a small extent.

The reason the 1941 figure is expected to be so high is that most sodium hydroxide consumed in Ecuador is required by soap manufacturers, the textile industry, petroleum, sugar, and edible oil refineries, in several of which demand has greatly increased. Smaller amounts are needed for disinfectants and for some laboratory and pharmaceutical use. Only minor quantities are produced locally.

Eire Forms Company to Exploit Mineral Resources

FORMATION by the Government of Eire of a Mineral Exploration and Development Co. is attributed to a shortage of fertilizers in that country and the need for exploiting any mineral resources which can be located. Lack of raw materials, according to a recent report, may force the closing of a chemical fertilizer factory at Dublin. The company depends on imported phosphate rock and pyrites as well as ammonium sulfate from Great Britain. Latter shipments ceased on January 1, 1941, with the other items no longer obtainable.

Patent Laws in Our Social Scheme[1]

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RECENT criticisms of the use of patents seem to indicate that speaking on patent laws in our social scheme is an attempt to justify something inherently evil. Critics of the patent system have been loud in their condemnation of alleged specific abuses without presenting to the public a fundamental view, or even a true picture, of the value of the patent laws to the progress of mankind. They have turned from fundamentals and taken a few isolated spots from which to portray an alleged evil of the system as a whole.

Today we are fighting to preserve democracy and our American way of life and, if we permit reformers and publicity seekers to blind us to fundamentals, we will have lost rather than preserved that for which we are fighting.

This does not mean that a patent holder is justified in any way in delaying our war effort. It does mean that he is as justified in insisting that his patent rights be recognized after the war is over as the man or corporation who has a plant or any other property devoted to war work is justified and correct in insisting that, when the war is over, he is entitled to use his plant to produce goods for profit in a normal peacetime economy under the capitalistic system.

To gain appreciation of the fundamental position of patent laws in our social scheme, let us review briefly the effect of the recognition of property rights on the progress of mankind. Imagine a wholly unorganized society in which the individual's right of possession is recognized only in that individual's ability to protect and defend his possessions. In such a state of society—a state bordering on savagery—even the hardiest individual could accumulate and defend only a very limited amount of property. Whether we visualize him as accumulating and hoarding coconuts or sugar, as soon as his hoard becomes known the other members of the tribe turn on him. He is compelled to divy up, either by actual force or threat of force, and you have Communism or Socialism, or even state control if that name is preferable, but there is no progress toward the more abundant life for anybody. Only after society as a group unit began to recognize and itself protect the right of an individual in certain property was any perceptible progress made from savagery.

Probably the first form of property right recognized by society, as existing in the individual, was man's property right in his wife and children—his right to be protected by society in these possessions. That form of property right has undergone many transitions and it is doubtful if any man today would dare assert a property right in his wife, but we do still recognize in law the right of the man to compensation for the loss of the life of a wife or child or to compensation for services or loss of services of a wife or child in any injury case. That form of property right, except for its stabilizing effect on society and its incentive given man in other fields, has not been a direct contribution to the scientific progress of civilization. Indirectly its influence is incalculable.

The recognition by society of the individual's right of property in personal possessions acquired and improved upon by him and in real or land property marked the beginning of a path of progress which has been unending in the march of civilization. The individual brings forth nothing new from within himself in settling upon, improving, and cultivating a piece of land, which was already there for anybody to acquire. Nevertheless, when civilization began to recognize in the individual a property right, in real or personal property, which society itself would protect, it gave the individual the incentive and reward to cultivate, develop, and improve that property. He could plant, cultivate, and store crops with the assurance that, as long as he complied with the laws of the existing society, the crops would be his to tide him and his family through the winter season or over the rainy day. He could construct buildings for shelter and for storage, rude as they might be, with some assurance that society within its strength and ability would protect him in the possession of his acquisitions and in his improvement thereof. This beginning of the incentive to improve, one of the most important incentives in the progress of man, is laid squarely on the recognition by society of a property right in the individual. The greater these improvements, the greater the ultimate progress of the society.

Under this system over long years man made a slow and painful progress, sometimes with long periods of retrogression and with the vicissitudes of war between tribes or larger units of society playing their part in making life and possessions at all times uncertain. Society, however, in all of its successful forms was always dependent for ultimate progress on the recognition in the individual of certain forms of property rights which gave the individual the incentive to improve and develop the property society recognized as his.

Throughout the period of recorded history to the past 300 years, in the Egyptian, Greek, and Roman civilizations, and through the Middle Ages, man made some progress improving upon what he acquired from his society in the form of real or personal property and many times adding to it from his own ingenuity, but without any recognition by society that a man could have a property right in his original ideas or in his inventive improvements on existing things.

Then came the Statute of Monopolies passed in England in 1623 during the reign of James I. This was the first statutory recognition that society might and should recognize and protect a man in the development of his original ideas. This statute was forced through Parliament to curb the practice of the Crown of granting monopolies to court favorites on everyday commodities of life, such as salt, spices, playing cards, and the like. It prohibited the granting of all monopolies, *except those for new inventions and new importations into the Realm.* From the negative beginning of this statute, the patent laws of the entire world have sprung.

This statute and patent laws of the various countries have been interpreted as preventing monopolies on things which were already known in the society, but as authorizing the grant by the society of legal monopolies for a limited number of years on those inventions, discoveries, and improvements which spring from within the individual, add to the sum of knowledge, and give new utilities to society.

As long as the usual type of real and personal property rights only were recognized by society, man's incentive to improve was limited by what it was prudent to put into a new building, a new ship, or a new tool. He could not afford to spend hours and years improving existing structures, or thinking out new ideas for later development and improvement. He could not even afford to improve upon such machines as were then known because under the existing rules of society he had no protection on these new ideas or improvements. Anyone could copy and use them as soon as they were developed and became known. Much less could he afford to hire, house, and correlate the work of numerous researchers to discover and develop new things. Consequently,

[1] Address delivered before the Western Connecticut Section of the AMERICAN CHEMICAL SOCIETY, March 30, 1942.

during the early centuries of civilization and through the Middle Ages, men who developed or originated new processes practiced them in secret as much as possible, and many secrets died with the individual and were either temporarily or permanently lost to society.

It took about 100 years for the effect, or rather the impact, of the philosophy behind the patent laws to make itself felt on the progress of society. By 1725 the more intelligent individuals began to know that they would be protected in their inventions, discoveries, and improvements, and by the beginning of the 19th century, spread by folklore and the facts of a few outstanding inventions, every individual knew that his fortune might be made if he could bring forth an invention which would contribute to the progress of mankind. Every individual became a potential inventor and improver by virtue of the incentive held out by the patent laws.

The progress of mankind toward the more abundant and more enjoyable life since that time has been astounding. Lying at the root of all this progress was a simple and not too well understood act of society in recognizing a new type of property right in the individual—the right to be protected for a limited period of years in the exclusive enjoyment of his original ideas, when developed and improved into things useful to mankind.

Under this new form of property right, recognized by society, man could afford to work upon and develop his embryonic ideas into useful things and be protected in the enjoyment of the fruits of his improvements—the same as under the older forms of recognized property rights he could improve his buildings or his plot of ground, and know that the improvements were his.

The dates of some of the more outstanding inventions under the patent laws are: steam engine, 1765; coal gas for lighting, 1790; steamboat, 1793; screw propeller, 1804; phosphorus match, 1831; telegraph, 1832; vulcanized rubber, 1839; rotary printing press, 1846; motion picture machine, 1861; telephone, 1875; and talking machine, 1877. The electric light, radio, talking pictures, automobile, airplane, automatic refrigerator, and numerous other inventions vital to today's society have been produced since 1875. In that span of less than 70 years, within the memory of men still living, a miracle of progress has unfolded.

Almost all of the things which make our life easier, working day shorter, and home life and leisure more enjoyable have come to us in the past 100 years. When we compare the progress of this past 100 years with the progress of the 4,000 years preceding it and the comforts of today's existence with those of 100 years ago, we realize that society made a tremendous forward spurt during this past century. Few of us pause to consider that it is the patent system—the recognition of a new form of property right by society—which is the fountain from which all these improvements spring. Underlying all these inventions is the new incentive afforded by the patent laws to develop new things and improve upon them.

There is no reason for us to believe that the past 100 years have produced a race of superior intelligence or superior attainments. The men who built the horse used in the siege of Troy, the workmanship on the Roman galleys, the superiority of Damascus steel and Venetian glass, and various other things from antiquity indicate that workmen in those days were as able, capable, and skilled as workmen of today. They were, however, offered by their society no incentive to improve upon existing conditions and no way in which they could profit from original ideas and discoveries except through the secret process. There was no possibility of reward for bringing forth something new or improving upon something old.

When society at last recognized the desirability of offering some reward or incentive for bringing forth new ideas and for improving upon old ones, the rate of progress made by civilization has been astounding. Prior to 200 years ago, the world had made relatively little scientific progress in its many centuries of development. Since that date we have literally revolutionized the life pattern of civilized man.

Not all this progress was by outstanding leaps and bounds. Just as the recognition of property rights in real and personal property enabled the individual to improve his property with safety, the recognition of a property right in ideas and inventions made it possible for man to make improvements on existing inventions, and to risk his time and capital in so doing, with the reasonable expectation that the improvements would inure to his benefit.

Within our memory the telephone has been greatly improved. From what was originally regarded as a gadget or a toy, it has become a necessity for modern business and a comfort in home life. Its span of distance has been increased from a few yards to the distance around the earth.

Improvement of the radio since the days of crystal sets and earphones has step by step brought it to the point where almost instantly and clearly the happenings in the most remote part of the world can be heard. Improvements in the automobile within the past 25 years are familiar history. The airplane has been developed from a rickety flying crate into luxurious ocean transports and formidable fighting weapons, and the end of these improvements is not in sight. The improvements are as important and useful as the original inventions and sometimes more immediately valuable.

With all this progress attributable in a very large measure to the patent system, critics of the system would have us believe that it has outlived its usefulness and that improvements would continue to be forthcoming without the incentive of return offered by the system. Would we improve our homes or factories if our neighbors or the community could come over and take the improvement from us the moment it was completed? No more would we or our employers spend time and money to improve existing drugs, machines, products, or processes or to develop and produce new products, if those new things could be taken away the moment they are completed. We are not now talking of control and regulation of production during wartime, but of what may happen to one of our important property rights in peacetime if we permit these misconceptions and false premises to spread.

This philosophy that the patent laws have outlived their usefulness and that patents should not be sustained or, if sustained, should be confined to outstanding inventions has pervaded the news in recent years. It has been inculcated into the outlook of our courts to such an extent that, without change of our patent statutes, the patent system is being shorn of the attribute most useful to society—the patent on improvements.

In a recent decision of the United States Supreme Court, a patent on an improvement admittedly new and useful was held invalid because it failed to reveal that "flash of creative genius" which should pervade all outstanding inventions. If a "flash of creative genius" is necessary for a patentable invention, the telephone might qualify in retrospect, but what of all the important improvements which have followed that flash and have made the telephone from a toy in 1875 to the necessity it is today? Are they to be placed outside the scope of the patent laws?

The "flash of genius" theory would rule out nylon as an invention because it did not come from a single burst of inspired thought, but from several years of intelligently directed research. Nylon is, however, not merely a boon to America today as an outstanding invention, it removes our dependence on Japan for natural silk and as a peacetime development makes our transition to a war economy easier. It is one of the substitutes which industry provided when no amount of political foresight could have anticipated its crucial need.

Critics of the patent system would have the public believe that as a result of granting patent monopolies it is being unmercifully gouged by the large corporations, despite the fact that to sell a patented product today you must give the public something new or something better for its money than before. When nylon was placed on the market, it had to offer a better, a cheaper, or a superior product to the silk hose which preceded it; otherwise there would have been no public re-

ception and demand for it. What prevails as to nylon applies to the marketing of every other patented product or development. If the public is not offered something better, or cheaper, or both, it does not buy.

There is likewise an immediate gain to the public from the marketing of every patented invention. Even though the owner of the patent may make a long profit during the period of the monopoly, and there are many instances in which he does not, he must give the public a sufficient "break" when he puts his product out to make a market for it. When the patent expires, as it does after a limited period, the public gets the full "break" of a new and better product under open competitive conditions.

Certain critics of our patent system would also have us think that the international exchange of patent rights and information is an evil for this country. This is a customary part of any war hysteria, but the quickest way we have of getting information and important developments from other countries, whether Germany, France, England, or Czecho-Slovakia, is through the purchase or licensing of patent rights with the necessary know-how to put them into operation.

Our commercial processes of producing synthetic methanol came from Germany after the last war. The fixation of nitrogen, which makes us independent of the Chilean nitrate deposits, came from Germany and was brought to us via the patent system. In these days of shipping shortages and losses, we would indeed be hard put if we had to provide ocean tonnage to transport all of our nitrates from Chile. Had we had more of these developments, whether made in our own laboratories or acquired abroad, we would be less dependent today on foreign supplies of quinine, rubber, and the like.

The Bausch & Lomb Co. has been blazoned in all the headlines for an arrangement to secure manufacturing rights from a German concern on certain optical instruments of a military character, but the important thing is that we have the know-how and the facilities to manufacture these optical instruments in this country which, but for the criticized arrangement, might have been made today in Germany only.

Criticism of the Standard Oil Co. of New Jersey for its arrangements with the I. G. on synthetic rubber, made originally in 1929 when nobody contemplated a world-wide war, fails entirely to mention that but for this arrangement the manufacturing rights and the know-how on Buna rubber might not be in this country today. It certainly is better that we know how to make Buna rubber in this country, no matter what we gave in return, than to be entirely without it. The cost of the acquisition was certainly less than if we were forced to develop the entire manufacturing technique after our supplies of natural rubber were cut off.

We must not let the critics of our patent system confound and confuse us with charges which essentially beg the main question. Has the patent system contributed to the progress of mankind and is that contribution sufficient to warrant the continuance by society of the recognition of a property right in the individual sufficient to protect him in the development and improvement of his patentable ideas?

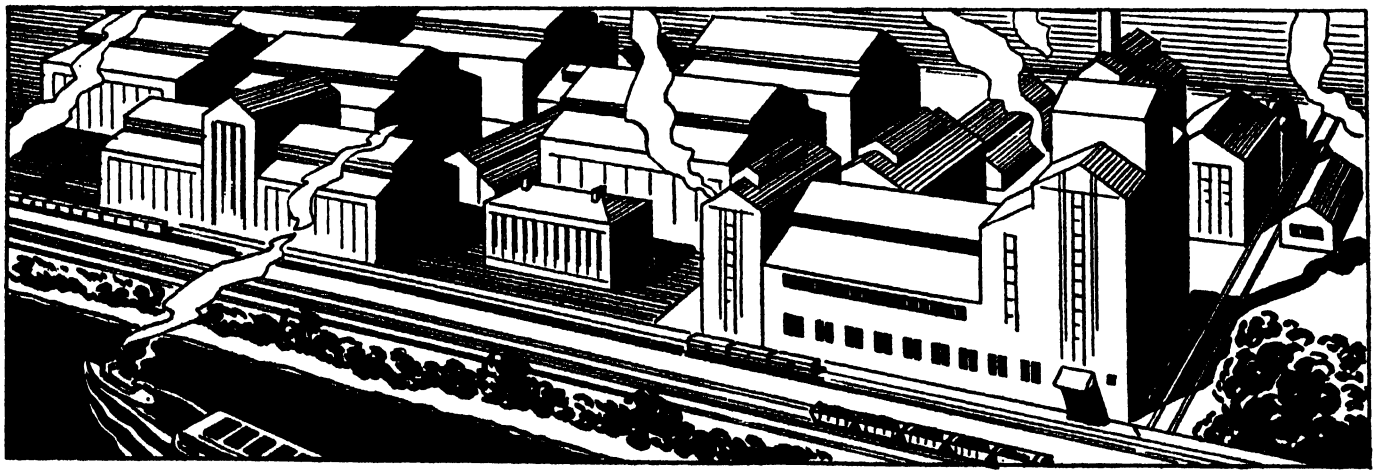
These things cannot be judged on a series of individual incidents or inventions, or on a survey of patents as affecting only four industries as in the T. N. E. C. hearings. The progress of mankind after the advent of patent laws must be viewed as a whole. While there are some entries on the debit side of the ledger, the credit side shows a handsome surplus for the society that created the patent right for inventions.

If the critics of our patent system have their way, the patent right will be restricted, regulated, and cut down by statute and court interpretation to such extent that the individual or corporation developing an invention will no longer be able to control it and to say where and how a competitor may come and use it. The international exchange of patent rights may be so fettered with governmental regulations that no one in peacetime will dare enter into an agreement with a foreign corporation for fear of being unfairly criticized for unpatriotic action, even though that action may bring this country more than is taken from it.

We must not let those things happen. In the aftermath of this war there will be more need for inventive developments than the world has ever witnessed—more need to encourage rather than discourage invention. The returning soldiers, as well as civilian employees released from war work, must be provided with employment, much of which must come from newly developed industries. The cry for cheaper housing to replace that which has been destroyed will tax man's ingenuity and will bring forth new and cheaper materials of construction and new and improved instruments for household comfort. The replacement of destroyed docks and sunken shipping, opening and efficient utilization of oil from blocked wells, reconstruction of destroyed refineries in the form of cheaper or more efficient units, conversion of the automobile industry from its all-out war effort to peacetime production, and many other problems will call for the exercise of man's best inventive efforts. These things will come at a time when the huge government expenditures for war materials will be cut off, and they must be provided by private capital and the efforts of individuals such as you and me to get back to a profitable peacetime business. It is up to us, while fighting for democracy, to see that the incentive for these improvements is not reduced or destroyed.

Potassium Permanganate Imports to Ecuador Drop

GERMANY was the principal source of potassium permanganate imported by Ecuador for use in pharmaceutical manufacture and in gold mining operations during 1937 and 1938. The decline in 1939 and 1940 of such imports may have been caused partly by suppression of German foreign trade by war. Imports averaged 4,000 pounds annually in 1937 and 1938.



Synthetic Resins and Synthetic Rubbers

P. O. POWERS

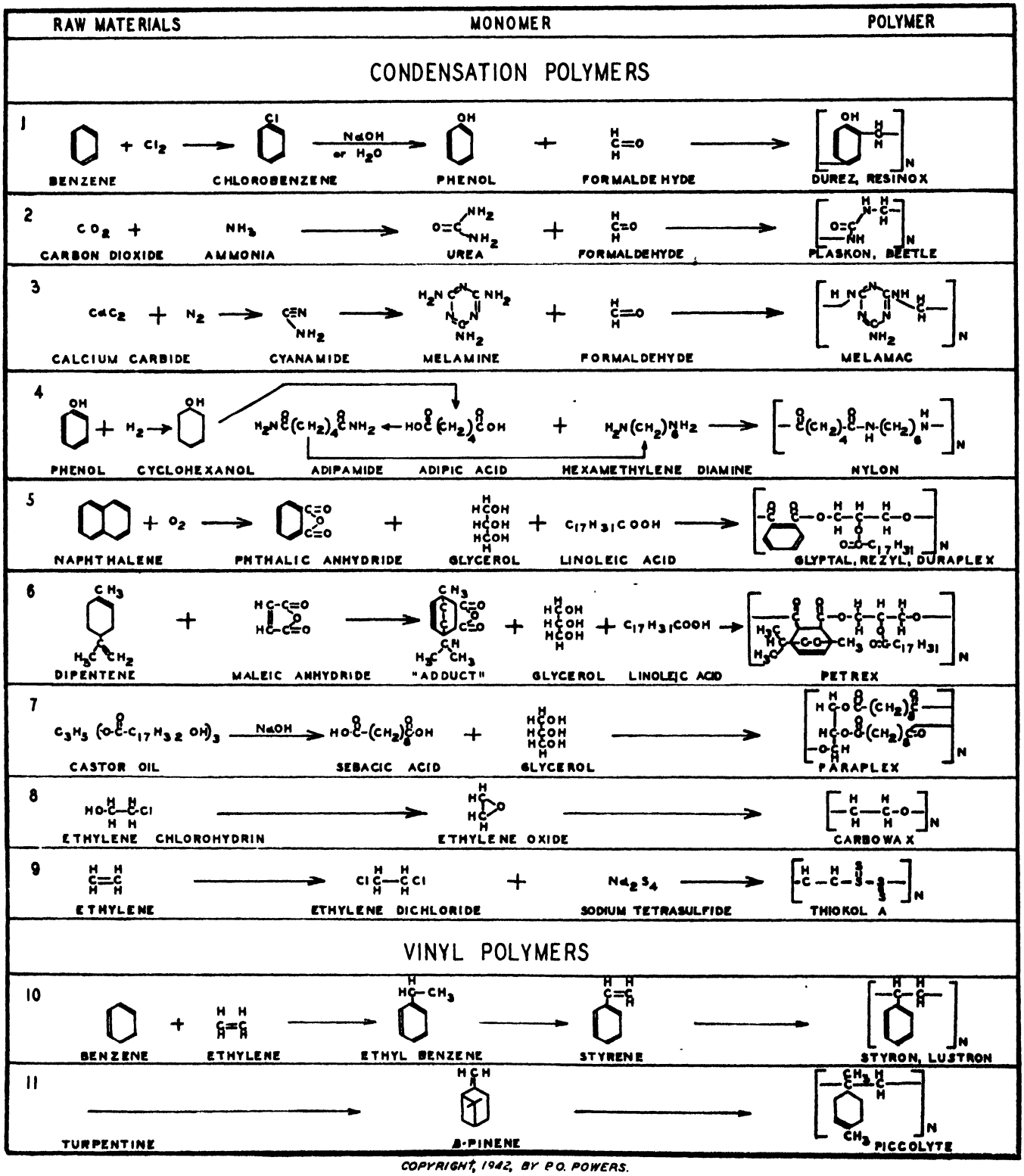
Armstrong Cork Co., Lancaster, Penna.

This chart is a revision and extension of the chart published last year [NEWS EDITION (AM. CHEM. SOC.) 19, 750 (1941)]. Resins from natural products and several new synthetic resins have been added.

Some of the registered trade-marks or trade names designating the resins are listed. For brevity, no attempt has been made to include all of these nor company trade-marks ordinarily associated with more than one type of resin.

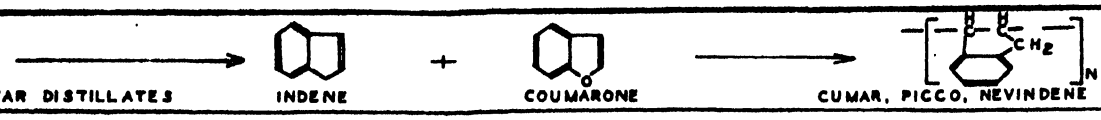
The formulas for the resins are necessarily abbreviated and may not always be entirely accurate. In some cases the formulas used have not been previously suggested.

All of the resins and rubbers in this chart are now produced in the United States in commercial quantities.



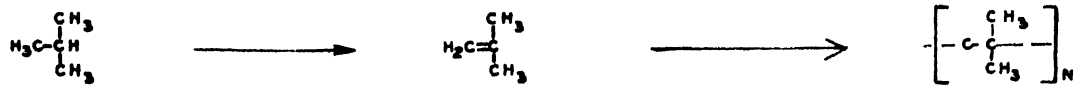
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12



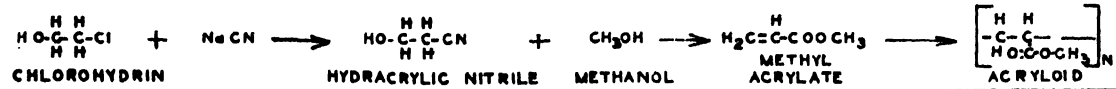
COAL TAR DISTILLATES — INDENE — COUMARONE — CUMAR, PICCO, NEVINDENE

13



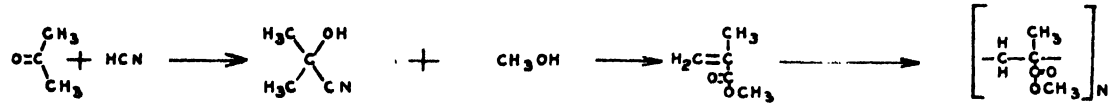
ISOBUTANE — ISOBUTYLENE — VISTANEX

14



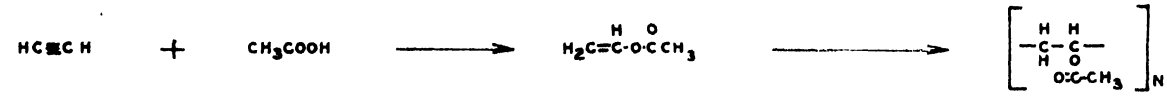
CHLOROHYDRIN — HYDRACRYLIC NITRILE — METHANOL — METHYL ACRYLATE — ACRYLOID

15



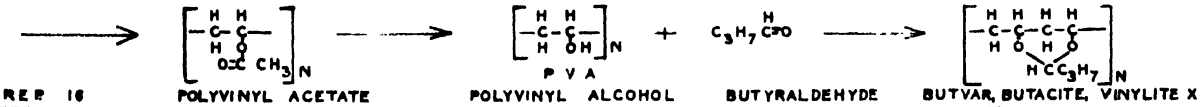
ACETONE — ACETONE CYANOHYDRIN — METHANOL — METHYL METHACRYLATE — PLEXIGLAS, LUCITE

16



ACETYLENE — ACETIC ACID — VINYL ACETATE — GELVA, VINYLITE A

17



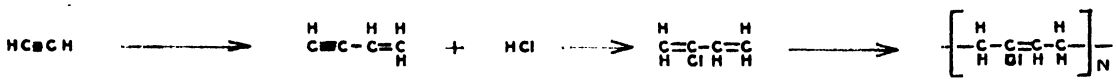
SEE PREP 16 — POLYVINYL ACETATE — POLYVINYL ALCOHOL — PVA — BUTYRALDEHYDE — BUTVAR, BUTACITE, VINYLITE X

18



ETHYLENE — CHLORINE — ETHYLENE DICHLORIDE — VINYL CHLORIDE — KOROSEAL

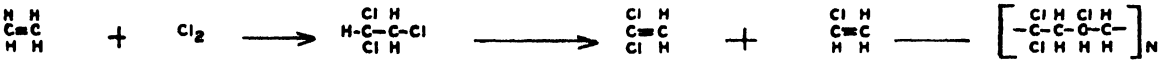
19



ACETYLENE — VINYL ACETYLENE — CHLOROPRENE — NEOPRENE

COPOLYMERS

20



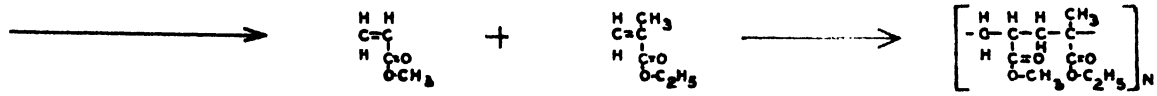
ETHYLENE — CHLORINE — 1,1,2 TRICHLOROETHANE — VINYLIDENE CHLORIDE — VINYL CHLORIDE — SARAN

21



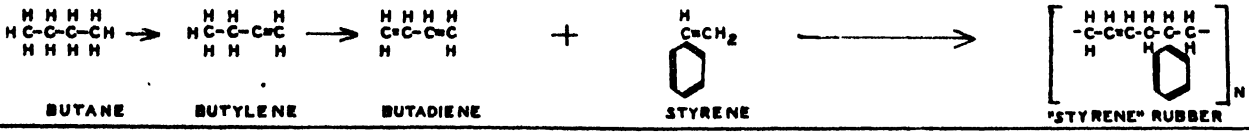
SEE PREPARATIONS 18 & 18 — VINYL CHLORIDE — VINYL ACETATE — VINYLITE V

22



SEE PREPARATIONS 14 & 15 — METHYL ACRYLATE — ETHYL METHACRYLATE — ACRYLOID

23



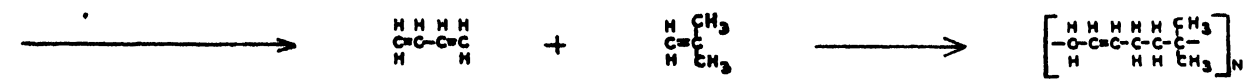
BUTANE — BUTYLENE — BUTADIENE — STYRENE — "STYRENE" RUBBER

24



CHLOROHYDRIN — SEE PREP 23 — ACRYLONITRILE — BUTADIENE — HYCAR OR CHEMIGUM

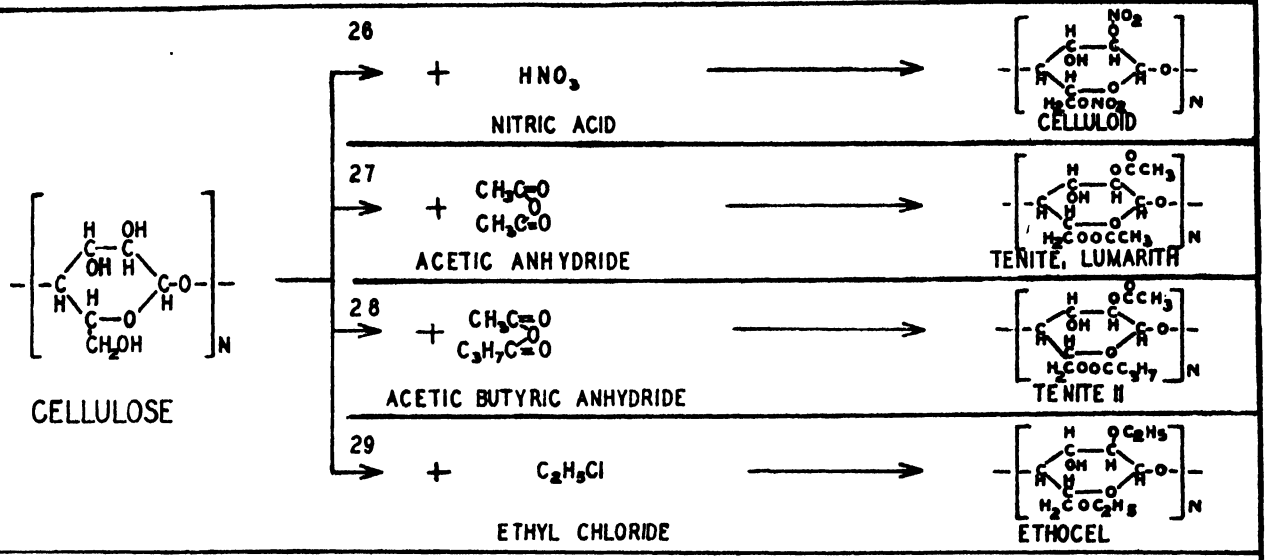
25



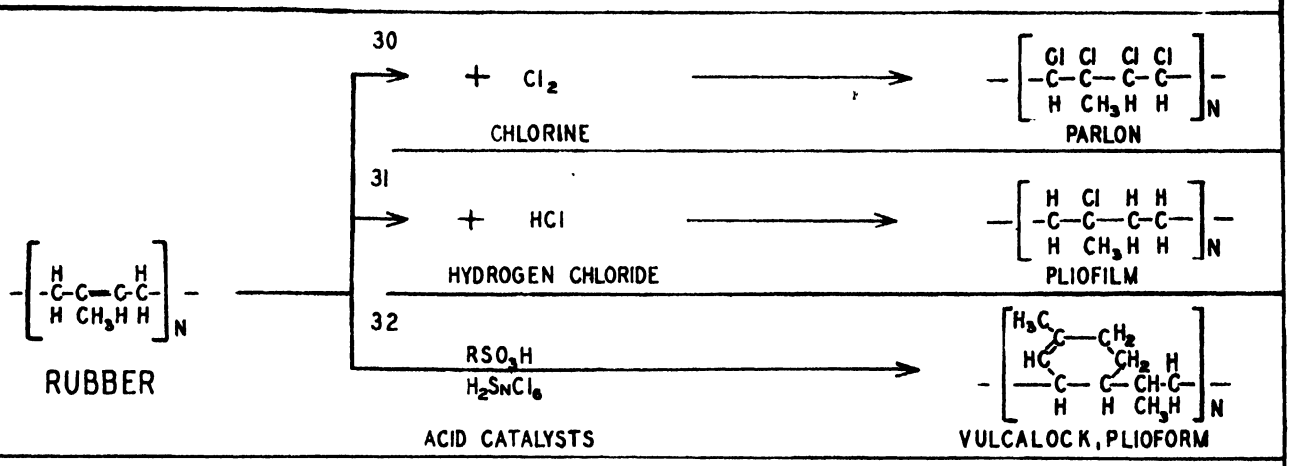
SEE PREPARATIONS 13 & 23 — BUTADIENE — ISOBUTYLENE — BUTYL RUBBER

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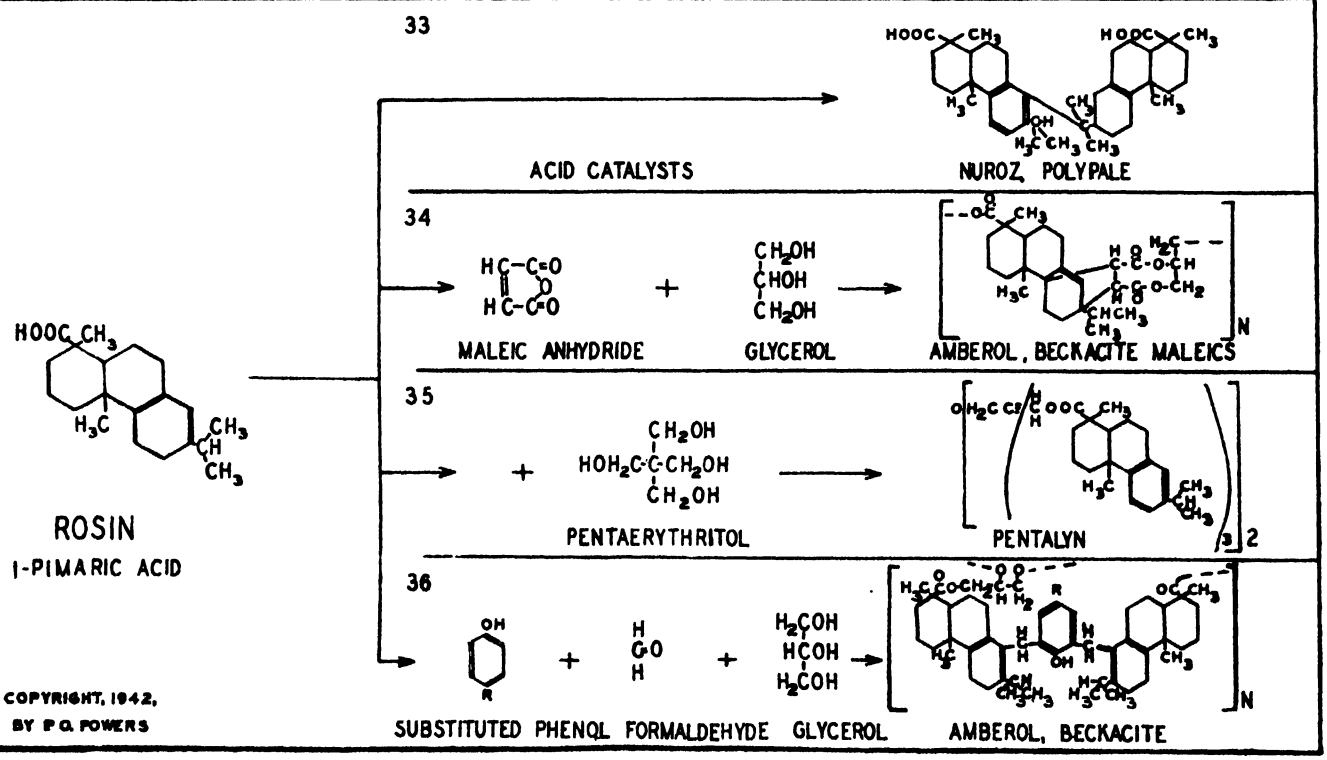
RESINS FROM CELLULOSE



RESINS FROM RUBBER



RESINS FROM ROSIN



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The L. S. O. G. Exchange

Edited by A. A. Ashdown, Ed. F. Degering, J. E. Hawkins, and S. L. Redman

Send items to Ed. F. Degering, Department of Chemistry, Purdue University, Lafayette, Ind.

THE objects of the Lexington Section of the AMERICAN CHEMICAL SOCIETY shall be: For the advancement of the science of chemistry through teaching and research, and to lend aid and hearty cooperation in helping carry on the work of the AMERICAN CHEMICAL SOCIETY (*cf.* the new constitution adopted April 6, 1927). These objectives have been rigidly adhered to since the section was organized in 1912, but it has endeavored to furnished a common meeting ground for all its members, both in the pure and applied branches of chemistry, where they can exchange ideas for the advancement, not only of the science, but of the individual and community as well.

The section has been organized so that this purpose can be accomplished most efficiently. Eight regular monthly meetings are held during the year from October to May except as otherwise ordered by the executive committee. This committee consists of the officers of the section—the chairman, first and second vice chairman, secretary-treasurer, and councilor. The executive committee handles all ordinary items of business, but such matters as the election of officers and amendments to the constitution are acted on by the section. This system allows the section members to devote more time to and take a greater interest in the technical and social part of the meetings and for discussion of the papers presented. The executive committee is organized in such a way that its duties are not burdensome. The chairman and first vice chairman act in an executive capacity, the second vice chairman as scribe writing up talks of the speakers and assisting the secretary in other ways.

Each meeting features a talk by some member of the AMERICAN CHEMICAL SOCIETY. Usually two or three speakers a year are members of the local section. The University of Kentucky chapter of Alpha Chi Sigma has for a number of years sponsored one meeting by furnishing the speaker and taking over the entire program. In recent years the section has affiliated with a number of sections through the Ohio Valley region to form a group called the Mid-West Cooperating Sections. This organization was founded to help each section of the group secure a visit of some nationally known speakers, experts in their field. The expense is small for each local section, and the speaker is able to complete a tour with a minimum of time and speak before a greater number of people.

The section maintains a membership committee whose duty it is to interest potential members in the organization and promote fellowship among members and prospective members. All advanced students are urged to become associate or junior members and to take part in local section affairs. The members of the section are drawn primarily from chemists in the educational field, though some come from the distillery and petroleum industries and the Kentucky State Highway Department. The Lexington Section has 57 members, most of whom are quite active and regular in attendance. A number drive 40 or more miles each month to attend the meetings.—MARTIN E. WEEKS, *Lexington Section.*

Richards Medal Awarded to F. G. Keyes



F. G. Keyes

THE Theodore William Richards Medal for 1942 has been awarded by the Northeastern Section of the AMERICAN CHEMICAL SOCIETY to Frederick G. Keyes, head

A. C. S. Student Membership Awards for 1942

DONOR	RECIPIENT
Alpha Beta Chapter of Alpha Chi Sigma Fraternity, University of Michigan. Annual award to the graduating senior with the highest scholastic average in chemistry or chemical engineering at the University of Michigan.	**Richard E. Field**
Bartow, Edward. Annual award to the outstanding graduate student in chemistry at The State University of Iowa. Includes subscriptions to the SOCIETY's three journals.	**Douglas S. Billington**
Baxter, Robert A. (13th annual award.) This is an award given to a senior on the basis of meritorious work in chemistry, calculated on the quality and quantity done in chemistry courses during the total attendance at the Colorado School of Mines.	**Willard M. Dow**
David Worth Dennis Award (established by Harrison E. Howe). Annual prize consisting of a membership for one year in the AMERICAN CHEMICAL SOCIETY and a subscription to one of the journals of the AMERICAN CHEMICAL SOCIETY to be given to a member of the senior class at Earlham College studying chemistry and meeting the requirements for the award.	**Robert H. Campbell**
Gamma Sigma Epsilon Fraternity. These memberships are awarded annually by the fraternity to the most outstanding student in each chapter.	
Alpha Alpha Chapter, Davidson College	**E. W. Larkin, Jr.**
Beta Alpha Chapter, University of Florida	**J. B. Redd**
Lambda Alpha Chapter, Mississippi State College for Women	**Laura Sue Ezell**
Lambda Beta Chapter, University of Mississippi	**John Thomas Abston, Jr.**
Zeta Alpha Chapter, Georgetown College	**Louis Jubanowsky, Jr.**
Ira D. Garard. These memberships are awarded annually to the highest ranking junior and senior students of chemistry at the New Jersey College for Women. (Miss McFarlane was the winner of the junior award last year.)	**Ruth E. McFarlane** **Elinor Hankins**
Theta Chi Delta Fraternity. This award is given through an essay contest sponsored by the fraternity. (Miss Gent, who is now doing graduate work at the University of Illinois, won this award while attending Carthage College.)	**Mary Gent**
Isabel Whelan Tibbitts. This award, consisting of membership in the AMERICAN CHEMICAL SOCIETY and a subscription to *Chemical Abstracts,* is made to the outstanding senior in chemistry at the College of St. Elizabeth.	**Kathryn J. Gunn**

A. C. S. Student Affiliate Awards

Centre College of Kentucky (Junior Award in Chemistry). This award, established by Nelson Allen in 1940, is given to the outstanding, highest ranking junior student majoring in chemistry and consists of student affiliation in the AMERICAN CHEMICAL SOCIETY and a subscription to *Industrial and Engineering Chemistry,* continued through the recipient's senior year.	Recipient for 1940: **Lewis K. Jones** Recipient for 1941: **Bryce McMullen**

of the Department of Chemistry and director of the Research Laboratory of Physical Chemistry at the Massachusetts Institute of Technology, for distinguished achievement in chemistry. Dr. Keyes has won international distinction for his work on the properties of steam under high pressure and for exact measurements of the physical properties of gases and binary mixtures.

This is the seventh award of the medal, which has been given previously to Theodore William Richards, Arthur A. Noyes, Gregory Paul Baxter, Charles A. Kraus, Gilbert N. Lewis, and Claude S. Hudson. It was established shortly after the death of Professor Richards in 1928 as a lasting memorial to his memory.

The Committee of Award is made up of Ernest H. Huntress, Walter L. Jennings, George B. Kistiakowsky, Arthur B. Lamb, Frank C. Whitmore, and George Scatchard, secretary.

General Aniline and Film Corp. Fellowship

The General Aniline and Film Corp. has established a $1,000 fellowship in organic chemistry at the University of Texas. Selection of the winning applicant will be made soon by a Committee of Award at the university.

Swift & Co. Fellowships in Nutrition

The University of California has received from Swift & Co., Chicago, a grant for the year 1942 to be used under the direction of H. J. Almquist in continuing his studies of the amino acid requirements of the chick. Dr. Almquist is well known for his work in poultry nutrition and has published a number of papers in the vitamin field, particularly on vitamin K. He has also contributed to the present knowledge of methods in evaluating protein quality. His most recent work shows that the chick has markedly different amino acid requirements from those of the white rat or other animals commonly studied. Dr. Almquist received his Ph.D. degree from the University of California, where he is now associate professor of poultry husbandry.

At the University of Georgia School of Medicine a Swift & Co. grant is to be used for investigations on vitamin deficiencies. The work, concerned especially with the depletion of biotin in human subjects and spontaneous avitaminosis, will continue on a larger scale research already in progress. Pathological effect, such as changes in the hemoglobin, cell volume, cholesterol and bile pigments in blood, excretion of biotin, and relation of excretion of vitamins to the intake, will be observed in the experimental subject. R. E. Butler of the U. S. Department of Public Health, Augusta, Ga., will have direct supervision during the absence of V. P. Sydenstricker, under whom the work was originally planned.

Hercules Powder Co. Establishes Fellowship

Hercules Powder Co. has established the Pine Chemicals Fellowship at Mellon Institute of Industrial Research at the University of Pittsburgh for the year 1942, with George B. Feild of the institute as fellow.

The purpose of the fellowship is to develop new uses for rosins, and to emphasize applications of these materials in the war effort. The fellowship continues the company's policy of expanding the uses of naval stores products, turpentine, pine oil, and rosin, and the products which may be derived therefrom.

In recent years the company's chemical research program in naval stores has been carried beyond the direct utilization of naval stores products to the development of chemical materials from these products. Hercules manufactures naval stores products only by the wood process, the distillation of pine wood, and extraction of naval stores by means of solvents. Gum naval stores, however, which are produced by tapping the pine trees and draining the sap from them, have also been included in the research program as possible sources of chemical products. Research carried on under the fellowship will be concerned with both wood and gum naval stores products.

Allied Chemical Continues Fellowships

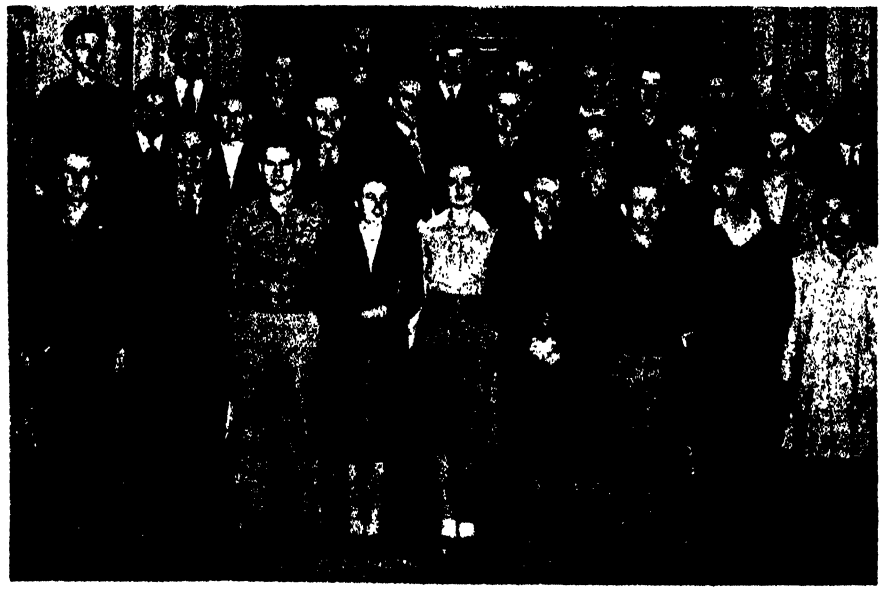
The Allied Chemical & Dye Corp., New York, announces continuation of its graduate fellowship plan in the academic year 1942–43. The company feels that encouragement of advanced training in chemistry and chemical engineering through aid to outstanding graduate students is of even greater importance now than in peacetime because of the service which highly trained chemists and chemical engineers can render in the war effort. Recipients of the fellowships and the subjects are chosen by the universities, and subjects are not restricted to those connected with the products or interests of Allied's operating divisions and subsidiaries. Stipend of each fellowship is $750.

Universities and colleges to which awards have been made for 1942–43 are University of California, California Institute of Technology, Columbia University, Cornell University, Harvard University, University of Illinois, State University of Iowa, Massachusetts Institute of Technology, University of Michigan, University of Minnesota, Northwestern University, Ohio State University, University of Pennsylvania, Pennsylvania State College, Princeton University, Purdue University, University of Wisconsin, and Yale University.

Labeling of Chemical Containers

A recent incident in the laboratory of a large manufacturing company emphasizes the necessity of testing even simple chemicals before using. With the rapid expansion in the personnel of chemical plants, errors will inevitably be made.

A cylinder of compressed gas labeled as carbon dioxide and painted with the conventional color of carbon dioxide cylinders, purchased from a long-established chemical supply company, was found to be filled with ethane. Fortunately, the flammability of the gas was tested before it was used and a possible serious accident was avoided.



A. C. S. Student Affiliates at Oregon State University

POTOMAC POSTSCRIPTS

WPB Activities

Construction. WPB has halted nonessential construction. Effective April 9, Conservation Order L-41 prohibits the start of unauthorized construction projects which use material and construction equipment needed in the war effort. It places all new publicly and privately financed construction under rigid control, except for certain strictly limited categories. Many of the same materials, such as iron, steel, and copper, are used by both essential and nonessential construction, and the same materials are largely used for war production. The order, in effect, allocates these materials away from unnecessary construction into ships, planes, tanks, guns, defense housing, and other essential production.

This step goes much further than the SPAB policy announced October 9, 1941, in which it was made clear that no priority assistance would be given to nonessential construction. The WPB order, however, provides that no construction may be started, except in a few specified cases, without permission.

Equally binding upon property owners, builders, and suppliers, the order prohibits not only the start of construction in most categories, but also the withdrawal from inventory and the purchase, sale, or delivery of any material for use in such construction unless expressly authorized by WPB. No residential construction except for maintenance and repair work may be started without permission if its estimated cost is $500 or more. Similarly, no new agricultural construction may be started if the estimated cost is $1,000 or more for the particular building or project involved. No other construction, including commercial, industrial, recreational, institutional, highway, roadway, subsurface, and utilities construction may be initiated without permission if the cost amounts to $5,000 or more.

Specific types of construction exempt from provisions of the order include:

Projects which will be the property of the Army, Navy, Coast Guard, Maritime Commission, and certain other listed agencies of the Federal Government.

Projects to reconstruct or restore residential property damaged or destroyed on or after January 1, 1942, by fire, flood, tornado, earthquake, or the public enemy.

Projects of the type restricted or controlled by provisions of the orders of the M-68 series, which cover the production and distribution of petroleum.

The order does not affect ordinary maintenance and repair work to return a structure to sound working condition without a change of design.

Enamel Coatings. To save scarce materials such as tung oil, resins, and solvents, Conservation Order M-116 limits the use of enamel coatings for glass container tops. The order prohibits further use of enamel coating on the exterior surfaces of tinplate or terneplate closures for glass containers, subject to certain exceptions. Reduction of the weight of the interior and exterior enamel coating on all closures for glass containers to not more than nine tenths of the standard weight in 1940, wherever practicable, is also directed.

WPB officials expect that through the order approximately 1,500,000 pounds of scarce protective coating raw materials will be conserved. These materials include tung oil, phthalic anhydride resins, phenolic resins, and certain solvents. Manufacturers will be allowed to coat container closures with enamel when required to protect lithographed printing, if other means of designation on the container closure are impracticable, or where the closures are heat-sterilized for use with food products for human consumption.

Glycerol. All deliveries of glycerol in excess of 50 pounds a month have been placed under allocation control. The allocations will become effective May 1. Deliveries for war orders and for manufacture of health supplies are exempted from the provisions of this General Preference Order M-58. Use of glycerol for manufacture of antifreeze is prohibited, and other users are limited to 70 per cent per month of their average monthly consumption in 1940. Inventories are restricted to one twelfth of the amount used and sold during 1940.

Users of glycerol must file a copy of Form PD-362 with suppliers monthly and the original with WPB. Refiners and producers must report on Form PD-363. All consumers who used more than 50 pounds in any one month for the six months ending March 31 must report before May 1 to the War Production Board on Form PD-361.

Methyl Alcohol. According to Amendment 4, designed to facilitate the operation of General Preference Order M-31, shipments of methyl alcohol to be used in the manufacture of formaldehyde for uses in Classification I of Order M-25, largely industrial uses, are granted a preference rating of B-2. Shipments for uses in Classification II, largely plastics for civilian use, are given a rating of B-3. Both classifications formerly received the same rating of B-3 for deliveries of methyl alcohol. Persons who require less than 55 gallons of methyl alcohol a month are exempted from the restrictions and requirements.

Priority Diversion. As the first step in an investigation of reported diversions in New York markets of chemicals purchased with priority assistance, WPB has ordered the Acme Chemical Co. and its subsidiary, the Rona Chemical Co., both of New York, to make no further sales or disposition of acetic anhydride or salicylic acid. The Acme Chemical Co. obtained large quantities of these scarce materials with priority assistance extended under the Health Supplies Rating Plan upon representation that they were for the manufacture of aspirin. Preliminary investigation by the WPB Compliance Branch indicates that the chemicals were not used for the production of aspirin, but were resold for profit.

Quinine. To build a stock pile for military needs, control has been established over supply and distribution of quinine. The regulation, Conservation Order M-131, affects all pharmaceutical and medicinal chemical companies, botanical supply houses, wholesale drug and supply houses, retail drug stores, and all other persons who deal in quinine—except the ultimate consumer. Terms of the order permit sale and delivery of quinine only for use as an antimalarial agent or an ingredient of quinine and urea hydrochloride. The restriction does not apply to any stock of quinine in combination with any other medicinal ingredient. Persons owning or having control of 50 pounds of cinchona bark or 50 ounces of quinine must report such stocks to WPB on form PD-401.

Ninety-five per cent of cinchona bark comes from Java. The Government has built a substantial stock pile and, in addition, there is available a large supply in the hands of manufacturers and distributors.

Estimated military requirements for the balance of this year will exceed the production expected to be obtained from South American sources. These sources, however, are being exploited as far as possible and at least fair amounts are expected to be received from South America this year.

Price Regulations

Lithopone. Redefinition of lithopone is contained in Amendment 2 to Revised Price Schedule 80. The new definition makes it clear that the name "lithopone" includes pure zinc sulfide, excepting chemically pure zinc sulfide and fluorescent zinc sulfide. These two latter grades are used, respectively, as a laboratory reagent and in the manufacture of fluorescent lamps. Their production is high-cost and represents only approximately 1 per cent of the total output of zinc sulfide.

Oxalic Acid. The reagent grade, used in comparatively small quantities in laboratory work, is exempted from provisions of the maximum price schedule by Amendment 1 to Revised Price Schedule 78 for oxalic acid. The amendment redefines the product put under a price ceiling by the Office of Price Administration. "Oxalic acid" means crystalline and powdered oxalic acid of technical grade. Reagent grade of oxalic acid is produced by refining the technical grade. The resultant grade is used in making analytical determinations in chemical laboratories. The process of purification involves additional cost. OPA has determined that prices higher than those charged for the less pure grade must be permitted in order not to discourage production of the grade essential to laboratory work.

Paraffin Wax. The additional cost of shipping paraffin wax in cotton bags, above the cost of burlap bags customarily used when Revised Price Schedule 42 for paraffin wax was issued on November 21, 1941, may be added to maximum prices. Under Revised Price Schedule 42, maximum prices for various grades of paraffin wax were established for shipments in tank cars, barrels, and bags. Another section of the schedule provided for maximum prices when shipments were in "other containers". In response to an industry query, OPA explained that the term "bags" as used in the schedule referred to burlap bags.

Electric Power Use in Canada May be Cut

CURTAILMENT of nonwar uses of electric power may be necessary in Canada late in 1942 as a result of war industries being established there, William L. Batt, chairman, U. S.–Canada Materials Coordinating Committee, has announced after a conference with Canadian officials.

The time or extent of this possible curtailment, however, is uncertain. The ruling factor will be water fall in Canada. Low water may bring drastic curtailment, and plenty of water would reduce it to a minimum. Such a curtailment would affect United States supplies of newsprint, as this industry is one of Canada's largest users of electric power. Stocks of newsprint in the United States, however, are at a high level. Aluminum and chemical plants now projected for Canada, at the request of the United States, will take the bulk of the Dominion's available power.

Retreaders and Recappers to Get Camelback

AUTHORITY under which retreaders and recappers will be able to get initial allotments of camelback for passenger car tires and local rationing boards may issue certificates for purchase of new tubes for List B passenger cars and trucks is contained in Amendment 4 to the Revised Tire Rationing Regulations, announced by OPA. The amendment, which went into effect April 10, prohibits the application of truck-type camelback to tires to be used on passenger cars and the application of passenger-type material to truck tires.

A retreader or recapper who as of midnight March 22 had passenger-type camelback inventory equal to less than 500 pounds for each mold or curing table in his establishment capable of treading only tires smaller than 7.50-20 can get a certificate for purchase of enough to bring his stock as of March 23 up to that level. To get such a certificate, he must apply not later than April 30 to the local rationing board which serves the area in which his principal office is located.

Allocations for Latin America Announced

THE Government of the United States in accordance with the policy of close inter-American cooperation has announced in Washington a list of commodities allocated to the other American Republics for the second quarter of 1942. This announcement was made jointly by the U. S. Department of State, War Production Board, and Board of Economic Warfare. Machinery has been established in the interested government agencies to carry out the allocations program.

The announced list comprises acetic acid, acetone, aconite, ammonium sulfate, anhydrous ammonia, aniline, camphor, carbon tetrachloride, castor oil, chlorine, copper, cotton linters, dibutyl phthalate, electrodes, farm equipment, formaldehyde, glycerol, leather, ferromanganese, methanol, molybdenum, neat's-foot oil, phenol, phosphorus, phthalic anhydride, plastics, potash salts, potassium permanganate, rayon, red squill, household electric refrigerators, soda ash, sodium hydroxide, strontium chemicals, sulfuric acid, superphosphate, tanning materials, toluene, tricresyl phosphate, light trucks, tungsten and ferrotungsten, ferrovanadium, and wood pulp.

A number of new materials not previously under export allocation are included, and additional materials may be made available during this quarter.

Labor-Management Committees Report

A TOTAL of 500 labor-management committees reported to the War Production Board in the first 16 days of April that they have organized to get War Production Drives under way in their plants. These committees were organized to increase production to meet the President's goal of 45,000 tanks, 60,000 planes, 20,000 antiaircraft guns, and 8,000,000 tons of shipping this year. They are purely voluntary, organized and operating at the request of Donald M. Nelson, chairman of WPB.

Zinc Oxide in 1941

SALES of leaded zinc oxide established a new high by a wide margin in 1941, and those for zinc oxide were the highest recorded since 1929, according to the U. S. Bureau of Mines. Total sales of zinc oxide, lead-free and leaded, in 1941 had never previously been exceeded.

Of the total lead-free zinc oxide produced in 1941, 76 per cent was from domestic ore, a fractional per cent from foreign ore, 13 per cent from metal, and 11 per cent from scrap. In 1940, 64 per cent was from ore and 36 per cent from metal and scrap; in 1939, 59 and 41 per cent, and in 1938, 62 and 38 per cent, respectively. The high percentages from ore in 1941 and 1940 reflect the increasingly tight situation in regard to supplies of metal and scrap.

Petroleum Field Office Set Up in Pennsylvania

TO STIMULATE crude oil production in Appalachian oil fields for the war program, the Petroleum and Natural Gas Division of the U. S. Bureau of Mines is establishing a field office at Franklin, Penna

The bureau is staffing the office with six or seven technicians who will consult with operators and point out engineering precepts applicable to existing conditions in secondary recovery projects—oil properties which are partly depleted and produce profitably only when certain stimulative methods are used. Other studies designed to aid in maximum recovery of crude oil with a minimum of expense will be conducted.

Heading the new office at Franklin is C. J. Wilhelm, petroleum engineer, formerly assigned to the Bartlesville, Okla., Petroleum Experiment Station of the bureau. Also on the staff are S. S. Taylor and E. M. Tignor, both petroleum engineers of the bureau.

Record Pyrites Production in 1941

PRODUCTION of pyrites in the United States reached a new record of 659,498 long tons valued at $2,035,000 in 1941, the U. S. Bureau of Mines reports. This represents a 5 per cent increase over the revised figures of 626,640 tons valued at $1,920,000 in 1940. Producers consumed 443,983 long tons and sold 207,504 tons in 1941, compared with revised figures of 422,545 tons and 206,867 tons, respectively, in 1940.

Pyrites imported for consumption in the United States in the first nine months

of 1941 dropped to 224,264 long tons at $978,729, compared with 407,004 tons worth $1,351,367 in all of 1940. Canada furnished 79 per cent of the imports in 1941 and 20 per cent in 1940, and, except for a few hundred tons from Mexico, Spain supplied the balance. Figures showing exports of pyrites are not available.

Program for 700,000 Tons of Synthetic Rubber Announced

JESSE JONES, Secretary of Commerce, has announced that Rubber Reserve Company and Defense Plant Corporation have made contracts and agreements with oil, chemical, and rubber manufacturing companies which will bring the annual production of synthetic rubber to more than 700,000 tons. The plants will come into operation over the next 18 months and, if no unforeseen construction delays are encountered, all should be in production by the end of 1943.

Companies which will participate are Atlantic Refining Co., Carbide & Carbon Chemicals Co., Celanese Corp. of America, Cities Service Oil Co., Dow Chemical Co., E. I. du Pont de Nemours & Co., Inc., Firestone Tire & Rubber Co., B. F. Goodrich Co., Goodyear Tire & Rubber Co., Gulf Oil Co., Humble Oil & Refining Co., Hycar Chemical Co., Koppers Co., Monsanto Chemical Co., Phillips Petroleum Co., Pure Oil Co., Richfield Oil Corp., Shell Union Oil Corp., Sinclair Refining Co., Socony-Vacuum Oil Co., Inc., Standard Oil Co. (Indiana), Standard Oil Co. of New Jersey, Standard Oil Co. of Louisiana, The Texas Co., and United States Rubber Co.

In addition, two or three groups of smaller rubber manufacturers will probably be given contracts and supplied with raw materials from some of the above companies with which to manufacture rubber. The plants to be built by the rubber companies require less time to construct than facilities for the production of the raw materials.

U. S. 1941 Mineral Products Valued at $6,600,000,000

THE value of mineral products in the United States last year—estimated at $6,600,000,000 by the U. S. Bureau of Mines—increased 18 per cent over 1940 and reached the highest peak in history with the exception of 1920, when prices were abnormally high following the first World War. Preliminary data, collected by the bureau chiefly for use of war agencies, indicated that, while a general advance in price levels of minerals accounted in part for the increased value, the major factor was the substantial gain in output of both metallic and nonmetallic products. The bureau's estimate is expected to be surpassed in 1942 owing to higher prices and accelerated demands for war matériel.

Magnesium production in 1941 more than doubled that in 1940, bauxite output increased 107 per cent, and manganese ore advanced 89 per cent. Other minerals and mineral products which showed decided production increases for 1941 were: aluminum, 50 per cent; molybdenum, 38 per cent; mercury, 16 per cent; bituminous coal, 11 per cent; anthracite, 6 per cent; coke, 13 per cent; crude petroleum, 4 per cent; zinc, 12 per cent; lead, 9 per cent; and copper, 8 per cent. Shipments of iron ore were 23 per cent higher, shipments of cement rose 29 per cent, and those of high-grade clays, 31 per cent. Production of crude gypsum was 20 per cent higher; lime, 20 per cent; and stone, 15 per cent.

During 1941 the output of gold decreased about 0.8 per cent, and silver dropped about 0.4 per cent under 1940.

Wholesale Price Indexes

INDEX numbers of wholesale prices for chemicals and allied products have been released by the U. S. Department of Labor. With 1926 as 100, the indexes are:

PRODUCT	YEAR 1941	YEAR 1940	CHANGE %
Chemicals and allied products	84.6	77.0	+ 9.9
Chemicals	87.2	85.1	+ 2.5
Drugs and pharmaceuticals	105.1	88.9	+18.2
Fertilizer materials	73.5	69.4	+ 5.9
Mixed fertilizers	76.0	73.8	+ 3.0
Oils and fats	77.6	44.3	+75.2

Chemical Manufacturers' Indexes

IN JANUARY the value of chemical manufacturers' inventories was 152.0 compared with 143.7 in December and 117.2 in January of last year, taking 1939 at 100, according to the U. S. Department of Commerce. Taking January 1939 at 100, the value of chemical manufacturers' shipments in January was 196, compared with 171 in December and 142 in January 1941.

Production, Shipments, Stocks of Manganese Ore

DOMESTIC production of manganese ore containing 35 per cent or more manganese (natural) during February was 9,500 long tons, shipments were 9,600 tons, and producers' stocks at the end of the month were 1,300 tons, according to the U. S. Bureau of Mines. In January output was 11,700 long tons, shipments were 11,700 tons, and producers' stocks at the end of the month were 1,400 tons. Shipments in 1941 totaled 76,000 long tons or an average of about 6,300 tons per month. The rate of shipments averaged 3,344 tons monthly in 1940, when the total amounted to 40,123 tons.

Further Rise Boosts Kaolin Shipments above Million Tons

FOR three straight years production of a high-grade clay in the United States has made new records. In 1941 sales of domestic kaolin jumped to 1,087,848 short tons valued at $9,205,892 compared with 833,450 tons valued at $6,994,106 in 1940, the U. S. Bureau of Mines reports. The tonnage topped that of the previous year by 31 per cent and was more than double that of 1929. The paper industry alone required 110,000 tons more than in 1940 and consumed 56 per cent of the total shipments. The country needs more and more paper, larger proportions of clay are used in making high-grade paper, and doemstic clay is being used instead of imported clay both as filler and coating. Percentagewise, the consumption of clay for refractories, pottery, rubber, paint, and certain minor uses increased even more than shipments of paper clay.

Imports—almost all English clay, which is used chiefly in paper, sanitary ware, and pottery, and to a diminishing extent in porcelain and tile—amounted to only 66,935 short tons with a foreign market value of $698,502 for the first nine months of 1941. Import statistics for the last quarter cannot be published, but the total for 1941 was undoubtedly less than the 105,566 tons imported in 1940. Average figures for 1925-29 show imports of 339,014 tons and domestic shipments of only 453,618 tons a year, and during 1909-13 the ratio of imports to domestic shipments was nearly 2 to 1.

Memphis Abstracts

AS USUAL, sets of abstracts of meeting papers in planographed book form will be supplied by the A. C. S. News Service, 1155 16th St., N. W., Washington, D. C. Sets are not guaranteed to be complete, but contain abstracts from all divisions as submitted by authors. The abstracts are now ready for delivery.

This enterprise is undertaken in a spirit of service and not for profit. Sets are offered on the following terms:

To members of divisions who forward receipt for divisional dues with remittance and order, 50 cents.

To those without receipt for divisional dues, who remit with order, $1.00.

To those who fail to enclose remittance with order, necessitating correspondence, $1.25.

To those who require bills to be rendered, $1.50.

NECROLOGY

Charles Morse Allen

CHARLES MORSE ALLEN, former head of the Department of Chemistry at Pratt Institute, died in Washington, D. C., on April 3 at the age of 82. Dr. Allen was born in Farmington, Maine, and was graduated from Wesleyan University in 1882. After teaching for seven years at Wyoming Seminary, he went to Pratt Institute, Brooklyn, N. Y., where he remained until his retirement in 1931. Dr. Allen was for some years a member of the AMERICAN CHEMICAL SOCIETY, which he joined in 1926.

Harry A. Carpenter



HARRY A. CARPENTER, outstanding figure in science teaching in the Nation's secondary schools and specialist in science for the Rochester, N. Y., Board of Education, died unexpectedly April 5 in Boston where he and Mrs. Carpenter were visiting. He was on an Easter vacation following the close of the Science Fair at Rundel Memorial Library which he originated for hundreds of scientific-minded high school children. Mr. Carpenter, who was 61 years old, was a cofounder of the Rochester Section of the AMERICAN CHEMICAL SOCIETY. He also instigated the Rochester School of the Air in 1933 and served as its pioneer broadcaster. The program attracted the attention of educators and today science broadcasts reach fifth, sixth, seventh, and eighth grade pupils not only in about 50 Rochester schools but also in some 200 schools outside Rochester. About 25,000 children are registered each semester.

Born in Honeoye Falls, Mr. Carpenter was graduated from the University of Rochester and joined the Rochester public school system in 1905 as head of the Chemistry Department at West High School. In 1911 he was advanced to become head of the school's Science Department, and a year later received his master of science degree from the University of Rochester along with his master of arts from Columbia University. During the last war he served as assistant to the chief chemist of the U. S. Bureau of Mines.

Several years after the war he was given supervision over all science classes in the city's junior and senior high schools. In 1926 Mr. Carpenter was appointed a lecturer in education at the University of Rochester, a post he held to the time of his death. In 1937 he attended the conference of the World Federation of Education Associations in Tokyo as assistant general secretary of the American Association for the Advancement of Science.

Mr. Carpenter was Chairman of the A. C. S. Rochester Section from 1916 to 1917 and president of the State Science Teachers Association in 1917–19. He was a director of three education organizations, the State Science Teachers Association, American Science Teachers Associations, and National Association for Research in Science. He was also president of the Rochester Science Center which sponsored the Science Fair. He was a contributing editor for *Science Education* and the *Journal of Chemical Education*, for some years elementary science editor of *School Science and Mathematics*, and author of a number of books and articles.

A. Brooking Davis

A. BROOKING DAVIS, cofounder and president of the Hilton-Davis Chemical Co., Cincinnati, died March 11 after a three-month illness. He was 59 years old.

Mr. Davis, a native of Illinois, studied chemistry at the University of Alabama. He worked for several oil and gas companies and as chemist for Eli Lilly & Company before going to Cincinnati in 1916 as director of research for the Ault & Wiborg Co. Three years later he became assistant general manager for the Cincinnati Chemical Works.

The Hilton-Davis Co. was organized in 1921 with Mr. Davis as vice president and Robert Hilton as president. Mr. Davis became head of the firm upon the death of Mr. Hilton six months after the founding. The company in its first year had one employee and sales amounted to $12,800. Today its plant covers 89 acres and 400 men are hired. Sales for 1940 amounted to nearly $3,000,000.

Mr. Davis had been a member of the AMERICAN CHEMICAL SOCIETY for 35 years.

Thomas Jobson

THOMAS JOBSON, a pioneer in development of alloy and tool steel in England, died April 12 in the Morristown, N. J., Memorial Hospital. He was 86 years old.

Mr. Jobson, a resident of Whippany, N. J., at the time of his death, was born at Newcastle-on-Tyne, England, and was graduated from the Royal College of Science where he specialized in chemistry and metallurgy. He first became affiliated with a steel concern in Sheffield, England, and came to the United States in 1912 to work with the United States Crucible Steel Co. At the time of his retirement in 1933 he was chief metallurgist.

Charles A. Kern

CHARLES A. KERN, associate professor of analytical chemistry at the University of Vermont, died February 16 at Winter Park, Fla. Professor Kern was graduated from the University of Vermont in 1901 and taught there for 38 years. Of wide interests and distinctively artistic feeling, his teaching and his associations with his students were notable for their cultural and civilizing influences.

He had been a member of the AMERICAN CHEMICAL SOCIETY since 1909.

Robert L. Perkins

ROBERT L. PERKINS, research group leader of the National Aniline & Chemical Co., died February 15 in East Aurora, N. Y. Mr. Perkins was born in Boyne City, Mich., June 5, 1890. He was graduated with a pharmaceutical degree from the University of Valparaiso, Ind., and held the bachelor of science and master of science degrees from the University of Michigan, where he served as instructor. He had also been research drug chemist for Parke, Davis & Co., Detroit.

Mr. Perkins had been a member of the AMERICAN CHEMICAL SOCIETY since 1918. For many years he had been active in musical groups.

Cornell Summer Courses in Microchemistry

DURING the coming summer session, June 29 to August 7, the Department of Chemistry, Cornell University, Ithaca, N. Y., will offer courses that may be taken separately or in combination, as the time and needs of the student justify.

Quantitative microanalysis will cover inorganic and organic procedures according to the methods of Pregl and others. Enrollment is limited, and inquiries should be addressed to M. L. Nichols.

Introductory chemical microscopy will include studies of particle size, optical properties and physical chemistry of crystals, lens systems and photomicrography, and applications to technical materials. Microscopical qualitative analysis will cover the common inorganic anions and cations. Inquiries regarding these courses or a shorter term of study should be addressed to C. W. Mason.

FOR CHEAP INSURANCE - - -

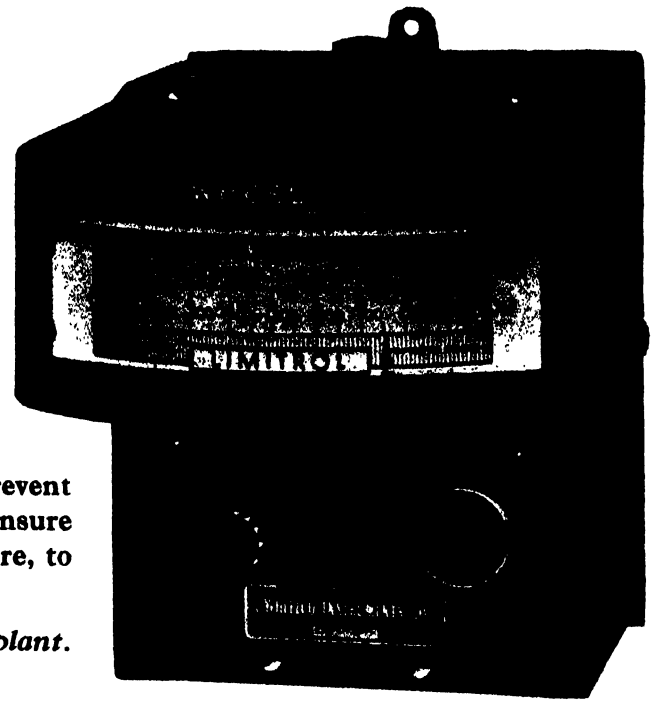
Use Wheelco LIMITROLS

The cheapest insurance you can buy for your plant is *Preventive Insurance.* Wheelco Limitrols provide *Preventive Insurance* by protecting you against the losses excessive temperatures can cause in your processes.

The Limitrol combines a high resistance pyrometer with an electrically operated automatic shut-off device to give you (1) continuous, accurate, temperature readings, and (2) automatic shut-off of heat input when the temperature measured reaches a point selected and set on the pyrometer scale.

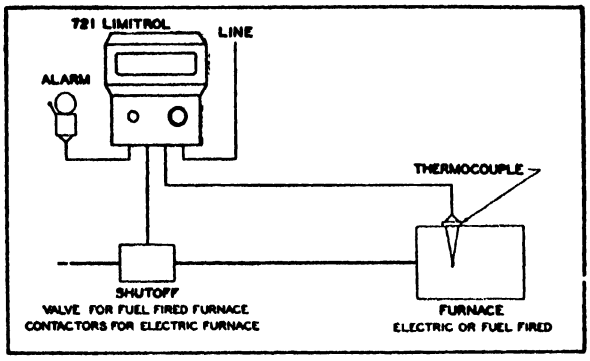
The Limitrol may be used as a safety device to prevent temperature from rising above a danger point, or to insure shut-down of equipment, at any desired temperature, to obtain the exact material specifications required.

Investigate the applications for Limitrols in your plant.

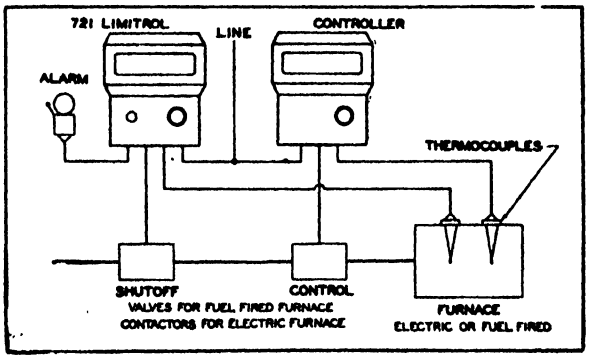


Wheelco Limitrol.

Diagrams below show typical methods of installing Limitrols.



Operating Diagram showing use of Limitrol only.



Operating Diagram showing Limitrol used in conjunction with a temperature controller.

LIMITROL FEATURES

Can be used in conjunction with controllers of any type, or it can be used alone.

Protects equipment from being overheated due to failure of control or switching apparatus.

Equipment cannot be turned on again until temperature has dropped to safe limit.

Any point on the scale can be selected as a shut-off point.

Thermocouple Break — Will shut off equipment if thermocouple is broken.

"Radio Principle" — Limitrols employ the famous Wheelco "Radio Principle" Control.

Limitrol Scales — 6" long.

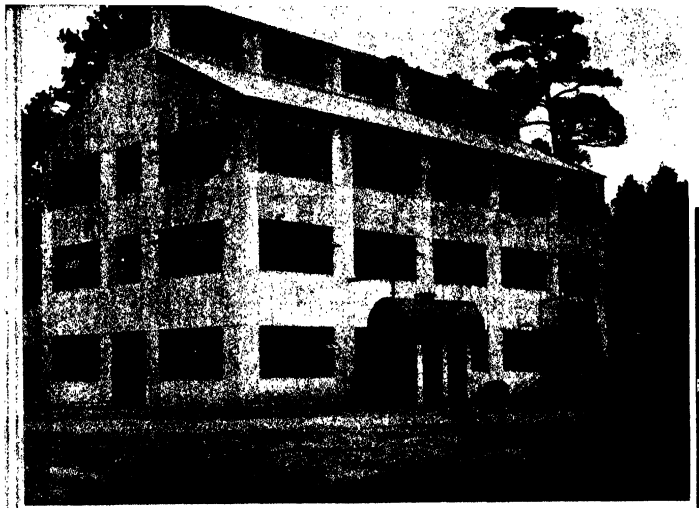
Scale Ranges — 0 to 3600° F. or equivalent ° C.

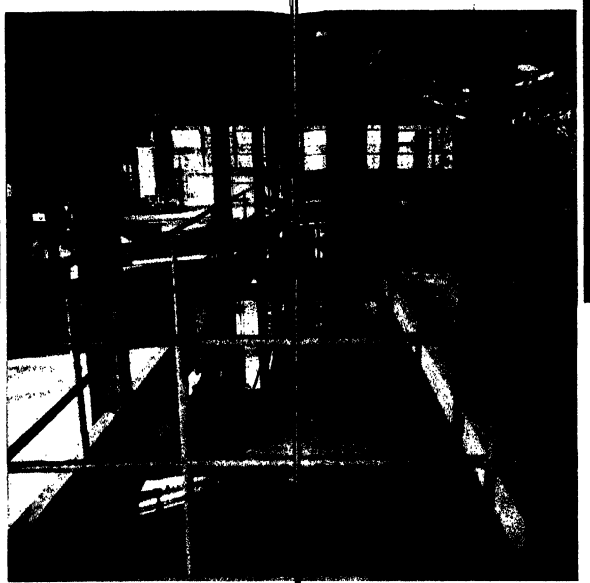
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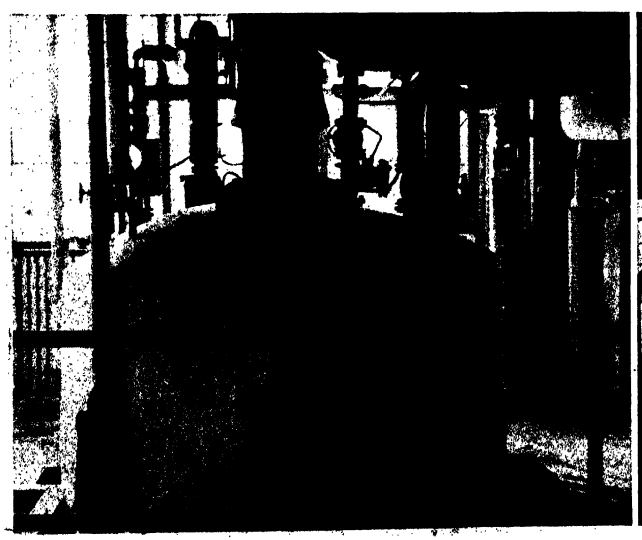
CHEMICAL NEWS PARADE

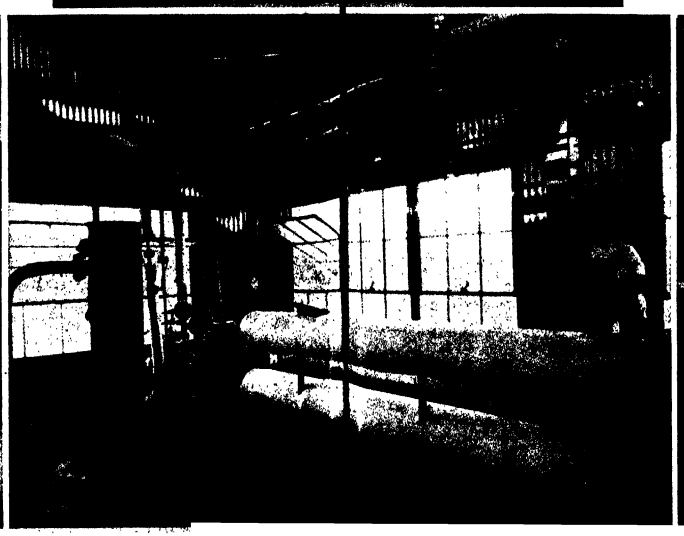


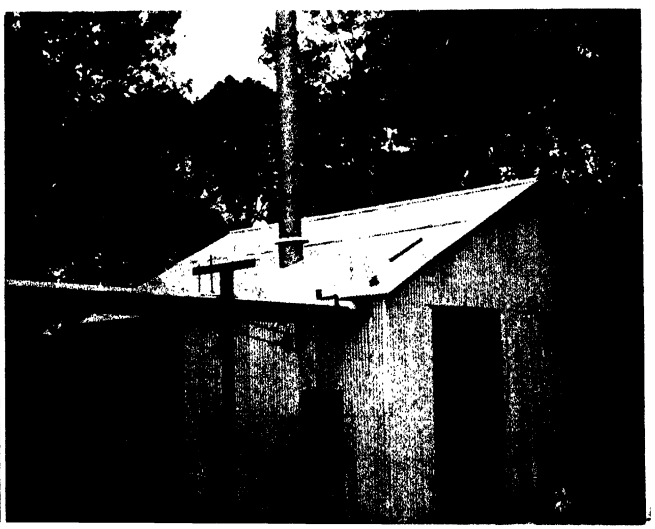




Speeded to meet growing demands of the war program are facilities of the Hercules Powder Co. for production of rosin esters at Hattiesburg, Miss., illustrated in this issue's Chemical News Parade. The new plant is unique in that it utilizes molten rosin delivered to it by pipe line from the adjoining Hercules naval stores plant. Use of molten rosin eliminates the packing, cooling, shipping, cracking, and remelting operations in handling rosin. The plant has been located advantageously at Hattiesburg because of the proximity of large supplies of rosin and hydrogen. Hydrogen, required in large quantities for the manufacture of hydrogenated methyl abietate, is obtained by cracking natural gas available in Louisiana and Mississippi. Deliveries are facilitated by tank car loading equipment and use of the Gulf ports. *Above.* The rosin ester plant of the Synthetics Department of Hercules. *Right.* Looking through the center wall from the second mezzanine floor. The heat exhangers are in the center and the rosin holding tanks are to the left and the right on the upper floor. *Below.* A resin kettle used in the manufacture of Pentalyn. *Above.* A continuous high-vacuum still for production of liquid rosin esters. In this still crude methyl abietate is refined to purify the abietate. *Left below.* Rosin and methanol preheaters used in the manufacture of Abalyn. At the left is a methyl alcohol rectifying column. *Below.* Dowtherm heater house. Demand for rosin esters—Abalyn, methyl abietate; Hercolyn, hydrogenated methyl abietate; Flexalyn, diethylene glycol diabietate; Pentalyn, pentaerythritol tetra-abietate; Staybelite, hydrogenated rosin and Staybelite ester gums—increased so rapidly during 1941 that sharp expansion of manufacturing facilities was required. Stimulated by price reductions announced a year ago for all of the rosin esters, existing fields for these products were expanded and new uses developed. Principal outlets for Abalyn and Hercolyn developed during 1941 were as plasticizers in nitrocellulose lacquers, adhesives, ethyl cellulose, chlorinated rubber, cumar and high-melting asphalts and pitches for roofing, floor tile, caulking compounds, and box toes. Use of the Pentalyn esters in oil varnishes has been increased by the shortage of tung oil.









American Chemical Society[1]

104TH MEETING. Buffalo, N. Y., September 7 to 11, 1942.

105TH MEETING. Indianapolis, Ind., spring of 1943.

106TH MEETING. Minneapolis, Minn., fall of 1943.

NATIONAL CHEMICAL EXPOSITION. Stevens Hotel, Chicago, Ill., November 17 to 22, 1942.

NINETEENTH NATIONAL COLLOID SYMPOSIUM, Division of Colloid Chemistry. University of Colorado, Boulder, Colo., June 18 to 20, 1942.

Other Scientific Societies

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, Southwestern Division. Las Cruces, N. Mex., April 27 to 30. Annual meeting.

AMERICAN ASSOCIATION OF CEREAL CHEMISTS. Edgewater Beach Hotel, Chicago, Ill., May 18 to 22. Annual meeting.

AMERICAN ASSOCIATION OF PHYSICS TEACHERS. State College, Penna., June 25 to 27.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Boston, Mass., May 11 to 13.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Chicago, Ill., June 22 to 26.

AMERICAN LEATHER CHEMISTS ASSOCIATION. Deshler-Walleck Hotel, Columbus, Ohio, June 1 and 2.

AMERICAN OIL CHEMISTS' SOCIETY. Rice Hotel, Houston, Tex., April 30 and May 1.

AMERICAN PHYSICAL SOCIETY. State College, Penna., June 25 to 27.

AMERICAN SOCIETY OF BREWING CHEMISTS. Netherland-Plaza Hotel, Cincinnati, Ohio, May 25 to 27.

AMERICAN SOCIETY OF REFRIGERATING ENGINEERS. Skytop Club, Skytop, Penna., June 7 to 9.

AMERICAN SOCIETY FOR TESTING MATERIALS. Atlantic City, N. J., June 22 to 26.

INSTITUTE OF FOOD TECHNOLOGISTS. Hotel Nicollet, Minneapolis, Minn., June 15 to 17. Annual meeting.

SCIENTIFIC APPARATUS MAKERS OF AMERICA. Hotel Hershey, Hershey, Penna., June 1 to 3.

SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION. Columbia University, New York, N. Y., June 27 and 28. Annual meeting.

Local Sections

SECTION AND PLACE	MAY	SPEAKER	SUBJECT
Akron, Women's City Club	13	**H. C. Kremers**	Synthetic Optical Crystals
Ames, Engineering Assembly Hall, Iowa State College	4	**J. W. Williams**	Ultracentrifugal Analysis and High-Molecular Compounds
Columbus, Ohio Wesleyan University, Delaware	15	**H. B. Hass**	The Nitroparaffins
Dayton, Thomas & Hochwalt Laboratories, Monsanto Chemical Co.	12	**W. A. Noyes, Jr.**	Organic Photochemistry
Erie, Carnegie Hall of Chemistry, Allegheny College, Meadville, Penna.	1	**Harry N. Holmes**	A Chemist's Adventures in Medicine
Florida, Hotel Roosevelt, Jacksonville	9	**R. C. Palmer**	Naval Stores Chemicals
Indiana, Severin Hotel, Indianapolis	8	**R. L. Shriner**	The Anthocyanins
Iowa, Chemistry Auditorium, State University of Iowa, Iowa City	5	**J. W. Williams**	Ultracentrifugal Analysis and High-Molecular Compounds
Kansas City, Chemistry Auditorium, University of Kansas, Lawrence	5	**S. B. Hendricks**	Ion Exchange in Heterogeneous Systems
Kansas State College, Main Chemistry Building, Manhattan	6	**S. B. Hendricks**	The Nature of Clays and Soils
Lehigh Valley, Allentown, Penna.	15	**Howard S. Bunn**	Textiles from Plastics (Ladies' Night)
Lexington, Kastle Hall, University of Kentucky	7	**W. A. Noyes, Jr.**	
Michigan State College, Kedzie Chemical Laboratory, East Lansing	14	**P. Debye**	The Coagulation of Colloids
Midland, Mich., Auditorium, Dow Chemical Co.	13	**P. Debye**	Dielectric Losses and Molecular Structure
New York, Hotel Pennsylvania	8	**Glenn T. Seaborg**	Applications of Artificial Radioactivity
		J. R. Dunning	Radioactive Isotopes
North Jersey, Hotel Winfield Scott, Elizabeth	11	**Karl P. Link**	The Hemorrhagic Disease Caused by Sweet Clover
Northeastern, Huntington Hall, M. I. T., Cambridge, Mass.	14	**Frederick G. Keyes**	Theodore Wm. Richards Medal Award
Oklahoma, Oklahoma City	14	**S. B. Hendricks**	
Oregon, University of Oregon, Eugene	9	**C. H. Secoy**	Cl_2O–H_2O Equilibrium
		P. J. Van Ryssel-berghe	Solutions of Magnesium Salts
Pennsylvania–New York Western Border, Warren, Penna.	13	**R. H. Schmidt**	Explosives, Manufacture and Testing
Peoria, Ill., Northern Regional Research Laboratory	8	**W. A. Noyes, Jr.**	Photochemical Reactions
Purdue, Stanley Coulter Hall, Lafayette, Ind.	11	**W. A. Noyes, Jr.**	Organic Photochemistry
Rochester, Lower Strong Auditorium, River Campus, University of Rochester	4	**James H. Sterner**	Controlling the Chemist in a Chemical Reaction
St. Joseph Valley, Chemistry Hall, University of Notre Dame, Notre Dame, Ind.	1	**Claire C. Balke**	Powder Metallurgy
St. Louis, St. Louis University School of Medicine	4	**S. B. Hendricks**	The Nature of Clays and Soils
Southeast Kansas, Science Hall, Kansas State Teachers College, Pittsburg	8	**S. B. Hendricks**	The Nature of Clays and Soils
Toledo, Ohio	11	**P. Debye**	
University of Michigan, Chemistry Building, Ann Arbor	12	**P. Debye**	The Coagulation of Colloids
Virginia Blue Ridge, Hotel Roanoke, Roanoke	8	**W. H. Sebrell, Jr.**	Chemotherapy
Washington, D. C., Chemistry Building, University of Maryland, College Park	14		Four group meetings: biochemical, organic, physical, and inorganic and analytical
Wichita, University of Wichita Science Hall, Room 207	7	**S. B. Hendricks**	Ion Exchange in Heterogeneous Systems
Wisconsin, Chemistry Auditorium, University of Wisconsin, Madison	15	**P. Debye**	Dielectric Losses and Molecular Structure
Wooster (Ohio), Reining's Restaurant	12	**C. J. Kaiser**	Protecting America's Protection with Synthetics

[1] The list of the SOCIETY's National Officers and Directors, Editors, members of Council, Divisional and Local Section Officers, Committees, and Chapters of Student Affiliates appears in CHEMICAL AND ENGINEERING NEWS three times a year—usually February 10, May 10, and October 10. The latest list is printed on page 187 of the February 10 issue.

X-Ray and Electron Diffraction Program Scheduled

A JOINT meeting of the American Association for the Advancement of Science, Section C, and the American Society for X-Ray and Electron Diffraction will be held at Gibson Island, Md., July 27 to 31. Registration and reservations should be made through the director of the Gibson Island Conferences, Neil E. Gordon, Central College, Fayette, Mo.

X-Ray and Electron Diffraction

B. E. WARREN, *Chairman*
A. L. PATTERSON, *Vice Chairman*

July 27
- I. FANKUCHEN. X-Ray Patterns of Imperfect Crystals.
- J. T. NORTON. X-Ray Diffraction Methods for Measuring Stresses in Metals.

July 28
- J. C. M. BRENTANO. Intensities in X-Ray Diffraction.
- K. LARK-HOROVITZ. Intensity Problem in Electron Diffraction Patterns.

July 29
- S. B. HENDRICKS. Types and Extent of Isomorphous Replacements in Silicate Structures.
- P. DEBYE. Temperature Diffuse Scattering.

July 30
- L. K. FREVEL. Chemical Analysis by Diffraction Methods.
- W. O. MILLIGAN. X-Ray and Electron Diffraction Examination of Inorganic Colloidal Materials.

July 31
- D. HARKER. Metallographic Results with the Electron Microscope.

A business meeting of the American Society for X-Ray and Electron Diffraction will be held at the conference room, Wednesday afternoon, July 29.

Summer Conference of New England Chemistry Teachers

THE New England Association of Chemistry Teachers is making plans for its fourth annual conference, which will be held on the campus of the University of New Hampshire, Durham, N. H., August 11 to 14, 1942. The program will include a Symposium on Atomic Structure, headed by J. E. Cavelti of Allegheny College.

Information regarding registration, program, and accommodations may be secured from Millard W. Bosworth, Vermont Academy, Saxtons River, Vt.

Meeting of American Society of Brewing Chemists

PLANS for the annual meeting of the American Society of Brewing Chemists, to be held at the Netherland-Plaza Hotel, Cincinnati, Ohio, May 25 to 27, are being completed. Features will include addresses by Carl F. Cori on "Enzymes in Yeast Fermentation", and by William H. Stein on "Current Problems and Recent Advances in the Chemistry of Proteins".

Detroit Rubber and Plastics Group Meets

A. A. SOMERVILLE, of the R. T. Vanderbilt Co., New York, will speak to the Detroit Rubber and Plastics Group in the Detroit Leland Hotel, May 8 at 8:00 P. M. Dr. Somerville's subject, "Latest Dope on Synthetic Rubber as Related to Accelerators and Plasticizing and High-Temperature Testing", will be presented before members of the group and guests. Arrangements for the dinner preceding the meeting, to be served at 6:45 P. M. should be made through Ed. Kvett of the Baldwin Rubber Co., Pontiac, Mich., or E. F. Riesing, Firestone Tire & Rubber Co., 1405 Henry St., Detroit.

Technical Program of A. A. T. C. C.

KENNETH H. BARNARD, Pacific Mills, will serve again as chairman of the Technical Program Committee for the 1942 annual meeting of the American Association of Textile Chemists & Colorists. This convention will be held late this year; the date and place have not been definitely set. Possibly Atlantic City will be selected.

The 1941 annual meeting was held in Pinehurst, was well attended by delegates from all parts of the country, and was very successful, especially from the point of view of the technical program. In keeping with the times the 1942 technical program will be devoted primarily to textile and chemical problems in connection with this country's war effort. It has been planned to hold again an intersectional contest because of the wide interest shown in it during the past two conventions. It is expected that the subjects selected for this contest by the individual sections will also pertain to the country's defense program.

Suggestions regarding suitable topics for the technical program may be referred to Mr. Barnard at 119 Lowell St., Shawsheen Village, Andover, Mass. and those who wish to present papers on a textile or chemical subject should also write to him.

Cereal Chemists Plan Chicago Meeting

THE annual meeting of the American Association of Cereal Chemists, scheduled at the Edgewater Beach Hotel, Chicago, May 18 to 21, will hold sessions on Agronomy and Milling Technology; Statistical Clinic; Cake, Biscuit, and Cracker Technology; Laboratory Baking Methods; Malting and Brewing; Protein Symposium; Bread Baking Technology; General Analytical Methods; and Symposium on Flour and Bread Nutritional Supplements. Cereal chemists may discuss their statistical problems at the statistical clinic, which consists of a joint session of the association with the Biometric Section of the American Statistical Association.

R. A. Gortner of the University of Minnesota will give the Osborne Medal Award address on "The Plant Proteins". Among other speakers will be F. T. Hogness of the University of Chicago, C. H. Goulden of the Dominion Rust Research Laboratory, Winnipeg, Manitoba, R. M. Hixon of Iowa State College, C. A. Elvehjem of the University of Wisconsin, R. R. Williams of the Bell Telephone Laboratories, and Clara Gebhard Snyder of The Wheat Flour Institute.

Sixty-four papers and addresses have been listed.

Further information about the meeting may be obtained from F. L. Dunlap, chairman of the Publicity Committee, at Wallace & Tiernan Co., Inc., 809 West Washington Blvd., Chicago, Ill.

Lectures on Civil Air and Chemical Warfare Defense

IN CHEMICAL AND ENGINEERING NEWS for March 10, 1942, page 321, reference was made to the practical course in home defense being given by the Speakers' Bureau of the Philadelphia Section of the AMERICAN CHEMICAL SOCIETY.

Lecture demonstrations were given on 10 consecutive Friday evenings, beginning January 23, 1942, nine of them including lantern slides, and most of them exhibits, demonstrations, and films. After each lecture a concise set of reference notes was distributed, covering the subject of the meeting. The topics presented were: The Military Airplane, Collective and Individual Protection against High Explosive Bombs and against Incendiary Bombs, Chemical Warfare in General, Properties and Identification of Chemical Agents, Tactical Use of Chemical Warfare, Individual Protection against Gas Inhalation and against Vesicants, Decontamination, Collective Protection against Gas Attacks, Organization for Civil Air Defense, and First Aid Treatments for Victims of Gas and Bomb Attacks.

This undertaking proved a great success, and the lectures were attended by considerable numbers of both chemists and non-chemists, including Sector and Post Wardens. The chairman of the Speakers' Bureau is O. F. Roller, Jr., 4817 Regent St., Philadelphia, Penna.

Hearing on Fruit Cocktail Standards Reopened

A PUBLIC hearing will be held at 10:00 A. M., May 11, in Room 3106, Department of Agriculture South Building, Independence Avenue and 12th Street, S. W., Washington, D. C., to receive additional evidence on proposals for standards of quality and fill of container for canned fruit cocktail, according to the FSA.

New Members Elected March 1 to April 1, 1942

Total Membership as of April 1—30,236

Akron Section. Gilbert H. Boeder[1], Gerard F. Cohan[1], Harry E. Eckert, Jr.[1], Richard W. Kibler[1], Leroy B. Kuhn[1], Grant P. Lawless[1], George W. McLaren, Jr.[1], Paul F. Niessen.

Alabama Section. Ellis E. Creitz, L. W. Donaldson, William Perlman[1], Wynelle D. Thompson, Joe K. Trauerman, Jr.[1].

Ames Section. Robert E. Rundle.

Baton Rouge Section. Charles E. Marks[1], Rafael J. Tamargo[1].

California Section. Lisle Baldwin[1], Harold H. Boyd, James Chickinoff[1], Sam U. Greenberg, Carl E. Hendel, Richard A. O'Connell, Jr.[1], Edward L. Prudhomme[1], Paul J. Rollin, Willis G. Routson[1].

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Central Texas Section. Kurn Kenneth Moore[1], James W. Morris[1].

Chicago Section. William A. Bonner[1], David L. Carpenter, Irvin A. Clausen, Alan F. Clifford[1], Ronald G. Crosier, Robert E. Deremiah[1], Robert K. Deutsch[1], Bernard J. Finkle[1], Max M. Gethner[1], Ralph A. Goldenberg[1], J. Arthur Gross, Morrison H. Grossman[1], Everett A. Hodges[1], Elwood V. Jensen[1], Harold C. Johnson, E. K. Jones, Ralph B. Jones, William M. Leaders, Morris A. Lipton, Frederick H. Low, Joseph A. Lubits[1], John D. T. Lundin[1], Robert W. Manuel, Harry C. Mehring, Charles G. Moore, Roy L. Mosemiller[1], John A. Munts, William Pastercsyk[1], Lester J. Perlman[1], William R. Remington[1], Walter O. Schellenberg[1], Thomas E. Sharp, Andrew D. Singleton[1], Walter D. Smuts, John C. Stauffer, Martin Steinberg[1], Maria Willfort Torok[1], Alfred J. Webber[1], Harold Ziskin[1].

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Cleveland Section. Arnold E. Bereit[1], Ernest A. Brown, George R. Jackson[1], Frank W. Jones, Richard Laubmann, Kenneth L. Mattern[1], Robert A. Sturges[1].

Colorado Section. Willard M. Dow[1], Harry M. George.

Columbus Section. Sidney R. Steele[1].

Connecticut Valley Section. William H. Ebelke, Stanley J. Kaseniac[1], Walter A. Maclinn, Anthony J. Urjil[1], Dorothy Wrinch, John A. Young[1].

Cornell Section. William S. Barnhart[1], Richard B. Hasbrouck[1], Peng Cheng Hsu[1], James M. Meyers[1].

Dayton Section. Herbert C. Morris[1].

Delaware Section. C. Franklin Miller.

Detroit Section. Harry K. Beasley[1], Ford Richardson Bryan, J. Harold Burns, Steve Eisner[1], Francis F. Farley, John R. Lewis[1], Frederick J. Marshall[1], Ford G. Martin[1], Milton H. Merchant, Roy J. Morris[1], Jack Patt, Marian Sawatskie[1], R. Bruce Scott[1], Ernest M. Skytta[1], Newton E. Whitman, Carl A. Winberg[1].

Eastern New York Section. Harold M. Belkin[1], Robert K. Staman.

Erie Section. Harley Willard Burchard.

Florida Section. Emanuel H. Bresler[1].

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Hawaii Section. Y. S. Loo, Joseph B. O'Toole, Jr.[1].

Illinois-Iowa Section. Herbert A. Poits[1].

Indiana Section. Robert H. Campbell[1], Keith D. Crane, Janet R. Laird[1], Marshall W. Mead[1], Joseph Francis O'Mahoney, Jr.[1].

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Kanawha Valley Section. T. Joseph Cuerdon, Jr., Kenneth L. Godfrey.

Kansas City Section. Ben Poisner, J. Leon Sealey, R. Devere Wallace[1], Ben W. Warner[1], John B. Williams.

Kansas State College. Donald J. Edgar[1], Colter A. Landis[1], Ralph E. Samuelson[1].

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Lexington Section. Wayne V. McConnell[1], Thomas H. Shelley, Jr.[1].

Louisiana Section. Fred E. Boettner[1], Howard Claire Eshelman, Leon Siegel.

Louisville Section. H. R. Bilford[1], Albert L. Bollinger, Samuel B. Crecelius, Paul F. X. Dunigan[1], Maurice F. Griffel[1], John C. Kalbach, Wayne May[1], Carl E. Moore[1],

CONTINUED ON PAGE 552

The ELECTRON MICROSCOPE

by E. F. BURTON

Head, Department of Physics, University of Toronto

and

W. H. KOHL

Development Engineer, Rogers Radio Tubes, Ltd., Toronto

The first electron microscope in America was designed and built in 1938 by the authors of this book, assisted by James Hillier, who was at that time a student of Dr. Burton's. Since then, news of the miraculous accomplishments of this instrument has spread rapidly through the scientific world. Actual magnifications of 67,000 diameters have been attained, enabling investigators to see organisms and colloidal particles of the order of magnitude of large molecules. The significance of this achievement in the fields of applied chemistry, bacteriology and biochemistry can scarcely be exaggerated. The industrial applications of the electron microscope already include the study of paper-coating clays, rosin size, wood and asbestos fibers, carbon black, and metallic oxide structures. Several of the larger research laboratories have installed them, and many others are planning to do so.

The book simply and clearly describes the fundamentals of the optical and electron microscopes; many original line drawings illustrate the more important points. A large number of striking photographs of industrial materials and bacteria will be of absorbing interest to all.

Contents: Preface. Introduction. Vision—How We See. Light Microscopes. What Is Light? Wave Motion. Wave Theory of Light. Electromagnetic Theory of Light. The Electron. The Dual Theory of Light. The Dual Theory of Electrons. Motion of Electrons in an Electric Field. Electrostatic Electron Mirrors and Lenses. Magnetic Electron Lenses. The History of the Electron Microscope. The Electrostatic Electron Microscope. Applications of Electrostatic Electron Microscope. The Compound Electron Microscope—Magnetic Type. What the Electron Microscope Can Accomplish. Bibliography. Index.

Of Interest to

● **Chemists** ● **Biochemists** ● **Physicists** ● **Physicians**
● **Bacteriologists** ● **Immunologists** ● **Research Directors**

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Memphis Section. Fred L. Dickson, Jr.[1], William F. Schroeder.

Michigan State College Section. John R. Park, Berwyn M. Robinson.

Midland Section. Earle L. Kropscott. Reuben E. Peterson.

Milwaukee Section. Martin A. Kjelson, Elmer H. Koll, Maurice F. Murphy[1], Timothy Joseph O'Connor[1].

Minnesota Section. Gunther Cohn, Myer Fishman[1], Paul Gunberg[1], Kyle H. Leveau, Frank Abel Loewus[1], Richard W. Luecke[1], Minnesota Linseed Oil Paint Co., Neil H. Sherwood, William L. Williams[1].

Montana Section. Arthur Fry[1], Robert D. Thompson[1].

Nashville Section. P. A. Webber.

Nebraska Section. William L. Haney, Jr.

New Haven Section. John S. Yates[1].

New York Section. Raymond E. Bass, Jacob Beller[1], George Belth, Arnett E. Benton, Peter H. Brull, Bart Bucaria, August W. Dege[1], Eleanor Dodge, Albert C. Dornbush, Theodore F. Dunne[1], Irving Ehrenthal[1], Everard A. Elledge, Joe Fellner, Herman Gershon[1], Maximilian Gotham, Adolph Gottfurcht, J. Walter Guyer[1], Clifford E. Herrick, Jr., Frederick Holly[1], Silve Kallmann, Samuel Kasden[1], Walter Kimel[1], Lawrence B. Knudsen[1], Samuel Kohan[1], Henry B. Linford, Hilda Lustig, Otto Lustig, Gordon MacLean, Ernest Mackensie Maxwell, Robert E. Muller[1], Benjamin C. Nesin, Christie J. Photiadis[1], Alfred Reis, Howard B. Richard, Louis T. Rosenberg, Henry M. Salisbury, William C. Scully[1], Ernest M. Seaman, Ernest J. Seewald[1], William H. Shields, Samuel Silberkraus, Edward L. Simons[1], Seymour H. Smiley[1], Ellsworth L. Smith, Robert C. Smith[1], Walter I. Smith, Carl Spatt[1], Howard D. Staley[1], Henry J. Vogel[1], Bernard Weissmann, Myron W. Willard, Jr.[1].

North Carolina Section. American Cyanamid & Chemical Corp., Camillo Artom, Otto Walter Ferrone, Edward J. Hackney[1], Robert B. Hicks[1], Winfred Lamar[1], Clayton Sechler[1], H. P. Vannah.

North Jersey Section. Robert B. Boyd, George Leo Bulger[1], Thomas S. Chambers, Irving H. Cooper, F. Graham Cunningham, Bernard F. Dudenbostel, Jr., Charles W. French, Jr., John P. Grese, Chester C. Kasica[1], N. S. Kuettel, Garfield Miller[1], Henry O. Mottern, W. Eldon Ness, Fred L. Pfeiffer, Bernard Piscopo, Robert C. Reeves[1], Stephen F. Schomody[1], John J. Scibior, John P. Sermattei, Samuel M. Sloat[1], Kenneth R. Snowe[1], W. Hastings Swenarton, C. Enrico Viscione[1], Raymond E. Wiech, Thomas F. Wood.

Northeast Tennessee Section. William M. Gearhart.

Northeastern Section. Domenic L. Bartolomucci[1], Jonathan Stanton Dixon[1], Richard Gordon[1], Robert H. Harper[1], Myer Krulfeld[1], Genevieve McGlinchey, Merville Mitchell[1], Ashley D. Nevers[1], Daniel P. Norman, Robert E. Pardee[1], Ardis Paul[1], Elmer A. Rietzel, Walter Roberts[1], Ben S. Seetoo[1], Samuel Soll[1].

Northwestern Utah Section. Lockwood W. Ferris, James W. Woodhouse.

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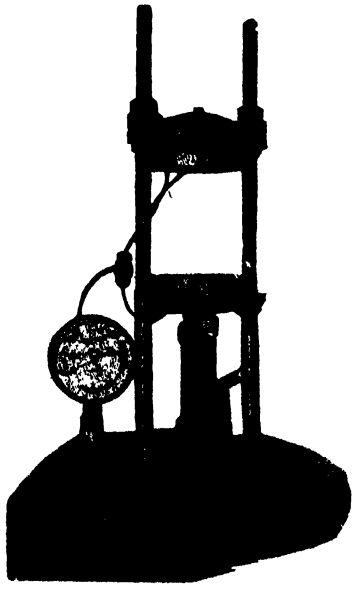
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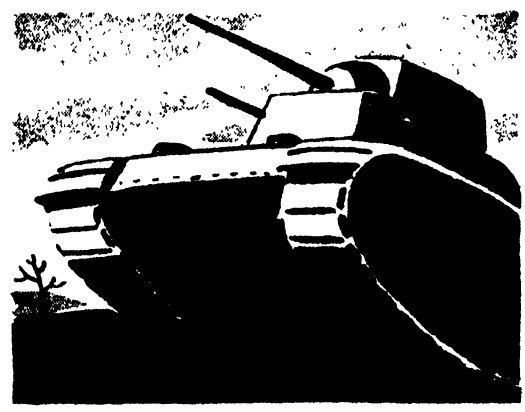
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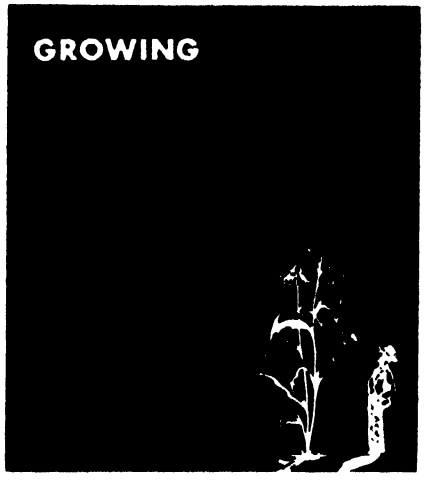
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[1] Junior member.

Registration of Engineers in Massachusetts

THE Board of Registration of Professional Engineers and of Land Surveyors for the Commonwealth of Massachusetts, created by an act of the legislature on October 9, 1941, has been organized and is receiving applications for registration. Forms may be obtained from the Division of Registration, 413 State House, Boston, Mass.

The board consists of Ralph F. Gow, (mechanical engineering), chairman; Gustavus J. Esselen (chemical engineering), vice chairman; Holcombe J. Brown (mining and metallurgy); Karl B. McEachron (electrical engineering); and Albert Haertlein (civil engineering), secretary.

Reclamation of Commercial Solvents

THE Industrial Salvage Section, Bureau of Industrial Conservation, War Production Board, Room 2605, Social Security Building, Washington, D. C., requires a list of all companies and parties engaged in the salvage and reclamation of commercial solvents. Although companies that reclaim commercial solvents for themselves and others are known, the list is incomplete and it is in the interests of national defense that the board be assisted in completing this information.

If our readers know of companies capable of reclamation of commercial solvents over and above their present capacity, such data would be valuable and a definite contribution to the conservation program of the War Production Board. Letters should be addressed to the attention of E. F. Mulligan.



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Hidden rocks and reefs are dangerous . . . so are little grains of sand. That is why the Maritime Machinery (especially Naval) is guarded against stranding . . . fuel and lubricating oils are clarified centrifugally . . . the Sharples way. ¶ The Chemical Process Industries are avoiding needless large manufacturing inventories . . . taking less time for production . . . and turning out a better product . . . by effecting separation and clarification centrifugally . . . the Sharples way.

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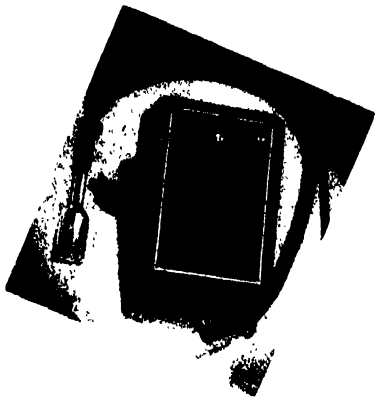
Use the RC Conductivity Bridge (shown above) for

- **Conductometric titration**
- **Routine analyses**
- **Determination of concentration of turbid liquids, etc.**
- **Conductance measurements of organic liquids, using special high-resistance model measuring up to 25,000,000 ohms specific resistance.**

In the PLANT. . . . .

Use the correct model Solu-Bridge and conductivity cell (shown below) for checking

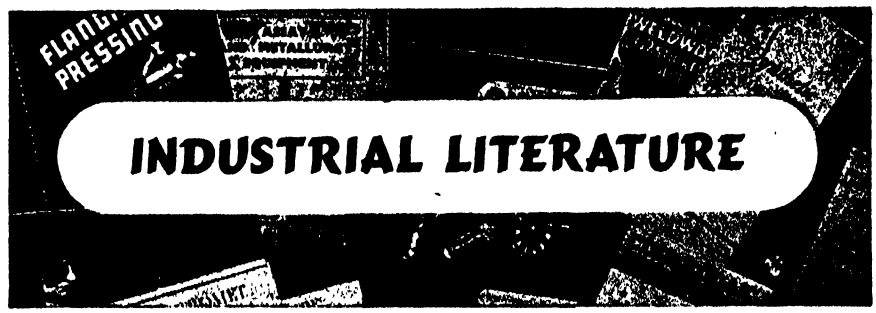
- **Purity of distilled water**
- **Condensate for contamination**
- **Completeness of filter press and centrifuge rinsing**
- **Strength of caustic or alkali in degreasing baths**
- **Acid strength of pickling baths**
- **End point of process reaction**
- **Exhaustion of caustic solution in air scrubbing towers**
- **Dissolved solids in boiler water.**
- **Etc.**



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Our files contain data on many specific applications not listed here. Prompt engineering advice will follow an inquiry submitting a definite control problem.

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Listed publications should be requested directly from the company concerned. Use business stationery, mention bulletin numbers, and refer to this journal. Publications will be sent free unless otherwise noted.

Acid Pumps. A centrifugal pump in which all wetted parts are made of plastic is described in this 4-page bulletin. Another feature of this pump is that it contains no stuffing box. Included is a list of solutions which may be safely handled. *Bulletin E-4320 CEN.* A. R. WILFLEY & SONS, INC., Box 2330, Denver, Colo.

Carbon, Graphite, and Metal-Graphite Brushes are illustrated in a 24-page bulletin. The catalog contains base prices of standard sizes of brushes and gives a simple method for computing prices for each style. *Catalog K-15 CEN.* KEYSTONE CARBON CO., INC., 1935 State St., Saint Marys, Penna.

Carburizers. A 24-page booklet describes the construction and operation of steel carburizing equipment. Effects on steel for various lengths of carburizing treatment are shown in a series of photomicrographs. *Bulletin HD-142 CEN.* HEVI DUTY ELECTRIC CO., Milwaukee, Wis.

Centrifugal Pumps. A 36-page bulletin describes a line of single-stage pumps in which the housing for the motor and pump are cast in a single unit. Compactness and certainty of alignment are a few of the features listed. Capacities range from 10 to 2,750 gallons per minute. *Bulletin B6018-B CEN.* ALLIS-CHALMERS, Milwaukee, Wis.

Centrifugal Pumps. This 12-page bulletin covers single-stage, split case, centrifugal pumps which are suitable for a wide variety of pumping applications. *Bulletin D-70 CEN.* LAWRENCE PUMP AND ENGINE CO., Lawrence, Mass.

Compounding Rubber with Spheron Carbon Black. This 24-page booklet reports on the resistance to abrasion and flexing determined on several tread-type rubber stocks. Different test stocks were made by varying grade and content of Spheron and amount of whole-tire reclaimed rubber. Formulas tested are given. Results are expressed by means of bar charts and photographs of samples. *Spheron in Reclaim Tread Stocks Booklet CEN.* GODFREY L. CABOT, INC., Boston, Mass.

Compressors. A 28-page bulletin describes horizontal, duplex, motor-driven compressors which are available in sizes ranging from 75 to 3,000 hp. *Bulletin L-675-B1 CEN.* WORTHINGTON PUMP AND MACHINERY CORP., Harrison, N. J.

Demineralized Water. This one-page folder details the water-demineralizing process which in the first step replaces the metallic ions (forming acids) and in the second step absorbs the acids. The product obtained approaches distilled water in quality at a cost said to be only a fraction of the cost of distilling. *Permutit Process for Demineralizing Water Booklet CEN.* PERMUTIT CO., 330 West 42nd St., New York, N. Y.

Die Casting. This 28-page illustrated booklet on die casting discusses possible savings in metal, machines, and manpower that may result when die casting is used in place of other methods. *Doehler Die Castings Bulletin CEN.* DOEHLER DIE CASTING CO., 386 Fourth Ave., New York, N. Y.

Dust Collectors. Filtration-type dust collectors and their applications are described in a 54-page illustrated booklet. An entire section is devoted to engineering data. *Catalog 72 CEN.* AMERICAN FOUNDRY EQUIPMENT CO., 615 South Byrkit St., Mishawaka, Ind.

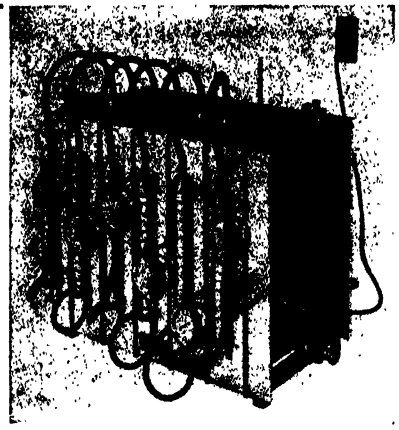
Emulsifying and Dispersing Machinery. A colloid mill and a homogenizer designed for pilot-plant or laboratory use are described in a 12-page bulletin. *Bulletin 32C CEN.* MANTON-GAULIN MFG. CO., INC., 7 Charlton St., Everett, Mass.

Gas and Oil Burners. Burners designed to utilize both oil and gas, employing steam or mechanical atomizers, are described in a 4-page folder. *Bulletin 203 CEN.* PEABODY ENGINEERING CORP., 580 Fifth Ave., New York, N. Y.

High-Pressure Reaction Kettles. A standardized line of high-pressure, glass-lined reaction kettles is the subject of a 12-page bulletin. These kettles are available to withstand an internal pressure as high as 125 pounds and a jacket pressure of 90 pounds. Capacities range from 350 to 2,000 gallons. A special feature is the tripod drive mount, which permits easier access to the agitator stuffing box. *Bulletin 810 CEN.* PFAUDLER CO., Rochester, N. Y.

Humidifying Unit. An industrial unit designed to humidify, clean, and heat air is described in a single-page folder. These units are said to be particularly adapted to maintaining high humidities in textile mills, paper and printing plants, or chemical storage buildings. *Folder 43G-1 CEN.* CARRIER CORP., Syracuse, N. Y.

CONTINUED ON PAGE 558



For Determining

THIAMINE (VITAMIN B_1)

by the Yeast Fermentation Method

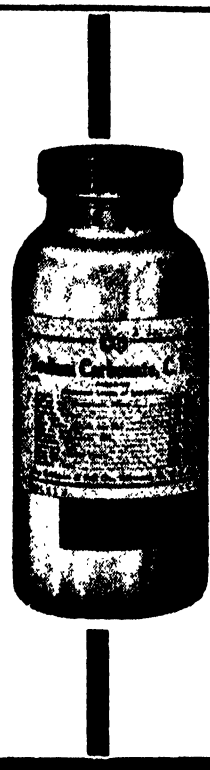
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★ A great time saver over other methods of thiamine determination. Complete tests are made in 3 hours by persons who need not have technical knowledge.
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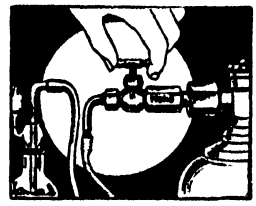


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It selectively adsorbs 4 to 20% of its weight in water, depending upon the particular application, and is regenerated by heating to 300–350°F. FLORITE is hard, stable, non-corrosive, non-poisonous, and is available in a variety of particle size classifications.

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Industrial Literature

CONTINUED FROM PAGE 556

Hydrocarbons. This 64-page booklet serves as a reference manual and catalog for the 39 hydrocarbons being produced on a commercial scale by this refinery. Physical properties, uses, formulas, and shipping information are given. The hydrocarbons are available in pure, technical, and commercial grades. *Bulletin 96 CEN.* PHILLIPS PETROLEUM CO., Bartlesville, Okla.

Microfilm Reader. A 4-page folder discusses the use of microfilm and describes a viewing unit. *Folder K97 CEN.* SPENCER LENS CO., Buffalo, N. Y.

Paper Stock Pumps. This 6-page illustrated folder describes single-stage centrifugal pumps particularly adapted for handling paper mill stock. *Bulletin 234 CEN.* WARREN STEAM PUMP CO., INC., Warren, Mass.

Portable Crane. A 6-page bulletin covers a crane mounted on a special truck chasis. The boom can be folded and laid alongside the truck cab, and the machine drives under its own power. *Folder 1928 CEN.* LINK-BELT SPEEDER CORP., 301 West Pershing Road, Chicago, Ill.

Pressure Recorders. This 32-page catalog is a treatise on pressure recording instruments. Instrument mechanisms, charts, and accessories are shown in an extensive series of illustrations. *Catalog 22A CEN.* FOXBORO CO., Foxboro, Mass.

Quenching Oil Cooling Systems. Four systems for the removal of heat from quenching oil are discussed in this 4-page bulletin, which is illustrated with flow diagrams. Cooling is accomplished through the use of cooling water, by evaporative cooling and recirculation of water, by mechanical refrigeration, or by a combination of these systems. *Bulletin S363 CEN.* TRANE CO., LaCrosse, Wis.

Rubber Reclaiming Machinery. An 8-page catalog is devoted to crushing, cutting, grinding, sifting, and conveying equipment used for reclaiming rubber. *Catalog 37-A CEN.* ROBINSON MFG. CO., Muncy, Penna.

Tabletting Machinery. This 48-page catalog discusses the tabletting of fine chemicals, pharmaceuticals, powdered metals, etc. Such features as reduction of bulk of chemical products and increase of efficiency of catalysts by tabletting are discussed. A complete line of tabletting machinery is described. *Catalog 41-T CEN.* F. J. STOKES MACHINE CO., Philadelphia, Penna.

Thermindex Colors. A pamphlet illustrated in color and accompanying text give data on use of Thermindex colors. They are said to be the basis of a new method of temperature measurement, giving a picture of temperature distribution over a heated surface instead of at any specific point. The most important application cited is in actual production on metal subjected to heat treatment or for which preheating is necessary. *Thermindex Temperature Indicating Colours Pamphlet CEN.* J. M. STEEL & CO., LTD., 36–38 Kingsway, London, W. C. 2, England.

Two-Stage Centrifugal Pumps of class GT are illustrated in a 12-page, 2-color bulletin. This bulletin contains 28 photographs and cross-sectional views, performance tables, and a comprehensive tabulation showing friction of water in various sizes of pipe. The text describes structural details and cites applications. *Form 7167 CEN.* INGERSOLL-RAND CO., 11 Broadway, New York, N. Y.

Water Testing. Boiler water test sets, conductivity apparatus, and proportioning pumps are described in a 20-page booklet. Methods of use for the test sets are given. *Water Testing Bulletin CEN.* BIRD-ARCHER CO., 400 Madison Ave., New York, N. Y.

Quick-Hardening Iron Cement

A NEW product has been developed by Smooth-On Manufacturing Co., 570 Communipaw Ave., Jersey City, N. J., for patching cracks, ruts, and shallow holes in concrete floors. This product, known as Smooth-On 7B quick patch cement, adheres firmly to surfaces with which it is in contact. Like other Smooth-On cements, the composition has an iron base, so that it is extremely wear-resistant as well as dustproof, oilproof, and waterproof. Patches of Smooth-On 7B harden overnight and become stronger with age.

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Cement clinker
Mineral and ores
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Bauxite
Fullers earth
Glass cullet
Sand
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Read the list again . . perhaps there is a material you want conveyed at an automatically-controlled rate through various processing zones . . to be dried or cooled on the way. Jeffrey-Traylor cooling and drying systems employ high-frequency vibration under absolute control . . handle friable, gaseous or pure materials without contamination, breakage or loss of color or lustre—direct and indirect types. Investigate Jeffrey-Traylor closely-controlled methods of drying and cooling. Do it today.

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New protection for hemophiliacs against danger of excessive bleeding and effective help for physicians, surgeons, and dentists in staunching the flow of blood from small wounds is provided by a new, powerful agent for clotting blood announced by Lederle Laboratories, Inc., 30 Rockefeller Plaza, New York.

The new material, clotting globulin, is the natural clotting constituent of blood separated in highly concentrated form from clear blood plasma.

Many persons bleed excessively from minor wounds because their blood contains too little of the clotting principle (prothrombin). This condition may be inherited and permanent (hemophilia) or it may be temporary, the result of the ravages of disease or other causes. No satisfactory method has been known before to control bleeding in persons thus afflicted and even pulling their teeth has involved serious hazard to their lives.

The new clotting globulin supplies the important constituent in which the blood of "bleeders" is deficient and places in the hands of the medical and dental professions an effective means for stopping the flow of blood from minor wounds in a few seconds. The procedure is simple. A few drops of a solution of clotting globulin are applied to the surface of the wound, either by spraying or on sterile absorbent cotton or gauze, followed by gentle pressure. By making up the deficiency of the patient's blood, this treatment causes it to clot in the capillary blood vessels within a few seconds. The method is not effective against bleeding from veins or arteries—this requires surgical treatment—but it has been shown at Boston City Hospital and elsewhere to stop bleeding from minor wounds quickly.

Clotting globulin was first isolated from clear blood plasma by I. A. Parfentjev, Department of Biological Research of Lederle Laboratories, Pearl River, N. Y. Dr. Parfentjev added ammonium sulfate solution to blood plasma and thus obtained a precipitate. When separated by filtration from the remaining plasma and dissolved in a solution of sodium chloride, this product possesses extraordinary power to hasten the clotting of blood even when anticoagulants have been added to it. Subsequent laboratory and clinical tests by others confirm the effectiveness and high potency of Dr. Parfentjev's preparation which is now available for general use by the medical and dental professions as Clotting Globulin Lederle.

Clotting globulin possesses true thrombic activity in coagulating the fibrinogen of the blood. It acts by supplementing the prothrombin naturally present. Clotting globulin can only be used locally and under the supervision of a doctor or dentist. Its effect is solely to coagulate the blood at the point of application, and it does not remove danger of excessive bleeding from other wounds.

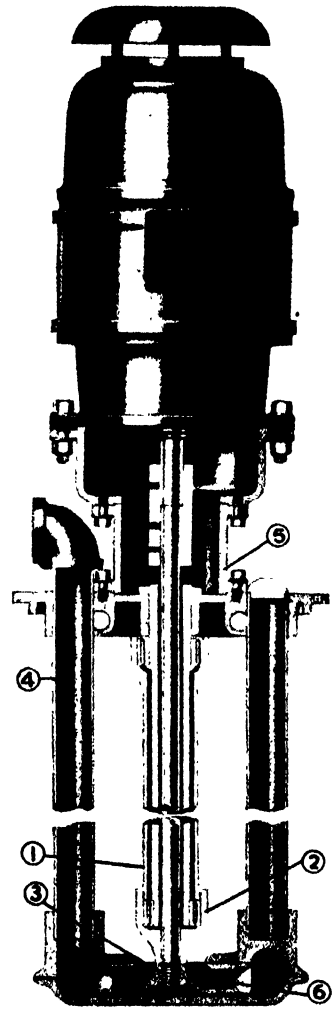
The things that give trouble were *"included out"* in designing this pump

Over the last 30 years Amsco has built a lot of pumps—more than half of those used for sand and gravel production; pumps for ash handling in power plants; ore and tailings movement in metal mines; and for contractors: services that are very abusive and which demand the ultimate in design and construction materials. Therefore, many of the operating problems that might arise are well known to us.

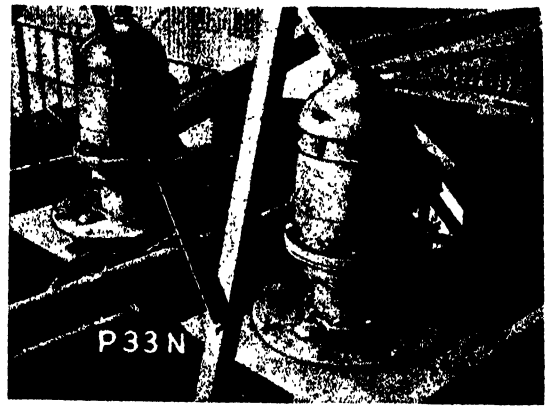
In designing the recently developed line of Amsco-Nagle Industrial Pumps, our engineers eliminated the causes of frequent replacements, high maintenance costs and inefficient operation. The result is a line of pumps that copes with the most abusive conditions.

The Amsco-Nagle Type "QW" Wet Pit Pump shown exemplifies the sound engineering thinking that went into the design of the complete line of vertical and horizontal pumps.

Identified are six design features that eliminate troubles common to pumps of this type: (1) no submerged bearings to abrade, corrode or present lubrication problems; (2) no stuffing box to require packing; (3) inverted inlet eliminates gas binding and makes use of hydraulic thrust to counterbalance the weight of the revolving parts; (4) use of discharge pipe as a structural member reduces weight; increases rigidity; (5) lubrication from above floor plate; (6) impellers — shrouded or open—screwed on.



Two 3", Frame 14, Type "QW" Pumps with 15 h.p. 1200 r.p.m. motors, are shown (P33N), giving excellent service in air washing system handling sludge composed of highly abrasive foundry sand, dust and water at the rate of 400 g.p.m. against a 100' total dynamic head. Amsco-Nagle Pumps are available in standard sizes from 4" to 12", in capacities up to 7,000 g.p.m. for heads up to 200' with water ends of a wide choice of abrasion and corrosion resistant materials. Bulletin 910 describes cost-cutting features throughout the line.



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OF THE AMERICAN BRAKE SHOE & FOUNDRY CO.
Chicago Heights, Illinois

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Welding Materials for reclamation and hard surfacing

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Rust Protection

To find how oxygen combines with metals and how fast, Earl A. Gulbransen, Westinghouse Research Laboratories, Pittsburgh, is weighing oxide films, or rust, with a machine so sensitive it measures in weight units of 10 billionths of an ounce. Through this research, Dr. Gulbransen is seeking new ways to protect steels and other metals against the destructive action of oxygen in the air.

The special machine devised for this study is sealed in a glass tube to take measurements on pieces of metals half the size of a razor blade. Movements of the balance's pointer, so minute they can be observed only through a microscope, reveal the weight added to a tiny sample of steel by a single layer of oxygen atoms. One layer of atoms is about 10 billionths of an inch thick.

The balance, about 6 inches long and 1 inch square, is enclosed in one arm of a glass tube the shape of a cross 3 feet tall and 2 feet wide. The moving arm of the balance is a piece of quartz 6 inches long and $^1/_{16}$ inch in diameter. It is supported in the middle like a see-saw by a fine piece of tungsten wire which is stretched across a framework made of quartz. Quartz is used because it has less expansion than other substances when heated.

From one end of the moving beam the sample piece of steel is suspended on a 2-foot piece of tungsten wire inside the vertical part of the glass tube. A counterweight, with the same weight as the sample, is hung on the other end of the beam.



Dr. Gulbransen reads the weight of oxygen atoms with a microscope

99.8 Per Cent Pure Sponge Chromium Metal Produced

A form of sponge or powdered chromium metal that under certain conditions attains a purity of 99.8 per cent, higher than any chromium used in present commercial manufacturing, has been produced from both low- and high-grade domestic chromite ores through a process developed by metallurgists of the U. S. Bureau of Mines. Its high purity and powdered form render it valuable in manufacture of special steels, brass and bronze materials, and alloys subjected to high temperatures, such as electrical heating elements.

Successfully carried through the laboratory stage to a point where pilot-plant tests are justifiable, the new reduction process may permit utilization of a large amount of America's "off-grade" chromite ores at costs comparable to existing prices of low-carbon ferrochrome. Its future will depend chiefly upon the availability and cost of chlorine, the chemical used extensively in producing this new metallurgical material.

Low-temperature reduction without sintering is the basis of the process which consists of chlorination of chromite ores at elevated temperature, sublimation and separation of volatile chlorides, and reduction of chromium to metal by hydrogen. Sponge chromium of at least 99 per cent purity may be produced and, if specially purified chloride is used, the product may reach 99.8 per cent purity.

Methods and formulas are detailed in "Sponge Chromium" by C. G. Maier, 109-page technical bulletin 436, soon to be published. Copies will be sold at 20 cents each by the Superintendent of Documents, Government Printing Office, Washington, D. C.

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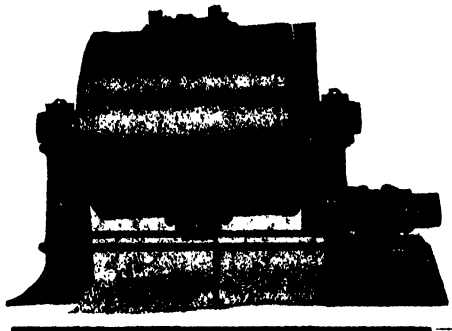
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Fatigue of Metals. Some Facts for the Designing Engineer. *D. Landau.* 45 pages. Paper cover. The Nitroalloy Corp., 230 Park Ave., New York, N.Y., 1941. Privately distributed.

THIS little booklet attempts to present to the designing engineer a brief résumé of the various factors concerned in the failure of metals owing to fatigue and the advantages to be obtained through the use of nitrided Nitroalloy steels.

The booklet is interesting reading, even for engineers not at the moment designing or implicated in the ever-recurring problem of metal failure. Landau begins with a general statement of the reasons and theory of fatigue failure, touches briefly on methods of data presentation and the trouble introduced by "stress-raisers" in metal specimens. The protection offered by the nitriding process is well explained, and many data are presented on corrosion protection and increase of fatigue limit of notched nitrided steels under the rotating beam test. There is a good discussion on overstress and, although nothing radically new is given in this booklet, it provides a fairly reasonable picture of the work being done in this field and is well worth the time necessary to read it.

The Principles and Practice of Beauty Culture. *Florence E. Wall.* 708 pages. Keystone Publications, 1659 Broadway, New York, N. Y., 1941. Price, $6.00.

THE introduction to this work contains the following paragraph:

> This book is the result of a serious attempt to draw from all the related branches of art and science whatever threads of knowledge constitute a requirement for, or a contribution to, beauty culture, and weave them all into the fabric of a new study, worthy of consideration on its own merits. It represents the accumulated findings of 16 years of research and practical experience in all phases of the vast business and industry of beauty culture.

The author has presented all this in a most comprehensive manner. Within the confines of 679 pages of text, there is set forth in logical sequence a vast amount of information on human physiology and the significance of cosmetology to every phase of the subject. The beautification of the person is not alone the application of creams, powders, deodorant, lipstick, nail polishes, etc., but the manipulative treatment of muscles, nerves, skin, as well as proper attention to the hair. To neglect any one phase is like building a house without a tight roof or with leaky walls or improper foundation.

Twenty chapters, covering the main subject matter, follow this theme note; for instance, the nervous system is fully described and illustrated and in its proper place there is set forth the relation of massage to that important function of the physiological picture. In like manner, the functions of the muscles are discussed, the structure of the skin and hair, and the importance of the glandular processes appertaining to each. With all this as a foundation, it is a natural step to personal hygiene and the use of external procedures by hand and machine, facilitated by cosmetics applicable to the particular operation in progress.

By such means the author emphasizes what should be done to effect the proper attractiveness of the individual who seeks the art of the beautician. This is well illustrated in a chapter on hair make-up, where the right and wrong styles of coiffure are shown on features of different types.

Space is devoted to the chemistry and properties of various articles employed in the modern beauty salon and home dressing table. Manicuring is featured in detail, and the treatment of the hands and feet given due attention. About one fourth of the text is given over to detailed data on treating the scalp and hair by various types of waves as well as methods in vogue for bleaching and dying.

There is a chapter on shop management with an appendix on first-aid treatment in case of accident, and another chapter outlines the technique of advertising and selling cosmetics. There is a comprehensive bibliography and a good index.

One of the merits of this work is the simplicity of its style. It is devoid of unusual medical and bacterial terms, and can be read and comprehended even by one whose education may not have gone beyond high school.

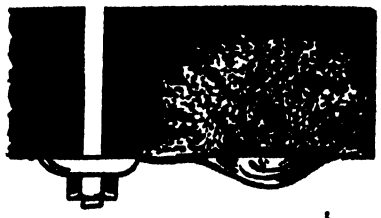
As a guide to the instructor and a textbook for the student, it should have a place in educational fields directly or incidentally concerned with cosmetics and beauty culture. A brief history at the beginning should be found of interest to anyone whether student or general reader. From it we find that many of the arts practiced today with elaborate equipment and "unusual" chemical compositions are only adaptations of the methods employed, somewhat arduously perhaps, many centuries ago, but the success of which is attested in the masterpieces of sculpture, fresco, and painting that have withstood the test of time, weather, war, and pestilence through the ages.

H. C. FULLER

Tables of Numerical Data

ANNUAL TABLES OF PHYSICAL CONSTANTS, intended to bring out periodically numerical data of recent and current years on physicochemical properties of substances and materials and characteristics of physicochemical processes, have started publication in the United States, under the American Committee on Annual Tables appointed by the National Research Council and sponsored by a promoting board composed of leading personalities in science and industry. The issue for 1941, which is now appearing, is being supplied in installments of 32 pages on loose sheets printed by photo-offset. Its delivery is expected to be completed soon. The issue for 1942, in preparation, will be available in the second half of this year. The 1941 installments now appearing include sections dealing with current properties of selected pure organic compounds, such as freezing-melting temperatures, boiling temperatures, densities, viscosities, surface tensions, vapor pressures, specific heats, refractive indexes, and dispersion. They cover the 15 years' period from 1926 to 1940. Several other topics, to cover also inorganic substances, materials and systems, are scheduled for publication in the 1942 issue.

The general plan of the undertaking, which continues both the former European series of Annual Tables and the International Critical Tables and is to supplement the latter, includes both tables by properties and, at a somewhat later stage, a card-file by substances. Annual Tables are a unique tabular work of constants and should prove to be a very helpful auxiliary tool of research. In realization of the need for up-to-date tables of numerical data, many members of staffs in universities, colleges, and research laboratories have volunteered to contribute, within the limits of their possibilities, to the task of assembling and editing data pertaining to their respective fields of work and interest. Leading industrial corporations have consented to provide financial support and thus have once more shown them-



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selves alert to the needs of scientific development and promotion of research. Thanks to these contributions, the price can be kept relatively low, despite the considerable amount of work involved in the search of the original literature, the critical editing, and the set-up of the tables. The charge is $1.00 per 100 pages, plus postage. The total of one year's installments is expected not to exceed 1,000 pages ($10.00). Subscription is not payable in advance, but is to be billed with the last installment of the year's issue.

Full information, including the general plan, the guide (giving in 24 pages the detailed scope of the work) and, as a sample on approval, the installments so far published of the 1941 issue, may be had upon request, without commitment to subscribe, and with the sole request for the courtesy of return in case of nonacceptance, from the office of Annual Tables, Frick Chemical Laboratory, Princeton, N. J.

Asbestos Dust

SAFE PRACTICE BULLETIN No. 93, entitled "Exhausting Asbestos Fiber and Dust in Wire Insulation Manufacture", has been issued by the Department of Labor and Industry, Commonwealth of Pennsylvania, Harrisburg. The illustrated bulletin, by Fred R. Kaimer, General Electric Co., York, Penna., will be distributed free of charge to safety engineers and industrial physicians upon request.

Journal of Physical Chemistry for April

THE *Journal of Physical Chemistry* for April contains the following articles in addition to reviews of new books:

J. D. KURBATOV AND M. H. KURBATOV. Isolation of Radioactive Yttrium and Some of Its Properties in Minute Concentrations.

I. M. KOLTHOFF AND F. T. EGGERTSEN. Studies on Aging and Coprecipitation. XXXV. Aging of Lead Chromate in the Colloidal State. Thermal Aging.

REUBEN JOSEPH GRIM. Catalytic Activity of an Intermetallic Compound of Cadmium and Copper in the Vapor-Phase Reduction of Nitrobenzene.

JOHN T. PINKSTON AND H. T. BRISCOE. Conductometric Titrations in Nonaqueous Solutions.

H. A. BERNHARDT AND H. D. CROCKFORD. The Determination of the Entropy of the Chloride Ion.

THERALD MOELLER AND PHILLIP W. RHYMER. Some Observations upon the Precipitation of Hydrous Cadmium Hydroxide in the Presence of Certain Anions.

GEORGE ANTONOFF, MILTON CHANIN, AND MORRIS HECHT. Discontinuities in Properties of Liquid Systems.

GEORGE ANTONOFF, MILTON CHANIN, AND MORRIS HECHT. Equilibria in Partially Miscible Liquids.

GEORGE ANTONOFF. On the Validity of Antonoff's Rule.

LOUIS A. REBER, WALLACE W. MCNABB, AND WALTER W. LUCASSE. The Effect of Salts on the Mutual Miscibility of Normal Butyl Alcohol and Water.

FRED HAZEL. The Effect of Small Concentrations of Hexametaphosphate on Iron Oxide Surfaces.

WORDEN WARING. Liquid-Vapor Composition of the Boiling Ternary Solution Ethyl Alcohol–Glycerol–Benzene.

Determining Steam Purity by Conductivity Methods

THE technical papers and discussions comprising a Symposium on Problems and Practice in Determining Steam Purity by Conductivity Methods, which were presented at the 44th annual meeting of the American Society for Testing Materials in Chicago, June 26, 1941, have now been reprinted from the *Proceeding of the American Society for Testing Materials* as a separate. This symposium represents the work of A. S. T. M. Committee D-19 on Water for Industrial Uses. The papers of the symposium follow an introduction by R. E. Hall and discuss The Sampling of Steam and Boiler Water, Experimental Methods for Determining Conductivity Corrections for Dissolved Gases in Steam Condensate, Calculation of Corrections to Conductivity Measurements for Dissolved Gases, The Degasification of Steam Samples for Conductivity Tests, A New Type of Conductivity Apparatus for Use with Boiler Waters and Steam Samples, and Conductivity Cells and Electrical Measuring Instruments. A combined bibliography on steam purity, including some 75 important references, concludes the book.

A copy of the publication in heavy paper binding may be obtained from the American Society for Testing Materials, 260 South Broad St., Philadelphia, Penna., at 60 cents a copy.

Directory of Corrosion-Preventive Technologists

THE American Coordinating Committee on Corrosion is contemplating revision of its confidential directory of technologists actively engaged in studies on corrosion and its prevention. The committee comprises delegates from 17 major technical societies together with representatives from the principal industrial research institutes and the National Bureau of Standards. Its directory currently lists some 400 investigators in a diversity of corrosion-preventive fields selected on the basis of questionnaires circulated to the membership of the committee's member societies. While it is felt that the directory list is quite complete, there are undoubtedly individuals who were not reached in the original circularisation. Accordingly, the committee now requests all persons actively engaged in corrosion

researches who have not been contacted to write the secretary, G. H. Young, 4400 Fifth Ave., Pittsburgh, Penna., for further details and application forms for directory listing.

Specifications

TESTING in Modern Industry", featuring conversion tables and specification standards for textiles, chemicals, metals, and other materials, has been published by the United States Testing Co., Inc., Hoboken, N. J. The 105-page book is being distributed to the company's clients. The first book of tables was issued some 40 years ago and has since been revised many times.

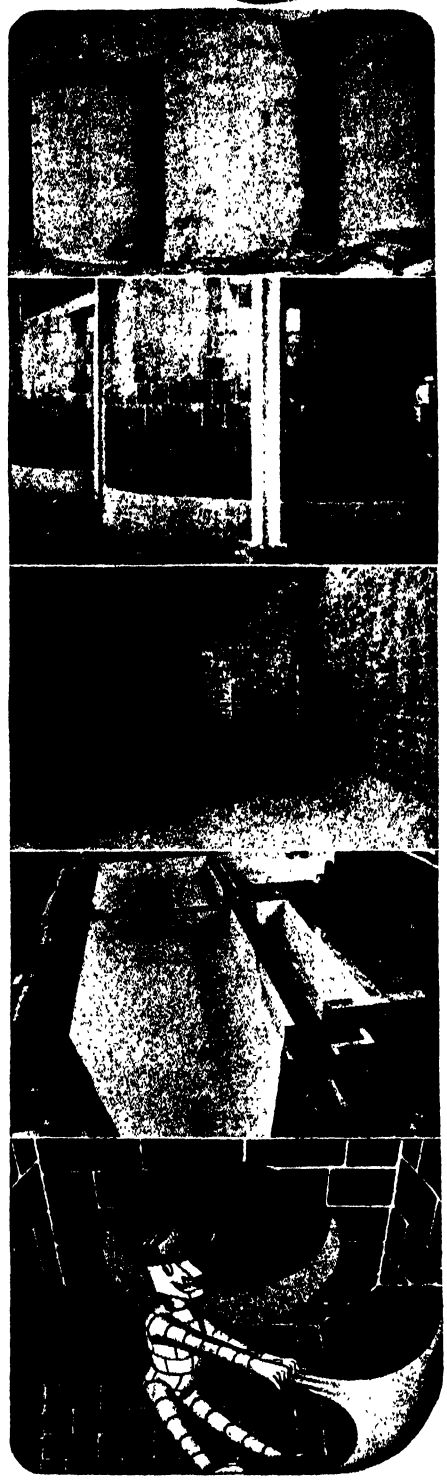
Oil Industry to Study Speeding Butyl Rubber Production

TO SPEED the Government's synthetic rubber program, W. S. Farish, president of Standard Oil Co. (New Jersey), at a meeting of the Petroleum Industry War Council requested appointment of a committee representing the entire oil industry to study the problem of butyl rubber in cooperation with the Petroleum Coordinator. The committee, to be appointed at once, will make recommendations on the best methods for promoting the manufacture of butyl and for utilizing it—with other synthetic rubbers—to the greatest possible extent in the present rubber shortage. The committee was empowered to act without reporting back to the council.

The Government's present 700,000 ton synthetic rubber program, announced by Jesse Jones, Secretary of Commerce, includes 60,000 tons annually of butyl, to be made by Standard. The first butyl output should be ready in November and will come from the $4,500,000 plant at Baton Rouge, La., on which Standard began construction with its own money in August 1941. Partly as the result of the consent decree which it accepted last month and partly as the result of voluntary action by Standard Oil Co. (New Jersey), producers of butyl will be licensed to use these patents royalty-free during the war and under reasonable royalties, to be fixed by the Government, after the war.

Butyl rubber, a development of the Esso Laboratories, is the lowest cost synthetic rubber so far produced. Tire companies who have done the chief experimenting with it say they can make butyl tires capable of running 10,000 miles at speeds up to 35 miles an hour. It is more capable than natural rubber of retaining air under pressure, so that it should produce superior inner tubes when present difficulties of commercial manufacture have been overcome. Components of butyl rubber are taken entirely from the petroleum industry.

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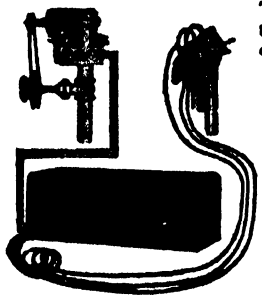
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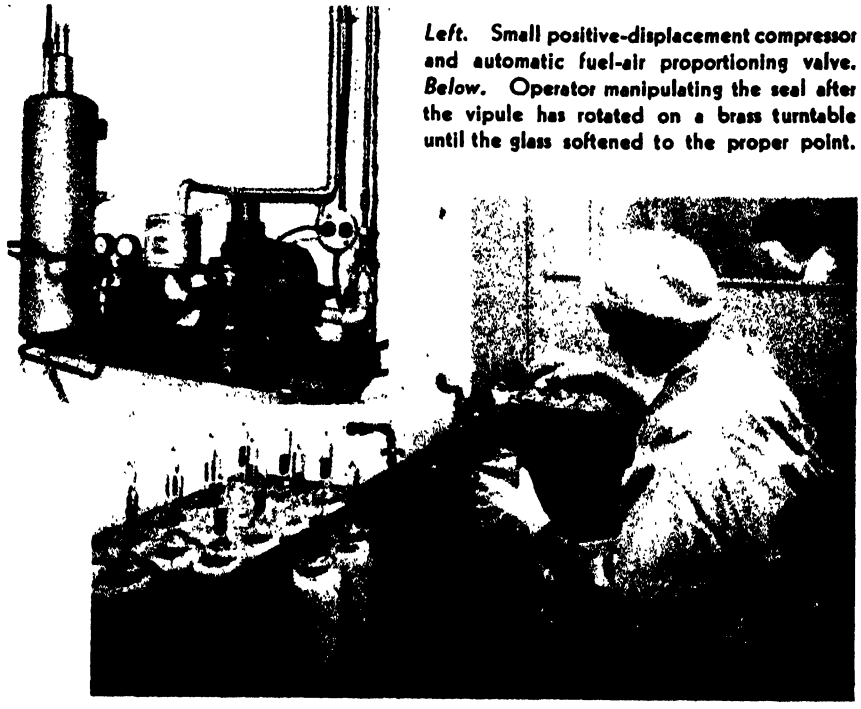
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Nitrogen
Nitrous Oxide
Oxygen
Phosgene
Propane
Propylene
Sulphur Dioxide
Trimethylamine

Normal Human Plasma for War Needs Sealed at High Rates

A NEW enterprise is drying blood plasma, sealing it in an evacuated "vipule" (glass flask stoppered like a vial and sealed like an ampoule), and packing it with another vipule of sterile water, a hypodermic needle, and other necessities for emergency use in war zones to promote healing where blood loss has been excessive. The Reichel Laboratories, Kimberton, Penna., have cooperated with the American Red Cross to prepare donated blood for the Allied armed forces.

The Reichel Laboratories use bottled propane for fuel, and to get consistently proper glass-working flames under pressure for fast sealing was found to be difficult by ordinary fuel-handling means. Accordingly, a small positive-displacement compressor and automatic fuel-air proportioning valve was installed. This unit, a Type J Selas combustion controller, reduces the propane to atmospheric pressure and intermixes it with the filtered air required for combustion, in constant ratio irrespective of variations in fuel pressure, rates of demand, or atmospheric conditions. It delivers the resultant carbureted fuel to refractory-tip jets, at a constant pressure of about 1.5 pounds per square inch. As a result, evacuated vipules of plasma (after centrifuging, pooling, freezing, and drying *in vacuo*) are now conveniently sealed at a rate of between 3 and 4 per minute per operator.

The vipule rotates on a small brass turntable until the glass has softened to the proper point, at which time the operator manipulates the seal.



Left. Small positive-displacement compressor and automatic fuel-air proportioning valve. *Below.* Operator manipulating the seal after the vipule has rotated on a brass turntable until the glass softened to the proper point.

Patents Granted

CELANESE CORP. of America has been granted two patents—2,278,537 relating to the manufacture of ketene and acetic anhydride and 2,278,540 relating to titanium oxide pigments.

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Boiling Range	79–82° C
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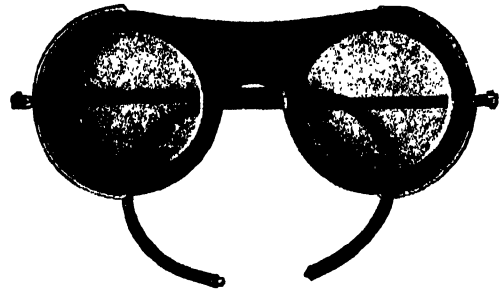
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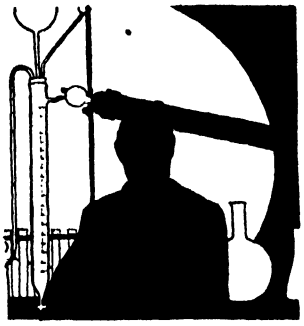
Years of use have shown the Parr Glass Blowers Goggles to be a dependable safeguard for eyesight in many applications. They effectively reduce the sodium glare which is present in various heating operations such as brazing, silver-soldering, cyanide case-hardening and, of course, glass blowing.

Although these goggles act as a barrier for sodium light, actually they are quite transparent and will allow the free passage of 41 per cent of ordinary daylight. As a result the wearer does not have to remove the goggles in order to see in detail objects other than the heated work, such as blueprints, instruction sheets and tools.

In the interests of better sight and better apparatus every laboratory should possess at least one pair of these goggles.

Write for Bulletin E-59 for details.

PARR INSTRUMENT COMPANY · Moline, Ill.







A Partial List of Harshaw Metallic Salts ▶

Aluminum Chloride
Aluminum Nitrate
Cadmium Acetate
Cadmium Chloride
Cadmium Sulphate
Chromium Acetate
Chromium Carbonate
Chromium Chloride
Chromium Fluoride
Chromium Formate
Chromium Nitrate
Chromium Sulphate
Cobalt Acetate
Cobalt Carbonate
Cobalt Chloride
Cobalt Formate
Cobalt Nitrate
Cobalt Phosphate
Cobalt Sulphate
Copper Acetate
Copper Carbonate
Copper Chloride
Copper Nitrate
Copper Phosphate
Copper Sulphate
Magnesium Nitrate
Manganese Acetate
Manganese Carbonate
Manganese Chloride
Manganese Phosphate
Manganese Sulphate
Nickel Acetate
Nickel Carbonate
Nickel Chloride
Nickel Fluoride
Nickel Formate
Nickel Nitrate
Nickel Sulphate
Silver Chloride
Silver Cyanide
Silver Nitrate
Stannous Chloride
Stannous Sulphate
Zinc Acetate

HARSHAW METALLIC SALTS
For Research, Pilot Plants or Commercial Production

If your process calls for a metallic salt, standardize on Harshaw materials for research, pilot plant, and commercial production. Harshaw chemicals are available in any quantity, a pound or a car load. Various grades and strengths are produced to meet the requirements of different industries. Laboratory control keeps quality uniform and dependable. Whatever your requirements, contact.....

THE HARSHAW CHEMICAL COMPANY

Cleveland, Ohio, and Principal Cities

Junior Chemists Needed in C. S. Positions

THE United States Civil Service Commission is seeking junior chemists at $2,000 a year. No written test is required.

Women especially are urged to apply. Completion of a 4-year course in a recognized college with 30 semester hours in chemistry is required. No experience is required, and there are no age limits. Applications must be filed with the Civil Service Commission, Washington, D. C., and will be accepted until the needs of the service have been met.

Use of Benzene in Industry

CONTRARY to allegations made in two recent newspaper articles, no prohibition against the use of benzene in industry exists in the laws or regulations of the State of New York, according to Industrial Commissioner Frieda S. Miller.

The first of these articles pointed out that benzene is suitable for industrial use "but is now barred by state regulations, which vary rather widely, are not present in some states, and are particularly stringent in New York, New Jersey, and Massachusetts".

The second article was more general and indicated that antibenzene regulations are in existence, that they require relaxation, and that "in many instances benzol can be substituted for toluol, but is forbidden by state regulations". From this second article it would also appear that in New York State the use of benzene is forbidden and that an appeal procedure is necessary to permit its industrial use.

Commissioner Miller said:

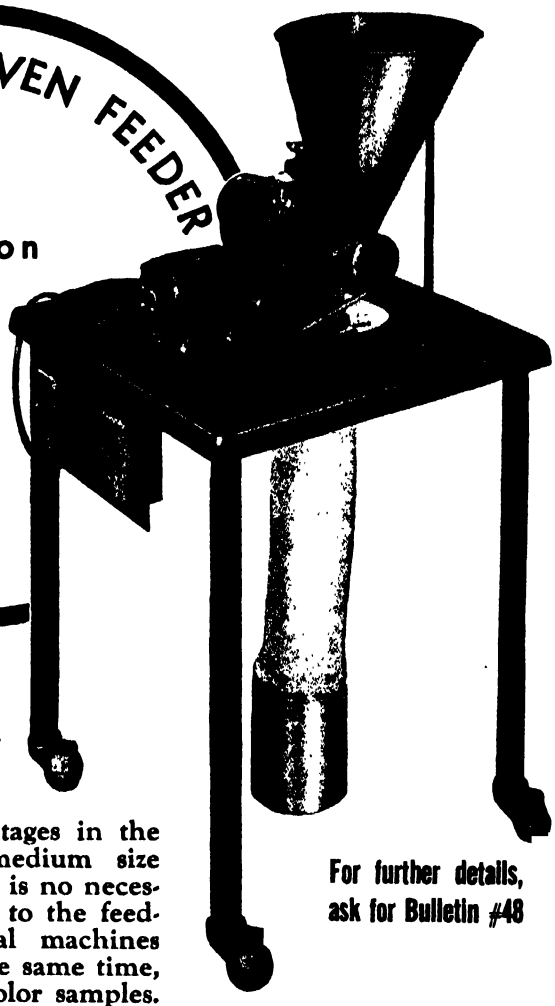
There are no regulations in the States of New York, Massachusetts, or New Jersey which forbid the use of benzol in industry. In New York State the use of this material is safeguarded by the general requirements applicable to all potentially toxic substances. The law calls for the maintenance of conditions which do not "tend to injure the health of the worker". In Massachusetts the only legal requirement is that benzol containers must be labeled. This latter State recommends a limit of 75 parts of benzol per million of air, but only in an advisory manner for guiding the users of this material. The New Jersey statutes require that workers be not exposed to concentrations in excess of 100 parts of benzol per million parts of air.

The American Standards Association, through one of its committees of experts, has recently promulgated a maximum allowable concentration of 100 parts of benzol per million parts of air.

It would appear that the legal requirements in the States of New York, New Jersey, and Massachusetts agree very well with the American Standards Association requirements and one wonders why there need be any confusion in the minds of persons interested in this subject. Certainly the facts are exceedingly clear and simple.

MOTOR DRIVEN FEEDER

. . . available on the Raymond LABORATORY MILL

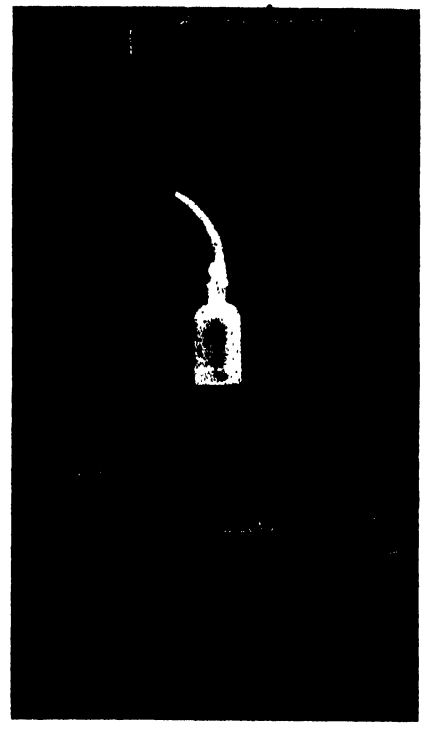


The *motorized feed type* of Raymond Laboratory Mill with variable speed control offers particular advantages in the continuous grinding of medium size batches of material. There is no necessity of constant attendance to the feeding operation, and several machines may be kept running at the same time, as in pulverizing various color samples. An extra large hopper is furnished, supported by a table brace. The complete unit comes mounted on a metal base with corner sockets for pipe legs. The standard type of Raymond Laboratory Mill with *hand-operated feeder* is also available and is recommended for most purposes where a few pounds of material are ground at a time.

For further details, ask for Bulletin #48

Pulverizing Separating

RAYMOND PULVERIZER DIVISION
COMBUSTION ENGINEERING COMPANY, INC.
1316 North Branch Street, CHICAGO
Sales Offices in Principal Cities
Canada: Combustion Engineering Corp., Ltd., Montreal



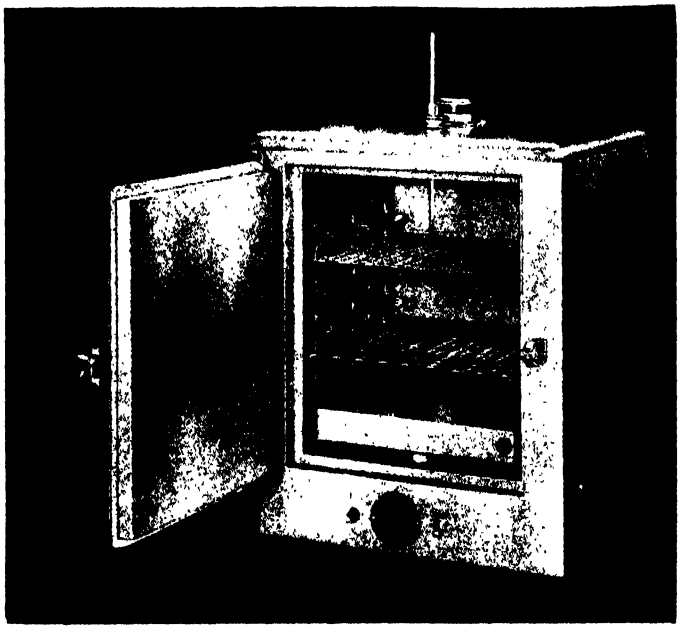
NH_4Cl Tube

This photograph of a 250-ml. reagent bottle containing hydrochloric acid shows a deposition of ammonium chloride in the shape of an irregular tube about 15 to 20 cm. long and about 1 cm. in diameter at the top. This phenomenon was photographed by George J. Benoit, Jr., Department of Chemistry, University of Washington, Seattle.

Double Walled *Hazard-Safe*

Ventilation Control

Brand New Precision Thelco No. 16



Automatic Temperature Control from Room to 150° C

$85.

Working chamber 11" x 11" x 11". Sensitivity Plus or Minus ½° C. Overall dimensions 16½" wide, 16" deep, 25" high. Includes 2 latticed metal shelves adjustable for height on 3 sets of brackets to permit pulling half-way out; thermometer holder; ventilating shutter, hazard-safe door latch, Neon pilot lamp, cord and plug. For A. C. single phase, or D. C. Wattage, 300. Specify voltage—see below.

Exemplifying construction characteristics heretofore restricted to constant temperature equipment at much higher price levels, this new all-metal Thelco offers a new measure of dependable performance.

More than 30 years of heat-transfer engineering is responsible for the fact that this is the finest oven in the moderate price field.

Specify A 64-741 for 110 Volts

Specify A 64-742 for 220 Volts

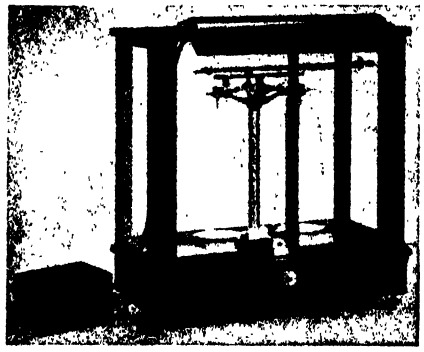
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YOUR ALLIED SCIENTIFIC DEALER

ASK FOR BULLETIN 42 - 48

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Soft fluorescent illumination on all parts of balance, without interference with manipulation. Lightweight, quickly attachable vitreous enameled parabolic reflector.

No. S-3820 .....$11.50

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Scientific Laboratory Supplies

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THE WALL STREET OF CHEMISTRY

	Earnings for Year		Per Common Share	
	1940	*1941*	*1940*	*1941*
Aluminum Co. of America	$46,522,470	$40,882,134	$26.73	$22.90
American Maize Products Co.	519,714	964,755	1.73	3.21
American Viscose Corp.	7,884,677	7,993,598	3.85	3.92
Bohn Aluminum & Brass Corp.	1,441,789	1,932,431	4.09	5.48
General Refractories Co.	1,159,065	1,268,775	2.46	2.70
Mead Corp.	1,426,881	2,109,784	1.56	2.66
United Gas Improvement Co.	27,794,622	21,776,714	1.03	0.77
U. S. Gypsum Co.	7,052,974	7,033,629	5.44	5.42

According to the *Wall Street Journal*, a new high in output of chemicals, spurred by the war, was recorded in February. The Federal Reserve Board unadjusted index of such production reached 157 in February (1935–39 average, 100), compared with 153 in January and 124 in February 1941.

Whereas 1941 was an extraordinarily good profit year for the rubber industry, manufacturers are gradually converting to production of goods other than rubber, mostly defense products, including ammunition, TNT, airplane parts, etc. It is expected that 1942 profits will be lower than 1941 in most cases.

The Carrier Corp. reports that orders booked during January were the second largest in the history of the company, 94.8 per cent being war orders. February 1942 business ran almost three times as large as February 1941.

The Dow Chemical Co. and subsidiaries report net income of $6,322,592 for the nine months ended February 28, 1942, equivalent to $4.88 per share on common. Taxes were provided in the amount of $5,632,873. During the period $2,107,475 was charged for the amortization of completed emergency plant facilities covered by certificates of necessity.

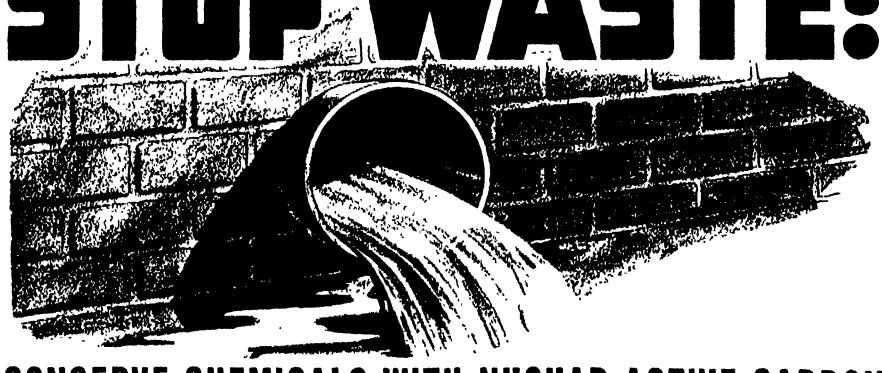
The Foster Wheeler Corp. is proposing to stockholders a recapitalization which provides for the issuance of six shares of new 6 per cent $25 par prior preferred stock and two shares of common for each share of the present $7.00 preferred. Since 1937 the company's business has expanded greatly, and in the past three years earnings have been approximately $2,525,500. Of this about $1,300,000 was spent for plant expansion and the remainder was used for working capital and payment of preferred dividends since January 1, 1941. It is hoped that the recapitalization will afford appropriate consideration to preferred stockholders and put the common stock in line for dividends.

During 1941 the **Freeport Sulphur Co.** was called upon to supply the largest tonnage of sulfur in its history. During the year the **Cuban-American Manganese Corp.** expanded its concentrating plant near Santiago by 30 per cent.

Production of nickel by the **International Nickel Co.** reached a new high record in 1941 and mines and smelters ran continuously, largely on a 24-hour basis. The company has under way an extensive program to increase production, so that by 1943, 50,000,000 pounds more than in 1940 will be produced.

The 1941 business of **Parke, Davis & Co.** was substantially the largest in its history, but higher costs of material and labor and sharply higher taxes materially affected earnings. The research laboratories have been expanded and altered, and investigative work is proceeding more vigorously than before.

STOP WASTE!



CONSERVE CHEMICALS WITH NUCHAR ACTIVE CARBON

In normal times, the Chemical Industry allows millions of dollars' worth of valuable chemicals to flow to the sewer because the cost of reclaiming them is too high to be considered.

However, with our war effort in full swing, there is an ever-growing shortage of chemicals; with even some of our most common heavy chemicals on the critical list. Therefore, it is becoming necessary to conserve chemicals and many chemical manufacturers are now finding it both practical and economical to reclaim acid, alkali, dye and other liquors by treatment with NUCHAR Active Carbon.

If the impurities can be removed by adsorption, the use of NUCHAR Active Carbon provides a simple, low-cost treatment. Investigate the possibilities of this treatment for the reclamation of your process liquors.

NUCHAR INDUSTRIAL CHEMICAL SALES

DIVISION OF WEST VIRGINIA PULP AND PAPER COMPANY

230 PARK AVE. NEW YORK, N.Y.

The Union Carbide & Carbon Co. reports construction expenditures during 1941 of $59,797,720, nearly all for capacity important to war work. Earnings before taxes and other deductions showed a gain of more than $23,000,000, but net income showed a slight decline.

The factories of the Victor Chemical Works are operating at capacity, and sales for the first two months of 1942 showed an increase over the similar period of 1941. Taxes in 1941 took 46 per cent of taxable income. The $1,250,000 realized from sale of stock had been used to pay off bank indebtedness of $750,000 and the remainder was used for general capital purposes.

Electrolytic Process for Tin-Plating Strip Steel

BOTH tin and electric power will be conserved by a faster, more economical electrolytic process for plating strip steel with tin, announced by the Electroplating Division of E. I. du Pont de Nemours & Co., Wilmington, Del. This halogen tin process employs a neutral solution which is said to eliminate sludging and the consequent waste of tin common to many electrotinning methods.

Strip steel for containers can be tin-plated twice as fast with less electric power by this process as by the "alkaline" electrotinning method, thereby reducing substantially labor and power costs. A thinner, more uniform coat of tin can be applied to strip steel electrolytically than by the conventional "hot dip" method, resulting in savings of from 40 to 65 per cent of the tin used.

A larger percentage of tin cans henceforth will be plated by electrolytic processes because the War Production Board has limited drastically the amount of tin for containers, and thin coatings of the metal will be necessary.

Tin deposited by the halogen process, it was said, can be heated without discoloration either when tin plate is heated to obtain the bright finish required by some can manufacturers or when treated during the process of applying lacquers or enamels.

High-Temperature Condensate Return

AT THE Pierce-Roberts Rubber Co., Trenton, N. J., 32 vulcanizing presses are in constant operation in the manufacture of gaskets, washers, and miscellaneous mechanical rubber goods. Steam is supplied the presses at 120 to 125 pounds per square inch. The condensate return system evacuates the molding presses at 85 pounds per square inch. Previously, the returning condensate flashed in an open hot-well was in a large measure wasted, and the heat from the 5-pound exhaust of a compressor engine was completely wasted to atmosphere. Now the high-pressure condensate is returned by the system of the Cochrane Corp., Philadelphia, Penna., direct to the boiler at a temperature approximating 325° and the 5-pound compressor exhaust is completely utilized in heating makeup.



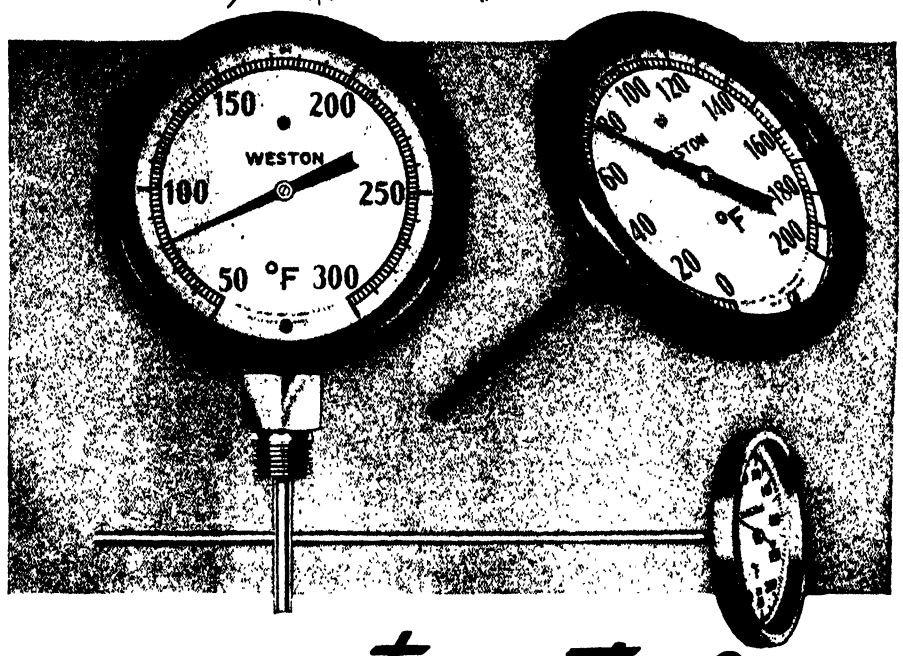
Blackout Controls

PHOTOELECTRIC illumination blackout controls, developed by Photoswitch, Inc., 21 Chestnut St., Cambridge, Mass., present a method for permitting illuminated displays to remain in operation where blackout regulations are in effect. Switches are aligned with the nearest street lamp, and automatically turn off the illumination when the lamp is turned off.

Metal Lead Primer

AS AN alternative to aluminum paint priming, The Midland Paint & Varnish Co., Cleveland, Ohio, offers a metal lead primer which is claimed to be equal to a good grade of aluminum paint. Hyspar metal lead primer is said to be rust-inhibiting, and may be brushed, sprayed, or dipped. It dries hard in 4 to 5 hours.

RUGGED ALL-METAL CONSTRUCTION CUTS BREAKAGE COSTS!



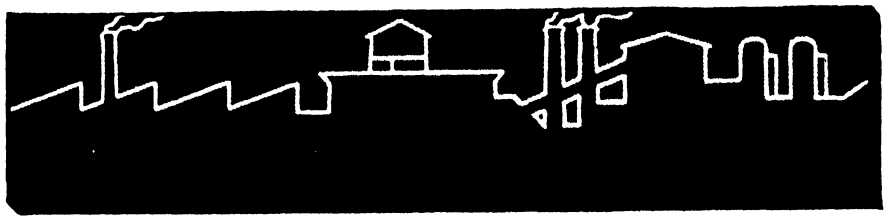
WESTON ALL-METAL *temperature Gauges*

Today it takes real ruggedness to withstand the mechanical abuse around the active plant. That's one of the reasons why more and more plants are installing WESTON Temperature Gauges. Their all-metal construction eliminates much of the common breakage, thus safeguarding against frequent interruptions and replacement costs. In addition to ruggedness, however, WESTON all-metal Temperature Gauges also provide the advantages of *pointer reading*. Their large, dial-type scales can be read accurately from a distance, and they can be mounted at any angle most convenient for easy reading. Available in types, sizes, stem lengths and ranges for most industrial applications. Accuracy guaranteed within 1% for the industrial types . . . ½ of 1% for the laboratory type. The coupon below will bring complete information.



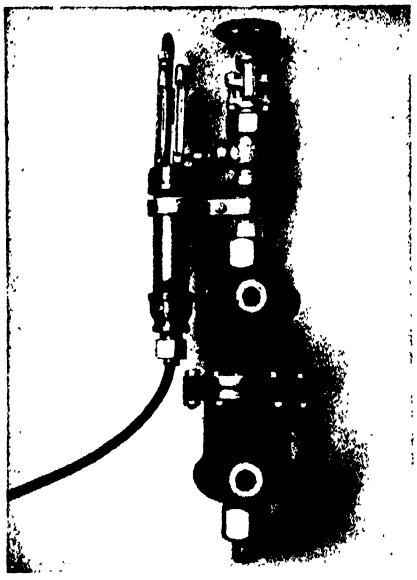
Weston Electrical Instrument Corporation
660 Frelinghuysen Ave., Newark, N. J.
Please send complete literature on WESTON Temperature Gauges.

Name.....
Address.....
City..... *State*.....



Condensate Sampler

A CONDENSATE sampler for the electrical-conductivity checkup is announced by Industrial Instruments, Inc., 156 Culver Ave., Jersey City, N. J. This device operates in conjunction with a suitable electrical instrument calibrated in direct-reading terms, such as percentage of carry-over of soluble salts. The well-known solu-bridge or the relay-operating solu-bridge controller for actuating a warning signal or corrective means may be used with the condensate sampler.



The cell holder admits the condensate into a chamber provided with a baffle and a two-way drain cock. At the bottom of the chamber is the conductivity cell. A thermometer indicates the temperature of the condensate, a vital factor in accurate conductivity readings. A sight gage indicates the presence of oil which can be drained off, safeguarding the conductivity cell against contamination. The conductivity cell holder may be connected with any suitable condenser.

New Dispersion Process

A NEW method of mixing through the use of air streams to disperse liquids and solids has been announced recently by the Pneumatic Dispersion Division of the Great Lakes Carbon Corp., 22 East 40th St., New York, N. Y.

The new process, said to produce complete, uniformly homogeneous mixtures, uses compressed air to inject streams of solids and liquids, fed from separate storage tanks, into a large mixing chamber where the two substances are intimately dispersed by the turbulence of the released compressed air. From the mixing chamber the materials drop into vertical hoppers underneath the mixer and then travel through a pneumatic system to cyclone separators where the particles separate from the air stream and are removed for further processing. The blend comes from the cyclone in the form of a dry powder easily handled. The new dispersion process, it is claimed, will yield a dry product even though the final mixture contains as much as 50 per cent liquid.

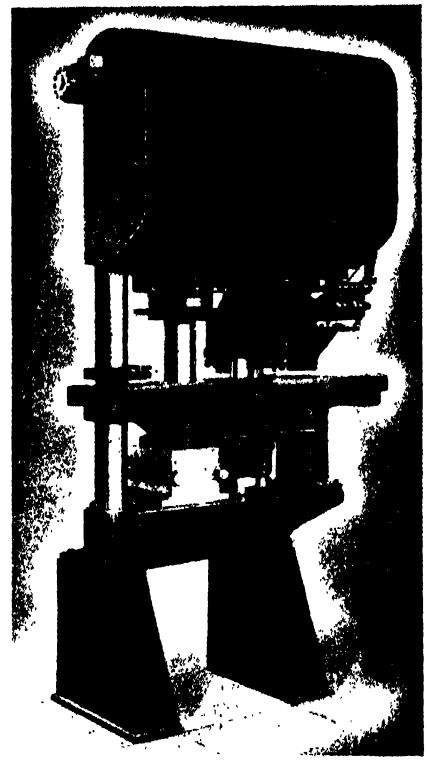
Among the advantages listed for the pneumatic system are mixing in any desired proportion, low-power requirements, mixing of any powder or dust that can be atomized, and low investment in equipment. A booklet, describing the Pneumatic Dispersion process, is available from the Great Lakes Carbon Corp.

Glue Shortage Partially Relieved by Chemical

ANIMAL glue, the critically scarce adhesive used in making tubular shell containers, ammunition boxes, and similar products, can be made to go almost twice as far by the use of Arlex, trade name of commercial sorbitol solution, according to the Industrial Chemicals Department of Atlas Powder Co., Wilmington, Del. The addition of a small amount of Arlex to glue mixes, it is claimed, not only gives glues nearly twice the coverage, but also makes possible the use of certain relatively more available grades of glue.

Because of reduced imports and greatly increased usage, certain types of animal glue are almost impossible to procure. Modern glues have long been standardized and unpublicized components of scores of industries. Available domestic supplies were closely related to slaughterhouse activity, but imports, in the past were readily available to make up any deficit needed to meet demands. However, since imports have been curtailed and domestic needs have increased, "extenders", or materials to make glue go further, are urgently in demand.

Extrusion Press

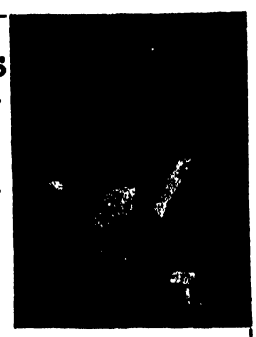


AN IMPROVED 125-ton extrusion press which permits simultaneous loading and extrusion has been developed by The Watson-Stillman Co., Roselle, N. J. The first of these units will extrude carbon mixtures but the press is also suitable for extruding any plastic material.

The press has two containers, mounted on a swinging arm. Operator starts the automatic extrusion cycle by push-button control, then devotes undivided attention to loading the free container. The container arm is provided with lifting cylinders for easy swinging and with hold-down

Read AIR VELOCITIES
INSTANTLY DIRECTLY ACCURATELY
with this
"Alnor" VELOMETER

Ruggedly constructed—expertly calibrated—the "Alnor" indicates air velocities directly on a scale in feet per minute without timing or calculation. This Velometer will also indicate pressures in inches of water when provided with suitable jets. Accuracy within 3% of full scale readings guaranteed. Range includes 15 to 24,000 F.P.M.



Write for Bulletin No. 2448-D

ILLINOIS TESTING LABORATORIES, INC.
420 N. LaSalle St. Chicago, Ill.

EDWAL Special Chemicals

Phenyl Ethyl Acetic Acid
Allyl Bromide Butyl Bromide
Uric Acid Aluminum i-Propylate

The above are only a few of the many special chemicals which our manufacturing division is equipped to supply. Write for quotations on your requirements. Ask for free 16-page book on Edwal services and special chemicals.

The EDWAL Manufacturing Division Laboratories, Inc.
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STOP

GAS and ACID Leaks *with* CHARLAB

CHEMICAL PUTTY

Waterproof—Acid Resistant—Stays Plastic

- Stops Gas and Acid Leaks at Flange Joints
- Packs Expansion Joints Excellently
- Makes Tight Joints at Ball and Spigot Connections

20¢ per lb. F.O.B. CHARLOTTE, N. C.
5% discount for quantities of 200 lbs. Packed in Standard 50-lb. containers

CHARLOTTE CHEMICAL LABORATORIES, INC.
CHARLOTTE NORTH CAROLINA

STEAM JET EVACTORS
AIDING NATIONAL DEFENSE

Numerous Croll-Reynolds Evactors are working overtime maintaining high vacuum in plants making explosives, synthetic rubber, airplane lubricants and a long list of other ordnance materials. They are maintaining high vacuum on engines and turbines of dozens of American ships sailing the seven seas.

While the large and special units require up to three months or more for fabrication the smaller ones are sometimes made in two weeks, or less, when the demand is urgent. These include single and multi-stage units for vacuum up to a small fraction of 1 mm. absolute, also small condensers and vacuum chilling equipment.

A recent development is a vacuum-cooled condenser for maintaining condensing temperatures down to 34° F. Inquiries will be handled as promptly as possible under the circumstances.

CROLL-REYNOLDS CO.
17 JOHN STREET *Established 1917* NEW YORK

cylinders to seal container against die during extrusion.

Air Conditioning Reduces Time for Tanning Leather

TIME required to tan leather for the use of the United Nations has been cut by two weeks through the use of air-conditioning equipment in the plant of the largest leather processing firm in Bogota, Colombia, according to Carrier Corp., Syracuse, N. Y.

Empresa Colombiana de Curtidos, S. A., reports that goat, cow, and sheep hides taken from the tanning rooms had required from 10 to 18 days to dry depending on the vagaries of the weather. Today, under weather conditions controlled by air-conditioning equipment, drying time has been cut to less than one day. As a result of the time saved, the Bogota firm has ordered an extension of the system installed by Uribe, Garcia Alvarez y Cia, distributors in Colombia for Carrier Corp.

Tube Turns Opens Houston Office

ON APRIL 1 Tube Turns, Louisville, Ky., opened a branch office in Houston, Tex., which will be managed by W. B. Whenthoff, formerly in charge of the office in Tulsa, Okla. W. E. Geiser has been made district manager of the Philadelphia office in the Broad Street Station Building.

Insulating Varnish



THE Sterling Varnish Co., 140 Ohio River Blvd., Haysville, Penna., has developed an insulating varnish, S-110, for application to electrical apparatus that must operate at abnormally high temperatures. Tests have indicated that S-110 will stand operating temperatures at 250° C. or higher.

When baked at 175° to 200° C. it dries all the way through the deepest winding and does not resoften when exposed to high operating temperatures. The dried film is mechanically strong, exceptionally adhesive and flexible, and retains these characteristics under adverse heat conditions.

Colonial Plastics

COLONIAL V PLASTICS, offered by the Colonial Alloys Co. (Chemicals Division), Philadelphia, Penna., have applications for both war and essential civilian needs, and are said to be made of materials that are plentiful and readily obtainable. They have a wide range of uses as alternates for rubber, copper, tin, aluminum, Monel metal, stainless steel, and other materials, in the shape of threads, tubes, rods, and sheets, and as extrusions from flexible to rigid grades.

HANOVIA FUSED QUARTZ MERCURY ARCS

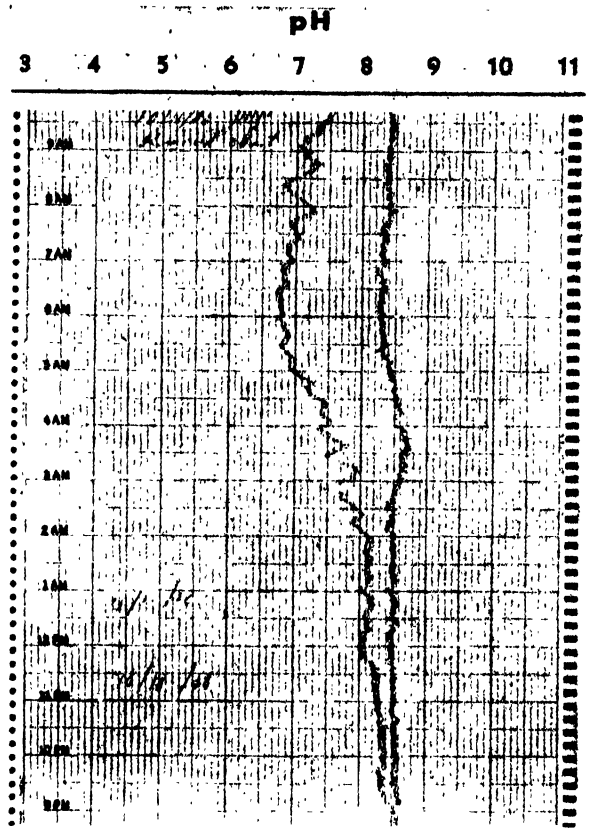
High Intensity Ultraviolet Radiations

POWERFUL:	Available in many types with luminous arc lengths of 1 1/2 to 59 inches and with an input of 100 to 4500 watts.
VERSATILE:	Provides radiations over the complete spectral range of the high pressure quartz mercury arc.
STABLE:	Loses only a little intensity in hundreds of hours of use.
CONVENIENT:	Lights automatically when power is applied and operates equally well in any position.
EFFICIENT:	Converts a high percentage of electrical energy to useful ultraviolet radiations.
ECONOMICAL:	The burner envelope is made of the finest grade of transparent fused quartz insuring maximum light transmission.

HANOVIA CHEMICAL & MANUFACTURING CO.
Dept. 351
Newark, N. J.

Multi-Point pH Recorder

A NEW pH recorder which will indicate pH values at separate and independent points in a fluid-flow system and record the values simultaneously on a single chart has been announced by the Cambridge Instrument Co., 3732 Grand Central Terminal, New York, N. Y. The new instrument provides a continuous picture to the control operator of the conditions throughout the plant and gives a rapid check on the effectiveness of processes and introduced changes.



The illustration shows a record from the condensate system of a large utility generating plant, where such guidance has helped to solve the problem of turbine blade deposits. The chart shows the change in pH of a condensate system before and after deaeration. The left line indicates the pH before treatment, while the right line is taken after the condensate leaves the deaerating chamber. This new development is of interest not only to power plant operators but to engineers in the process industries where far-reaching economies may be influenced by the pH at different stages in a process or treating operation.

The new instrument is conventional in appearance but incorporates an advance in circuit design which permits installation of measuring electrodes at separate and independent sampling points in the plant.

It is expected that the new instrument will find use in many industrial plants where pH control is important, such as the brewing industry where pH control of ingredients helps regulate the acidity of the final product, and the paper industry may use the instrument for pH control in cooking, bleaching, sizing, and water purification and to correlate the pH readings at various mill points. Other contemplated users are the textile processors for wool-processing control, the oil refineries where control of neutralization reactions are important, and in sugar refineries for control of clarification and colloidal precipitation.

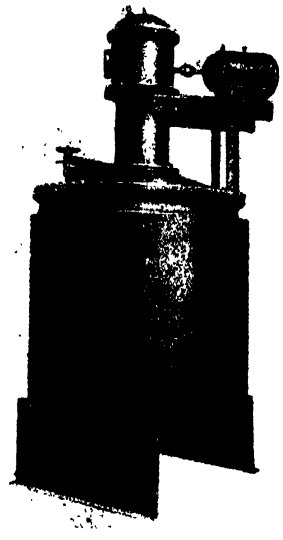
Watt-hour Meter Controls Electroplating Current

A NEW use for the ordinary watt-hour meter is to provide an accurate and refined control of the current used in electroplating permanent magnets at the Westinghouse Newark works of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Penna. The cost of the unit is less than that of the ampere-hour meter commonly used, and expensive and cumbersome shunts across the plating electrodes are eliminated.

The watt-hour meter may be placed on a switchboard some distance from the plating tank, whereas in the case of the ampere-hour switch it is necessary to place the shunt near the plating tank in the heavy output lead.

Mixer for Heavy Materials

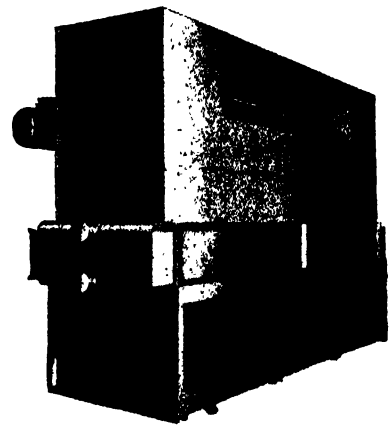
A RECENT development by L. O. Koven & Bro., Inc., Jersey City, N. J., is a special unit which incorporates in one mixing tank three means of agitation to produce completely homogeneous diffusion, kneading, blending, and absorption in viscous masses or thick compounds. The container is an all-welded tank with dished bottom. An outside jacket, as illustrated, may be provided for heating or cooling the product during the mixing process. The cover, gasketed and bolted to the tank, is provided with a manhole which can be opened quickly. The outlet valve at the concave bottom may be any type best suited to permit quick flow of the mixture.



The agitating mechanism consists of a vertical shaft, the upper terminus of which is coupled to a speed reducer driven by a motor. A three-blade ship-type propeller is mounted on the shaft halfway down its length in the tank but can be adjusted to any other desired depth. At the bottom end of the shaft is a turbine-type impeller. The tank itself has four baffles projecting radially in four quadrants along the cylinder but mounted several inches from the wall. Rotation of the propeller causes the material to be sucked down toward the turbine which, because of the pitch of its blades, gives the material a combined peripheral and upward motion. As some of the material strikes the baffles it is turned back with a rotary kneading or turnover action. At the same time some of the material flows between the baffle and cylinder which gives it a shearing effect.

Quenching Oil Cooler

A QUENCHING oil cooler has been developed by the Trane Co., La Crosse, Wis., for industrial applications calling for the quenching process of hardening steel.



The unit utilizes the atmospheric evaporative principle, and is ordinarily applicable where the use of large quantities of water is uneconomical, where water quantity is insufficient, where water temperature is too high, where it is not necessary to maintain quenching bath temperature below 100° F., where water has corrosive properties or is dirty, and where the water supply may fail.

Profit-Sharing Bonus Paid to Fairbanks-Morse Employees

FAIRBANKS, MORSE & Co., Chicago, Ill., has paid $426,160.73 as a bonus to factory and office employees, exclusive of salesmen, branch house managers, and others who are on bonus contracts. The amount paid as profit-shares equals 4.314 per cent of each employee's annual wage or salary for 1941. This is the fourth year the profit-sharing arrangement has been in effect.

THE Metallizing Co. of America has removed its Chicago general offices and midwestern warehouse to 1330 West Congress St., Chicago.

EMPLOYMENT INFORMATION

RATES to be paid in advance. Standard setting 5c a word, minimum charge $2.00 each; include 8 words for box address. Exceptions see ——▶ Display, $10.00 per column inch. 2 inches maximum, larger units at regular display unit rates. No discounts or allowances.
SEND advertisements with remittance to INDUSTRIAL AND ENGINEERING CHEMISTRY, 332 West 42nd St., New York, N. Y., to reach there not later than 10:00 A.M. on the 10th and 25th, closing dates for editions of CHEMICAL and ENGINEERING NEWS of the 25th and 10th, respectively. Insertions made in order of receipt provided necessary remittances are complete.
EMPLOYERS are requested to mention in their announcements the section of the country in which the open position is located to ensure replies only from those who are geographically available.
In printing these advertisements the SOCIETY assumes no obligations as to qualifications of prospective employees or responsibility of employers.

UNEMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking employment for themselves are allowed in one calendar year 3 announcements free (one per issue) set in standard style and limited to 50 words each, including 8-word box address, and 3 additional standard announcements at 50% of regular rate. Further announcements and excess words at full rate.

EMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking new positions are permitted 3 standard announcements during the calendar year at 50% of the regular rate—include 8 words for box address.

EMPLOYERS seeking chemists and chemical engineers are permitted 3 standard announcements, not to exceed 50 words each including box address and not more than one per issue, during the calendar year without charge, provided they agree in writing to acknowledge all replies (excess words 5c each), otherwise full rate applies.

The AMERICAN CHEMICAL SOCIETY is vitally interested in the welfare of its members and in seeing that the chemical industry is manned with competent chemists and chemical engineers. These pages are part of our service in that connection. In addition most of the larger sections of the AMERICAN CHEMICAL SOCIETY and several of the smaller ones have active employment committees. Local section secretaries in your area will inform you as to any employment aids that may be available locally.

An Employment Clearinghouse is operated at each national meeting of the SOCIETY for the purpose of bringing together representatives of industry looking for chemists and members and student affiliates in attendance wishing to make such contacts. For further details, consult the preliminary and final programs as printed in the NEWS EDITION prior to each meeting.

In the New York area, special employment facilities are offered by the Employment Bureau of the Chemists' Club, 52 East 41st St., New York, N. Y. In the Chicago area, the Chicago Section maintains an employment service at 413 Stevens Hotel, Chicago, Ill.

Those replying to announcements should be careful to send copies and not original documents. Advertising circulars will not be forwarded and to that end all letters will be opened at the forwarding office.

SITUATIONS OPEN

Those announcements in which the letter "P" is part of the address key have paid in full and are not committed to acknowledge replies. The Society regards acknowledgment by employers of all applications as an act of common courtesy but can assume no responsibility for their failure to do so.

GRADUATE ASSISTANTSHIPS, Chemical Engineering, University of Rochester, beginning September 1, completing M.S. program in one year. Stipend $700 plus tuition. Request further information or apply by sending complete personal data, photograph, transcript and two reference letters to Howard S. Gardner, Dept. of Engineering, University of Rochester, Rochester, New York.

CHEMICAL ENGINEERS. Positions open for young M.S. or B.S. well grounded in chemistry or chemical engineering for development work with major oil company. Applicant should submit details concerning education, scholarship, experience, personal data, references, and recent photograph. State salary expected.
54-N-4, Ind. & Eng. Chem., Easton, Pa.

COLLOID CHEMIST, Ph.D. and several years' experience in this field. Particular consideration will be given to a man with knowledge of surface chemistry. Knowledge of organic chemistry desirable. In reply give full information regarding training and experience, draft status and salary that you would consider. Mid-western location.
Box 60-NP-4, Ind. & Eng. Chem., Easton, Pa.

GRADUATE ASSISTANTSHIP in woman's college of southern university. Work for M.S. degree. Qualifications: B.A. or B.S. with adequate training in physics and mathematics as well as in chemistry.
Box 99-N-4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST WANTED: experienced in manufacture of Hydrosulfites, Eastern location.
Box 19-T-4, Ind. & Eng. Chem., Easton, Pa.

HEATING & VENTILATING Position open for graduate engineer with experience in the design, installation and operation of industrial air conditioning and process air handling (drying, etc.). Chemical background desirable. State age, salary expected, etc.
Box 28-TP-4, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST or Engineering Physicist with recent B.S. or M.S. North Philadelphia suburb. Must have good knowledge of use of microscopes, knowledge of spectrographic work, X-ray, electron diffraction, surface area measurements, electrical quantitative measurements desirable. Mostly research work. Reply giving full details in first letter on education, experience, personal data, availability, references, salary expected and draft status. Enclose full length recent photo. Gentile only.
Box 29-TP-4, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, American citizen, wanted for sales training in highly specialized technical field. Location, New York City. State age, draft status, education, experience and salary record. Enclose photo. Replies considered confidential.
Box 30-T-4, Ind. & Eng. Chem., Easton, Pa.

A LARGE pharmaceutical manufacturer is seeking a person to serve, after adequate training, as administrative manager of a manufacturing plant. In addition to a broad background in organic and pharmaceutical chemistry, he must have executive ability. Send a statement of education, experience and qualifications.
Box 71-TP-4, Ind. & Eng. Chem., Easton, Pa.

POSITIONS OPEN: (1) Organic chemist, Ph.D. as research assistant. (2) Chemist familiar with micro-analytical procedure. Well known research institute in the west. Give complete personal data including education, experience, references, nationality, and recent photograph.
Box 42-T-4, Ind. & Eng. Chem., Easton, Pa.

CREAM CHEMIST or practical experienced man who will do actual manufacturing of creams and allied products for private label cosmetic manufacturer. Young man not subject to draft preferred. Permanent position. Location Newark, N. J.
Box 46-TP-4, Ind. & Eng. Chem., Easton, Pa.

FERMENTATION CHEMIST. Experienced man wanted for industrial research on fermentation; industrial alcohol background desirable. Please give complete details, including experience, salary desired, etc.
Box 49-TP-4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST WANTED: Unusual opportunity with an aggressive, successful New England company devoting an exceptionally large proportion of its activities to laboratory and research work. Man desired should have several years' experience and creative flair for solving finishing problems—knowledge of pigments, shellac, casein and similar materials. Not necessary that he be a graduate chemist if capabilities are proved. Must be 3A draft exempt. All communications will be held in strict confidence.
Box 53-TP-4, Ind. & Eng. Chem., Easton, Pa.

WOMAN ANALYST. Experienced woman analyst wanted at once by industrial laboratory in southern New England. Work consists mainly of analysis of baking powders, baking powder materials, phosphates, phosphoric and sulphuric acids. Must be single, American born and with American born parents. State experience and salary required. Good chance for advancement. Send recent photo.
Box 59-TP-4, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST

Excellent opportunity for recent graduate with doctor's degree. Several years with industrial company important but not necessary. In reply state experience and enclose photo.

Box 75-TP-4, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER. Assistant chemical engineer. Both men must have plant experience in the manufacture of ethyl alcohol, preferably from grain materials. Submit complete information on training, experience, personal data, draft status and include photo.
Box 89-T-4, Ind. & Eng. Chem., Easton, Pa.

PROCESS ENGINEER. Company manufacturing processing machinery wants engineer of sufficient experience to take over the designing of Mixers, Kettles, Autoclaves, Attrition machinery and other process equipment. Location—Southern Ohio, and all organization executives are familiar with this ad. Excellent position for the future for proper experienced man.
Box 110-TP-4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, single, sugar experience preferred; development work; South America; give full details regarding education, experience, salary; send small photo.
Box 95-TP-4, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST, Biochemist, Cereal Chemist, Chemical Engineer, Food Technologist, Organic Chemist, Physical Chemist. Consideration will be given to applications from Bachelors, Masters, Ph.D.'s and those with a few years' post-doctorate experience. These openings represent opportunities for qualified persons in the Research Laboratories of a prominent food organization located in the East. Applicants should submit educational history, college record, experience, age, and other personal data, and recent photograph.
Box 100-TP-4, Ind. & Eng. Chem., Easton, Pa.

OUTSTANDING PHARMACEUTICAL manufacturer seeks director for development and research foundation, thoroughly trained organic chemist, with working knowledge bacteriology and biology. East. $5,000-$10,000. *Superintendent*, wholesale drug experience, foreign and domestic, shipping, receiving, handle engineering problems small milling plant. East. $5,000-$7,000. *Physicians*, Eastern ethical pharmaceutical manufacturers in medical promotion department. $3,000-$6,000. Medical Director, small ethical house. Salary open. *Physician*, editorial writer eminent medical publication. To $6,000. *Organic* chemists, midwest, $3,000-$4,000. *Control* chemists, New England, $2,000-$3,500. *Men & Women* pharmacy bachelors, some experience, $150-$250. *Pharmaceutical* chemists. East. $250-$500. *Tablet* & ointment manufacturers (2) to $300. East. *General* pharmaceutical research, three to ten years out of college. Open. *Women* chemists, several pharmaceutical and analytical openings. East. $125-$250. Replies will be considered confidential. No registration fee. Everett Brown Agency, 17 John Street, New York.

ORGANIC CHEMIST, familiar with either research or production on either or all of the following chemicals: Phenol, formaldehyde, pentaerythoritol, hexamethylene tetramine, alkylated phenols and phthalate esters. Give full particulars in first letters. Location Middle West.
Box 106-TP-4, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, bachelor or master degree with thorough training and experience in microchemistry analyses (Pregl methods). Only those who have at least two years of experience in this special field need send applications, including recent picture to: Carl Tiedcke, 366 Fifth Ave., N. Y. C.

CHEMIST: wanted for work in chemical laboratory of large Oklahoma refinery. Give complete details, including education, citizenship, experience, salary desired. Send photograph.
Box 108-T-4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC or BIOLOGICAL chemist to fill teaching position in A.C.S. approved college. Ph.D., not over 35 years of age, with teaching experience in small college preferred. Teaching not excessive. Opportunity for research. Rank and salary dependent on qualifications.
Box 109-T-4, Ind. & Eng. Chem., Easton, Pa.

TECHNICAL MEN WANTED

Metallurgists, hydrometallurgists, and chemical engineers with milling experience, mechanical engineers, and welding engineers. For research on problems relating to war industries.

BATTELLE MEMORIAL INSTITUTE
COLUMBUS, OHIO

Address communications to the box number indicated and Mail to Easton, Penna.

The American Chemical Society has no information concerning the position advertised, or in regard to those seeking employment.

SITUATIONS WANTED
(A.C.S. MEMBERS)

SPECIAL LIBRARIES ASSOCIATION will recommend trained chemical and technical men and women librarians at no cost to employer or member. Competent persons are now available. Write to the Executive Office, 31 East Tenth Street, New York, New York, for additional information.

PHYSICAL CHEMIST. Chemical Engineer. Eight years' teaching chemistry and chemical engineering. Six years' varied industrial experience in responsible positions. A.I.Ch.E. Desire teaching position — chemistry.
Box 19-N-3, Ind. & Eng. Chem., Easton, Pa.

PRIVATE RESEARCH assistant in large Eastern university. Organic chemist, Ph.D. 1941. Undergraduate major — Bio-chemistry. Research on amines, amino acids, unsaturation, organic synthesis. Publications. Graduate assistant in organic 4 yrs. Desire research or teaching position. Draft deferred, 27, single, available immediately.
Box 54-N-3, Ind. & Eng. Chem., Easton, Pa.

EXPERIENCED REFINER of corn starch, corn syrup and by-products, seeks position as director of research, chief chemist, assistant shift superintendent or general superintendent.
Box 60-N-3, Ind. & Eng. Chem., Easton, Pa.

ENGINEER with exceptional training and ability. Degrees in chemical and industrial engineering leading universities. Successful record in research and development on plastics, cellulose paper, lignin, extraction and engineering economics; would prefer production. Fluent French, Spanish. Single, 24, draft deferred, immediately available.
Box 11-T-3, Ind. & Eng. Chem., Easton, Pa.

CHEMIST and CHEMICAL Engineer, B.S. 1941. Now working toward M.Ch.E. Extensive laboratory training in analytical organic and inorganic. Single, 23, draft deferred. Desires analytical, production, control and research work. New York preferred; will consider anywhere. Available June 1st.
Box 29-T-3, Ind. & Eng. Chem., Easton, Pa.

CHEMIST B.SC. in Chemistry, May 1942, prefers employment within 100 miles of Philadelphia, but will go anywhere. Scholarship student (I Q. 150), with summer experience in control laboratory Basically trained in inorganic, organic, analytical and physical chemistry, also in microanalysis.
Box 38-T-3, Ind. & Eng Chem., Easton, Pa.

ANALYTICAL CHEMIST, B.Sc. May, 1942. Standard training in main divisions of chemistry, including microanalysis and chemistry of foods and drugs. Scholarship student, college laboratory assistant, summer experience in petroleum industry.
Box 40-T-3, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, M.S. Thirteen years' experience in research, development, and production on nitrogen, chlorine, and sulfur compounds, poisonous and volatile gases, and high pressure catalytic synthesis. Expert in training personnel and starting new plants.
Box 54-T-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, research, development, M.A. eastern university 1942. Teaching fellow, B.A. far western university 1938. Two years' experience in mid-west in synthetic resins, coatings, plastics, and related products. Persistent worker. Age 25. Selective service 2-A. Available June.
Box 58-T-3, Ind. & Eng. Chem., Easton, Pa.

THOROUGHLY TRAINED chemist. M.S. Iowa State; B.S., Ph.D. Cornell. Research: plant pigments, vitamins, bioassays, balance studies, feed and food analyses, mineral nutrition. Experience; two years' industrial, one year head of chemistry department small college. Phi Kappa Phi. 26, married. Desires teaching with opportunity for research.
Box 66-T-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST. Ph.D. Wide experience in theoretical and synthetic organic chemistry. Undergraduate and graduate study, academic and industrial Post-doctorate appointments, and instructorship, at large Eastern University. Phi Beta Kappa, Sigma Xi. Publications, independent research. Employed. Desires industrial or academic position.
Box 76-T-3, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D.; Sigma Xi; wishes part-time literature or laboratory work in New York City area; now employed; own laboratory; synthesis and analysis; prefers small active firm.
Box 82-T-3, Ind. & Eng. Chem., Easton, Pa.

METALLURGIST CHEMIST: desires teaching or industrial connection. Five years' metallurgical and chemical college teaching experience; worked four years steel mills. Experience includes physical testing, analysis, melting, inspection. Age 34, married. now employed.
Box 10-N-4, Ind. & Eng. Chem., Easton, Pa.

SYNTHETIC ORGANIC chemist. M.S. leading University. Young, personable, responsible. Excellent organic training. Research and industrial experience. Desires organic research position in a metropolitan area, preferably New York or Chicago. Presently employed.
Box 14-N-4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC RESEARCH chemist. Ph.D. 1937. Age 29. Employed, married. 5 years' industrial experience in synthetic, analytical, developmental aliphatic and aromatic chemistry. Good technician. Keen student of scientific literature. Vital defense development position sought. Salary $4500.
Box 16-N-4, Ind. & Eng. Chem., Easton, Pa.

ATTENTION — COLLEGES and Universities. Do you need chemistry instructors for your summer session? Here's one with five years' experience at a Grade A college. Ph.D. honor societies. Married. Available May 25 to Sept. 15.
Box 24-N-4, Ind. & Eng. Chem., Easton, Pa.

SUPERINTENDENT or FACTORY Manager. Accustomed full responsibility. B.S., M.S., Ch.E. Plant design, pilot, layout, development, installation; operation, maintenance, production planning, costs, chemical economics, mass production, packaging, personnel and sales relations. Solvent recovery, distillation (including vacuum), oleum handling. Inorganic and synthetic chemicals, alcohols, alkaloids, plastics, solvents. Age forty, married, American ancestry, Protestant; consulting experience, patents, publications, references. Available immediately, war production preferred.
Box 30-N-4, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST, M.S. in Physical Chemistry. Two years' graduate work toward Ph.D. with research in Ceramics and high temperature physical chemistry. Experience in physico-chemical measurements, refractories, electrode-potentials, use of petrographic microscope, X-ray, spectroscope. Excellent record, references. Favorable draft status.
Box 35-N-4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST-Chemical Engineer, Ph.D. Organic and Chemical Engineering, August 1942; B.S. 1939; M.A. in organic and analytical, 1940; Ph.D. course work complete in May. Research on Phenanthridine in progress. Excellent background in thermodynamics, theory of plastics, and organic synthesis. Possesses initiative, ambition, and ability to work with people. Want responsible position in industrial development or university teaching. Unmarried, good health, honor societies. Draft classification 2-A. Age 23. Available September 1942.
Box 47-N-4, Ind. & Eng. Chem., Easton, Pa.

SUMMER TEACHING position desired by assistant professor at accredited eastern college. Ph.D. 34 years' old. Will teach general, analytical or physical chemistry. Eastern location. Will consider permanent position with opportunity for advancement.
Box 58-N-4, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Ph.D., with good background in organic and physical chemistry. Teaching and industrial experience. Three years' research in vitamins with publications. Now employed. Age 29, married. Research or teaching position desired in East. Available on short notice.
Box 65-N-4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.S. Available June 1. Graduate research with organometallics at leading midwest university. 3 years' teaching experience, desires to go into organic research in industry. Some experience with dyes, organic syntheses. Single, 23, Protestant, draft 2-A. Location immaterial. Now located in Iowa.
Box 66-N-4, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST Ph.D. 1942 (June). Vitamins and nutrition. Good foundation in organic and physical chemistry and physiology. Research on vitamin B complex and protein requirements. Publications. Five years' teaching biochemistry, general and physical chemistry. Desires research or teaching.
Box 69-N-4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, AGRICULTURAL, M.S. Age 32, Major—soil, plant and analytical chemistry. Seven years' experience. Also interested in fertiliser work. Location immaterial. Now employed. Protestant. Draft 3A. Available 30 days.
Box 70-N-4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC PH.D. Nine years' experience in research and development of synthetic medicinals, pharmaceutical specialties, food products and processes, control methods. Capable analyst, working knowledge of bacteriology, physiological chemistry, and pertinent medical sciences. Experience in arranging clinical trials of new medicinals. Understands commercial aspects of research work. Thorough knowledge of Food and Drug Laws. Administrative ability. Laboratory facilities available if desired. Publications. Employed. Married.
Box 72-N-4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, BIOCHEMIST, Bacteriologist. A.B., 16 years' experience in foods, biological and bacteriological products, plant management including production, maintenance, personnel, and accounting. Successful research and sales records. Patent experience. Age 39, married, Protestant. Continental U. S. preferred.
Box 83-N-4, Ind. & Eng. Chem., Easton, Pa.

RESEARCH or DEVELOPMENT position desired, preferably on the Pacific Coast or in Rocky Mountain States. Ph.D. in Physical and Inorganic Chemistry, University of Minnesota, 1930. Industrious worker. Eigh tyears' experience in inorganic research; five years' teaching experience. Age 40.
Box 11-T-4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST B.S. 1936. Draft classification 3-A. Six years' experience in research department of large manufacturer of fiber board structural insulation. Well versed in the manufacture of and finishing treatment of such products as asphalted blocks and sheathing, acoustical materials, and decorative panels.
Box 15-T-4, Ind. & Eng. Chem., Easton, Pa.

DIRECTOR of RESEARCH Ch.E., Ph.D. Twenty years' experience. Food, feeds, vitamins, nutrition, pharmaceuticals, biologicals. Man of wide experience with high attainments and outstanding accomplishments desires position with company undertaking expansion in research or setting up new department.
Box 16-T-4, Ind. & Eng. Chem., Easton, Pa.

RESEARCH and DEVELOPMENT Chemist. B.S. in Chem. Fourteen years' diversified experience on plastics, synthetic resins, organic chemicals, paints, varnishes, cloth and paper coatings and process development. Excellent record and experience. East preferred. Available immediately. Draft deferred.
Box 18-T-4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, working for masters in physical chemistry, desires position with progressive firm which would give opportunity for someone without actual experience, to prove their ability for research or otherwise. Graduate assistant in large eastern university. Also qualified in inorganic, analytical and organic.
Box 20-T-4, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, M.S., 3-A draft classification. A dozen years of wide and varied experience. Desires responsible position in research laboratory of large corporation in the New York City area.
Box 21-T-4, Ind. & Eng. Chem., Easton, Pa.

TEACHER RESEARCH worker; Ph.D. Majors: Physical chemistry, chemical engineering. Twelve years' teaching these with inorganic, analytical chemistry, etc. Sixteen years' industrial research, consulting, testing. Numerous publications. Employed. Seeking broader field.
Box 22-T-4, Ind. & Eng. Chem., Easton, Pa.

YOUNG PLANT executive, chemist, M.S. degree, manager of inorganic chemical company, desires permanent position with greater opportunity for advancement. Wide experience; research, production, improving plant processing, reducing operating costs, technical sales and personnel supervision. Starting salary $6000–$7000.
Box 23-T-4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.S. Broadly trained, excellent scholastic record, additional graduate study, over two years' experience in research and plant development. Married, American, wants production work in defense industry; southeastern location.
Box 24-T-4, Ind. & Eng. Chem., Easton, Pa.

CELLULOSE CHEMIST: Chief chemist of small eastern non-defense plant desires work in defense industry. Age 28, married, six years' diversified experience in pulp and paper research, production, conversion, sales, and industrial applications.
Box 25-T-4, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER. Age 29, draft 3A. Eight years' varied experience in sales, chemical research, development, manufacturing and plant design. Expert in petroleum chemistry and engine mechanics. Thoroughly conversant with technical sales, advertising, and general marketing problems. Desires connection with chemical or oil concern that can utilise the combined assets of a competent chemical engineer, and a sales minded business promoter. Prefer to oeate in or near N. Y. C.
Box 26-T-4, Ind. & Eng. Chem., Easton, Pa.

PRODUCTION CHEMIST Executive Ph.D. 15 years' experience and successful record in managing Prod. Dept. of large plant. Thoroughly familiar with modern methods of plant operation, production planning, cost calculations, etc. Primarily interested in industrial production supervision and process development. Age 44.
Box 27-T-4, Ind. & Eng. Chem., Easton, Pa.

PHARMACEUTICAL ORGANIC Chemist, Ph.D. June, 1942. Thesis on pressor amines. Graduate training in organic synthesis, chemistry of medicinal products, physical chemistry, analysis, pharmacology, catalytic reductions. Draft 2-A. Sigma Xi, Rho Chi. Five years' teaching assistant.
Box 32-T-4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC BIOCHEMIST, Ph.D., 1942. Available immediately. Research experience in organic synthesis and enzyme chemistry. Interested synthetic organic or biochemical research. Age 24, single, draft deferred. East preferred. Member Phi Beta Kappa, Phi Lambda Upsilon, Sigma Xi.
Box 34-T-4, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 575)

(Situations Wanted Continued)

ORGANIC CHEMIST, Ph.D. 1939. Desires research position in the middle-west, in the field of synthetic organic chemistry. Sigma Xi, Phi Lambda Upsilon. Industrial experience. Employed, available within reasonable time. Draft deferred. Married.
Box 36–T–4, Ind. & Eng. Chem., Easton, Pa.

ASSISTANT or ASSOCIATE professorship of organic chemistry in well established institution, beginning in September. Ph.D. prominent University, 1931. Eight years' department head in small mid-western University. Excellent record building up Department. Experience teaching undergraduate and graduate courses, directing M.S. researches, administration, placement, purchasing, glass blowing. Recent and projected publications based on M.S. theses. Sigma Xi, Phi Lambda Upsilon. Active A.C.S. section. Superior references. Protestant, age 37, married. Location immaterial.
Box 37–T–4, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, B.S. 1941. Midwest university, single, 24, American born, draft deferred. Employed since graduation. Supervisory capacity in heat treating of alloy steels. Desires change but will consider similar position. Interested in synthetic organic field.
Box 38–T–4, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, M.A., M.S., Ph.D. with California teaching credential wishes employment as teacher or in research near Los Angeles, Calif. Six years' research in X-ray crystallography, two publications, two years' teaching experience in Jr. college. Age 29.
Box 39–T–4, Ind. & Eng. Chem., Easton, Pa.

METALLURGICAL CHEMIST, M.S., June 1942. Inorganic major and physical metallurgy minor. Undergraduate research in organic; graduate research in inorganic. Summer experience in analytical chemistry. Experience with metallographic photomicroscope and X-ray diffraction equipment. Defense course in metal's inspection. Desires Southern California position.
Box 40–T–4, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, A.B. 1941 from Mount Holyoke College, with one year's work as graduate assistant toward Masters Degree, desires position with chemical research laboratory in New York City or vicinity. Protestant. Iota Sigma Pi. Fluently German; reads French.
Box 41–T–4, Ind. & Eng. Chem., Easton, Pa.

AGRICULTURAL CHEMIST, M.S., experienced in agricultural research and analyses. Major fields biochemistry and organic. Some experience in food industry. Desire research or plant operation in a defense industry. Age 26. Married.
Box 43–T–4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST. B.S. in Ch.E. 1935, age 29, married. Six years' experience in organic synthetics. Product and process development from laboratory to plant production. Desires location near New York or New Jersey.
Box 45–T–4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, M.S., 25 years' diversified analytical and development experience. Employed. Last 12 years charge analytical laboratory prominent plastic manufacturer. Will consider position requiring broad experience and mature judgment. Location immaterial. Age 47, married, American.
Box 47–T–4, Ind. & Eng. Chem., Easton, Pa.

TEACHING POSITION, College, University or Technical Institute. Ph.D. from leading technical institute, experienced teacher. Research, many publications and patents covering 12 years industrial experience. Sigma Xi, Tau Beta Pi, Phi Lambda Upsilon, Pi Mu Epsilon. Age 35, married.
Box 48–T–4, Ind. & Eng. Chem., Easton, Pa.

EXECUTIVE with broad scientific training and administrative experience desires new connection with progressive and responsible organization. Ability proven through successful planning and directing technical projects. Market development a specialty. Familiar with heavy chemical manufacturing operations. Patents. Publications. Ph.D. Protestant. Married. Age 42.
Box 52–T–4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, M.S. 1941. A.C.S. accredited university. Major biochemistry and organic. Desires position with industry engaged in defense work—research preferred. Presently employed as instructor in same university. Single, 24, assurance of draft deferment. Sigma Xi. Available June 1. Location immaterial.
Box 54–T–4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S. in chemistry in liberal arts college, June 1942. Age 21. Training includes physical chemistry and organic analysis. Location immaterial. Available in June.
Box 55–T–4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST M.S. Accredited eastern university. Fellowship. Organic major, but thoroughly trained in physical, inorganic, analysis. Desires research or production position, preferably in east. Available middle of May, 1942. Single.
Box 56–T–4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST wants real job. Ph.D. 1933. Over six years' industrial organic research (synthesis), development, supervision, technical service in antiseptic, insecticide fields. Two patents pending. Two years' teaching experience. American, age 36, married, children, Protestant, 3-A. Go anywhere. Now employed in New York area.
Box 58–T–4, Ind. & Eng. Chem., Easton, Pa.

SUMMER POSITION, May 18, Sept. 1, desired by chemistry instructor. Ph.D. Can install analytical laboratory. Specialties-engineering, colloidal and physical chemistry, instruments. Eastern location.
Box 61–T–4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S., M.S. with additional work toward Ph.D. Three years' experience Viscose Rayon. Graduate work on Slash Pine. Prefer work with cellulose industry. Age 37, married, draft classification 3A. Protestant.
Box 63–T–4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST. B.S. in Ch.Eng., 1940. Single, 27, previous classification 2-B. One year's experience naval stores plant and laboratory control. Desire analytical, control, or research work. Available immediately.
Box 67–T–4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST. Technical degrees. Three years supervision and research in resins, paints; 1/2 year same in by-products from dry distillation of coal. Desires research work, but would also work analytically. Will go anywhere, preferably Middle West.
Box 68–T–4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S. 1934. Thoroughly trained in analytical, organic and physical chemistry. Diversified experience for past seven years. Now completing Defense course in physico-chemical measurements; qualified for position in testing, control and research work. Desires position defense industry. Married. 3A draft.
Box 69–T–4, Ind. & Eng. Chem., Easton, Pa.

RUBBER CHEMIST, B.S., Special training in rubber chemistry. Experienced in synthetic rubber research. Desires responsible research position. Age 23. Draft deferred.
Box 72–T–4, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER: B.S. in Ch., Ch.E. Industrious worker with well above average ability and intelligence. Three years experience in research and process development. Desires similar position or position giving technical service or assistance to production department. Single. Job with 2B draft classification soon coming to a close.
Box 73–T–4, Ind. & Eng. Chem., Easton, Pa.

SYNTHETIC RESIN Chemist having several years experience in actual formulation and manufacture of thermosetting resins, which include urea, melamine, phenol and aniline types for molding, laminating and adhesive applications. Also, experience in compounding, blending, and molding of thermosetting compounds. Desire responsible position in plastics development.
Box 76–T–4, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, M.S. in Chem., June 1942. Experience in teaching, spectroscopy, reaction kinetics, drying oils. Wants position in which his talents can be of use in war effort, especially in plastics or synthetic rubber. Eastern seaboard preferred, but location immaterial.
Box 77–T–4, Ind. & Eng. Chem., Easton, Pa.

ATTENTION: SUCCESSFUL organic research chemist (Ph.D.) with ten years experience in varied fields desires executive or administrative position with progressive organization. Familiar with manufacturing methods for phenol and other resin raw materials.
Box 78–T–4, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST, M.S., 15 years experience in analytical methods of testing, production and development. Resourceful adaptable, and creative. Author of books. Capable of directing laboratory, production, and research. Age 40, American, married, and employed.
Box 79–T–4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, M.S. desires responsible position with financially sound and progressive company. 25 years experience in production, control, development, vacuum processing milk and food products. Knowledge of vitamin fortification and food laws.
Box 81–T–4, Ind. & Eng. Chem., Easton, Pa.

FOOD CHEMIST, B.A. One and a half years post graduate work. Seven years' experience in analyses and inspection of foods and feed stuffs. Minneapolis area desired. Draft status 3A.
Box 90–T–4, Ind. & Eng. Chem., Easton, Pa.

ASSISTANT PROFESSOR of organic and analytical desires position in essential industry or teaching position in a department interested in developing chemists. Ph.D., M.S. in organic physical minor, recent research in nonferrous electrochemistry. Sigma Xi, Phi Lambda Upsilon, publications. Protestant, married, age 29. Philadelphia area preferred, but will go anywhere, including South America.
Box 91–T–4, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST. B.S. 1940 with one year's analytical experience in pharmaceutical house. Available in May. Single, 22, 2-B. Eastern location preferable. Desires employment in control or production.
Box 93–T–4, Ind. & Eng. Chem., Easton, Pa.

RESEARCH PHARMACEUTICAL organic chemist, Ph.D., 1941, large mid-western university. Research experience in organic syntheses, sulfur and nitrogen compounds, vitamins. Publication. Member Sigma Xi, Phi Lambda Upsilon, Rho Chi, age 27, married, draft 2-A Now employed, but desires new connection where his abilities can be utilised fully. Available upon short notice.
Box 96–T–4, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST M.Sc. 1940 with 1 1/2 years of industrial experience desires employment in any of the Defense Industries, in control or in production. Also desires position as an Assistant Spectrographer. Eastern location preferable.
Box 97–T–4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, 1940 Ph.D., married, now teaching in a N. Y. college, seeks position in synthetic organic research. Industrial and institute experience, Sigma Xi. Particularly interested in work contributing to the war effort. N. Y. C. area preferred; position for the duration acceptable.
Box 99–T–4, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST wants position as analytical chemist in some industry. B.A. degree in June, 1942, 45 semester hours in chemistry, including inorganic, organic, analytical, and physical chemistry. Location near Newark, N. J. or New York City. Available June 15th.
Box 101–T–4, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER· Experience maintenance, production, and design. Degree B.Ch.E. Able to work in non-defense industries.
Box 103–T–4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.S. Desires research position. Experience: Phenols, sterols, aminoacids, vitamins, synthesis, organic analysis, micro-analysis. Familiar with electrospectrophotomery, pH control, micro-biological techniques. Languages: German, French, Publications. Draft: 3-A (dependency).
Box 104–T–4, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, M.S., with three years' industrial experience in chemical, metallurgical, petroleum, and fuel technology; also one year in other technical fields. Currently employed as subchief chemical engineer responsible or development, design, erection, and operation of synthetic fine chemicals plant. Will consider only war program activities; location, hazards, permanence of work immaterial. Salary no object, but seeking position demanding utmost in resourcefulness, driving energy, and breadth of technical training. Present employer knows of intentions. Draft 2A. Single.
Box 117–T–4, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST Ph.D. Broad knowledge of all branches related to biological chemistry. For many years directing biochemical and biological research in the field of hormones, enzymes and vitamins. Special experience in protein chemistry. Numerous publications, member of several scientific societies. At present employed. Desires responsible position in research laboratory.
Box 118–T–4, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(NONMEMBERS)

CHEMICAL ENGINEER, degree. Four years' food technology and development, mostly prepared cereals. Now production manager for food company with large national business. Two years' research and control of electrotyping solutions. Receptive to offers from other fields. Married, 3 children, age 27.
Box 12–T–4, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, 1941. Experienced in research and development. Desires development work or position giving technical service or assistance to production department. South or Southwest location preferred. Age 24, married. Company must be eligible to request continuance of 2B draft classification or equivalent.
Box 33–T–4, Ind. & Eng. Chem., Easton, Pa.

PLANT SUPERINTENDENT, experienced in design, erection, operation and technical direction of vegetable oil plant manufacturing refined and hydrogenated oils, Oleomargine, Mayonnaise, Distilled Fatty Acids and Crude Glycerine.
Box 44–T–4, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 576)

(Situations Wanted Continued)

LIBRARIAN for industrial or commercial research department. Young woman. Phi Beta Kappa. University graduate; library school trained. Science major, including chemistry, bacteriology, biology. Literary ability. Knows German, French, Spanish, typing. Location immaterial.
Box 50–T–4, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, Ph.D. Eight years' experience research, process design, and technical service major petroleum refinery.
Box 51–T–4, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST, age 45. Thoroughly experienced, practical analysis of metals, ores, silicates, gas, water, chemicals, commercial organic materials. Now employed near Philadelphia. Seeks new connection offering permanency of employment at moderate pay.
Box 57–T–4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, 26, married, deferred 3A; M.S. 1937 University Illinois. Now developing methods for converting nicotine and coal tar bases to nicotinic acid. Patents. Previous experience organic synthesis and research some analytical.
Box 62–T–4, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER in fractional distillation, B.S., 30, married, six years' experience in operation, design, research and development in benzol industry; especially experienced in toluol purification. Desire work in petroleum, coal-tar or industry connected with their design and construction.
Box 65–T–4, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER. B. of Ch.E. 1940. Experienced in chemical economics; preparing critical law material consumption surveys for priority reports, production planning, standard cost analysis, power conservation. Presently employed by large out-of-town dyestuff manufacturer. Desires similar position N. Y. C. or vicinity. Age 25, draft 3A.
Box 70–T–4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST ORGANIC, six years production and development work on solvents, varnishes and synthetic chemicals. B.S. degree. Graduate work, defense courses. Age 27, married, citizen.
Box 74–T–4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., June 1942, desires research position. Thorough basic training in all branches of chemistry and in bacteriology. Research in heterocyclics, sulfanilamides, and natural products. Linguistic ability. Member of Organic Division. Age, 23, unmarried. Protestant.
Box 80–T–4, Ind. & Eng. Chem., Easton, Pa.

COLLEGE TEACHING or research, organic major M.S. 1940, two years' experience as graduate assistant in general and organic chemistry. Two years' experience as production chemist. Available within reasonable notice.
Box 88–T–4, Ind. & Eng. Chem., Easton,

WOMAN CHEMIST B.A. in May 1942 from A.C.S. accredited university. Honor graduate with 44 semester hours in Chemistry. Eastern location preferable.
Box 98–T–4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S. in 1942. Good background in biochemistry, bacteriology, food analysis, organic, inorganic, physical and analytical chemistry. Desires position with industrial or pharmaceutical firm. Location immaterial. Unclassified for selective service. Available in May. Excellent references.
Box 105–T–4, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, eight years' experience in research, development, specification, applications of vinyl type resins and coatings. Interested in plastics and synthetic rubber. B.Ch.E., M.Sc., age 31, married, class 3-A, Protestant, employed non-defense.
Box 119–T–4, Ind. & Eng. Chem., Easton, Pa.

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Box 13–T–4, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: 100 grams of nicotinamide, 100 grams 8-hydroxyquinoline, 100 grams hexylresorcinol, 200 grams coumarin, 200 grams nicotinic acid, and 100 grams diphenylamine. Offers solicited.
Box 14–T–4, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Cenco spectrograph, 18 months old, perfect condition, grating of exceptional quality, complete auxiliary equipment including power control unit.
Box 17–T–4, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: 1000 pounds Beryllium Copper Scrap, 2½% Beryllium, 100 pounds Portuguese Wolframit, large lumps, 2 tons each Strontium, Carbonate, Nitrate, 5 tons Cerium Chloride Tech, 100 tons Black Oxide Iron Magnetic, Ton Antimony Metal Powder, Ton Ground Beryl.
Box 60–T–4, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Chemical Abstracts Vol. 6 to 35 inclusive; first and second decennial index; J.A.C.S. Vol. 45 to 63; Ind. Eng. Chem. Vol. 12 to 33; Anal. Ed. Vol. 1 to 13; News Ed. Vol. 10 to 19; J. Chem. Educ. Vol. 1 to 18; School Science Review numbers 67 to 76. All unbound in good condition. Location Washington, D. C. Any reasonable offer for all or part will be accepted.
Box 64–T–4, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: "Journal de Pharmacie et de Chimie": 1816–1834, 1854–1870, 1873, 1884–1908, bound; "Bulletin, Societe Chimique de France": 1889–1902, 1907–1911, 1914, 1917–1918, 1925–1935. W. Westerfield, 7 Hobart Street, Bronxville, N. Y.

FOR SALE, immediate delivery, Spencer Binocular Microscope, (2) Monocular Microscopes with 3 objectives, Schmidt & Haensch Polarimeter, Gaertner Cathetometer, Gaertner, Spectrophotometer Unit, Micrometer Measuring Microscope, (2) Rotary Microtomes, Leeds & Northrup Potentiometers-Eppley Standard Cells, L. & N. Galvanometer, (2) Bausch & Lomb Dubosq Colorimeters, (5) Compound 2 Objective Microscopes, (8) Torsion Scales all types, Analytical Balances, Pulp Balances, Specific Gravity Balance, etc. Write for full list or send us your wants, The Laboratory Exchange, 24 E. 21st St., N. Y. C.

FOR SALE, In stock for immediate delivery, (2) Organic Combustion Furnaces three section type, (3) Freas 12 × 12 Double Wall Drying Ovens, Freas Carius Oven, Freas Vacuum Oven, Thelco Large Incubators, (3) International Centrifuges size SB and size 2 with all Accessories, (3) Horizontal Sterilising Autoclaves Double wall Dial lock door various sizes, Hanovia Ultra Violet Quartz Lamps, Watson Stillman 12 × 12 Hydraulic Press, DeLaval Purifier, De-Laval Disk Clarifier, (3) Barnstead Water Stills for gas or Electric Vacuum Pumps, Mercury Barometers Pellin Types, etc., write us your needs for immediate quotation, The Laboratory Exchange, 24 E. 21st St., N. Y. C.

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FOR SALE: A complete set of the first series of the Zeitschrift füer physikalische Chemie, volumes 1–107, inclusive, with indices. The volumes are bound in cloth, except the first sixteen volumes which are in half-leather. For information apply to
Box 114–T–4, Ind. & Eng. Chem., Easton, Pa.

WANTED: New or used hand or power mill with six to eight inch diameter horizontal stone or acid-proof porcelain grooved grinding surfaces, similar to A. H. Thomas Company catalog No. 4264. Quote price in reply to Northern Regional Research Laboratory, 825 North University Street, Peoria, Illinois.

WANTED: Rubber mill, 10" × 24" rolls or thereabouts, in A-1 condition; also miniature mill, approximately 2" × 6" rolls.
Box 31–T–4, Ind. & Eng. Chem., Easton, Pa.

WANTED: substantial quantities Histamine Diphosphate, Histidine Monohydrochloride, Rhamnose, Calcium Levulinate, Asparagin, Sodium Glutamate. Advise price and quantities available for immediate or definite future delivery.
Box 35–T–4, Ind. & Eng. Chem., Easton, Pa.

WANTED: LABORATORY apparatus and equipment urgently. We wish to purchase all standard laboratory instruments such as Abbe Refractometers, Polarimeters, Microscopes, Spectroscopes, cameras, binoculars, accessories, lenses, measuring microscopes, micrometers, objectives, evepieces, mechanical stages, balances, Spectrographs, etc., complete laboratories, or single items. Offer us your surplus equipment now, write or wire or phone us for immediate attention, The Laboratory Exchange 24 E. 21st St., N. Y. C.

WANTED for PRIVATE library only important chemical books and journals, American and Foreign. State condition, author, title, publisher, year of publication. Would also purchase complete private or corporation libraries. Dr. G. H. Fransius, 201 East 82nd Street, New York, N. Y.

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CHEMICAL AND ENGINEERING NEWS

HARRISON E. HOWE, Editor

PUBLISHED BY THE AMERICAN CHEMICAL SOCIETY

VOLUME 20 MAY 10, 1942 NUMBER 9

A. C. S. Memphis Meeting

Directors' Minutes

THE Board of Directors of the AMERICAN CHEMICAL SOCIETY met in Room 213 of the Peabody Hotel, Memphis, Tenn., at 8:20 P. M., April 19, 1942. Thomas Midgley, Jr., Chairman of the Board, presided, and the following Directors were present: L. H. Adams, Roger Adams, Robert T. Baldwin, E. K. Bolton, Willard H. Dow, William Lloyd Evans, Per K. Frolich, Harry N. Holmes, Charles L. Parsons, R. E. Swain, and Charles A. Thomas. Alden H. Emery was present by invitation.

It was moved, seconded, and carried that the minutes of the previous meeting be approved.

Thomas Midgley, Jr., was unanimously re-elected Chairman of the Board of Directors, and he, together with the President, the President-Elect, the immediate Past President, the Secretary, and the Treasurer, were elected as an Executive Committee.

The Secretary presented an ad interim report on the condition of the SOCIETY, and the Board recommended that this be presented to the Council at its meeting the following day (see Council Minutes, page 579).

A report of the Finance Committee was received, accepted, and ordered placed on file.

It was moved, seconded, and carried that because of mounting costs of labor and material an increase in compensation of 5 per cent be made to the Mack Printing Co., Easton, Penna., as outlined in a letter from the company dated February 19, 1942, the new rate to be retroactive to April 1, 1942, and to be incorporated in the contract now existing between the Mack Printing Co. and the AMERICAN CHEMICAL SOCIETY.

It was moved, seconded, and carried that the AMERICAN CHEMICAL SOCIETY Chapter of Student Affiliates at the Alabama Polytechnic Institute be dropped from the roles because of failure to comply with regulations approved by the Board of Directors on September 6, 1937. For some time the chapter's membership has been below the minimum number required under the rules.

It was moved, seconded, and carried that the ad interim report of the Committee on Economic Status be placed on file.

It was moved, seconded, and carried that an additional appropriation of $2,000 be added to the 1942 budget for expenses of the Committee on Economic Status.

It was moved, seconded, and carried that the report of progress of the Committee on Chemical Service to Medicine be accepted and placed on file.

At 12:03 A. M., April 20, just prior to adjournment, it was moved, seconded, and carried that all motions above recorded be approved. There being no further business, the meeting adjourned.

CHARLES L. PARSONS, *Secretary*

A. C. S. Meeting Registrations

YEAR	PLACE AND DATE	REGISTRATION
1935	New York, N. Y., April	5105
1935	San Francisco, Calif., August	1111
1936	Kansas City, Mo., April	1491
1936	Pittsburgh, Penna., September	2904
1937	Chapel Hill, N. C., April	2155
1937	Rochester, N. Y., September	3483
1938	Dallas, Tex., April	1093
1938	Milwaukee, Wis., September	2871
1939	Baltimore, Md., April	4024
1939	Boston, Mass., September	3924
1940	Cincinnati, Ohio, April	3514
1940	Detroit, Mich., September	4206
1941	St. Louis, Mo., April	3960
1941	Atlantic City, N. J., September	5021
1942	Memphis, Tenn., April	2324

Council Policy Committee Minutes

THE Council Policy Committee met at 3:30 P. M. in Room 1101 of the Peabody Hotel, Memphis, Tenn., April 19, 1942, with President Harry N. Holmes in the chair and Messrs. Robert T. Baldwin, Erle M. Billings, E. J. Crane, G. J. Esselen, Wm. Lloyd Evans, Per K. Frolich, Arthur B. Lamb, Thomas Midgley, Jr., Charles L. Parsons, and Walter A. Schmidt present.

The committee requested the President to appoint Per K. Frolich and Paul D. Bartlett as representatives of the AMERICAN CHEMICAL SOCIETY on the Division of Chemistry and Chemical Technology of the National Research Council for the period July 1, 1942, to June 30, 1945.

After careful consideration of possible loci for AMERICAN CHEMICAL SOCIETY meetings in 1945, the committee recommended to the Council that any decision in regard thereto be delayed until a later date.

A successor to Wm. A. Noyes, deceased, Editor of Scientific Monographs, was considered. A communication received from the members of the Board of Scientific Monographs showed that all members of the board were of the unanimous opinion that the work should be carried on by Harrison E. Howe. Recommendation was made to the Council that Dr. Howe be elected and that he be recorded as "Editor of Monographs".

The meeting then adjourned.

CHARLES L. PARSONS, *Secretary*

Future A. C. S. Meetings

September 7 to 11, 1942	Buffalo, N. Y.
Spring of 1943	Indianapolis, Ind.
Fall of 1943	Minneapolis, Minn.

The Council Meeting

THE Council of the AMERICAN CHEMICAL SOCIETY met in the Ballroom, Peabody Hotel, Memphis, Tenn., at 9:40 A. M., April 20, 1942, with President Holmes presiding and the following Councilors present:

Councilors and Substitutes

Ex Officio. L. H. Adams, Roger Adams, Robert T. Baldwin, Edward Bartow, L. W. Bass, Shailer L. Bass, Erle M. Billings, E. K. Bolton, F. E. Brown, S. M. Cantor, E. J. Crane, Willard H. Dow, Wm. Lloyd Evans, W. Conrad Fernelius, Per K. Frolich, John H. Gardner, Harrison Hale, E. H. Harvey, Harry N. Holmes, C. S. Howard, Arthur B. Lamb, S. C. Lind, Thomas Midgley, Jr., Ben H. Nicolet, Charles L. Parsons, Orin W. Reese, Jos. K. Roberts, G. L. Royer, Walter A. Schmidt, Lee I. Smith, Robert E. Swain, Charles A. Thomas.

Councilors-at-Large. Wm. Mansfield Clark, Gustav Egloff, Henry Gilman, Edward Mack, Jr., Carl S. Marvel, W. A. Noyes, Jr.

Local Sections. *Akron*, A. J. Gracia (subs.), E. E. Gruber (subs.), E. G. Haas. *Alabama*, Ellis S. Hertzog (subs.), J. Thompson Vann. *Ames*, Harvey C. Diehl (subs.), L. A. Underkofler. *Baton Rouge*, Cecil L. Brown, A. R. Choppin. *Binghamton*, Donald P. Germann (subs.). *California*, S. A. Ballard (subs.), Frederick Rust (subs.), W. E. Vaughan (subs.). *Central Pennsylvania*, A. J. Currier (subs.), N. B. Guerrant (subs.). *Central Texas*, Henry R. Henze, H. L. Lochte. *Chicago*, Howard Adler, M. H. Arveson (subs.), Weldon G. Brown (subs.), V. Conquest, James J. Doheny, Jr., L. M. Henderson, W. F. Henderson, Charles D. Hurd, Warren C. Johnson, Roger H. Lueck (subs.), L. E. May, E. E. Moore (subs.), Marjorie B. Moore (subs.), Marvin C. Rogers, B. E. Schaar, C. M. Suter (subs.), A. W. Weston (subs.). *Cincinnati*, John S. Brod (subs.), E. W. Eckey (subs.), W. H. McAllister (subs.), C. C. Ruchhoft. *Cleveland*, E. A. Arnold, H. S. Booth, Amos G. Horney (subs.), C. F. Prutton (subs.). *Colorado*, L. C. Atchison (subs.), H. B. Van Valkenburgh (subs.). *Columbus*, Cecil E. Boord, Wallace R. Brode (subs.) M. L. Wolfrom. *Connecticut Valley*, Samuel E. Q. Ashley (subs.). *Dallas–Fort Worth*, W. H. Clark, J. L. Whitman. *Dayton*, M. E. Haas, Austin M. Patterson. *Delaware*, R. Max Goepp, Jr., Robert T. Hall (subs.), H. A. Lubs (subs.), A. M. Neal (subs.), Emil Ott, G. H. Pfeiffer (subs.), J. H. Shipp (subs.), H. W. Starkweather. *Detroit*, G. Calingaert, Lynne L. Merritt, Jr. (subs.), Helen I. Miner, Arthur Rautenberg, L. A. Sweet, Thomas H. Vaughn. *East Tennessee*, J. H. Wood. *Eastern New York*, Arthur Knudson, A. L. Marshall. *Erie*, John L. Parsons (subs.). *Florida*, J. P. Bain, Allen T. Cole. *Georgia*, Harold B. Friedman (subs.), J. S. Guy. *Indiana*, Wm. Higburg, Edward J. Hughes (subs.), J. L. Riebsomer, Auburn A. Ross (subs.). *Iowa*, W. G. Eversole. *Kanawha Valley*, R. W. Gaines (subs.), Whitfield Price, J. N. Wickert (subs.). *Kansas City*, James A. Austin, R. Q. Brewster. *Kansas State College*, H. H. King. *Lehigh Valley*, F. S. Eisenhauer (subs.), Wm. H. Holst (subs.), Carl D. Pratt. *Lexington*, W. A. Hensley. *Louisiana*, A. Watson Chapman (subs.), Harry P. Newton. *Maryland*, Hubert B. Bramlet (subs.), Walter H. Hartung, P. K. Leatherman (subs.), Kenneth L. Waters (subs.). *Memphis*, J. R. Meadow. *Michigan State College*, D. T. Ewing. *Midland*, Edgar C. Britton. *Milwaukee*, John R. Koch (subs.). *Minnesota*, H. H. Barber (subs.), Geo. O. Burr, W. M. Lauer, R. C. Sherwood (subs.). *Nashville*, Ward C. Sumpter. *Nebraska*, C. S. Hamilton (subs.). *New Haven*, Clinton Doede. *New York*, Orville N. Breivik (subs.), Charles L. Gabriel (subs.), T. C. Heisig (subs.), Arthur W. Hixson (subs.), Wm. R. Johnston, A. R. Kemp (subs.), D. H. Killeffer, R. E. Kirk (subs.), Victor K. LaMer (subs.), W. E. Manring (subs.), Glennard E. Miller (subs.), S. P. Miller, L. P. Moore (subs.), Walter J. Murphy (subs.), Wm. F. O'Connor, Donald Price, E. Whitman Rice, R. L. Sawyer (subs.), Alfred S. Schultz (subs.), Foster Dee Snell, Florence E. Wall (subs.). *North Carolina*, R. W. Bost, P. M. Gross. *North Jersey*, M. L. Crossley, A. M. Erskine (subs.), Robert J. Moore, J. L. K. Snyder (subs.), Maxwell Tishler (subs.). *Northeast Tennessee*, Jack James Gordon (subs.). *Northeast Wisconsin*, Harry F. Lewis. *Northeastern*, Chester M. Alter, Allen D. Bliss (subs.), Gustavus J. Esselen, John J. Healy, Jr., Robert C. Hockett (subs.). *Northern West Virginia*, James L. Hall (subs.). *Oklahoma*, B. W. Logue, Otto M. Smith (subs.). *Omaha*, Christopher L. Kenny. *Pennsylvania–New York Western Border*, Ralph W. Hufferd. *Peoria*, Robert D. Coghill. *Philadelphia*, S. W. Ferris (subs.), A. B. Hersberger (subs.), Alfred E. Hirschler (subs.), J. M. McIlvain (subs.), R. S. Shutt (subs.), Glenn E. Ullyot (subs.). *Pittsburgh*, Frederick W. Adams, L. H. Almy, C. F. Bailey (subs.), H. H. Craver (subs.), G. G. Eldredge (subs.), A. L. Robinson (subs.), E. K. Wallace. *Princeton*, Hugh S. Taylor. *Purdue*, Ed. F. Degering (subs.). *Rhode Island*, N. W. Rakestraw. *Rochester*, John A. Temmerman (subs.). *St. Joseph Valley*, Kenneth N. Campbell (subs.). *St. Louis*, Wm. H. Elliott (subs.), W. R. Fetzer (subs.), R. B. Semple, Franklin D. Smith (subs.), V H. Wallingford (subs.). *Sioux Valley*, Alvin L. Moxon (subs.). *South Carolina*, J. E. Mills. *South Jersey*, Henry G. Berger, J. M. Tinker, W. V. Wirth (subs.). *Southeast Tennessee*, Wm. O. Swan (subs.). *Southeastern Texas*, Robert J. Lee (subs.), R. H. Price. *Southern California*, Arnold O. Beckman (subs.), W. A. Bush, J. B. Ramsey, Wm. G. Young (subs.). *Syracuse*, A. L. Elder, A. P. Julien (subs.). *Texas A. & M.*, A. R. Kemmerer (subs.). *University of Illinois*, B. S. Hopkins (subs.), Frank H. Reed (subs.). *University of Michigan*, H. H. Willard. *Virginia*, Wortley F. Rudd (subs.), John H. Yoe. *Virginia Blue Ridge*, J. W. Watson. *Washington*, W. D. Collins, Nathan L. Drake, Alden H. Emery (subs.), F. O. Rice, Frederick D. Rossini, Edward Wichers. *Western Connecticut*, Harry L. Fisher, Lois W. Woodford. *Western New York*, Max E. Bretschger (subs.), Lawrence H. Flett (subs.), A. E. Jennings, Jr. (subs.), H. O. Kauffmann (subs.), Maurice C. Taylor. *Western Vermont*, P. Conant Voter (subs.). *Wilson Dam*, J. W. H. Aldred. *Wooster*, Roy I. Grady.



The Council voted to approve the minutes of the Atlantic City meeting as printed.

The Secretary read the following list of members reported as deceased since the Council met at Atlantic City, and the Councilors stood for a few moments in silent tribute to their memory:

Deceased Members

Aguilar-Santillan, Rafael
Arnold, Henry C. F.
Averill, Eugene A.
Blanc, Charles
Bliss, A. Richard, Jr.
Bollinger, Thomas W.
Branegan, James A.
Brown, Brian S.
Bush, James M.
Carpenter, Harry A.
Conlon, James J.
Cruser, Frederick V. D.
Currier, E. E.
Davis, A. B.
Dozier, Wilbur M.
DuPont, Francis I.
Eimer, August
Elliot, Thomas G.
Flanigan, George E.
Foote, H. W.
Francis, Francis E.
Freas, Raymond
Fuller, R. Clinton
Galewsky, Paul
Getman, Frederick H.
Grove, John M.
Hadley, E. R.
Hake, Donald S.
Harrar, Norman J.
Harrod, J. R.
Hayden, H. P.
Heckel, George B.
Henderson, Lawrence J.
Higbie, Ralph W.
Hills, Franklin G.
Ioannu, John H. P.
Iwanoff, Nicolai N.
Jackson, Daniel D.
Jahn, Francis P.
Johnson, Harold
Jones, G. H.
Kipp, Theodore
Kirschberg, Bradley H.
Knight, Charles M
Kresge, Robert E.
Lewis, Daniel C.
Lippincott, William L.
Lowy, Alexander
McElroy, K. P.
Mackie, Robert F.
Michael, Arthur
Miller, A. B.
Morse, Charles W.
Murphy, A. J.
Murray, W. C. R.
Nernst, Walter[1]
Nibelius, Axel W. T.[2]
Norton, T. H.
Noyes, William A.[2]
Park, Charles R.
Pensel, George R.
Perkins, Robert L.
Pincussen, Ludwig
Roberts, John A.
Schoenheimer, Rudolf
Scoville, Wilbur L.
Segerblom, Wilhelm
Shively, W. L.
Stafford, Orin F.
Surprenant, L. C.
Welin, John E.
Whedbee, Edgar
Wiener, Renee v. E. (Mrs.)
Wikoff, Alan G.
Willey, Leland M.
Yngve, Victor
Zimmer, Benedict F.

[1] Honorary member.
[2] Emeritus member.

At the direction of the President, the Secretary then read the following Statement of Condition of the Society:

The AMERICAN CHEMICAL SOCIETY assumes no responsibility for the statements and opinions advanced by contributors to its publications.
Published by the AMERICAN CHEMICAL SOCIETY, Publication Office, 20th & Northampton Sts., Easton, Penna. Editorial Office, 1155 16th St., N. W., Washington, D. C.; Telephone, Republic 5301; Cable, Jiechem (Washington). Advertising Department, 332 West 42nd St., New York, N. Y.; Telephone, Bryant 9-4430. Entered as second-class matter at the Post Office at Easton, Penna., under the act of March 3, 1879, as 24 times a year on the 10th and 25th. Acceptance for mailing at special rate of postage provided for in Section 1103, Act of October 3, 1917, authorized July 13, 1918.
Annual subscription rate, $2.00. Foreign postage to countries not in the Pan American Union, $0.60; Canadian postage, $0.20. Single copies, $0.15. Special rates to members.
No claims can be allowed for copies of journals lost in the mails unless such claims are received within 60 days of the date of issue, and no claims will be allowed for issues lost as a result of insufficient notice of change of address. (Ten days' advance notice required.) "Missing from files" cannot be accepted as the reason for honoring a claim. Charles L. Parsons, Business Manager, 1155 16th St., N. W., Washington, D. C., U. S. A.

Statement of Condition of the Society

THE AMERICAN CHEMICAL SOCIETY is still growing in numbers, in prestige, and in influence, far more so than those who have been in closest touch with its progress had any reason to hope. It means that American chemists are more and more realising that the AMERICAN CHEMICAL SOCIETY is their friend, is interested in their welfare, is doing all it can to enable them to develop themselves, and that membership in the SOCIETY is a catalyst to success. Its efficacy is not always appreciated by indivduals who lack real professional consciousness.

The SOCIETY now has 30,400 members, of which slightly over 3,000 have joined in 1942. Inasmuch as our publications can no longer be sent to foreign countries and since payment cannot be received therefrom, there has been a loss of approximately 1,000 subscribers to the *Journal of the American Chemical Society*, 1,400 to *Chemical Abstracts*, 1,600 to *Industrial and Engineering Chemistry*, and 1,400 to CHEMICAL AND ENGINEERING NEWS. In spite of this, on April 1, 1942, there was the following increase in subscribers as compared with April 1, 1941: *Journal of the American Chemical Society* 60; *Industrial and Engineering Chemistry* 431; and CHEMICAL AND ENGINEERING NEWS 1,481. The subscription list of *Chemical Abstracts*, on the other hand, on account of large foreign circulation, decreased 342 between these dates. Income from subscriptions, since the increase was largely due to subscriptions at the special rates given to members, is so far approximately $7,000 less in 1942 than on the same date in 1941.

The Committee on the Professional Training of Chemists has collected complete lists of the students in our colleges and has sent a special questionnaire to these students for registry in the National Roster of Scientific and Specialized Personnel. At this meeting, the committee has been in session for four days and evenings, continuing its strenuous labors in studying and accrediting the chemical departments of our educational institutions. The SOCIETY owes the members of this commttee a debt of gratitude for accomplishments which are having, and will continue to have, a far-reaching effect on our professional standing and on the quality of the chemists and chemical engineers whose services are in future to be utilized by our country.

The Employment Clearing House is again functioning at this meeting, and continues to give unusual opportunities to members for contact with our best employers, thus rendering a service unsurpassed by any professional group. In order that those principles may be implemented, it is open only to employers who agree to the basic principles laid down by the Board of Directors in its action taken at Atlantic City on "Employer-Employee Relationships" (NEWS EDITION, 19, 1014, September 25, 1941). A number of firms have written the SOCIETY that they were carefully revising their salary lists of employees to meet at least the minima set by the Directors, and a number of firms have stated that they are, and have been, exceeding the salaries recommended for graduate chemists and chemical engineers. Reports coming from our colleges make it evident that the young men being graduated this year are receiving distinctly higher offers of compensation than in previous years. Unfortunately, this is not true of all employers and explains in part the number of individuals registering for employment, or change of employment, in the Employment Clearing House. Practically all of those registered are seeking change of employment, the number of unemployed registrants being negligible.

The AMERICAN CHEMICAL SOCIETY Committee on Cooperation with the National Defense Research Committee sent out a questionnaire last December, the results of which were embodied in "The 'Production Army' *vs.* the 'Combat Army'" which appeared in the February 10 CHEMICAL AND ENGINEERING NEWS. This, too, has had its influence on a desire for change of employment, but it has been especially helpful in convincing authorities directing the war efforts that there is a very serious scarcity of chemists and chemical engineers for the "Production Army", and that replacements for any who may be inducted are not available unless other serious vacancies are created.

Expenses for paper and printing are increasing. The Directors have found it necessary to modify the SOCIETY'S contract with the Mack Printing Co. to help meet additional costs forced upon the company in connection with labor and materials. Nevertheless, it is anticipated that with the increased support from American chemists we will again be able to balance our budget.

One of the SOCIETY'S most noteworthy accomplishments of the past year was the definite establishment of the full professional status of our members and the legal recognition of graduate chemists and chemical engineers as professional men. Today full membership in the AMERICAN CHEMICAL SOCIETY is a far better guarantee of professional standing and status than can be given by any state licensing board. Through the interest, encouragement, and support given by the AMERICAN CHEMICAL SOCIETY to its members at the Shell Development Co., Emeryville, Calif., it has been legally established that professional men cannot be forced to submit to inclusion in any organization controlled by heterogeneous groups of nonprofessional men. It is a decision of far-reaching importance to the chemical profession, as outlined in the article on page 165 of the February 10 issue of CHEMICAL AND ENGINEERING NEWS. The National Labor Relations Board decision, No. R-3245, and briefs containing a compilation of the laws governing these cases, are available to groups of our members who may be threatened with coercion. All of this was promised to the membership when the Committee on Economic Status was appointed. This committee has been exceedingly active and its report, presented at this meeting, will be published in detail in CHEMICAL AND ENGINEERING NEWS and reprinted as a separate document. It will bring much important and useful information to the chemical profession.

The Secretary's office has been especially concerned with, and active in, problems affecting the proper allocation of chemists and chemical engineers in the country's war effort. It is recognized and admitted that the normal place for chemically qualified men is in the Production Army. True patriotism requires them to serve there. Without them the combat forces simply cannot be supplied with the materials and implements of warfare. On the whole, Selective Service has functioned efficiently. General Hershey and his corps of assistants are exceeded in efficiency and intelligence by no other group in the Army or Navy. The local boards are made up of patriotic citizens and, in the main, of intelligent citizens. It would be surprising if all of the 6,600 local boards contained men who were capable of judging the importance to the war effort of graduate chemists and chemical engineers. Many mistakes have been made. Several hundred chemists and chemical engineers, including some with seven years of training and additional years of experience, have been inducted into the Army and are now functioning as stretcher bearers, orderlies, pharmacists' clerks, and in other necessary occupations but in which high school graduates could function with equal efficiency. As a consequence, their years of special training and experience are lost to the country. For reasons which no one can explain, there are apparently no channels in the War Department through which this manpower can be assigned to chemical work, either in the Production or Combat Armies. The situation is as serious as if graduates of West Point were assigned to the ranks as privates. All efforts to remedy this situation have completely failed, notwithstanding that the entire matter has been forcefully presented to high authority. In many instances also students of chemistry and chemical engineering have not been allowed to complete their courses. This procedure is certain to deplete future supply should the war continue. These mistakes, however, have been caused by a few of the local boards only and are not the rule. When appeals are properly made, and when details can be sent in time to Selective Service Headquarters, deferment for service in the Production Army is usually secured. Once inducted,

the best trained chemists and chemical engineers are simply "genus homo" and at present nothing can be done toward utilizing their special ability and experience in the country's service.

In contacting local boards, employers should call attention to Selective Service Memoranda I-347, I-398, and I-405. If the men who have been called in the draft are necessary men in work essential to the national health, safety, and interest and to the war effort, the employer should make every effort to see that deferment is allowed. If the local board refuses, the case should be appealed immediately to the Appeal Board. When an appeal is taken, but not before, if the employer will send to the Secretary of the AMERICAN CHEMICAL SOCIETY'S office a copy of Form DSS 42A used in the appeal, together with the selectee's number and local board number and address, the case will be referred to Selective Service Headquarters for such advice and recommendation as the premises may warrant. Such appeals, when justified, have usually been granted. Eliminating previously mentioned errors, chemists and chemical engineers of America, with the exception of those brought into the Army through their commitments as reserve officers, are engaged in the Nation's war effort where they feel they can serve best.

The AMERICAN CHEMICAL SOCIETY has today a list of 60,000 individuals, with data as to the training and experience of each, who believe themselves to be chemists or chemical engineers. It has been of inestimable value to the SOCIETY and has greatly helped to implement its aid to both the Production and Combat Armies.

It was reported that the Council Policy Committee had reached the unanimous conclusion that it would be unwise at this time to attempt to set any loci for 1945 meetings. It was further stated that no invitation had been received for the spring meeting of 1944.

The Council approved the petition for the formation of a local section with headquarters at Poughkeepsie, N. Y., to be known as the Mid-Hudson Section, with territory comprising the Counties of Dutchess, Orange, Putnam, and Ulster in the State of New York.

H. C. Urey and H. B. Hass were unanimously elected Councilors-at-Large to fill the terms of Per K. Frolich and Charles A. Thomas, expiring December 31, 1942 and December 31, 1943, respectively, Dr. Frolich having been elected President-Elect of the SOCIETY and Dr. Thomas Director-at-Large. Messrs. Urey and Hass received the next highest votes in the last election for the positions to which they have now been unanimously elected.

An amendment to the By-Laws of the Division of Biological Chemistry was approved. This amendment changes the term of office of the Secretary-Treasurer from one to three years and provides for his triennial rather than annual election.

On the unanimous recommendations of the Associate Editors of Scientific Monographs, Harrison E. Howe was elected to fill the unexpired term of William A. Noyes, deceased, Editor of Scientific Monographs, and on recommendation of the Council Policy Committee it was voted that the office be now designated "Editor of Monographs".

The Council instructed the Secretary to send a telegram of greetings to Editor Howe, who was unable to attend, to let him know that he was missed.

On recommendation of the Supervisory Committee on Standard Methods of Analysis, the Council adopted a revision of the Standard Methods for the Sampling and Analysis of Commercial Soaps and Soap Products, Revised (*Ind. Eng. Chem., Anal. Ed.*, 9, 2, 1937). The revised methods will be printed in the *Analytical Edition* of *Industrial and Engineering Chemistry*.

On recommendation of the Supervisory Committee on Standard Methods of Analysis, the Council adopted the revised specifications for F. A. C. Titer Test Thermometer as recommended by the Committee on Analysis of Commercial Fats and Oils.

A special vote of appreciation and thanks was given W. D. Collins for his many years of efficient accomplishment and hard work as Chairman of the Committee on Analytical Reagents.

Upon the recommendation of Thomas Midgley, Jr., Chairman of the Committee on Professional Status, the Council voted that the committee be disbanded with thanks.

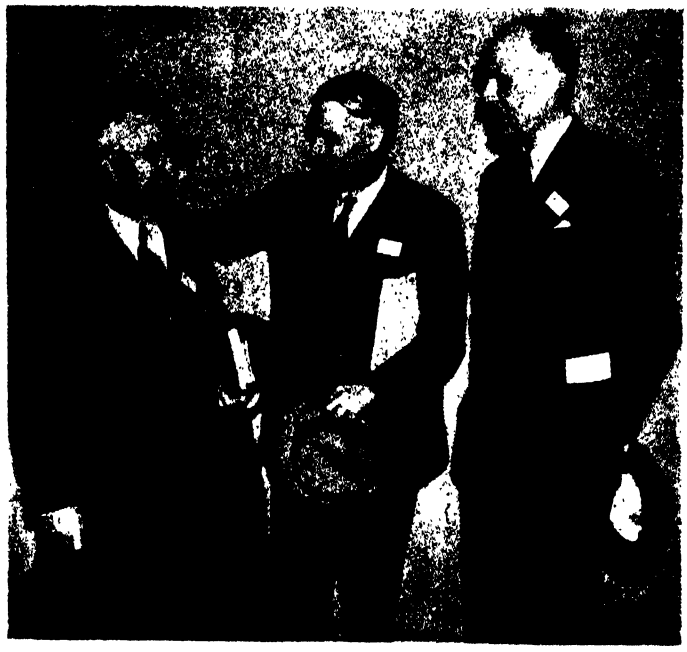
The reports of committees for the year April 1941 to April 1942 were presented and approved and will be found on page 595 of this issue unless otherwise noted.

The Council voted that President Holmes be requested to appoint a committee of six to consider the feasibility and practicability of utilizing in this emergency the services of retired chemists, and to report its findings at the Buffalo meeting.

The Secretary was instructed to send the unanimous thanks of the Council to the local section officers, committees, and individuals who contributed to the success of the Memphis meeting.

The Council then adjourned.

CHARLES L. PARSONS, *Secretary*



Guardians of the A. C. S.—the most recent Past President Wm. Lloyd Evans, President H. N. Holmes, and President-Elect Per K. Frolich

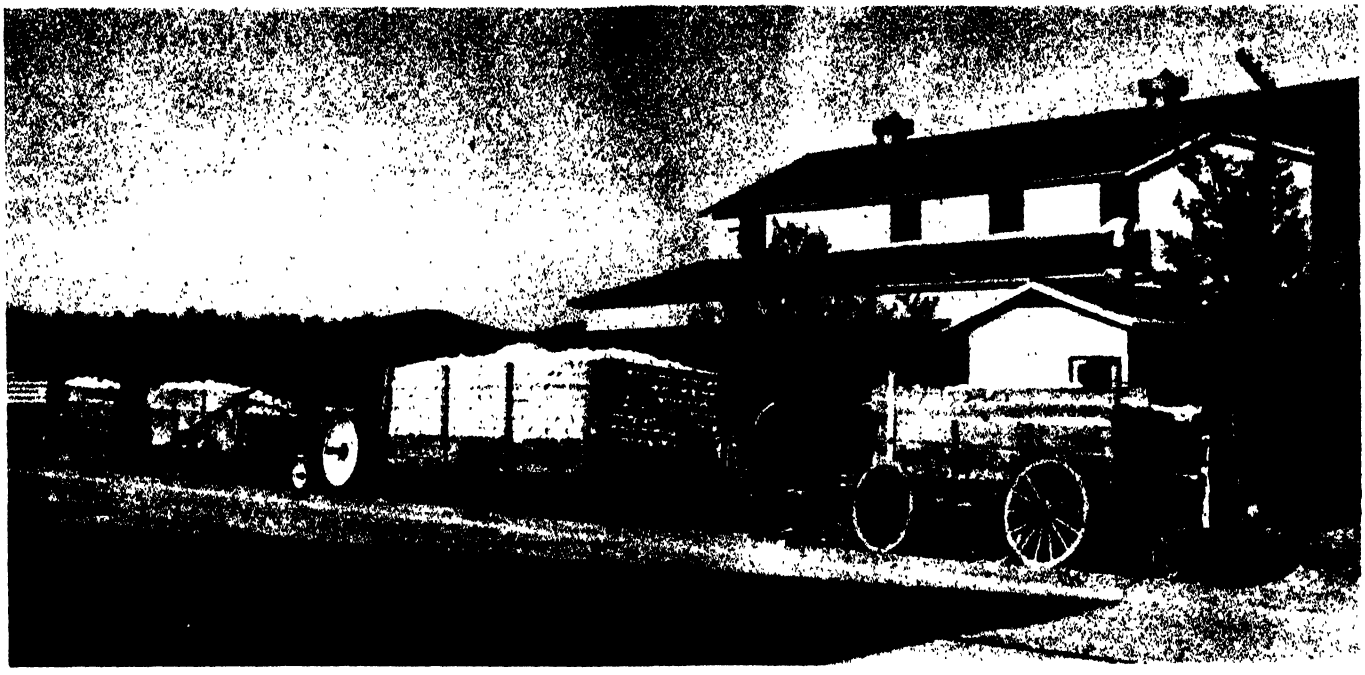
Memphis Meeting Abstracts

A FEW sets of planographed books of abstracts of papers presented at the recent Memphis meeting are still available from the A. C. S. News Service, 1155 Sixteenth St., N. W., Washington, D. C. The price is 50 cents per copy if order is accompanied by remittance and divisional receipt card; $1.00 per copy if order is accompanied by remittance but without receipt card; and $1.50 if bill must be rendered.

Harry E. Barnard Honored

THE Division of Agricultural and Food Chemistry honored its oldest living Past Chairman, Harry E. Barnard, at a complimentary luncheon at the 103rd meeting of the AMERICAN CHEMICAL SOCIETY in Memphis. Chairman E. H. Harvey presented a certificate commemorating the 30th anniversary of Dr. Barnard's chairmanship of the division, together with a bound volume of congratulatory letters received from students, professional associates, and old friends who were unable to be present.

Many past chairmen of the division were present. Secretary Parsons, Dr. Barnard's first teacher in chemistry and a close personal friend during the last 40 years, briefly reminisced about their early days in New Hampshire.



U. S. D. A. PHOTO BY FORSYTHE

Cotton—Yesterday, Today, and Tomorrow[1]

HENRY G. KNIGHT

Bureau of Agricultural Chemistry and Engineering, United States Department of Agriculture, Washington, D. C.

Up to the present the work of mechanical and textile engineers has been more influential than that of chemists in the development of the cotton-textile industry. Nevertheless, the contributions of chemistry have been most essential to this development.

The principal applications of chemistry in the cotton-textile industry have been in the bleaching, dyeing, and finishing of fabrics to make them more attractive, more useful, and more durable. The chemical treatments used to accomplish these ends may be classified into four groups, according to the manner in which they affect the fiber:

(1) Treatments that take undesirable substances out of the fiber, exemplified by scouring and bleaching;
(2) Treatments that add something to the fiber without altering the chemical composition of the underlying cellulose, exemplified by dyeing;
(3) Treatments that help to modify the form and density of the fiber, such as mercerization;
(4) Treatments that actually change the chemical composition of the fibers, without changing their form, exemplified by acetylation.

Scouring or purification of cotton goods, an example of the first group of treatments, is accomplished by a process known as kier boiling, which removes natural fats and waxes, mineral matter, and protein and pectic substances, together with any oil or grease acquired by the yarn during spinning and any warp-sizing materials present in the woven fabrics. In the early days of the industry cotton fabrics were sometimes bleached by the method used for linen—that is, by exposure to air and sunshine. It was later discovered that chlorine dissolved in lime water was more effective and by 1830 chlorinated lime became available in the form of a fairly stable powder. Since then most cotton fabrics have been bleached for use as white goods and in preparation for dyeing and printing.

The dyeing of cotton goods and other fabrics was originally an empirical process limited to the application of one of a few natural dyestuffs, after mordanting with a heavy metal salt (sometimes over tannin extract) to set the color. The first direct cotton dye (Congo Red) was used in 1884 and the first important azoic dye (Para Red) in 1889. Synthetic indigo became available in 1880, and other vat colors during the first decade of the present century.

Today, dyeing is a carefully controlled chemical process for which a vast array of synthetic dyestuffs of different classes, with appropriate mordants and fixing agents, developers, or other dyeing assistants for each class, have been made available through chemistry. Dyestuffs and printing colors and methods for applying them are among the most important contributions which chemists have made to the cotton-textile industry. The pleasing and permanent colors we have today are no doubt among the most important factors governing utilization of clothing and household fabrics.

In addition to dyeing and printing, other additive finishing treatments are often applied to cotton fabrics to impart properties that will make them more useful for special purposes or otherwise more acceptable to consumers—for example, mildewproofing, waterproofing, and fireproofing treatments. Substances can now be added to cotton fibers to make them resistant to mildew and other microorganisms which destroy cellulose, and occasionally chemicals are added to retard burning. But unfortunately the more effective flameproofing or so-called fireproofing agents are soluble in water and therefore easily removed by rain. Substances have also been added to cotton fabrics to make them water repellent.

Besides the additive finishing treatments for imparting mildew resistance, flame resistance, and water repellency to cotton textiles, there are many treatments of this class designed for special purposes. Some are applied to fabrics used for wrapping silverware or lining silver chests to make them absorb sulfur gases from the air and thus protect the silver from tarnishing. Others are intended to make cotton fabrics useful as substitutes for leather. And still others are intended to impart softness, stiffness, smoothness, luster, or some other special property to cotton fabrics.

[1] Abstract of an address before the general meeting at the 103rd meeting of the AMERICAN CHEMICAL SOCIETY, Memphis, Tenn., April 20 to 23, 1942.

The recent introduction of new chemical products, such as cellulose esters, cellulose ethers, synthetic resins, and other plastics, has made possible the development of new additive finishes for cotton clothing and household fabrics that are not removed by washing. Application of cellulose compounds to cotton fabrics has resulted in greatly improved materials for window shades and other uses. Another process, which prevents creasing and crushing of cotton fabrics, comprises the application of synthetic resin in an intermediate stage within the fibers, the resin on the surface being subsequently removed as completely as possible. By means of alkali-soluble cellulose ethers various permanent finishes have been imparted. One is a glossy finish like that of glazed chintz, and another is a finish having the appearance and feel of linen.

Mercerization is one of the most interesting and important of all the chemical treatments. The process, discovered by John Mercer in 1850, alters both the form and appearance of the cotton fiber. It causes the fabric to shrink considerably, but increases its strength and also the affinity of the cotton for dyestuffs. In this process the individual fiber, which ordinarily has the form of a flat twisted ribbon, swells, becomes almost cylindrical, and acquires a rough surface. One of the purposes of this treatment is to strengthen the fabric and permit dyeing to deeper shades. About 1890 it was discovered that under tension the fibers, which are distended and apparently softened by mercerization, are straightened and become smooth and lustrous. So today the mercerizing treatment is applied to cotton yarns and fabrics to give luster, as well as to increase strength and affinity for dyes.

There are only a few chemical finishing treatments for cotton of the fourth class—those that actually change the chemical composition of the fiber, without changing its form. Examples of such treatments are: acetylation of the cellulose fibers to produce cellulose sulfonic acid or other cellulose ester on the fiber surfaces, and production of a mixed ether of cellulose on the fiber by treating with a substituted quaternary ammonium salt and sodium acetate and decomposing the intermediate product with moderate heat.

These treatments, which actually change the composition of the fiber by producing cellulose compounds on the surface, open up a new field of research in chemical finishing of cotton textiles which invites further investigation.

In the United States the growing, handling, manufacturing, and utilization of cotton are closely entwined with our daily lives; in truth, it is a *part* of our very existence. This being so, the answer to the question of what the future holds for the cotton industry is of deep concern to everybody.

It is difficult to conceive of an industry so huge as the cotton-textile industry and producing such a wide variety of products, as not being prosperous during the extravagant years of the late 1920's. And yet the industry as a whole was not prosperous during that period.

The depression beginning in 1929 came when the industry was ill-prepared to do little more than try to keep losses at a minimum and wait until our national economy should take a turn for the better. There were signs of revival in the middle thirties, but by then new factors had come into the picture. So-called artificial silk, today universally known as rayon, was fast becoming a textile fiber of importance. Paper had acquired a strong foothold in many important uses, such as bags for food products and cement, where cotton and its competitor, burlap, had once reigned supreme. In the offing were nylon, vinyon, fiberglas, and other man-made fibers ready to enter the textile field. And here is a significant fact and a broad hint to the cotton industry—all these competing textile materials are the outgrowth of research. The cotton industry might not have suffered such an economic setback if it had put more faith in research and pushed it as hard as research was pushed by the developers of these competing synthetic fibers.

The present war prosperity, shared in full by the cotton-textile industry, tends to obscure the real condition of this industry. For decades leaders both in and out of the industry have pleaded strongly and worked tirelessly for an expanded research program to prepare the industry for the inevitable competition from textiles and other products which are better meeting the public needs for many uses. Many organizations of a private, public, and semipublic nature are now undertaking research on cotton. The Southern Regional Research Laboratory of the Bureau of Agricultural Chemistry and Engineering, United States Department of Agriculture, the National Cotton Council, with headquarters in Memphis, the Cotton Textile Institute, the Textile Foundation, the United States Institute for Textile Research, the American Association of Textile Chemists and Colorists, and many state and private universities, are either conducting or sponsoring research to increase the utilization of cotton. A few of the larger textile mills have organized their own research departments to improve the quality and lower the cost of their products.

Obviously, the properties of yarns and fabrics depend ultimately on the physical and chemical properties of the individual fibers. Although man has been remarkably ingenious in devising machinery for spinning and weaving cotton into fabrics with an almost unlimited variety of properties, he has been making use of cotton's inherent fiber properties in only an empirical manner. By trial and error he has found that cotton of certain varieties grown in certain localities is suitable for, say, tire cord, while other varieties grown in other localities are not. Moreover, there are comparatively few fabric uses for which even an empirical relationship of this nature has been established. Such a condition has existed partly because use requirements, in general, have never been carefully and systematically studied, and partly because only a few of the relevant fiber properties have been known or measurable.

Various scientists who have studied the structure of the cotton fiber have reported that the cellulose wall is made up of layers of fibrils alternately spiraling in opposite directions, but roughly parallel to the axis of the fiber. Studies of the fiber with all available facilities have led to the belief that the cellulose of cotton fibers exists in two forms—amorphous and crystalline. The general concept of the submicroscopic structure of cotton cellulose is that in some places the long-chain cellulose molecules are arranged substantially parallel to each other in parallel groups, or micelles, which are crystalline in character, and that some portions of molecules cross from one group to another through regions of porous or amorphous matter. The proportion of the cellulose molecules arranged in crystalline alignment determines the relative strength of the fibers. The cause of lower strength of cotton fibers, as compared to flax, ramie, or hemp, is the lower proportion of cellulose in crystalline structural alignment.

While the naturally poor alignment of cotton fiber is a fault from the tensile strength standpoint, it is advantageous from other standpoints. That cotton is one of the least brittle of vegetable fibers may be ascribed to the considerable proportion of amorphous cellulose, which in turn seems to be related to the poorer alignment of cellulose molecules. This lack of brittleness makes it possible for cotton fiber to withstand continued shock or impact—such, for instance, as in automobile tires—to a far greater extent than many other plant fibers.

Intensive and more comprehensive research is needed to explore the various physical and chemical properties of cotton fiber, to disclose their interrelationships, and to devise better means of measuring many of them, so that all these properties may be utilized in the best possible way. Sufficient research has already been done along this line to demonstrate its real value in connection with the development of new and improved cotton products. This is true not only from the standpoint of mechanical processing, but also from that of developing new and improved chemical treatments to alter or enhance the properties of cotton products.

There are many unsolved problems associated with the development of new and improved cotton products affecting mechanical processing machinery. Research on the development of cotton prod-

ucts is not new. The cotton-textile industry from its beginning has developed many hundreds of products. But very few of these have been developed by the use of scientific methods to determine the requirements for specific uses. This was only natural in an industry which during its growth period found markets for almost any type of staple fabric which could be produced. But today, considering that the present war demand for textiles is temporary, the industry is facing an entirely different problem. Competition from other fibers and products is keen and any further expansion of markets, or even the holding of some of the present markets, can be accomplished only by intensive research aimed at developing new and improved cotton products for specific uses.

The procedure involved in this type of research is quite straightforward, and its effectiveness is limited only by the extent of man's ingenuity. Three principal steps are involved: first, the determination of permissible cost and the basic physical and other requirements of the particular use being studied; second, the experimental development of a cotton product designed to meet the requirement of the use; and third, laboratory and service testing to determine whether the experimentally developed product meets all use requirements. Repetition of these steps, where necessary, finally leads to the development of a satisfactory cotton product or to a reliable conclusion that such a development is not feasible.

Although it may seem obvious that such a procedure is the one and only logical method to be followed in developing new and improved cotton products, this has not been the general procedure in the cotton industry. However, there have been a few notable exceptions which definitely establish the effectiveness of this type of research. Tire fabric is an outstanding example of a cotton product, which, during its entire history, has been developed into a better and better product by the use of scientific methods with attention focused directly on the *use* requirements. Open-mesh cotton bags for handling fruits and vegetables are another example of a widely used cotton product developed in this manner. Research of this nature must be both broadened and intensified. The results obtained will be a major factor in determining the future of the cotton industry.

Within recent years more research has been done on chemical finishes than in any other field. This does not mean, however, that more research of this nature is not needed or that opportunities for increasing the utilization of cotton in this manner have been lessened by the results already obtained. Precisely the opposite is true. Instead of lessening these opportunities, recent progress in the development of new and improved chemical finishes has actually indicated new opportunities which 10 years ago were only in the realm of speculation. The possibilities of some of these newly developed finishes have been only partially explored, and the introduction of new types of finishes serves only as a stimulus for the discovery and development of other types.

The needs with regard to chemical finishing include more effective finishes for some purposes, and more permanent and less expensive finishes for most purposes for which finishes are now applied. Also, new kinds of finishes will be needed to produce new effects in cotton textiles to adapt them to uses now served by other fibers or to other uses not yet conceived. A few specific examples of research needed in chemical finishing might be mentioned. There is a need for more research on mildewproofing, especially for clothing fabrics where it is desirable that the appearance, feel, and draping properties of the fabrics be unaffected. There is need, too, for improvement in making wearing apparel water repellent, and for new treatments to replace the rubber coating and rubber impregnation treatments so extensively used in the past to make hospital sheeting and other fabrics impervious to water. Finally, since cotton is competitive with rayon, nylon, and other synthetic fibers in many uses, finishes must be developed which will give to cotton fabric as many as possible of the properties of the fabrics made from these other fibers.

The Southern Regional Research Laboratory at New Orleans, one of the four laboratories recently established by Congress to develop larger industrial outlets for farm products, is giving most of its attention to cotton. An extensive program of research has been planned to increase the utilization of cotton and cottonseed products. The program for cotton includes research on the fiber, on mechanical processing, and on chemical finishes. Each branch of research is handled by a separate group or division.

The objective of the first group, the Cotton Fiber Research Division, is to determine the relationships between the chemical and physical structures and properties of cotton fibers and the characteristics desired in textiles for specific uses, and to learn how to improve cotton fibers for specific textile and other uses by changing them physically or chemically.

One objective of the second group, the Cotton Processing Division, is to determine the physical requirements of a textile for a specific use, regardless of the particular kind of fiber that may have been used in the past, and then to learn how to meet these requirements as fully as possible with cotton, by controlling the properties of the yarns through necessary mechanical processing and those of the fabrics by employing suitable weaving patterns. Another objective is to improve and develop cotton-processing machinery through better application of basic mechanical principles in order to reduce cost and improve quality of products.

The objective of the third group, the Cotton Chemical Finishing Division, is to improve additive and modifying finishing methods which will impart the properties most desired in textile products for specific purposes.

The research work on cotton at the Southern Laboratory and, in fact, all of the work of the Bureau of Agricultural Chemistry and Engineering of which it is a part, is now specifically directed toward aiding the Nation in the war effort. Most of the projects which would require several years to yield useful results have been deferred until the end of the war. Short-time special projects of a defense nature are given precedence over all others.

One accomplishment of this special war work is the development of means for cutting cotton to uniformly short lengths so it can be used with existing commercial equipment to supplement linters for making smokeless powder. Some of the objectives of present war work are: plastic-coated or impregnated fabrics for replacing rubberized fabrics; an unlined cotton fire hose to replace linen hose of the same type; rotproofing treatments suitable for commercial application to cotton fabrics for sandbags and revetment covers; improved mesh fabric for use as a base for transparent plastic substitutes for window glass; the development of cotton products to replace those made from imported fibers; and other projects which cannot be mentioned on account of their defense nature.

Up until around a year ago there was a great deal of discussion about the future of the whole cotton industry. Because of low prices and mounting surpluses, the outlook was not very encouraging. But the war has changed the appearance of the picture almost overnight. Instead of the low prices that existed 18 months ago we are now enjoying the most favorable prices that we have had in years, with domestic consumption at the highest level in history, and some feel that because everything is all right now our cotton troubles are over.

But that is not the case. The temporary relief and prosperity that we are now enjoying is like a shot in the arm, the effects of which will die out when the war is over. So instead of relaxing and feeling that our troubles are over we should take advantage of the present favorable situation by pushing constructive *research* so that the throne which has been recently threatened by paper, rayon, and other synthetic fibers will be made safe for King Cotton.



The Chemist's Place in Civilian Defense

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WHAT is the place of the chemist in Civilian Defense?

There is scarcely an important phase of modern life in which chemical science and the chemist do not play a vital part. It is, therefore, but logical to expect the chemist to have a decidedly important role in Civilian Defense. He has.

What is Civilian Defense and what is the chemist's role therein?

The President, when he proclaimed April 6 as Army Day, said in part:

> That day means more than ever to us this year. We are fighting an all-out war in defense of our rights and liberties. Army Day becomes, therefore, in fact a *total-war day*. It becomes a day when all of our citizens in civil pursuits can rally to the support of our armed forces, for only in the united effort of all of our forces—Army, Navy, and civilians—can we find the strength to defeat our enemies.

Mark these words "total war". That term has been used to characterize modern wars since the Germans in 1870 attempted to mobilize the entire people, to constitute a nation in arms. However, not until the present war did the term "total war" gain full significance. Never before has there been a total war. We are in one now, the first in the history of the world. Every man, woman, and child in the warring nations is either a potential victim or an active productive member of his country's war machine.

Naturally in time of war our eyes are focused upon the fighting forces and the military front, whether on land, on sea, or in the air. That constitutes the spectacular part of the national effort. The President's statement brings out the importance of the civilian element in the national fighting team in which the Army, Navy, and civilians are integral parts.

The civilian part of this team, the home front in contradistinction to the military front, is the province of the Civilian Defense Organization. The home front is as important as the military front; in a sense, more important. Recent events justify that statement. For instance, if the military front is broken, readjustments can be made, a line reformed, an army evacuated, and the war can still be won, provided the home front morale is high and the determination to win is uppermost in everyone's mind, and everyone is doing his or her bit to win. But if the home front crumbles, no matter what the cause, everything goes with it—Army, Navy, and every weapon. We witnessed that in the case of Germany in the last war.

Many activities comprise the home front embodied in the so-called Civilian Defense Organization but I will discuss only that portion of Civilian Defense which deals with protective measures, organized, trained, and operated by communities. This form of protection is the outgrowth of total war which brings the destructive effects of the battlefield into the homes of the civil population. Distance is not of necessity a guarantee against such a contingency. Furthermore, war is never static, and wisdom dictates the need of providing against possible disaster.

Planning against such a possibility started in this country in May 1941, when the Office of Civilian Defense was created by a Presidential Executive Order, dated May 20, for the purpose of providing, among other things, for "effective coordination of federal relations of State and local governments engaged in defense activities, and to provide for necessary cooperation with State and local governments in respect to measures for adequate protection of the civilian population in emergency periods".

The first problem that confronted the Office of Civilian Defense was to decentralize its activities to ensure effective action at the state and local level. This was accomplished by the creation of regional areas coterminous with War Department Corps Areas, with regional offices in the same cities as Corps Area Headquarters. This pattern was used because of the desirability of tying in as closely as possible with military commanders to ensure that our plans conform to military requirements, such as blacking out areas directed by the Army and to ensure no embarrassment to military activities.

Representation of other agencies of government is taken care of in the membership of the Board for Civilian Protection, which is provided for in the Executive Order as an advisory body. Departments and agencies represented on this board include the War Department, Navy Department, Department of Justice, Federal Security Agency, American Red Cross, Council of State Governments, American Municipal Association, and United States Conference of Mayors. The field representatives of these departments and agencies are also included on Regional Boards for Civilian Protection which operate in an advisory capacity for each Civilian Defense Region. This representation provides an excellent medium for consideration of defense problems involving federal agencies, as well as state and local governments.

The next echelons are the state governments, through their State Defense Councils. One of the principal missions of State Defense Councils is to assist in the organization of local defense councils, which in turn are responsible for the organization, training, and operation of the Citizens Defense Corps, the final echelon.

The greatest effort must be placed at the local level where planning and operation merge, as this may become a battle-front. In other words, a community where many people live, whether or not military objectives are located therein, is the place the enemy selects for bombing; not the State or the county, but a congested, pulsating beehive of humanity.

British experience shows that the most destructive elements involved in a bombing raid are the fires resulting from the use of incendiary bombs, which cause not only the greatest destruction of property, but loss of life as well. Therefore, the basis of the protective organization, known as the Citizens Defense Corps, is built around those protective services and facilities normal to any community, such as fire, police, medical service, public works, and utilities. These must be augmented by volunteer units created for specific jobs, such as:

Auxiliary firemen to handle the auxiliary firefighting equipment.

Rescue squads which usually operate under the jurisdiction of the Fire Department.

Auxiliary police to handle special police problems, war traffic control, etc.

Emergency Medical Service, such as medical teams for Hospital Field Units, Ambulance Units, Casualty Stations, and First Aid Stations.

Public Works, such as demolition and clearance crews, road repair squads, decontamination corps, water supply including emergency repair and water mains, sewerage disposal and repair.

The various utilities must organize and equip crews for repair of gas mains, transmission lines and power stations, transportation and communication systems.

In addition to the above an entirely new service must be created known as the Warden Service, which permeates the entire organization, extending to warden posts serving approximately each group of 500 people. The Warden Service must win and hold the confidence of the people. It is the key service in relating the protective system to the people. It directs people to shelter in an air raid. It clears the streets. It instructs and places the

[1] Abstract of an address presented before the general meeting at the 103rd meeting of the AMERICAN CHEMICAL SOCIETY, Memphis, Tenn., April 20 to 23, 1942.

fire watchers. It takes charge when bombs drop, creating an incident. Wardens call for and direct the other services to the points where they are needed. They direct nonmedical bombing victims to rest centers or other points of assembly where emergency food and housing units take charge.

Finally, these various services must be tied together, for no matter how well they may be trained in their particular specialty, they cannot function efficiently in an emergency except as a team. Therefore, in every community where a Citizens Defense Corps is organized, there must be a commander duly authorized by appropriate city ordinance to train and operate the team. He must be empowered to appoint an operating staff to assist him. Communication facilities must be set up and centralized in a Control Center which constitutes the nerve center of the entire organization and is a part of the commander's headquarters. In the Army we call it the "Message Center". The Messenger Service and Drivers Corps are operated by the Message Center.

The local defense council cannot exercise command, nor any other group of individuals. Command is a one-man function. Any other system is doomed to failure. There must be no divided responsibility.

To complete the organization, the Citizens Defense Corps must have certain equipment to accomplish its respective tasks. Auxiliary firemen must be furnished with auxiliary pumpers, hose, axes, ladders, lanterns, and similar items, together with protective clothing. Special firefighting equipment of a simpler character, such as so-called hand pump tank extinguisher and related equipment, must be supplied for each city block. Medical supplies and equipment must be provided for the various medical echelons; steel helmets, for various enrolled workers; and distinguishing arm bands, for all; protective clothing for use of decontamination squads as a precaution against the extremely remote contingency that war gas might be used; and, by the same token, a limited number of gas masks for training purposes.

Congress has recently appropriated $100,000,000 and, under the provisions of the act, arrangements are being made with the War Department for the procurement of this material for loans to designated communities selected on the basis of the importance of their industries from a war production standpoint and their exposed location. The War and Navy Departments have been consulted in the determination of these priorities. Protection requirements of these localities will be met to the limit of available funds. A considerable portion of these funds is being used to create facilities for mass production of gas masks for the civilian population in case of need.

Further assistance is being rendered by the national office through a system of Civilian Defense Schools being set up in various universities throughout the country, where individuals selected by communities may be sent for courses of instruction in gas protection, handling the incendiary bomb, and the method of organizing, training, and operating the Citizens Defense Corps. Those selected to attend these schools should be able to assume leadership in their local communities in establishing local schools in setting up defense organizations.

Finally, and of equal importance, is the problem of educating the public as to the purpose of this organization and the part each individual must play, even though not enrolled as one of the workers. I refer to the responsibilities of the householder, the management of hotels, theaters, stores, restaurants, schools, etc., for protecting their property and the people assembled there in event of an air raid and the mutual responsibilities of individuals to each other and to the community at large. Everyone must willingly curtail certain liberty of action. They must know the scope of the organization and its purpose. They must know their post air raid warden. They must participate in the frequent tests that are needed to ensure efficient operation of the team.

Panic is more destructive than enemy bombing. It evidences a complete disintegration of the morale of the people. The predisposing cause of panic is complete unpreparedness to meet emergency situations. The correction of such a condition can be brought about only through an organization of the people such as outlined, which, when properly trained, equipped, and led, will enable localities caught in the sudden, crushing impact of an air raid, to function with the confidence, spirit, and resolution traditional of our people.

Chemical or gas attacks would have for their main purpose the creation of panic. Chemists may be the most potent means of preventing or allaying this panic. Here is the chemist's role.

A clear and succinct answer to where chemists fit into Civilian Defense would seem to be apparent from a study of the table on page 586.

Note that 15 categories of personnel are listed in the Enrolled Volunteer Groups. Note also that the personnel of each group or service is required to take certain specified training courses, indicated in column two, for award of insignia. Bomb Squads are omitted since that is to be a military activity handled by the Ordnance Department.

Each enrollee must take a course in Gas Defense. Most of them likewise must take a course in First Aid and in Fire Defense. In each of these three most important courses the knowledge and instructional experience of the chemist are tremendously important. It is hardly conceivable that a really efficient course in any of these subjects could be conducted without the cooperation of the chemists in the region covered by the school.

The chemist must play a major role in the organization, training, and functioning of Decontamination Squads.

We do not have personnel especially trained for gas detection by means of gas analysis apparatus, field type, as in England. When and if this addition is made to any categories of specialists, the chemist will have an additional important field and role.

How does the chemist find his place in his local Civilian Defense organization? By volunteering and by helping those in charge of enrolling volunteers to understand the contribution which the chemist can make and where and how his services would be most valuable.

If gas is used we shall possibly have a sudden and excessive demand for chemists unless each community has in its anticipatory planning and training made full use of all available chemists. Help your local organization to plan and train now to avoid being caught unprepared chemically. This is a most valuable contribution. The possibility of panic can be forestalled by making clear in talks and symposia that gas is not the fearsome weapon most of us have imagined it to be. In reality it is one of the most readily protected against by proper training (emphasize the training) and one of the most relatively humane of all weapons (if the term "humane" can be applied to a weapon of war).

The service is providing a very fine standardized lecture on incendiaries with sketches and a list and description of experiments which may be conducted readily by any trained chemist as a most interesting contribution to the instruction as well as the entertainment of the citizens of his community. All high school and college professors and chemists in general are urged to consider using this standardized lecture as a basis for a far-flung system of enlightening and most entertaining talks that will give their fellow citizens a background knowledge of incendiaries that will facilitate greatly their training in fighting fire bombs.

Chemical science, and chemical industry based thereon, constitute an all-pervading and a major influence for good or ill in the civilization of today. *We live in a chemical age.* However, in the matter of Chemical Warfare, the chemist is often held up to scorn as having prostituted a noble science to the destruction or maiming of human beings. Even some of our chemists have this plausible but most erroneous idea.

Why was Chemical Warfare initiated in the World War? Chemicals were and are used in war because man from the earliest times in employing force against an enemy

VI. Summary of Training Requirements[1]

Group or Service	Basic Training Required for Award of Insignia	Hours	Special Duty Training Required for Award of "First Class" Rating	Hours if Estimated
Staff	First Aid (10 hours); Fire Defense A; Gas Defense A; General Course	20	Map reading; municipal organization; utilities; city geography; law of authority; staff operation and functions; messages and reports; inspections and reviews	Not estimated
Messengers	First Aid (10 hours); Fire Defense A; Gas Defense A; General Course	20	City geography; black-out training; message procedure	Not estimated
Drivers	First Aid (10 hours); Gas Defense A and B; General Course; Drill (2 hours); Night and Convoy Driving; Black-Out Driving; Map Reading; Emergency Road Repairs; Test and Optional	40	Training exercises and volunteered work; test to be arranged by local authorities	Not estimated
Auxiliary firemen	First Aid (10 hours); Fire Defense A and B; Gas Defense A; General Course	27	Special initial training; advanced training; supplemental training (see sec. V)	50
Rescue squads	First Aid (20 hours); Fire Defense A and B; Gas Defense A and B; General Course	40	Special training course (see sec. V)	40
Auxiliary police	First Aid (10 hours); Fire Defense A; Gas Defense A and B; General Course	23	Special training course (see sec. V)	50
Air-raid wardens	First Aid (10 hours); Fire Defense A; Gas Defense A and B; General Course	23	Special training course (see sec. V)	Not estimated
Fire watchers	Fire Defense A; Gas Defense A; General Course	10	Knowledge of sector; methods of observation; reports	6
Emergency food and housing	Gas Defense A; General Course	7	Recommendation of unit leader, approved by Chief Air Raid Warden, after operation (see sec. V)	Not estimated
Medical auxiliaries	First Aid (20 hours); Gas Defense A; General Course; plus special training as is directed by the Office of Civilian Defense	27 plus	None announced	None announced
Nurses' aides	First Aid (10 hours); Gas Defense A; General Course; plus Nurses' Aide Course of American Red Cross	17 plus	None announced	None announced
Demolition and clearance	Fire Defense A; Gas Defense A; General Course	10	Issued after actual training exercises, upon recommendation of Crew Leader and approval by Chief of Emergency Public Works	Not estimated
Road-repair crews	Fire Defense A; Gas Defense A; General Course	10	Issued after actual training exercises, upon recommendation of Crew Leader and approval by Chief of Emergency Public Works	Not estimated
Decontamination squads	First Aid (10 hours); Gas Defense A and B; General Course	20	Issued after actual training exercises, upon recommendation of Squad Leader and approval by Chief of Emergency Public Works	Not estimated
Utilities-repair squad	Gas Defense A; General Course	8	Issued upon recommendation of Squad Leader, with the approval of the Chief of Emergency Utilities	Not estimated

[1] Reprinted from "Training Courses for Civilian Protection (Enrolled Volunteer Groups)", Civilian Defense Publications, page 28.

has made use of whatever his natural resources, his development in art, science, industry, and his inventive ability made available. When the chemical industry reached a suitable point of development, chemicals became a weapon of war. As a matter of fact chemistry has been a major factor in warfare since the introduction of gunpowder on the battlefield in the 15th century.

The War of the Rebellion official records of the Union and Confederate Armies show that we in America strove unavailingly to be first in this field. One of the knightliest of General Lee's officers, Brigadier-General W. N. Pendleton, chief of Artillery of the Army of Northern Virginia, who was afterwards a revered Episcopal minister of Lexington, Va., sought in 1864 to obtain by requisition from the Chief of Ordnance, General Baldwin, gas shell to be used against the Union forces. The Chief of Ordnance could not furnish them. The chemical industry of the Confederacy was not equal to the demand. General Lee's army might, otherwise, have been the initiator of chemical warfare.

The supposition that gas would be more cruel than other weapons has proved notoriously false. We cannot, of course, be sure that if gas is used in the present war its general characteristics and effects will be as in World War I. We can, however, be reassured by that experience. Statistics show that chemical warfare is the most effective force yet devised by man, with relatively slight destruction of life and property, and minimum of human suffering and aftereffects.

Since World War I gas has been used effectively by the Italians in Ethiopia and on a limited scale, probably as a test or experiment, by the Japanese. You quite logically ask, why has not gas been used in World II? Is it probable that it will be used?

To the first question a number of reasoned replies may be furnished. Gas is a surprise weapon. It was used prematurely in World War I, before adequate amounts had been provided and adequate tactics and technique developed. It failed as a decisive tactical weapon by reason of this premature disclosure. Tanks were likewise used prematurely and therefore failed in decisive surprise. All military schools of the world have emphasized the importance of avoiding this error in future.

We, of course, do not know but it is a reasonable possibility that gas may be reserved by Hitler for a decisive surprise all-out attack against England. At any rate our only sound and reasonable line of action is to be completely prepared against chemical attack in technique, equipment, training, and psychological attitude. To do less will tend to invite enemy use of gas against us. To do that much will tend to mitigate, if not to prevent, gas attacks. To accomplish this we depend in a large measure upon American chemists. Not only the chemists but each citizen, however humble, however exalted, has a definite, specific, hard task, but a glorious

task, a personal effort and sacrifice, to sustain the cause of human liberty.

We are living through one of the two or three most critical periods in the whole of human history. Do we grasp its significance to our country, to humanity?

In conclusion, I quote the soul-stirring words of a great and noble leader:

I have nothing to offer but blood, toil, tears, and sweat.

Not only great dangers, but many more misfortunes, many shortcomings, many mistakes, many disappointments will surely be our lot. Death and sorrow will be the companions of our journey; hardship our garment; constancy and valour our only shield.

Come then: let us to the task, to the battle, to the toil—each to our part, each to our station. Fill the armies, rule the air, pour out the munitions, strangle the U-boats, sweep the mines, plough the land, build the ships, guard the streets, succour the wounded, uplift the downcast, and honor the brave. Let us go forward together in all parts of our Nation. There is not a week, nor a day, nor an hour to lose.

Our Southern Exposure

MEMPHIS, we learned by experience and by information, means "place of good abode", being derived from the ancient Egyptian. Further, Memphis is located in the southern part of the district known as "little Egypt" from its useful floods.

* * *

SOUTHERN hospitality attained new meaning to chemists who were taken to the hearts of Memphians.

Even the ducks in the fountain at the Peabody joined with welcoming quacks. Fortunately no chemist carried out the threat to add duck-sinking wetting agent to the fountain.

* * *

SUNDAY'S early arrivers found sightseeing about the city delightful under the guidance of well-qualified porters from the Peabody.

* * *

INCIDENTALLY, pronunciation and dialect difficulties cropped up to harry New Englanders, who often needed interpreters. The name of the headquarters hotel requires accent on the second syllable and not on the first as the word is pronounced in Boston. Elision of the second "m" in Memphis by Southerners also caused some trouble.

* * *

OFFICIALLY the meeting began with registration on Sunday afternoon and an informal reception in the evening.

* * *

MONDAY'S Council meeting fulfilled its functions with harmony and dispatch. Harry N. Holmes arrived on time; that is, before President Holmes opened the meeting.

* * *

FOR the record: Sixteen divisions met; Fertilizer and Rubber Divisions absent; 331 papers by 517 authors; 13 symposia; 61 group meetings with meals or cocktails; 10 plants scheduled for visits, 8 plants visited.

* * *

TRANSPORTATION troubles, both coming and going, emphasized the incidence of war and the conservation of tires which reduced automobile travel to a new low. Gasoline was plentiful in Memphis, but not tires.

* * *

NOVEMBER 6th Street in Memphis does not commemorate a military event, but was named for the date of a political victory, politics being a major interest of Memphians.

* * *

MEMPHIS' Mayor Chandler was unable to welcome chemists to his city because he was in New York receiving an award for the safety record of his city, safest in the Nation through traffic regulation. That regulation was duly impressed on visitors at every street intersection where waiting for the light was universally enforced, even on New Yorkers.

* * *

COMING of chemists was duly impressed on guests of Memphis hotels before the meeting by cards stating that each room was reserved for the A. C. S. All hotels in Tennessee and neighboring states had notices posted advising travelers to avoid Memphis April 20 to 23. Chemists decidedly did not heed them.

* * *

BRIDE and bridegroom of the meeting were Dr. and Mrs. C. S. Hudson, married in Birmingham, April 18. Mrs. Hudson admitted to being a childhood sweetheart of the Washington chemist.

* * *

MEMPHIS' jail, from the outside, was surprisingly like a college library. No chemist reported seeing it from the inside.



Hostesses in old southern costume greeted A. C. S. ladies at Holly Springs



Left to right. **R. H. Lueck, American Can; George Norman, Hercules; R. J. Moore, Bakelite**

ARKANSAS, visible beyond the Father of Waters, was reputed to be the place one should go for amusements of a kind, but it developed that Memphis taxis are forbidden to cross the river.

* * *

EMPLOYMENT reached new highs in the Clearing House at Memphis with employers bidding actively against each other for likely candidates. Auctions were not open, as they were in slave days, but results clearly confirmed the bullish tone of the market for chemists.

* * *

TRUE to form, World War II provided sensational news just as the meeting opened. This time it was the bombing of Japanese cities and the return of Laval to power in Vichy France.

* * *

TRANSPORTATION to and from Memphis was at such a premium that even hitch-hikers suffered, their ranks swelled by those who could not get space on planes or trains.

* * *

PATRIOTISM requires chemists to join the Production Army. That was the gist of sentiment at the meeting directed at both young and old, even though the latter might have reached retirement age.

* * *

E. R. BARROW, Vice Chairman of the Local Committee, substituted for both Mayor Chandler and General Chairman Bowld in welcoming visitors at Monday's general meeting. His technique was excellent and his words to the point.

* * *

PRIORITIES, allocations, secrecy orders, and the like were fully explained at the Tuesday afternoon session of the Division of Industrial and Engineering Chemistry. Many notes were taken before the speakers admitted that all of it might be changed at any time. Difficulty in impressing Washington on chemical matters was laid to the laymen's impressions of chemists "and Washington is full of laymen".

* * *

REGISTRATION again was surprisingly high, climbing to 2324—quite a figure, considering our all-out war program and the demands upon the chemist's time.

* * *

G. E. BARTON and Albert L. Smith were easily outstanding attractions at the general meeting when they, two of ten entitled to them, received in person diplomas signifying 50 years' continuous membership in the A. C. S. Others absent from the formal presentation, but also 50-year members, were Leo H. Baekeland, Walker Bowman, Harold H. Fries, Walter Mills Saunders, Alfred Springer, C. P. Van Gundy, Homer Jay Wheeler, and Fred G. Zinsser. We bow to them all.



G. E. Barton and A. L. Smith, recipients of 50-year diplomas

PRIZES announced for award at Buffalo are: the A. C. S. Award to John Lawrence Oncley, Harvard Medical School, and the Garvan Medal to Florence Barbara Seibert, University of Pennsylvania.

* * *

COLONEL GIBSON on "The Chemist's Place in Civilian Defense" (see page 584) supplied useful guidance for those of us on the home front. His address was supplemented by the OCD motion picture on "Fighting the Fire Bomb".

* * *

LAWRENCE W. BASS, giving a preview of the report of the immense amount of work by the SOCIETY'S Committee on Economic Status, forbade quotations until checked and revised, but when the report is published be sure to read it.

It does a real job of analysis of chemical earnings.

* * *

KING COTTON, everywhere Monarch of Memphis, needs research to keep his throne, according to Henry G. Knight at the general meeting. See page 581.

* * *

PRIZES awarded at Memphis were: Borden Award in the Chemistry of Milk to George E. Holm, U. S. Bureau of Dairy Industry; and Eli Lilly and Company Award in Biological Chemistry to Earl Allison Evans, Jr., University of Chicago. Each prize is a check for $1,000 and a suitable medal.

* * *

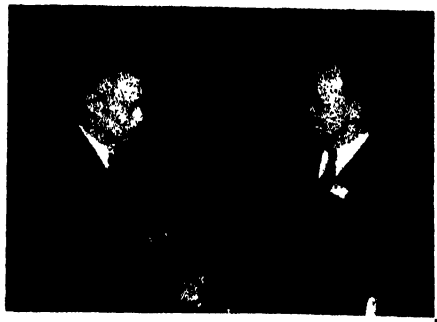
WHEN members of the SOCIETY reached Memphis they found the Hotel Peabody management had efficiently arranged that rooms would be available for them. In each room a small notice had been placed, reading: "This room reserved April 20–23, 1942. If your visit extends into the above period, please notify Asst. Mgr. On that date Memphis is host to AMERICAN CHEMICAL SOCIETY."

* * *

TWO teas were on the program for the ladies. First was the reception given in honor of wives of A. C. S. officers. The other followed a special showing of southern pottery and Van Gogh art at the Brooks Memorial Art Gallery. The Van Gogh paintings were loaned to the gallery by the Netherlands Government.

* * *

A GOVERNMENT regulation prohibiting busses from leaving the city limits threw a wrench into plans for the ladies' trip to Holly Springs, but it couldn't stop the ladies. Off they went—in private cars.





President Harry N. Holmes makes award presentations at the general meeting. *Above.* To G. E. Holm, senior chemist, Research Laboratory, Bureau of Dairy Industry, the Borden Award in the Chemistry of Milk. *Right.* To Earl A. Evans, Jr., Department of Biochemistry, University of Chicago, the Eli Lilly and Company Award in Biological Chemistry

catfish were often mentioned as a choice local dish but failed to appear because local custom labels it trout.

* * *

CENSORSHIP caught up with the meeting at several points. One was the cotton oil industry, whose doors were closed to the group because it produces linters.

* * *

"A CAPELLA" in the name of a choir means "without accompaniment". After hearing the Vanderbilt (University) A Capella Choir on Monday evening, many chemists thought the words meant "tops". Certainly the performance by the choir under the direction of Edward Cleino supported such a meaning, as does the prominence of several former choir members—Robert Perry on the Pet Milk radio program, Dinah Shore with Eddie Cantor, and James Melton on the Bell Telephone entertainment.

* * *

BEEFSTEAKS and barbecue vied with Tennessee country ham and fried chicken as leading menu demands. Fried



***Above.* R. F. Schultz of Hercules and D. Price of National Oil Products. *Below.* F. W. Sullivan Barrett, and C. L. Brown of Standard Oil of Louisiana**

LOCAL SECTION OFFICERS breakfasted early to have time for discussion of the effects of war on programs and especially on attendance in sections where distances are great. No solution of the tire shortage problem was forthcoming since even hitch-hiking seems out.

* * *

MEETING rooms were provided for most divisions to meet in comfort in the Municipal Auditorium. Ramps connected rooms on different floors and provided whispering galleries which often amplified private corridor conferences with amazing effect.

* * *

REMINISCENT of the Dallas meeting was the use of the Pepper Memorial Building of the First Methodist Church to supply three meeting rooms. Evidently Dallas experiences were considered effective with most divisions since only Sugar (which seems to need prayer especially now) and Physical and Inorganic were sent to Sunday School. Meeting rooms of Physical and Inorganic were appropriately designated X and Y, the unknown quantities.



***Above.* Lieutenant-Colonel Albert H. Hooker and Major A. Berne-Allen, Jr., of the Chemical Warfare Service. *At right.* Mrs. Ed. F. Degering and H. N. McCoy, Lindsay Light and Chemical Co.**

* * *

MEMPHIS being the home of the Blues, chemists were appropriately and delightfully entertained on Tuesday evening after the barbecue supper by an all-star colored company of singers, dancers, and instrumentalists from the famous Beale Street district. That set a high mark of real enjoyment and mirth which will be difficult to equal at future meetings.

* * *

DIFFERENT interpretation of language was evident in the signs of Memphis liquor stores. They read "Liquors and Gins".

* * *

SNUFF manufacture seemed to most chemists a small business until inspection of one large Memphis plant revealed that it alone pays some $75,000 a week in federal taxes.

* * *

CHINA RELIEF workers decked chemists with bits of bright red cloth for donations of "six cents for a Chinese child". Bids for grown-up Jap soldiers went much higher with no takers present.

* * *

MANY chemists were royally entertained in Memphis homes where they were welcomed after hotels were filled.

* * *

DIFFICULTIES of censorship, transportation, and war work were advanced unsuccessfully for omitting one meeting a year from the SOCIETY'S schedule. No definite action was taken but plans for meetings in 1944 and after were held in obeyance for future action.

* * *

MANY visitors were abashed by the free way waitresses in Memphis restaurants apply the term "Honey" to all their customers. "Honey, you must eat some vegetables" and the like.

* * *

LADIES returned to the Peabody after Tuesday's sight seeing, each bearing a cotton mop to add to their souvenirs.





Left to right: Top. E. J. Crane, *Chemical Abstracts,* Cyrus Fleck of the Mack Printing Co., and H. N. Alyea of Princeton. *Center.* G. H. Ross and E. K. Skoog, both of Solvay Process Co. *Bottom.* F. W. Sullivan of Barrett, P. M. Van Arsdell, Universal Oil Products, R. J. Moore of Bakelite, and Gustav Egloff, Universal Oil

EDWARD BARTOW, Past President of the SOCIETY, made an offer, upon seeing the murals in the Balinese Room of the Claridge, to send anyone copies of the pictures he took of the girls in Bali. Whether a copy of his famous speech "Dancing Girls I Have Known" will be included wasn't stated.

* * *

ONE of the officers of the armed forces, whose name must not be mentioned for censorous reasons, told of the Navy Admiral who while walking back to his ship one night was accosted by an enlisted man. The gob, much under the influence and for the moment not recognizing the Admiral as one, asked for a light. The Admiral flecked out his cigaret lighter, and when the enlisted man saw the gold stripes revealed by the flare, he stammered, "I am sorry, sir". The Admiral replied, "It's all right but it's lucky for you that I am an admiral and not an ensign."

* * *

IN SPITE of wartime restrictions on Weather Bureau operations, Memphis managed a consignment of the perfect product for the whole meeting, even for the Golf Tournament.

* * *

HIGH point of the entertainment especially for the ladies was the day-long tour to old homes and gardens at Holly Springs, Miss. Ante-bellum (i. e., before the War between the States) homes were opened to visiting ladies who were received by hostesses in dresses of that period and shown how the Old South lived.

* * *

WEDNESDAY evening's subscription dinner will long be remembered by the shortness of the speeches. None was longer than 5 minutes. Other sections, please note.

* * *

NO visitor was allowed by the local committee to want for anything that could be obtained. The Sheriff of Shelby County even offered space in the palatial jail, if needed. Fortunately, it was not.

SUGAR reserves received a serious blow when one Memphis Hotel ran short of teaspoons for the Chemical Education luncheon and had to use consommé spoons instead—and the sugar wasn't rationed at this particular hotel either.

* * *

THE shortage of trained chemists was borne out by one laboratory head who is hiring women technologists to conduct routine laboratory tests. "And", he said, "I'm getting the best looking girls I can find so that when the war is over they will have no trouble getting married."



Left. Hazel Jane Ward, one of the door prize winners, and A. L. Elder of the War Production Board. *Right.* Mrs. Wallingford and V. H. Wallingford of Mallinckrodt

LOCAL assistants deserved and got high praise for efficiency in helping with divisional meetings.

* * *

BOB WILSON did not win the Wilson Cup at Thursday's golfing. He did not play, was not even present.

* * *

GOLFING skill was again rewarded at the annual tournament. The Wilson Cup and a $25 defense bond went to P. M. Snyder; $25 bonds to G. A. Lenaius and L. C. Swain; $10 in defense stamps to M. J. Heiler; golf bag to A. M. Goldblatt; and an all-weather jacket to K. E. Burgess. But to J. R. Meadow for third low gross went the A-1 prize of 1942- a dozen golf balls.

* * *

A NICE gesture to the ladies at the banquet—gardenia corsages flaunting ribbons of the A. C. S. gold and blue. Door prizes were nineteen $5.00 defense stamps. Among winners were Virginia Bartow and Dr. Evans of Lilly Prize fame, both at the head table, and four Memphians—Mrs. J. Dudley Atkinson, Jr., Miss Hazel Jane Ward, G. Worthen Agee, and LeRue Marx.

* * *

AMONG spots of beauty visted by the ladies were three Memphis gardens—one, a tiny gem of perfection; another, much larger, including practically all plants adapted to the climate; the last, a huge estate, noted throughout the South, with thousands of azaleas and many wild flowers in their native setting.



Above. Isabel McKinnell of Florida State College and Chairman of the Tallahassee Section. *Below.* R. F. Nickerson of Mellon Institute

Divisional Reports

Agricultural and Food Chemistry

THE Division of Agricultural and Food Chemistry enjoyed an illuminating three-day session. Most of the 39 papers aroused considerable discussion and, in the main, the meetings were well attended.

In collaboration with the Division of Biological Chemistry, Tuesday afternoon was given over to consideration of the trace elements, manganese, bromine, boron, copper, zinc, lead, arsenic, and selenium, in plant and animal nutrition. Of special interest was the use of arsenic to offset the toxic effect of selenium among livestock grazing in seleniferous areas. The value of radioactive isotopes in the study of trace elements in nutrition was stressed by J. D. Kurbatov.

In keeping with the local of the meeting one full day was given over to papers on the utilization of the products of southern agriculture. Many speakers emphasized the important industrial and low-cost nutritive values to be derived from the by-products of cotton, peanut, and tobacco crops, all of great significance in a war-time economy.

The chemistry and industrial uses of starch attracted considerable attention in a half-day program in which the Division of Sugar Chemistry and Technology collaborated. Two groups of authors presented important contributions to the structure and mechanism of formation of starch, the isotopic tracer method being employed in the study of the latter. Astonishing results were reported from the use of levulinic acid derived from starch as a plant stimulant.

The Thursday afternoon session was high-lighted by the address of George E. Holm, 1942 recipient of the Borden Award in the Chemistry of Milk.

At the semi-annual luncheon Thursday noon special honor was paid Harry E. Barnard, chairman of the division more than 25 years ago. The occasion was commemorated by presenting Dr. Barnard with a certificate and a portfolio of letters received from his associates of many years.

R. H. LUECK, *Secretary*

Analytical and Micro Chemistry

THE meeting of the Division of Analytical and Micro Chemistry was confined to one session, at which nine papers were presented. In conjunction with the Division of Organic Chemistry, a symposium of five papers was also conducted, taking up two sessions the following day. From 60 to 100 members attended the divisional meeting and about 150 were present at the symposium. The divisional luncheon held on Thursday was attended by 36 members.

The papers by H. H. Willard on the use of ozone as an analytical oxidizing agent and of P. J. Elving on the determination of organic fluorine were especially interesting, and Father Power's paper on statistical applications provoked considerable discussion.

The symposium papers were all timely and well presented and brought to the attention of the members a great variety of new analytical tools now available in the field of organic analysis.

Dr. Royer, the Chairman, announced tentative plans for a symposium with the Division of Analytical Chemistry at the Buffalo meeting on the general topic of teaching analytical chemistry, with special reference to the needs of the industries. He also reported on the progress of the various committees of the division and announced that the first two primary standards for elementary organic analysis namely, benzoic acid and acetanilide—were ready for distribution by the National Bureau of Standards. The other proposed standards are in process either of purification or of testing.

FRANCIS W. POWER, S.J., *Secretary*

Biological Chemistry

ON TUESDAY, joint meetings were held with the Division of Agricultural and Food Chemistry on Vitamins and on Trace Elements in Nutrition. The first brought out much information on the determination, instabilities, and the interaction of vitamins. A possible new factor in liver extract affecting the nutrition of rats was reported. Anhydrovitamin A and kitol were added to the complications (and clarifications) of the chemistry of A vitamins. Although there was a considerable turnover, attendance was consistently between 150 and 180.

Wednesday 16 papers were given covering a wide range of topics. Perhaps the most novel was an attempt to estimate the presence, and perhaps the severity, of disease, from polarographic data and measurements of surface-film areas on certain blood-protein fractions. Attendance was fair at 60 to 120, except that the room overflowed for the excellent address of Earl A. Evans, Jr., when he described the work on which the Eli Lilly Award was based.

BEN H. NICOLET, *Chairman*

Cellulose Chemistry

THE Division of Cellulose Chemistry held two sessions on Thursday. While the number of papers was less than at



Spring arrived before the chemists

some previous meetings, the attendance was above normal. Interesting discussions followed each of the papers, all of which were of high quality, showing careful preparation. A group luncheon, characterized by its friendly and informal discussions of problems of interest to individual groups, was held at the Gayoso Hotel. Interest in chemical developments which are expected from a better knowledge of the fundamental aspects of cellulose chemistry was especially evident.

The committee wishes to express its appreciation to the local group for the splendid way in which every requirement for a successful meeting was provided and to all the chemists of the Memphis area for their friendly cooperation and hospitality.

ELWIN E. HARRIS, *Chairman*

Colloid Chemistry

THE spring meeting of the Division of Colloid Chemistry was attended by a total of about 160. There were only a few papers since most colloid papers are held over for the Colloid Symposium in June. Each paper presented an application or development of physical chemistry in the field of colloids.

One paper from Stanford University showed that the phase rule in its classical form is strictly applicable to certain types of colloid systems. An extraordinary variety of interesting and characteristic new phases occur in soap systems. The phase diagrams seemed to yield a definitive interpretation of processes of soap manufacture.

A paper from the Rice Institute again used the physical tool of x-rays to characterize and interpret the crystalline nature of the constituents of gelatinous precipitates such as copper sulfides.

A continuation of the studies from the Univerisity of Missouri on the permeability of clay membranes to cations showed that the electrochemical potentials so produced promised to be a most useful tool for measuring ionic concentrations in dilute solutions.

Another paper from Stanford University presented a new measure of stability of foaminess and analyzed the breakdown of froth into processes of drainage (corresponding to "creaming" in emulsions), collapse or coalescence, and additional stabilization in the residual surfaces by accumulation of stabilizing material thereon.

J. W. MCBAIN
Secretary-Treasurer

Chemical Education

THIRTY-THREE papers were presented during the division's four sessions. Sixteen were given by students on Wednesday, both sessions being devoted to the Student Program. In the main, these student papers were good, carefully prepared, and well presented.

More than 100 attended the Student Breakfast preceding the Student Program.

The Round Table on the Problem of Teaching Chemistry attracted a large audience which apparently felt repaid for sitting three hours through the presentation of thoughtfully prepared papers and the helpful discussion which followed.

The Book Exhibit, sponsored by the division, proved to be a welcome innovation to the more than 1,200 who visited it in the Hotel Peabody.

PAUL H. FALL, *Secretary*

Gas and Fuel Chemistry

THE meeting of the Division of Gas and Fuel Chemistry was held Wednesday afternoon. The attendance was fairly regular—about 30 to 40. Papers of timely interest dealing with coal hydrogenation, combustion in the Diesel engine, and coal problems, including dustproofing, rapid moisture determination, and oxidation were well received and brought forth interested discussion.

G. R. YOHE, *Secretary*

History of Chemistry

THE Symposium on the History of Chemistry in the South was given exactly as planned with every author present and presenting his own paper. The attendance was much above average and it was interesting to note how many came to hear the report on their own state. It is hoped that the reports from the three or four states not represented may be given later.

All the papers scheduled for Wednesday morning were presented with the exception of No. 12 by V. F. Payne. Appreciation was voted of the carefully prepared and comprehensive report of C. A. Browne



At the symposium of the Division of Industrial and Engineering Chemistry. *Left.* A. W. Fisher, Jr., Fisher Scientific Co. *Center.* H. E. Barnard, WPB. *Right.* A. L. Elder, WPB

and Eva V. Armstrong on the plan for preparing under the sponsorship of the division a History of Chemistry in America.

Dr. Browne's paper and slides on Bernard Tollens and some American students in his school were especially enjoyed as also was Miss Wall's discussion of the life of Hofmann.

Plans were made for a bicentennial celebration, in the spring of 1943, of the birth of Lavoisier and of Thomas Jefferson.

HARRISON HALE, *Chairman*

Industrial and Engineering Chemistry

ATTENDANCE at the general sessions was consistent and averaged about 150 persons. Several of the papers occasioned more than usual discussion but particularly Dr. Nickerson's paper on "Structure, Properties, and Industrial Utilization of Cotton". Dr. Othmer's four papers on vapor pressure and related subjects almost constituted a symposium and were extremely ably presented.

The Symposium on Effect of Priorities on Research Laboratory Administration was attended by an almost capacity crowd of over 300 people in the main ballroom of the Peabody Hotel. A. L. Elder's clear exposition of the reasons for secrecy and the withholding of chemical patents during the war period brought out points that had puzzled many research workers. H. E. Barnard very ably discussed the application of priorities to the needs of chemical laboratories and suggested the best ways whereby priorities may be obtained on equipment essential to the war effort. The difficulties that Dr. Barnard's group has experienced in keeping the channels open for high priorities to research laboratories were outlined, and the ways in which he has been able to inform those in high places of the need for fundamental laboratory investigations were particularly illuminating. Following this paper, Aiken W. Fisher, Jr., Fisher Scientific Co., presented the suppliers' viewpoint. Emil Ott, of the Hercules Powder Co., outlined the problems of the industrial research laboratory, and H. F. Johnstone of the University of Illinois presented the viewpoint of the university laboratory. A heated discussion followed these papers and was most ably crystallized by D. B. Keyes' strong plea for direct allocation of the supplies necessary for research work. This symposium was without a doubt one of the highlights of the meeting, and it is regretted that because of necessary war secrecy the information given by the authorities who spoke cannot be distributed more widely.

More people wished to attend the division's luncheon than could be accommodated. Those who were fortunate enough to attend heard a stirring address by W. H. Jasspon, president of Perkins Oil Co. and vice president of the Cotton Research Foundation. He outlined the benefits that a group of cotton growers can obtain by virtue of association with organized research.

WHITNEY WEINRICH,
Secretary-Treasurer



At the Division of Industrial and Engineering Chemistry luncheon, Tuesday, April 21. *Left to right:* R. Norris Shreve, W. H. Jasspon, speaker, L. W. Bass, Whitney Weinrich, and H. F. Johnstone

Medicinal Chemistry

THE Division of Medicinal Chemistry held one half-day session at which eight papers on the synthesis and properties of organic compounds of medicinal interest were presented. As usual, new sulfa compounds attracted considerable interest. The meeting was well attended and was followed by the divisional luncheon at which 56 persons were present.

JOHN H. GARDNER, *Chairman*

Organic Chemistry

MEMBERS and guests of the Division of Organic Chemistry who persevered and followed Room L signs up three flights of stairs and along two ramps were rewarded with a stimulating meeting at Memphis. A few chemists, not yet reduced to slender proportions by wartime restrictions, were heard to complain slightly about the location of their meeting rooms. The division is indebted to Jacob R. Meadow, Southwestern College, Memphis, Tenn., and his assistants, who handled the speakers' slides and local arrangements very capably.

Papers presented before the division drew large audiences. Synthetic, theoretical, heterocyclic, carbohydrate, aliphatic, aromatic, sterol, vitamin, and bile acid fields were represented by papers. A joint symposium with the Division of Analytical and Micro Chemistry was held on Thursday on Analytical Methods in Organic Chemistry. The division is indebted to Frederick D. Rossini, Ernest H. Huntress, Walter M. Lauer, Wallace R. Brode, and Robert C. Gore for their kindness in addressing members of the symposium and to the many authors who contributed papers to the regular divisional meeting.

The Executive Committee of the division undertook preliminary consideration of possible locations for the next National Organic Chemistry Symposium, to be held in December 1943. Suggestions are invited from members of the division. Several chemists have expressed the hope that the next symposium be held at a place where facilities match those enjoyed at the recent Ann Arbor symposium.

ARTHUR C. COPE, *Secretary*

Paint, Varnish, and Plastics Chemistry

THE number of members and guests in attendance at the presentation of the paint and plastic papers varied from about 75 to 350. These figures are somewhat lower than at past meetings, owing primarily to two factors—the demands made upon many of our members by the war effort and the difficulties encountered and time consumed in reaching Memphis.

Some of the papers attracted considerable attention. Paint and lacquer formulators were particularly interested in the possibilities offered by the nitroparaffins described by Bogin and Wampner. Fischer and Jerome presented extensive data demonstrating that the influence exerted by surface-active agents on the properties of pigment suspensions varies greatly with the nature of the pigment and vehicle so that any given agent may not only aid in deflocculation but may also cause flocculation. A simple bubble viscometer permitting the determination of the viscosity of highly viscous oils and resin solutions, designed by Young and McArdle, promises to become an important and useful tool in the study and control of the properties of paint liquids. The papers dealing with the study of high polymers by infrared absorption spectroscopy, solvent fractionation, viscosity and cryoscopic methods gave rise to considerable discussion on the merits and demerits of the various experimental and theoretical approaches.

On Tuesday evening the members and guests of this division sought and found relaxation in a good dinner and snappy show. Chairman S. L. Bass, in welcoming the guests, proved to be a very capable toastmaster and his ready wit and large selection of funny stories put all present in a receptive mood for the entertainment that followed.

A. C. ELM, *Secretary*

Petroleum Chemistry

THROUGHOUT a considerable part of the program, the seating capacity of the meeting room (220) was filled to overflowing. On the basis of attendance, chief interest was evidenced in those papers dealing more or less broadly with the major petroleum problems of the day; nevertheless the variation in the personnel of the audience with successive papers strongly indicated the specific interests of those present.

LOUIS HENDERSON, *Acting Secretary*

Physical and Inorganic Chemistry

THE division met for its usual dinner at the Gayoso Hotel on Monday evening. About 65 members and friends were present, and were entertained after the meal by Paul M. Gross, who gave an extremely interesting account of some of the research on tobacco being carried out at Duke University.

The division held a Symposium on the Hydrogen Bond and Related Topics on Tuesday and a Symposium on the Rare Earths on Thursday. The papers were well received and brought forth considerable discussion. The members interested in the rare earths met for a special breakfast Thursday morning.

Several sessions of contributed papers were held Wednesday.

In spite of the preoccupation of many of the members with defense work, and consequent small number of contributed papers, there was a fairly representative attendance, and the meeting was successful.

O. K. RICE, *Secretary*

Sugar Chemistry and Technology

THE first three papers on the program of the division were of much greater interest than was expected by those who were previously informed on the chemical possibilities for carbohydrates. Papers



Southern hospitality and service with smiles



The smile that sold all the abstracts

that followed amply justified the stated opportunities offered by the possibility of limitless production from soil, rain, and sunshine of very pure carbohydrate from which may be produced truly an infinite number of products. Many such products were enumerated and some of the characteristics were described. The production of alcohol, ancient though it may be, is today shown to be capable of radical improvement through the use of molds for conversion of starch to fermentable sugars. Such improvement may be followed by continuous fermentation resulting in remarkable speed and efficiency as compared with present standard practice.

Among the many interesting papers was the description of the development of an equipment to determine continuously, and thereby control, the degree of supersaturation in a solution from which crystallization is taking place. This can be of great commercial importance.

Progress is continually being made toward clearing up the mystery of purification accomplished by bone char and similar carbons and this clarification of structure, physical and chemical, is being pursued very actively to ascertain the character of the starch molecule. Many are interested in this effort and much information was presented which indicates the problem is well on the way to solution.

E. WHITMAN RICE, *Secretary*

Water, Sewage, and Sanitation Chemistry

EIGHTEEN papers were presented at the two sessions of the division held on April 21. The subject matter covered water analysis, water treatment, public water supplies, and industrial waste treatment.

The water analysis papers included analyses by absorption spectra, x-ray diffraction methods, photometric and the usual volumetric procedures. The papers on filter photometry and a new method for determining calcium by soap solution caused considerable discussion. The role of carbon dioxide in the shattering and cracking of ice also aroused much interest.

Public water supplies of Arkansas, Florida, and Oklahoma were discussed in three papers, Florida supplies calling forth most discussion.

Two papers on trade wastes were given—one on laundry and the other on cannery wastes. Several asked for more information on the construction of the plant for treating laundry wastes.

The morning session was unusually well attended.

H. GLADYS SWOPE, *Secretary*

Registration at Memphis

	Members		Nonmembers Chemists		Visitors	
States	Men	Women	Men	Women	Men	Women
Alabama	55	3	3	0	10	7
Arizona	1	0	0	0	0	0
Arkansas	17	0	2	0	3	9
California	28	1	0	0	1	1
Colorado	9	0	0	1	3	1
Connecticut	14	1	0	0	0	2
Delaware	41	1	2	0	1	0
District of Columbia	30	3	0	0	2	5
Florida	12	2	0	0	0	1
Georgia	26	4	1	0	7	0
Idaho	0	0	0	0	0	0
Illinois	237	9	2	0	12	22
Indiana	83	6	2	1	7	4
Iowa	42	3	0	0	2	4
Kansas	26	0	0	0	0	6
Kentucky	28	3	0	0	4	4
Louisiana	57	4	2	0	6	5
Maine	0	0	0	0	0	0
Maryland	18	0	0	0	1	0
Massachusetts	28	2	2	0	0	0
Michigan	96	4	1	0	3	14
Minnesota	34	0	0	0	1	3
Mississippi	22	4	0	0	7	2
Missouri	95	4	3	0	9	7
Montana	0	0	0	0	0	0
Nebraska	5	0	0	0	3	1
Nevada	0	0	0	0	0	0
New Hampshire	0	0	0	0	0	0
New Jersey	103	3	2	0	1	9
New Mexico	1	0	0	0	0	0
New York	165	6	2	0	14	11
North Carolina	14	0	0	0	0	1
North Dakota	2	0	0	0	0	0
Ohio	136	3	2	0	13	20
Oklahoma	23	0	2	0	6	0
Oregon	1	1	0	0	0	1
Pennsylvania	106	1	0	0	5	9
Rhode Island	1	0	0	0	0	0
South Carolina	8	0	0	0	0	0
South Dakota	6	0	0	0	4	0
Tennessee	129	6	5	0	41	37
Texas	54	3	1	1	8	6
Utah	0	0	0	0	0	0
Vermont	2	0	0	0	0	0
Virginia	20	0	0	0	1	2
Washington	3	0	0	0	0	0
West Virginia	19	0	0	0	3	0
Wisconsin	33	1	0	0	0	1
Wyoming	0	0	0	0	0	0
Alaska	0	0	0	0	0	0
Canada	3	0	0	0	2	0
Colombia, S. A.	1	0	0	0	0	0
Total	1834	78	34	3	180	195
Grand Total	2324					

Women Chemists at Convention 103 in Memphis



May Whitsitt, Southern Methodist University; Florence Wall, New York consultant

THE keynote of the women chemists group at Memphis was that the women are ready, waiting, and anxious to do their part in the present emergency. Women are now going to have the chance they have been waiting for and it is up to them to prove their value and to contribute their share to chemistry as a profession.

Iota Sigma Pi held its convention meeting at breakfast on Tuesday. Kathryn H. Hicks was the chairman and Evelyn McBain, national president of the sorority, the principal speaker. Dr. McBain gave a review of the present status of the opportunities for women in chemistry. Mrs. Hicks followed with a summary of the position held by women chemists in the southern area

Mrs. Hicks and her committee also proved themselves excellent hostesses for the women chemists group of about 75, and the mementos—a bottle of gardenia perfume and souvenir cotton bolls from Memphis—were pleasant reminders of the luncheon on Tuesday. Miss Wall, the principal speaker for the occasion, in her own unsurpassed way, told her experiences as a pioneer in the profession of chemistry for women. Her talk was an inspiration and was thoroughly appreciated, as one woman to another.

As a conclusion to the women chemists luncheon, a survey on the employment of women in chemistry under the chairmanship of Dr. Whitsitt was reported by Mildred Graflin. Miss Graflin's report included a short review of the compilation of the statistics on employment of women as given by the WPA group; her conclusion was that this survey was the most complete reference material at hand concerning the employment of women in the chemical and allied professions. Plans for keeping the report by the WPA up to date were also discussed since the business and professional women are expecting to complete yearly surveys in order that the report may be continuous and a fair cross-section dealing with women's employment.

The climax of the convention for the women chemists occurred with the speech at the subscription dinner Wednesday evening when Dr. Whitsitt gave an excellent summation of the challenge the present crisis presents and its acceptance by the women in chemical professions. The gist of her talk was that "the opportunity has presented itself and we are glad to be here and ready at a time when we are most needed".

A. C. S. Committee Reports

Advisory to the Bureau of Mines and the Bureau of Standards on Nonferrous Metals

OWING to the present emergency, there were no meetings held during 1941 of these committees, nor do I believe there will be any held during the war.

WM. B. PRICE, *Representative*

Analytical Reagents

DURING the year the committee continued the preparation of specifications for analytical reagents and the consideration of corrections to published specifications. The committee continued its cooperation with the Subcommittee on Reagents of the Committee of Revision of the U. S. Pharmacopoeia in the preparation of specifications for reagents for the current revision.

W. D. COLLINS, *Chairman*



Outside the old slave quarters at Walter Place, Holly Springs, where the A. C. S. ladies saw the Old South

Cooperation with the Chemical Warfare Service

THE committee has not met as a group since our last report. There have been frequent contacts between officers and technical personnel of the Chemical Warfare Service and individual members of the committee in regard to problems that arise from time to time. Naturally the nature of this work is such that no detailed report can be made.

H. E. HOWE, *Chairman*

Economic Status

THE committee was appointed in September 1941.

A comprehensive survey of the economic status of members of the SOCIETY was selected as the first major project. With the aid of Dr. Parsons, the interest of the U. S. Bureau of Labor Statistics was enlisted, and a cooperative arrangement with that bureau was worked out. A completely precoded questionnaire was developed covering annual incomes and monthly earnings of the membership for nine selected years during the period 1926–41 in relation to educational level, years of professional experience, geographical location, size of community, occupational status, source of employment, and field of specialization.

Questionnaires were mailed on November 25, 1941, to the 24,490 members of the SOCIETY located in the United States and its possessions. The questionnaire was

closed on January 25, 1941, by which date 19,008 returns had been received, representing 77.6 per cent of the number mailed. The data from the questionnaires were transferred to punch cards by the Bureau of Labor Statistics. Early in February the machine tabulations were begun by the bureau. The data from the machine tabulations were analyzed by a clerical staff engaged by the committee. A comprehensive report on the results of the survey was presented on the general program at the Memphis meeting of the SOCIETY. The manuscript will be ready for publication shortly. The committee contemplates supplementary studies as warranted by the findings of the present survey.

L. W. BASS, *Chairman*

Exchange

WARTIME irregularities have had a strong effect on the work of the committee during the past year. Exchanges actively in effect now total 351 as contrasted with 490 last year and 663 in 1940. Efforts to maintain the foreign exchanges in spite of warfare were fairly successful up to the time of the happenings in last December. Now communication with most of the countries of Europe and Asia is blocked and the exchanges are at a low ebb.

The committee has made 14 new exchange arrangements since its last report (made March 21, 1941). During this period 167 exchanges have been discontinued; 45 were Japanese, 31 were German, 11 Rumanian, 10 Fininsh, 8 Ukrainian, 4 Latvian, 2 Estonian, 2 Hungarian, 2 Philippine, 2 Yugoslavian, and 1 each Austrian, Belgian, Bulgarian, Chinese, Manchurian, and Norwegian. The discontinued German exchanges and a few of the others had been reinstated after temporary discontinuance during the earlier days of the war in Europe. Seven old exchanges have been resumed during the past year. Fourteen exchange proposals by others have been refused and all exchange requests which we have made have been granted.

The office of *Industrial and Engineering Chemistry* receives 16 of the exchange periodicals and the remainder come to the office of *Chemical Abstracts*. Though its effectiveness is much curtailed now, the exchange plan is of great service in obtaining papers for abstracting. (The committee Chairman asks the privilege of stating parenthetically, as Editor of *Chemical Abstracts*, that diligent effort to obtain by other means papers needed for abstracting from the countries affected by the war has met with some, though decreasing, success during the past year. Difficulties have increased, but the effort is being continued.)

It is the policy of the committee to reconsider all of the existing exchanges twice each year to see that they are in good order and to determine whether or not continuance is justified. Besides this systematic check special attention has been paid to war developments and their effect on journal deliveries in both directions.

E. J. CRANE, *Chairman*

Hazardous Chemicals and Explosives

THE committee reports that it has been active in its capacity as consultant to a similar Committee on Hazardous Chemicals and Explosives of the National Fire Protection Association during the past year.

The committee has answered the usual inquiries submitted by various officers and members of the SOCIETY and other individuals interested in hazardous chemicals and explosives.

In cooperation with the committee of the National Fire Protection Association, authoritative data have been prepared on additional hazardous chemicals and revisions have been made on many of the chemicals listed in the 1939 edition of the Table of Common Hazardous Chemicals.

Because of the numerous manufacturing plants now using hazardous chemicals in connection with the war effort and the many new chemicals having toxic and combustible properties being developed and used in large quantities in the chemical industries in connection with national defense, the functions of our committee are becoming of increasing importance. These newer chemicals are critically reviewed with respect to their life, fire, and storage hazards. Recommendations are made relative to proper fire-fighting methods when the hazardous chemicals are involved in fires.

G. W. JONES, *Chairman*

Industrial Alcohol

THE committee has held no meetings and has not been active during the past year. No major industrial alcohol problem has been presented to the committee, and none such has arisen.

MARTIN H. ITTNER, *Chairman*

Licensing Inquiry

THE committee reports that the only important item under observation during the year was a new bill that was introduced into the New York State Legislature somewhat modified in comparison with previous attempts and purporting to be permissive in character only. This bill was killed in committee. It is not yet certain whether or not it will be reintroduced during the present year.

The committee is watching trends in legislation and is of the opinion that the state legislatures generally are not likely to give much attention to matters of this kind during the present emergency.

F. W. WILLARD, *Chairman*

Membership

THE committee is pleased to report that the membership again increased in 1941. A detailed statement follows:

Individual members elected 1941...	4,428
Corporation members elected 1941..	38
Members resigned during 1941.....	410
Deceased members 1941.....	79
Total membership at end of year 1941.....	28,738
Members dropped for delinquency on December 31, 1941.....	782

W. D. COLLINS, *Chairman*

Nomenclature, Spelling, and Pronunciation

INTEREST in America in the use of good chemical nomenclature is growing. The committee sees much evidence of this growth. Inquiries concerning good usage received by the committee are numerous. There is gratifyingly strong demand for copies of printed nomenclature rules. Cooperation is easier to obtain. It is encouraging to observe a fuller realization that exactness should characterize the reporting of scientific results as well as the obtaining of them.

During the past year the committee has distributed, at 10 cents per copy, 755 reprints of Rules for Naming Inorganic Compounds, which is the latest report (1940) of the Committee for the Reform of Inorganic Chemical Nomenclature of the International Union of Chemistry. The committee has provided an American version of these rules by a limited amount of editing of spellings and of the translation, done with the understanding that it was not the intent of the International Committee to interfere with the written forms peculiar to the languages of individual countries. Demand for the rules for naming organic compounds (Definitive Report of the Commission on the Reform of the Nomenclature of Organic Chemistry of the International Union of Chemistry, issued in 1933) has also been strong, so that the committee has had to provide itself with a supply of an additional 2,000 copies. Sales of the organic rules, also at 10 cents per copy, total 2,836 to date. There is a steady demand for the committee's other nomenclature and pronunciation pamphlets also.

Leonard T. Capell and Austin M. Patterson have been the most active members of the committee in answering the numerous nomenclature questions which come from individual investigators, editors, and representatives of other organizations. The committee, with the cooperation of the *Chemical Abstracts* office staff, endeavors to maintain a clearinghouse for information on good nomenclature usage,

and our most active year in this work has just been completed.

E. J. CRANE, *Chairman*

Paper

THE practice of checking each delivery of paper made to the printer to determine whether or not it conforms to the specifications has been followed, as in past years. No serious deficiencies were found in any delivery, and in no case did the deficiency affect either permanence or printing quality.

The committee, with the cooperation of the paper mills and the printer, made a study of some of the papers in an effort either to improve the quality of the printing or to obtain a satisfactory paper of a lower grade than formerly used. As a result of this work, the committee has approved the following changes in specifications:

A. General Requirements. Owing to the War Production Board's restrictions on the use of chlorine and other chemicals, it may be necessary to relax somewhat our requirements that the stock used in certain papers be free from unbleached or groundwood fibers. Thus far all papers have complied with the specifications, but future restrictions may make it necessary that we permit the use of some unbleached stock. It is not probable that the use of groundwood will have to be considered.

Rather than alter the specifications to permit definite changes in stock requirements, the committee is of the opinion that a new item, A-3, under general requirements will allow ample leeway to permit only such deviations from the specifications as may later prove necessary. Furthermore, when restrictions are removed after the war, it will be a simple matter to drop this one item, thereby restoring the original requirements.

The new item A-3 is to read, "Stock requirements shall be subject to such modifications as may be required by the orders of the War Production Board. All modifications must have the approval of the Paper Committee."

Supercalendered Book Paper. Item B-1-f. Oil penetration to be 125 to 150 sec., instead of 75 to 100 sec. With the equipment available for preventing offset, this change aids in getting more brilliant and sharper printing. The effect has been particularly noticeable in recent issues of CHEMICAL AND ENGINEERING NEWS, where there has been a definite improvement in the printing of the halftones.

Coated Cover Papers. Items B-3 and B-4. This was changed last year from a No. 1 to a No. 3 grade. The smoothness specifications, Items B-3-e and B-4-f, have been lowered slightly. The new specification requires a minimum smoothness of 500 sec. as compared with the old requirement of a range of 600 to 800 sec. The No. 3 grade is proving satisfactory in use and the quality of the printing is good.

Envelope Paper. Item B-7-a. Eliminate "unbleached." **Item B-7-g.** New item. **Minimum pH value 5.0.** This change was made unofficially some months ago and is in line with the findings and experience of the Government Printing Office and the U. S. Bureau of Standards.

Section C. Methods of Testing. The method of making the Dennison wax test is clarified by specifying a 15-minute cooling period for the wax after application to the paper.

As in past years, the committee has maintained close contact with the Mack Printing Co. and the mill which supplies the paper used in printing the body portion of the SOCIETY publications. The Chairman of the committee made two trips to the printing plant and Mr. Fleck, vice president of the Mack Printing Co., met with one of the committee members at the Bureau of Standards to discuss the above changes.

Following our established custom, the committee held a luncheon meeting at the annual T. A. P. P. I. convention, at which both the printer and paper mill were represented. We have found this annual get-together to be of considerable value to all concerned.

B. L. WEHMHOFF, *Chairman*

Patent and Related Legislation

THE committee has been unusually active this year, but has carried on its work entirely by correspondence between the members, the Chairman, and H. T. Stowell in Washington. Mr. Stowell, member of the committee, has furnished much valuable assistance in keeping the members advised of pending legislation and hearings thereon before congressional committees and in appearing personally at some of these hearings.

The procedure followed has been generally the same as last year. With respect to all important proposed patent legislation, the views of the committee members were obtained either by questionnaires or by exchange of letters, and reports of the opinions so expressed were distributed to all the committee members. Also, whenever it appeared advisable, the recommendations and views of our committee were communicated to the Chairman of the appropriate Congressional Committee, either by letter, telegram, or by personal appearance at hearings.

It is gratifying to report that none of the proposed legislation which was considered by the committee to be dangerous or ill-advised has been enacted into law.

New Laws

The important legislative measures relating to or affecting patents, enacted into law during 1941, may be summarized briefly as follows:

Public Law No. 221, approved August 18, 1941. This act revises Section 4989 of the Revised Statutes. It authorizes the assignment of applications for patent and provides for recording such assignments on the same basis as assignments of patents.

Public Law No. 239, approved August 21, 1941. This act amends Public Law No. 700 of the 76th Congress, under which the Commissioner of Patents is authorized to issue secrecy orders. The act prohibits the filing in any foreign country of an application for patent on any invention made in the United States without license from the Commissioner of Patents and provides for fine or imprisonment for violation of a secrecy order or for filing a foreign application without a license.

Public Law No. 274, approved October 16, 1941. This act provides for the requisitioning of "military or naval equipment, supplies, or munitions, or component parts thereof, or machinery, tools, or materials necessary for the manufacture, servicing or operation of such equipment, supplies, or munitions" which are needed for the defense of the United States. The bill further provides for the primary determination of fair and just compensation for the property by the President subject to review in the Federal Courts.

The original bill, S. 1579, specifically provided for the taking of patents and patent rights, but this provision was eliminated from the bill by the Senate Military Affairs Committee before the bill was reported.

Public Law No. 354, approved December 18, 1941. Title I. Authorizes the President to coordinate, consolidate, and transfer duties and powers of any executive department, commission, bureau, agency, governmental corporation, office or officer, except the General Accounting Office.

Title II. Authorizes the President to authorize entering into any contract for war purposes without regard to legal restrictions, but prohibits "cost-plus" contracts.

Title III. Amends the Trading with the Enemy Act of October 6, 1917, to give the President complete control over transactions involving any property or right in which any foreign government or national has any interest, including the power to take over any such property or interest; and grants full power of censorship over all communications between the United States and foreign countries.

Pending Legislation

In addition, some 15 or 20 new bills were introduced in Congress, and are still pending, which relate to various aspects of patents and patent rights. Some of the more important of these pending bills are the following:

S. 674, S. 675, and **S. 918** (all introduced by Senator Hatch) are the administrative procedure bills. **S. 675,** proposed by the majority of the members of the Attorney General's Committee, specifically excludes patents and trade-marks from most of its provisions. Extensive hearings before a subcommittee of the Senate Judiciary Committee have been concluded. A favorable report on a bill in the form of **S. 675** is anticipated.

H. R. 3360 (Kramer) would prohibit issuance and enforcement of injunctions on patents when necessary in the national defense. Substitute proposals which would grant authority to the President to requisition patents or any interest therein were submitted by the Department of Justice. Extensive hearings on the bill and the Justice Department proposals were held by the House Committee on Patents. No action has been taken on this bill since the hearings terminated in April 1941. It may be assumed that the House Committee was convinced that the proposed legislation is not necessary. But a new bill, namely

S. 2303 (O'Mahoney) has recently been introduced in the Senate. This new bill would provide for granting of licenses by the President under any patent with respect to any material or article which he

might find and declare to be in the interest of national defense, during any war in which this country is engaged, and would prohibit injunctions with respect to any such material or article during the period specified by the President, and limit recovery by the patent owner to a reasonable royalty fee. Section 2 of this bill would go still further and authorize the President, during any period of national emergency declared by him and whenever he determines it to be in the interest of national defense, to acquire patents and inventions by various means, including a declaration of taking, the only recourse of the patent owner in that event being to bring suit in the Court of Claims for compensation. This new bill has not yet been set for hearing, but a hearing thereon before the Senate Committee on Patents is expected shortly, and the matter is receiving careful consideration by our committee.

S. 892 (Bone) and H. R. 3211 (Kramer) limiting the life of a patent to twenty years from the application, and S. 928 (Bone) establishing a circuit court of appeals for patents, appear to be the most controversial items of the legislative program proposed by the Commissioner of Patents more than two years ago. It does not appear that any action has been taken on these bills in either house of Congress or in either of the Congressional Patent Committees during the present session, although the other items of the Commissioner's program were enacted, as reported in our committee report of March 1940.

Court Decisions

The committee has also followed certain trends which have become apparent in recent litigation involving patents and also involving alleged unlawful monopolistic practices by patent owners and by those operating under patents. These trends include a notable raising of the standard of invention required to support validity of patents, resulting in a marked increase in the proportionate number of patents held invalid because of failure to meet this standard; and a restriction of the scope of the monopoly afforded by a patent, both with respect to the exercise of control over the prices or distribution of goods not directly covered by the patent but resulting indirectly therefrom, and also with respect to contributory infringement by others who furnish material or equipment that does not directly infringe but which is to be used in operations that do infringe.

A further outgrowth of this last-mentioned trend is apparent in a number of recent Supreme Court decisions to the effect that where a patentee has attempted unlawfully to extend his patent monopoly so as to control the sale of unpatented articles, it is contrary to public policy to grant the patentee any relief in court, under the patent, even against others who directly infringe, until such improper practice is completely abandoned and the consequences thereof "have been fully dissipated".

There have been numerous suits recently under the anti-trust laws, based on alleged improper uses of patents for the control of prices and stifling of competition. The above noted trends, and the effects of some of these recent decisions, have been reported more fully in an article by Nelson Littell, member of our committee, in the January 1942 issue of *Industrial and Engineering Chemistry*.

Nonlawyer Patent Attorneys

Finally, we report that our committee has given much time and thought to the agitation which presumably started with members of the bar to prohibit practice before the Patent Office by nonlawyer patent attorneys. This agitation has been particularly pronounced in the states of Illinois and California, and several bills were introduced in Congress which, if they had been enacted, would have prohibited the continued practice of nonlawyer patent attorneys before the Patent Office. State measures such as have been proposed in Illinois and California would not be binding upon the Patent Office, but would regulate the activities of patent attorneys within the state. More recently similar agitation has been started in the State of Pennsylvania. Our committee is of the opinion that many chemists who are not members of the bar are doing valuable and constructive patent work, and we are pleased to report that no adverse legislation has yet been passed.

Patent Planning Commission

President Roosevelt has appointed a Patent Planning Commission to study the problem of stimulating invention and also to study the question of constructive improvements in the patent statutes. Membership of this commission is as follows: Charles F. Kettering, representing science; Owen D. Young, representing industry; Chester C. Davis, representing government; Edward S. McGrady, representing labor; and Francis P. Gaines, president of Washington and Lee University, representing the public.

WALTER A. SCHMIDT, *Chairman*

Professional Status

THIS committee has found nothing to do for the past two years. No suggestions have been made to it by members or members of the Council, and the committee itself has been quite inactive.

There has recently been appointed a committee for the study of the economic status of the chemist. It is believed that this committee will perform most of the functions which the membership expected the Committee on Professional Status to execute.

In view of this situation it is respectfully requested that the Committee for Professional Status be disbanded.

THOMAS MIDGLEY, JR., *Chairman*

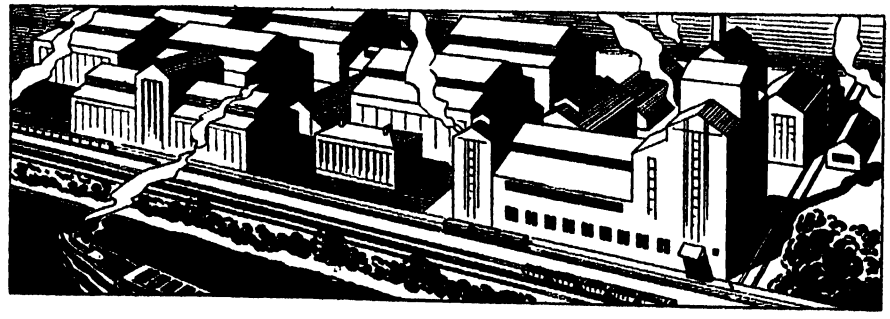
Professional Training of Chemists

SINCE the St. Louis meeting, the committee has continued its program of visitation. Many institutions were considered at the time of the Atlantic City meeting, and a revised list of institutions was published in the October 25, 1941, NEWS EDITION. That list contained the names of 111 institutions whose graduates, when certified by the chairmen of the departments concerned, are eligible for membership in the AMERICAN CHEMICAL SOCIETY in the minimum length of time following graduation as specified in the bylaws. The statistical data presented on page 599 will indicate the number of institutions which have been considered together with the number which have not been approved and the number on which action has been deferred.

The committee has also begun a review of those institutions which have been approved on previous lists. In some instances important changes in personnel or other factors have made it necessary to withdraw approval.

The present situation arising from the war has changed materially curricula in a large number of institutions. Many colleges and universities are now forced to operate with reduced personnel and generally speaking, the situation has become abnormal for most institutions of higher learning. The committee must consider very carefully, therefore, just what is to be the nature of its activities during the present crisis. It is planned to complete considerations of all those institutions which have signified their willingness to cooperate with the committee but, aside from keeping data up to date, it may be necessary to restrict consideration of institutions hereafter to those cases in which marked changes not to be ascribed primarily to "speed-up programs" have considerably lowered the level of instruction and quality of staff.

The most important problem confront-



ing the committee lies in the evaluation of the quality of the teaching staff. No objective standard has yet been formulated to meet this problem, but a letter was addressed to the chairmen of chemistry departments asking for suggestions on this matter. About 93 replies have been received.

The following statistical data summarize the activities of the committee from April 1, 1941, to April 1, 1942:

Institutions Participating in the Program	Apr. 1, 1941	Apr. 1, 1942
Number authorizing visits	407	436
Number deferring authorization	21	7
Number of visits unnecessary	18	38
Number approved without visits	13	13
Number yet to be contacted	23	0
Number of replies not yet received	8	0
Number whose status is indefinite	...	6
Total institutions participating	490	500
Visitation Program		
Number authorizing visits	407	436
Number visited	323	423
Visited previous to Sept. 1, 1941 (Atlantic City meeting)	390	
Visited since Sept. 1, 1941	33	
Status of Institutions Considered to Date		
Approved	92	111
Rejected	141	235
Deferred	76	41
No action pending further study	...	3
Total considered	309	390

Institutions Considered by the Committee at Its Meetings	
Number considered previous to Apr. 1, 1941	211
Number considered at St. Louis, Apr. 5 to 8, 1941	227
Number considered at Atlantic City, Sept. 1941	132
	570

Total Institutions Considered by the Committee (These figures exclude review of institutions and show only total number considered at least once by the committee)		
Prior to Apr. 1, 1941	211	
St. Louis, Apr. 5 to 8, 1941	108	
Atlantic City, Sept. 4 to 8, 1941	71	
Memphis, Apr. 20 to 23, 1942	33	
	423	
Total remaining to be considered	13	
Total authorizing visits	436	
New colleges and universities considered through Atlantic City		390
Schools that have been considered more than once through Atlantic City		180
		570

Questionnaires

In June a questionnaire was sent to each approved department of chemistry and chemical engineering in order that the department chairman might indicate to the committee the list of students who had fulfilled the Society's minimum requirements and thereby were eligible to be admitted to full membership in the Society in the minimum length of time.

From this same questionnaire was secured information relative to staff changes, staff activities, changes in equipment and facilities, and other information of value to the committee so that it could be familiar with the present status of chemistry instruction in each of the approved schools.

Again this year, a questionnaire will be sent out, less extensive in form, but which will secure similar information.

National Roster of Scientific and Specialized Personnel

The committee's secretary has handled the registration of senior student chemists and chemical engineers and graduate students in both of these fields for the National Roster of Scientific and Specialized Personnel.

The following students have been registered throughout the United States:

	Chemists	Chemical Engineers
B.S.	4,591	1,985
M.S.	718	233
Ph.D	519	59
Total	8,105	

W. A. Noyes, Jr., *Chairman*

Soap and Soap Products

During the past year the committee submitted to the Supervisory Committee on Standard Methods of Analysis a recommended revision of the Standard Method for the Sampling and Analysis of Commercial Soaps and Soap Products, Revised [*Ind. Eng. Chem., Anal. Ed.*, 9, 2 (1937)], and it has been approved by the Supervisory Committee on Standard Methods of Analysis.

F. W. Smither, *Chairman*

Standard Apparatus

The committee has continued its cooperation with committees of the Scientific Apparatus Makers of America and of other organizations on problems relating to the standardization of shapes, sizes, and quality of laboratory apparatus.

W. D. Collins, *Chairman*



Standard Methods for the Examination of Water and Sewage

(To Cooperate with the Committee of the American Public Health Association)

The committee has considered in detail a complete revision of methods for the examination of water including an entire reorganization of the present procedure. These recommendations will be presented to the joint committee of the cooperating societies at a meeting which is tentatively set for the week of June 21 in Chicago.

A. M. Buswell, *Chairman*

Standardization of Biological Stains

Although no meeting of the whole Executive Committee was held during 1941, two sectional meetings were held, one in Chicago and one in Philadelphia. Both meetings were attended by the chairman of the commission and it was thus possible for him to discuss several important matters with all the members.

Practically all foreign subscriptions to *Stain Technology* have been stopped but their loss has been compensated for to a great extent by the increase in domestic subscriptions. In order to overcome increased costs and the effect of the slight decrease in the number of subscriptions, the listed subscription price has been raised, but a special rate (no higher than the old rate) is granted to individual scientists and to scientific institutions who place their subscriptions directly with the publishing agent. The commission has continued its biological testing and chemical analyses of stains for certification. The increase in this work reported last year has continued at an accelerated rate. Up to a few years ago the number of samples of stains submitted for certification rarely exceeded 50. In 1940 this number was 71 and in 1941 the number of samples tested was well over 100. This increase has largely been due to orders placed by the Army and Navy for equipping their many medical units. In addition to the stains which have been tested in the past, a demand for other dyes has developed recently. It is probable that these are stains which were formerly supplied from Europe and are no longer available from that source. Also many users of stains who have been using German stains in the past have been confronted with the problem of adapting their procedures to the equally good or better American stains, a change which usually involves some modification of the technique. The commission has been called upon for assistance in solving many of these difficulties and stands ready, as always, to give what help it can in the solution of any biological staining problems.

The chemical testing of the stains

which, at the time of my last report, was being carried out in the chemical laboratories of the Philadelphia College of Pharmacy and Science, has now been moved to the Eastern Regional Research Laboratory of the United States Department of Agriculture, Chestnut Hill Station, Philadelphia, Penna., where it is being continued under a cooperative agreement between the Department of Agriculture and the commission.

The great increase in the demand for stains has improved the financial position of the commission considerably and sufficient funds are now available to continue the work for some time, even though the revenue should decline to the 1939 level.

JOHN T. SCANLAN, *Representative*

Standardized Methods for Vitamin Research

THE committee reports progress in the same sense as in previous years. Methods of working with vitamins are not likely soon to reach a point at which the SOCIETY would wish to give official adoption in the sense that it sometimes does to analytical methods when they have reached a sufficiently conclusive stage of development. This committee does, however, serve a sort of clearinghouse function which on the whole seems worth while and, if the AMERICAN CHEMICAL SOCIETY is disposed to continue its vitamin committee, I have no doubt the members of the committee will be glad to serve.

H. C. SHERMAN, *Chairman*

Supervision of Chemical Engineering Catalog

THE committee, which consists of representatives of the American Institute of Chemical Engineers, the AMERICAN CHEMICAL SOCIETY, the American Section of the Society of Chemical Industry, and the Salesmen's Association of the American Chemical Industry, has prepared a joint statement on the Chemical Engineering Catalog for the year 1941–42 which is as follows:

The sudden and rapid development of chemical industries during the First World War stimulated the demand for information which led to the inauguration of the Chemical Engineering Catalog in 1915. A similar, perhaps even greater, emergency confronts our industries today. With the passage of time the catalog has changed and developed just as have the process industries which it serves. To meet the urgent need for concise and accurate information as to equipment, supplies, and raw materials, the distribution of the Chemical Engineering Catalog has this year been stepped up to 15,000. At all times the demand for the catalog has exceeded the supply.

The Book Section has been brought up to date and constitutes a most complete bibliography of chemical technology.

The redistribution of returned copies of the catalog to universities and technical schools maintaining courses in chemical engineering has been continued and expanded. In this way the men to whom the process industries must look for technical direction in the future become habituated to the use of the catalog at the outset of their careers—a fact of great value to the firms represented in the book.

The committee hopes that the users of the catalog will cooperate with the publishers by making known at every possible opportunity the fact that it is being used by them to obtain information relating to purchases. The firms who spend their money for this service are naturally interested in having direct evidence that the publication is producing results for them. Also the committee will be glad at all times to receive suggestions from users of the catalog as to additional data that might well be included in it. The success of the enterprise to date is largely due to cooperation of this kind.

W. R. VEAZEY.
A. C. S. Representative

Supervisory on Standard Methods of Analysis

THE committee has approved the revised Standard Methods for the Sampling and Analysis of Commercial Soaps and Soap Products, which was submitted July 18, 1941. It awaits the approval of the Council.

H. H. WILLARD, *Chairman*

Teaching of Chemistry in High Schools

THE committee has held four meetings, at three of which there were three members present. We have outlined a program, have established contact with several groups of educators who are concerned with various phases of science instruction, and each member of our committee has undertaken to study conditions and inaugurate reforms in his own and in adjacent states. We agree that more effective, more complete, and more permanent improvements can be made by working with school authorities and teacher-training institutions than would be possible through legislative action. We hope first to improve the teaching of science in a few states by building up a better scientific background; then using the experience thus gained to expand the process to other localities.

The following projects have been selected as in most urgent need of attention:

Grouping of subjects in high school teaching programs so the sciences may be logically associated with each other and with allied subjects such as mathematics.

Soliciting the cooperation of high school inspectors in promoting a reasonable grouping of the sciences.

Urging the universities, colleges, and normal schools to direct the teacher-training process so the teachers of science in the small and medium-sized high schools may have at least an elementary training in all the subjects of the science group.

Arranging a system of licensing of graduates whose training in all the subjects of the science group is sufficient to permit them to qualify as teachers of science.

It is obvious that these projects are designed to help the smaller high schools. The committee believes that improvement is most urgently needed in schools of this type and that the larger schools where less diversity of subject matter is necessary are now on the average doing an excellent job of teaching chemistry and the other sciences.

B. S. HOPKINS, *Chairman*

Women's Service

THE committee submits the following report:

Studies

1. Women Registered in the Employment Clearing House. The committee has made inquiry concerning the number of women securing positions through the Employment Clearing House. It has been learned from the St. Louis and Atlantic City registrations that the number of women taking advantage of the Clearing House is small; of the total registration about 3 per cent at St. Louis and 5 per cent at Atlantic City were women. From interviews at the latter meeting, approximately one third of those registered accepted employment; the percentage of men registrants accepting employment was the same.

2. Women Chemists Displaced from Foreign Countries. The committee has felt concern for trained scientists forcefully displaced from other countries. It has found there are no special facilities in the AMERICAN CHEMICAL SOCIETY for aiding foreign chemists in finding employment; the difficulties lie largely in the exigencies of the prevailing war conditions.

3. Graduate Scholarships for Women in Chemistry. The committee has in hand some information concerning graduate scholarships in chemistry available to women. This study is not entirely complete; when completed it will be given to the succeeding Women's Service Committee.

Advisory Work

The committee has acted in an advisory capacity for a number of young women graduating from college seeking employment in chemical fields. It has also to a lesser extent advised with displaced foreign women chemists.

General Meeting

At the suggestion of the committee, the local chairmen on entertainment for women chemists at the St. Louis and Atlantic City meetings arranged late afternoon sessions at which time many women

chemists held profitable discussions on problems connected with their work.

Garvan Award

The committee has designated 1942 as the time at which the next Garvan Award may be made. The committee through canvassing has secured nominations for the award, and these have been forwarded to the Award Committee through the Secretary of the AMERICAN CHEMICAL SOCIETY.

MAY L. WHITSITT, *Chairman*

The A. C. S. Convention at Memphis

THE Memphis convention
Is but a memory,
An exceedingly pleasant memory—
Dean Rudd, Copson, and Isabel McKinnell.
Renewing old acquaintances
And winning a friend.
A fleeting glimpse of this one
With nod of recognition,
A friendly glance,
A word or two,
Or hours of reminiscence.
There were meetings, consultations,
Inspection trips, and papers.
There was the register one peruses
A friend to find.
Podbielniak and Baldeschwieler,
Per Frolich, Hooker, Jones, and Smith.
There were breakfasts, teas, and dinners.
There were cocktail parties, too.
Some parties were quite private,
But the banquet was for many.
There was dancing on the Skyway,
Sociability running high.
Now Memphis is a memory
And Buffalo still remote.
But make a pledge to be there,
A pledge you'll not revoke,
And no regrets.

A. BERNE-ALLEN, JR.

Box 369
WAYNESBORO, VA.

Lost and Found at Memphis

THE following articles were turned in to the Information Booth at the Memphis meeting under the lost and found service. They may be obtained by the owners, provided sufficient identification is offered, by contacting Jeff M. Hart, Jr., Laboratory Department, Firestone Tire & Rubber Co. of Tennessee, Memphis, Tenn.

Silver and black Parker pencil
Checkbook of Ruston State Bank & Trust Co., Ruston, La.
Pair of lady's black fabric-gloves
Brown felt hat, "Richards Clothes" label
Gray raincoat bearing name of Alison Smith

Theodore C. Swigert has been assigned to the Armored Force Research Laboratory, now under construction at Fort Knox, Ky., which will study problems pertinent to personnel and equipment, with a view to correcting existing difficulties and considering the human equation in tank warfare.

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WASHINGTON–IDAHO BORDER. *Chairman*, E. V. White; *Secretary*, Andrew van Hook, Department of Chemistry, University of Idaho, Moscow, Idaho; *Councilor*, R. W. Gelbach.

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WESTERN VERMONT. *Chairman*, E. B. Womack; *Secretary*, Constance L. Brown, Williams Science Hall, University of Vermont, Burlington, Vt.; *Councilor*, H. C. Hamilton.

WICHITA. *Chairman*, W. E. Perdew; *Secretary* L. A. Enberg, East Plant No. 2, Carey Salt Co., Hutchinson, Kans.; *Councilor*, R. E. Puckett.

WILSON DAM. *Chairman*, G. L. Bridger; *Secretary*, Robert A. Wilson, Box 1364, Wilson Dam, Ala.; *Councilor*, J. W. H. Aldred.

WISCONSIN. *Chairman*, John W. Williams;

Secretary, Joseph O. Hirschfelder, Department of Chemistry, University of Wisconsin, Madison, Wis.; *Councilors*, Homer Adkins, N. F. Hall.

WOOSTER (OHIO). *Chairman*, Milton P. Puterbaugh; *Secretary*, John W. Chittum, 722 North Bever St., Wooster, Ohio; *Councilor*, R. I. Grady.

Committees

(April 1942 to April 1943)

Members of the SOCIETY should note that these committees are *their* committees. Some of these committees deal with very general and all-important problems. They desire to serve as clearing houses and are anxious to have suggestions and thoughts from individual members. Send your suggestions to the chairman of the committee. There is no committee so able or representative that it cannot profit by the individual ideas of the membership.

Advisory to the Bureau of Mines and National Bureau of Standards on Nonferrous Metals. *A. C. S. Representative on the Committee:* Wm. B. Price, Scoville Mfg. Co., Waterbury, Conn.

Analysis of Commercial Fats and Oils (established 1926). *Chairman*, V. C. Mehlenbacher, 112 South La Grange Road, La Grange, Ill.; J. Fitelson, W. D. Hutchins, M. L. Laing, C. P. Long, K. S. Markley, J. E. Maroney, L. B. Parsons, W. J. Reese, H. A. Schuette, M. L. Sheely, S. O. Sorensen, L. M. Tolman, H. P. Trevithick, F. C. Woekel.

Analytical Reagents (established 1917). *Chairman*, Edward Wichers, 113 West Woodbine St., Chevy Chase, Md.; A. Q. Butler, W. D. Collins, P. H. Messinger R. A. Osborn, Joseph Rosin, John F. Ross.

Annual Report on Atomic Weights (established 1897). G. P. Baxter, Coolidge Memorial Laboratory, Cambridge, Mass.

Award Committees:

American Chemical Society Award in Pure Chemistry (established 1931). Canvassing Committee for Award Nominations: *Chairman, Term expires April 30, 1943:* George Scatchard. *Term expires April 30, 1944:* Ralph L. Shriner. *Term expires April 30, 1945:* Joel H. Hildebrand.

Borden Co. Award in Chemistry of Milk (established 1938). Canvassing Committee for Award Nominations: *Chairman, Term expires April 30, 1943:* R. C. Newton. *Term expires April 30, 1944:* R. Adams Dutcher. *Term expires April 30, 1945:* George E. Holm.

Eli Lilly and Company Award in Biological Chemistry (established 1934). Canvassing Committee for Award Nominations: *Chairman, Term expires April 30, 1943:* M. L. Crossley. *Term expires April 30, 1944:* Lyndon F. Small. *Term expires April 30, 1945:* C. A. Elvehjem.

Chemical Service to Medicine (established 1939). (Committee reports to the Directors) *Chairman*, Vincent du Vigneaud, Cornell University Medical School, 1300 York Ave., New York, N. Y.; H. T. Clarke, W. G. Karr, V. C. Myers, A. E. Osterberg, D. D. Van Slyke.

Cooperation with Chemical Warfare Service (established 1920). *Chairman*, H. E. Howe, 1155 16th St., N. W., Washington, D. C. *Research:* Roger Adams, Per K. Frolich, C. A. Kraus, A. B. Lamb, W. A. Noyes, Jr., E. R. Weidlein, F. C. Whitmore. *Development:* Bradley Dewey, W. K. Lewis, G. A. Richter, C. M. A. Stine, L. T. Sutherland. *Production:* G. O. Curme, Jr., W. H. Dow, L. C. Jones, M. C. Whitaker. *Physiological:* Wm. Mansfield Clark, Paul D. Lamson, E. K. Marshall, Jr., D. D. Van Slyke, Vincent du Vigneaud.

Cooperation with National Defense Research Committee (established 1940). (Committee reports to the Directors.) *Chairman*, Roger Adams, Chemistry Laboratory, University of Illinois, Urbana, Ill.; Harry N. Holmes, Thomas Midgley, Jr., *Ex Officio;* J. B. Conant, W. K. Lewis, Charles L. Parsons, E. R. Weidlein, R. E. Wilson.

Council Policy (established 1923). *Ex Officio: Chairman*, Harry N. Holmes, Severance Chemical Laboratory, Oberlin College, Oberlin, Ohio; Robert T. Baldwin, E. J. Crane, Wm. Lloyd Evans, Per K. Frolich, H. E. Howe, A. B. Lamb, Thomas Midgley, Jr, Charles L. Parsons. *Term expires December 1942:* Erle M. Billings. *Term expires December 1943:* G. J. Esselen. *Term expires December 1944:* Walter A. Schmidt.

Economic Status (established 1941). *Chairman*, Lawrence W Bass, New England Industrial Research Foundation, Inc., 137 Newbury St., Boston, Mass.; George Calingaert, Walter A. Schmidt, Walter G. Whitman, F. C. Whitmore.

Exchange (established 1907). *Chairman*, E J. Crane, *Chemical Abstracts*, Ohio State University, Columbus, Ohio; H. E. Howe, A. B. Lamb.

Hazardous Chemicals and Explosives, to Cooperate with National Fire Protection Association Committee on the same subject (established 1923). *Chairman*, George W. Jones, U. S. Bureau of Mines, Pittsburgh, Penna.; F. F. Chapman, A. H. Nuckolls.

Industrial Alcohol (established 1921). *Chairman*, Martin H. Ittner, Colgate-Palmolive-Peet Co., Jersey City, N. J.; R. F. Bacon, J. H. Beal, J. G. Davidson, W. H. Dow, E. H. Killheffer, R. H. McKee, H. W. Rhodehamel.

Licensing Inquiry (established 1939). *Chairman*, Frederic W. Willard, 12 Hawthorn Place, Summit, N. J.; Arthur Guillaudeu, H. S. Lukens, Foster D. Snell.

Membership (established 1876). *Chairman*, W. D. Collins, U. S. Geological Survey, Washington, D. C.; H. E. Howe, Charles L. Parsons.

National Research Council Representatives from A. C. S. on Division of Chemistry and Chemical Technology. *Terms expire July 1, 1942:* Per K. Frolich, John R. Johnson. *Terms expire July 1, 1943:* G. J. Esselen, Paul M. Gross *Terms expire July 1, 1944:* L. W. Bass, H. M. Chadwell.

Nomenclature, Spelling, and Pronunciation (established 1894). *Chairman*, E. J. Crane, *Chemical Abstracts*, Ohio State University, Columbus, Ohio; Board of Editors of the *Journal of the American Chemical Society;* Editor of *Industrial and Engineering Chemistry;* L. T. Capell, A. M. Patterson, Janet D. Scott.

Paper (established 1908). *Chairman*, Byron L. Wehmhoff, 6506 Brennon Lane, Chevy Chase, Md.; B. W. Scribner, H. J. Skinner

Patent and Related Legislation (established 1899). *Chairman*, Walter A. Schmidt, 1016 West Ninth St., Los Angeles, Calif.; Robert T. Baldwin, F. E. Barrows, F. G. Breyer, Bruce K. Brown, Henry Howard, Nelson Littell, J. C. Morrell, O. W. Storey, H. T. Stowell, E. H. Volwiler.

Professional Training of Chemists (established 1936). *Chairman*, W. Albert Noyes, Jr., Department of Chemistry, University of Rochester, River Campus, Rochester, N. Y. *Secretary* (member *ex officio*), Erle M. Billings, 343 State St., Rochester, N. Y. *Term expires April 30, 1943:* W. G. Young. *Term expires April 30, 1944:* Harry B. Weiser. *Term expires April 30, 1945:* W. Albert Noyes, Jr. *Term expires April 30, 1946:* S. C. Lind.

Soap and Soap Products (established 1935). *Chairman*, F. W. Smither, National Bureau of Standards, Washington, D. C.; R. E. Divine, J. E. Doherty, C. P. Long, E. B. Millard, M. L. Sheely, H. P. Trevithick.

Standard Apparatus (established 1917). *Chairman*, W. D. Collins, U. S. Geological Survey, Washington, D. C.; J. V. Freeman, R. A. Osborn, Lyon Southworth, Edward Wichers, H. H. Willard.

Standard Methods for the Examination of Water and Sewage, to Cooperate with the Committee of the American Public Health Association (established 1920). *Chairman*, Arthur M. Buswell, University of Illinois, Urbana, Ill.; W. D. Collins, C. R. Hoover, F. W. Mohlman, F. G. Straub.

Standardization of Biological Stains (established 1924). *A. C. S. Representative on the Commission:* John T. Scanlan, Eastern Regional Research Laboratory, U. S. Department of Agriculture, Chestnut Hill, Philadelphia, Penna.

Standardized Methods for Vitamin Research (established 1921). *Chairman*, Edward A. Doisy, 1402 South Grand Ave., St. Louis, Mo.; A. D. Emmett, C. G. King, E. V. McCollum, E. M. Nelson.

Study Problem of the Teaching of Chemistry in High Schools (established 1941). *Chairman*, B. S. Hopkins, Chemistry Laboratory, University of Illinois, Urbana, Ill.; H. N. Alyea, M. V. McGill, A. W. Scott.

Supervision of Chemical Engineering Catalog (established 1915). W. R. Veazey, Dow Chemical Co., Midland, Mich.

Supervisory on Standard Methods of Analysis (established 1910). *Chairman*, H. H. Willard, 208 Chemistry Bldg., University of Michigan, Ann Arbor, Mich.; B. L. Clarke, I. M. Kolthoff, G. E. F. Lundell, W. W. Skinner.

Women's Service (established 1927). *Chairman*, May L. Whitsitt, Department of Chemistry, Southern Methodist University, Dallas, Tex.; Mildred Adams, H. Marjorie Crawford, Rachel H. Edgar, Mildred W. Grafflin, Gertrude Vermillion

Chapters of Student Affiliates

Agricultural and Mechanical College of Texas, College Station, Tex.
Albion College, Albion, Mich.
Albright College, Reading, Penna.
Birmingham–Southern College, Birmingham, Ala.
Brooklyn College, Brooklyn, N. Y.
Bucknell University, Lewisburg, Penna.
Butler University, Indianapolis, Ind.
California Institute of Technology, Pasadena, Calif.
Central College, Fayette, Mo.
College of Puget Sound, Tacoma, Wash.
College of St. Thomas, St. Paul, Minn.
College of Wooster, Wooster, Ohio
Colorado State College of Agricultural and Mechanical Arts, Fort Collins, Colo.
Duquesne University, Pittsburgh, Penna.
Fordham University, New York, N. Y.
Franklin and Marshall College, Lancaster, Penna.

Grove City College, Grove City, Penna.
Hamline University, St. Paul, Minn.
Hofstra College, Hempstead; N. Y.
Howard College, Birmingham, Ala.
Indiana University, Bloomington, Ind.
Iowa State College, Ames Iowa
Jamestown College, Jamestown, N. Dak.
Lafayette College, Easton, Penna.
Lawrence Institute of Technology, Highland Park, Mich.
Loyola University, Los Angeles, Calif.
Manhattan College, New York, N. Y.
Marietta College, Marietta, Ohio.
Massachusetts Institute of Technology, Cambridge, Mass.
Massachusetts State College, Amherst, Mass.
Newark College of Engineering, Newark, N. J.
Niagara University, Niagara University, N. Y.
Northeastern University, Boston, Mass.
Ohio Northern University, Ada, Ohio
Ohio University, Athens, Ohio
Oregon State College, Corvallis, Oreg.
Polytechnic Institute of Brooklyn, Brooklyn, N. Y.
Rensselaer Polytechnic Institute, Troy, N. Y.
Rhode Island State College, Kingston, R. I.
Rice Institute, Houston, Tex.
St. John's University, Brooklyn, N. Y.
St. Louis University, St. Louis, Mo.
St. Norbert College, West DePere, Wis.
San Jose State College, San Jose, Calif.
South Dakota State College, Brookings, S. Dak.
Texas Christian University, Forth Worth, Tex.
Texas Technological College, Lubbock, Tex.
Union College, Schenectady, N. Y.
University of Alabama, University, Ala.
University of Buffalo, Buffalo, N. Y.
University of California, Berkeley, Calif.
University of Connecticut, Storrs, Conn.
University of Delaware, Newark, Del.
University of Denver, Denver, Colo.
University of Detroit, Detroit, Mich.
University of Florida, Gainesville, Fla.
University of Houston, Houston, Tex.
University of Kentucky, Lexington, Ky.
University of Minnesota, Minneapolis, Minn.
University of Montana, Missoula, Mont.
University of Nevada, Reno, Nev.
University of Pennsylvania, Philadelphia, Penna.
University of Pittsburgh, Pittsburgh, Penna.
University of South Dakota, Vermillion, S. Dak.
Virginia Military Institute, Lexington, Va.
Virginia Polytechnic Institute, Blacksburg, Va.
Washington and Lee University, Lexington, Va.
Western State College, Gunnison, Colo.
Westminster College, Fulton, Mo.

National Academy of Sciences Elects Honorary Members

THE National Academy of Sciences elected 15 persons to honorary membership at the business session during its annual meeting, April 28, in Washington, D. C. Eight of those so honored are members of the AMERICAN CHEMICAL SOCIETY: Homer B. Adkins, University of Wisconsin; Hans T. Clarke, Columbia University; Conrad A. Elvehjem, University of Wisconsin; Michael Heidelberger, Columbia University; John G. Kirkwood, Cornell University; Paul D. Merica, International Nickel Co.; Thomas Midgley, Jr., Worthington, Ohio; and Selman A. Waksman, New Jersey Agricultural Experiment Station.

POTOMAC POSTSCRIPTS

WPB Activities

Benzene. Order M-137 halts the use of benzene in motor fuel, with the exception that any producer or distributor may use before May 20 one sixth of the amount he used for the three months ended March 31. Benzene is added to motor fuel as an anti-knock ingredient, either in addition to or in place of tetraethyllead. It is a principal source of styrene, one of the main ingredients of Buna rubber. Although production is on the increase, both demands cannot be met. The order specifically exempts benzene used in the production of aviation fuel with an octane rating higher than 87.

Chlorine. A change in the method of computing the permissible use of chlorine in the treatment of rag stock under General Limitation Order L-11 has been ordered. Order L-11 limited the use of chlorine in the treatment of rag stock according to the total amount consumed during a base period. Amendment 1, effective April 20, changes the basis of limitation to the amount used per ton of rag stock treated. The effect is to afford relief to some paper mills which were already conserving chlorine during the base period by using a minimum amount per ton and whose production has been unduly restricted under the original method of computation.

Compressors. Heavy compressors, urgently needed in the war production program, have been placed under a system of complete allocations. The synthetic rubber, toluene, aviation gas, aviation lubricating oil, and oxygen and ammonia programs require large numbers of compressors. More are needed in tank, plane, aluminum, and steel plants. Total needs for the period ending April 1, 1943, are in excess of the available capacity of the industry. An expansion program has been undertaken by several companies, but the necessity for concentration of available machine tools on the ship, tank, and bomber programs will delay completion of additional facilities for compressors.

The order, L-100, prohibits the placing or acceptance of orders for compressors covered by the regulations unless specific authorization is made on Form PD-420. Application for authorization to place orders must be made on Form PD-415. Manufacturers with whom orders authorized by the Director of Industry Operations are placed must accept such orders. Regardless of prior commitment or preference rating, manufacturers may deliver compressors only in accordance with a set procedure. This involves a filing by the manufacturer of a statement showing compressors available for distribution, a list of all orders, and an application on form PD-416 for permission to make delivery. Such application must be made on or before the 25th day of each month

As defined by the order, heavy compressors are classed as "critical compressors". This means "any crank and flywheel type horizontal reciprocating compressor or dry vacuum pump having a displacement of 50 cubic feet per minute or more, or any other reciprocating compressor having a displacement of 300 cubic feet per minute or more, and includes new, second-hand, and reconditioned equipment".

Explosives. Use of a higher preference rating to obtain explosives and explosive equipment is granted to mining enterprises operating under Preference Rating Order P-56 by Amendment 5. Under the order as originally issued a preference rating of A-8 was assigned to deliveries of operating supplies, including explosives. Amendment 5, which adds explosives and explosive equipment to the types of machinery and supplies listed in Schedule A of the order, will allow mining enterprises to use a rating of A-1-c to obtain them, subject to quota restrictions.

Machinery. Restrictions on production of critical industrial machinery listed in Limitation Order L-83 will go into effect May 15. Effective date of the order, originally April 9, was postponed to avoid disruption of schedules in plants preparing to convert to output of war supplies. Provisions of L-83 already in force, however, make it unlawful for manufacturers or distributors to accept orders for such equipment or to make deliveries without WPB approval. Amendment 1 will permit manufacturers to continue production on orders that were on their books before L-83 became effective. There is no guarantee, however, that machinery produced on unapproved orders will be permitted to be delivered to the person or persons from whom the orders were received. Before deliveries will be permitted, WPB must be advised of the type of equipment involved and the use for which it is intended.

Priority Assistance. All applications for priority assistance which do not specify a required delivery date will hereafter be returned to the applicant by the War Production Board. Priorities Regulation 1 as amended requires every applicant for priority assistance to specify the latest date on which the items in connection with which priority assistance is requested can be delivered to him to meet his contract obligations or production schedules. Many applicants, especially those submitting individual applications on PD-1A forms, have been specifying "immediately" or "at once" instead of filling in a definite

delivery date. Hereafter, no such applications will be considered until an exact delivery date has been filled in.

Priority Diversion. Black market operations in scarce chemicals, which had resulted in profits of more than 100 per cent to two New York firms, backfired when on April 23 WPB announced suspension orders directed against the Acme Chemical Co., Inc., Rona Chemicals, and Hans Lowey and Leroy G. Cohen, principals in the illegal transactions.

The orders state that priority orders were violated. Order S-41, directed against Acme, provides that for a period of six months no preference ratings shall be assigned to delivery of any material to the offending company and that no allocation of any material restricted by the WPB shall be made to it. S-42 is directed against Hans Lowey and Leroy G. Cohen, individually or doing business as Rona Chemicals, and imposes the same penalties meted out to Acme. Since many medicinal chemicals are difficult if not impossible to obtain without preference ratings, the punitive action in these cases is severe.

Resins. Natural resins, which have been substituted in civilian use for the synthetic resins needed for war purposes, have also become scarce. Unfortunately, natural resins come only from such widely separated parts of the world as New Zealand, the Philippines, Batavia, Singapore, the East Indies, India, and Africa. With war demands growing for both plastics and paints and limited supplies of natural resins being received, curtailment of civilian use of natural resins is necessary.

This is accomplished by Conservation Order M-56 which, in the main, restricts the use of natural resins in any calendar quarter to 50 per cent of the amount used in the corresponding quarter of 1941. In manufacture of rotogravure inks the restriction is to 75 per cent of the amount used in the corresponding period. Form PD-339 is provided for quarterly inventory reports. Use of natural resins in barn paint, farm equipment finishes, floor finishes, freight car paints, interior house paints, pencil finishes, playing card finishes, porch and deck paints, road marking paints, spirit label varnishes, and toy and novelty finishes is prohibited entirely. Asphaltic and pitch bases can be used for some of these products, and pine rosin is adaptable to others. For the slick varnish finish on pencils and playing cards, no substitute is known.

The restrictions do not apply to Army, Navy, or Lend-Lease contracts, nor to use as a noncorrosive finish in chemical plants, in research laboratories, in vessels other than pleasure craft, or in health supplies. The order applies to the manufacture of products containing natural resins and does not restrict the sale of paints or varnishes already manufactured.

Rotenone. Because imports of rotenone from Malaya and the Netherlands Indies have been cut off, limitations on its use are ordered in Conservation Order M-133. M-133 permits continued use as a delousing agent and for food crops other than cotton, tobacco, cranberries, eggplant, cucurbits, onions, peppers, and sweet corn. Household uses are prohibited. The order applies to manufacture of preparations containing rotenone and does not affect the use of such products already manufactured. Rotenone imports from Latin America, normally half the United States supply, are expected to increase sharply next year. Shipments of pyrethrum, a satisfactory substitute for household uses, continue to arrive from Africa and are not restricted.

Shellac. Order M-106 freezes 50 per cent of all inventories of shellac of 10,000 pounds or more and 50 per cent of all future imports. Output of phonograph records and radio transcriptions is reduced to approximately 30 per cent of 1941 production by limiting the amount of shellac available to that amount. Other uses are restricted to 75 per cent of the corresponding period of 1941 until June 30 and 35 per cent by quarters thereafter. Uses excepted from the restrictions are electrical equipment, coatings for munitions, military explosives and pyrotechnics, navigational and scientific instruments, communication instruments, marine paints for vessels other than pleasure craft, grinding wheels, wood patterns for metal castings, health supplies as defined in P-29, and in scientific research.

Price Regulation

Fats and Oils. Labeling persistent reports of a forthcoming increase in present fats and oil ceiling prices as "utterly without foundation", Price Administrator Leon Henderson has charged that rumors of this nature have inspired a withholding movement of substantial cottonseed oil, soybean oil, and tallow supplies from the market to the detriment of industry and the entire war effort.

At the same time, Mr. Henderson said that Amendment 3 to Revised Price Schedule 53 will be issued shortly by OPA. Purpose of this new amendment will be to set specific prices for some 125 varieties of fats and oils at certain basing points over the country. These prices, it is emphasized, generally will spell out specifically the same prevailing ceilings under which the industry now is operating. The present maximums are the individual seller's highest prices as of October 1, 1941, or 111 per cent of the price at which transactions were made on November 26, 1941. The new price basis will be a uniform one for the entire industry, with differentials for various basing points.

Glycerol. Harshaw Chemical Co., Cleveland, has been authorized to sell to the Treasury Procurement Division approximately 45 tons of dynamite glycerol at a price reflecting only cost but nevertheless exceeding the maximum prices set by OPA Revised Price Schedule 38. The glycerol in question was refined from crude glycerol purchased in South America before OPA imposed ceiling prices. The contract price exceeded the maximums thereafter set by OPA. Because of transportation difficulties the crude product was not delivered to Harshaw until recently.

Paints. Heeding the danger of threatened serious price advances by producers of oil paints and varnishes, OPA has fixed temporary maximum prices at levels which prevailed on April 12, 1942. Effective April 22, the action is embodied in Temporary Price Regulation 19. The new regulation will remain in force for 60 days, during which time OPA will continue its investigation of the pressures on paint prices.

The temporary regulation covers manufacturers' prices on all paints and varnishes in which linseed oil, or any other drying oil, is a component part, and includes house paint, wall paint, interior flat paint, enamels, lacquer enamel, undercoats, floor and deck paint, barn and roof paint, colors in oil, shingle stain, oil stain, fillers, and varnish.

The order provides that the cost to a purchaser of oil paint or varnish from a manufacturer shall not exceed the prices the purchaser paid or would have paid on April 12 and keeps in force all discounts, charges, deposits, allowances, and freight and delivery practices then recognized by the manufacturer.

Nelson Asks for More Subcontracting

INCREASED subcontracting may swing the balance in this war, Donald M. Nelson, chairman of the War Production Board, said recently in an open letter to major prime contractors. Production speed is the dominant factor in the race with the Axis, Mr. Nelson asserted, and we have no time to wait for new tools and new plant facilities. Every available idle tool that can be put to work must be put to work. This may cost more, he added, but the job must be done fast and experience has shown that some prime contracts can be subcontracted as much as 90 per cent. Every prime contractor should consider having an established subcontracting department. Subcontractors should be given engineering assistance. Plants with as few as five or six machines can and should be used in subcontracting.

The War Production Board, Mr. Nelson pointed out, has established field offices throughout the United States, now grouped in 13 regions. To effect the fullest and most efficient utilization of facilities within their areas they maintain

records of machine tool equipment and other facilities of manufacturing establishments. He urged all contractors to make subcontracting needs known to the nearest office.

Hearing Scheduled on Standard for Canned Peas

A PUBLIC hearing will be held May 25 to consider a proposal to amend the identity standard for canned peas, published in the *Federal Register* of February 24, 1940, and effective since May 24 of that year. The hearing will commence at 10:00 A. M., in room 1039, South Building, Independence Avenue between 12th and 14th Streets, S. W., Washington, D. C.

Proposals of the pea-canning industry under consideration are that the standard be amended to provide for addition of inorganic calcium, sodium, and magnesium compounds as optional ingredients for the purpose of retaining color, with such substances designated as optional ingredients and named on the label.

Details are published in the *Federal Register* of April 25. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 10 cents each.

Magnesium Companies Fined

FINES totaling $140,000 have been imposed upon five corporations and six individuals who pleaded *nolo contendere* to an indictment charging violation of the antitrust laws in the production and fabrication of magnesium, the U. S. Department of Justice has announced. At the same time, the entry of a consent decree was entered providing for compulsory free licensing of patents held by the defendants for the production and fabrication of magnesium.

Defendants fined were Aluminum Co. of America, $25,000; Dow Chemical Co., $25,000; American Magnesium Corp., $25,000; Magnesium Development Corp., $20,000; General Aniline and Film Corp., $15,000; Arthur V. Davis, chairman of Alcoa, $5,000; Roy A. Hunt, vice president of Alcoa and president of American, $5,000; Irving W. Wilson, vice president of Alcoa, $5,000; Willard H. Dow, president, and Earl W. Bennett, vice president of Dow, $5,000 each; and Karl Hochschwender, president of Magnesium Development, $5,000.

Judge Goddard remitted the fine against Hochschwender.

Government Takes Foreign-Owned Schering Stock

LEO T. CROWLEY, Alien Property Custodian, has completed Americanization of the Schering Corp., Bloomfield, N. J., by taking over in the name of the U. S. Government 100 per cent of the corporation's common stock, heretofore held by foreign nationals. The company itself began eliminating alien influences in its management some months ago.

Schering manufactures drugs and biologicals of vital importance to the public health and to medical branches of the armed forces. Its manufacturing facilities are being expanded to permit wider distribution of its products, and representatives of the Alien Property Custodian are stationed at Schering Corp. to supervise operations.

PRODUCTION of linseed oil and the crush of flaxseed during the first quarter of 1942 was the largest recorded since the beginning of the quarterly collection of these statistics in 1919, according to a preliminary report released by the U. S. Bureau of the Census.

Second Report of Scarcity of Materials Issued

THE second in the series of provisional reports on the relative scarcity of certain materials, prepared by the Conservation and Substitution Branch of the Bureau of Industrial Conservation, WPB, shows inclusion of many more items.

The following table lists the materials, new to the ranks of those short in supply, as well as indicating the changed status of some given in the previous report (CHEMICAL AND ENGINEERING NEWS, March 25, page 375). The words in parentheses show the ranking of the materials as they were listed in the first report and indicate whether the supply situation has relaxed or tightened. Materials in the previous report which have not changed in relation to supply and demand, according to WPB, are not again listed here.

Group I. Materials most vitally needed for war purposes, not generally available for civilian needs

- Acetone (from Group II)
- Ammonia, anhydrous (from Group II)
- Anthraquinone derivatives
- Cotton duck
- Feathers and down, goose and duck
- Kyanite
- Methyl methacrylate sheets
- Mica splittings (from Group II)
- Nickel scrap
- Nylon
- Palm oil (from Group II)
- Phosphates
  - Tricresyl
  - Triphenyl
- Phthalic anhydrides and phthalates
- Polystyrene
- Quartz crystals (from Group II)
- Quinine (from Group II)
- Rapeseed oil (from Group II)
- Rhodium (from Group II)
- Shellacs (from Group II)
- Teak (from Group II)
- Zinc, high grade (from Group II)

Group II. Basic materials that are essential to the war industries but whose supply is not so critically limited as materials of Group I

- Albumin, blood
- Alcohol
  - Butyl
  - Ethyl
- Benzene
- Cotton, raw, long staple
- Cottonseed
- Ferrosilicon
- Glues, animal and vegetable
- Glycols
- Henequen
- Iron
  - Pig
  - Scrap
- Lead (from Group I)
- Lithium
- Methyl methacrylate powder
- Ruthenium (from Group III)
- Silicon and alloys (from Group III)
- Steatite talc
- Vulcanized fiber
- Wood pulp
- Xylene
- Zinc, low grades
- Zirconium

Group III. Materials available in significant quantities for other than strictly war purposes. Use, however, may be restricted by manufacturing limitations. Restrictions are commonly imposed but supplies are not critically short, except in the case of iron and steel

- Atebrin
- Carbon black
- Casein (from Group II)
- Charcoal
- Coal-tar pitch
- Diatomite
- Emery
- Fluorspar
- Gilsonite
- Hydrochloric acid
- Indium
- Invert sugar
- Iodine (from Group II)
- Lime
- Linseed oil (from Group II)
- Mica, common
- Osmium
- Pottery
- Silica sand
- Sodium metasilicate
- Sodium nitrate, commercial
- Starch
- Steel, open hearth
- Straw
- Sugar (from Group II)
- Tripoli
- Vermiculite

Riboflavin Requirement Postponed

EFFECTIVE date of the requirement that 1.2 mg. of riboflavin be an ingredient of enriched flour, enriched bromated flour, enriched self-rising flour, and enriched farina has been postponed to April 20, 1943, the FSA announces. The supply of riboflavin, it is explained, will not be sufficient by July 1, 1942, the former effective date, to permit production of the foods on a scale to meet current demands, but should be adequate by April 20, 1943.

The order is published in the *Federal Register* of April 25. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 10 cents each.

Bass to Head New England Industrial Research Foundation



Lawrence W. Bass

LAWRENCE W. BASS, chemical engineer and research management specialist, has been appointed director of the newly established New England Industrial Research Foundation, Inc., 137 Newbury St., Boston, Mass. Dr. Bass has been assistant director of the Mellon Institute of Industrial Research, Pittsburgh, since 1937 and previously was a member of the executive staff from 1929 to 1931.

The New England Industrial Research Foundation, organized under the sponsorship of the New England Council, is the outgrowth of a two-year study made by the council's New Products Committee headed by Karl T. Compton, president of Massachusetts Institute of Technology. The foundation is broadly interested in the maintenance and further expansion of industrial New England and the more intensive development of its resources, as well as with the opportunity afforded by existing research and engineering facilities for the advancement of established industrial enterprises.

Officers of the New England Research Foundation are: president, Earl P. Stevenson, president, Arthur D. Little, Inc., Cambridge, Mass.; treasurer, Harold B. Richmond, treasurer, General Radio Co., Cambridge; director, Lawrence W. Bass; assistant director and secretary, Richard B. Cross, former secretary of the New Products Committee, New England Council.

Trustees of the foundation are: Ralph E. Flanders, president, New England Council, and president, Jones and Lamson Machine Co., Springfield, Vt.; Earl P. Stevenson; A. E. Marshall, president, Rumford Chemical Works, Rumford, R. I.; Karl T. Compton; Harold B. Richmond; Harold Ladd Smith, director of research, Vermont Marble Co., Proctor, Vt.; and Richard B. Cross.

Frank R. Mayo, instructor in organic chemistry at the University of Chicago, has resigned to take a position as research chemist with the U. S. Rubber Co. at Passaic, N. J.

Women Wanted for War Work

WOMEN have their part in the war program, and it is an important part. They are urgently needed for a wide scope of scientific and technical work in government positions in Washington, D. C., and in the ordnance laboratories and arsenals throughout the country.

In the fields of chemistry and physics, the greatest need for women at this time is for those qualified for positions of assistant technical and scientific aid, $1,620 a year; junior physicist, $2,000; and junior chemist, $2,000. Opportunities, however, are not limited to these positions, but women who can qualify are also needed for the higher grades.

The United States Civil Service Commission urges women to apply who have successfully completed at least one year of college training, including laboratory courses in physics or chemistry. Applications should be filed under one or more of the announcements for the following positions depending on the nature and extent of applicant's education or experience or both: technical and scientific aid (various grades) $1,440 to $2,000 a year; junior physicist, $2,000; junior chemist $2,000; research chemist and analytical chemist (various grades), $2,600 to $5,600; physicist (various grades), $2,600 to $5,600 a year.

Announcements giving further details and application forms may be obtained at any first- or second-class post office or from the U. S. Civil Service Commission, Washington, D. C.

Chemist Graduates of Smith College

THE students of Smith College, Northampton, Mass., listed below will receive their A.M. degrees in June and will be located as follows:

Rosa F. E. Kohls, Celanese Corp., Cumberland, Md.

Mary E. Sanguineti, Ridbo Laboratories, Inc., Paterson, N. J.

Margaret E. Wyatte, Women's College, University of North Carolina, Greensboro, N. C.

The following will receive the A.B. degree in June:

Clara H. Gebhard, Eastman Kodak Co., Rochester, N. Y.

Ellen Y. Saville, Texas Co., Beacon, N. Y.

Josephine van der Voort, Armstrong Cork Co., Lancaster, Penna.

Richard W. Schayer has left the Fish and Wildlife Service, College Park, Md., to accept a position as assistant chemist with the U. S. Public Health Service, Industrial Hygiene Section, Missouri State Board of Health, Jefferson City.

Mellon Institute Does Aeronautical Research for Navy

THE Navy Department recently established a basic research project on problems relating to the operation of specialized aviation instruments at the Mellon Institute of Industrial Research, University of Pittsburgh, Pittsburgh, Penna.

The scientifically trained personnel working on this project in behalf of the Bureau of Aeronautics includes the following members of the Mellon Institute: George E. Barker, senior industrial fellow, George E. Alter, industrial fellow, and Charles E. McKnight, fellowship assistant. Other specialists will be added as the research progresses.

A broad survey of the problems involved is being made by Dr. Barker with the cooperation of the Navy Department, various American instrument manufacturers, and other federal government laboratories.

Kober Foundation Honors Awarded

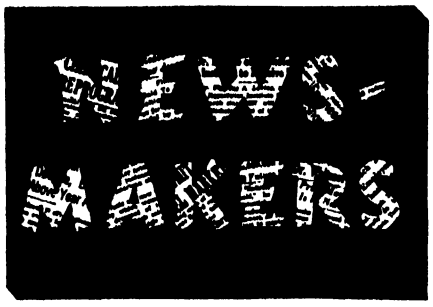
SCIENTIFIC honors of Georgetown University's Kober Foundation have been awarded to Donald Dexter Van Slyke, discoverer of the new amino acid, hydroxylysine, and holder of the Willard Gibbs Medal, and Charles Armstrong, chief of the Division of Infectious Diseases, United States Public Health Service.

The 1942 Kober medal went to Dr. Van Slyke at the annual meeting of the Association of American Physicians in Atlantic City on May 5 for "distinguished research in preventive medicine". Dr. Van Slyke has been associated with the Rockefeller Institute for Medical Research continuously since 1907 and chemist of its hospital since 1914.

Dr. Armstrong, designated to be the lecturer, an appointment which carries a $500 honorarium, spoke on "Recent Developments in Neurotropic Virus Diseases" May 5 in Gaston Hall at the university. He has been associated with the National Institute of Health since 1921 and with the Public Health Service since 1916.

The Kober Foundation was endowed by the late George Martin Kober. As dean of the Georgetown medical school, Dr. Kober provided that recipients of the annual honors be chosen alternately by the Medical Society of the District of Columbia, Association of Military Surgeons of the United States, and Association of American Physicians. Dr. Van Slyke was selected by the Association of American Physicians; Dr. Armstrong by the Association of Military Surgeons.

Cecil Carr, a recent graduate of Iowa State College, has been added to the research staff of the Commercial Solvents Corp., Terre Haute, Ind.



Robert O. Alexander, for three years development and control chemist in the laboratories of the U. S. Rubber Co., Providence, R. I., has accepted a position as development chemist in the laboratories of the Thiokol Corp., Trenton, N. J.

J. G. Baragwanath, American mining engineer long active in Latin American mining developments, has been placed in charge in Cuba of the Nicaro Nickel Co.'s project to develop Cuban nickel ores, and will have headquarters in Havana. The Reconstruction Finance Corp. has made available $20,000,000 for construction of a nickel-recovery plant and facilities for treating low-grade ores on the eastern end of Cuba.

R. I. Bashford is now located in Paducah, Ky., in defense work for the Government.

Norman Baughn, for 12 years connected with the Cook Paint & Varnish Co., has joined the staff of the American-Marietta Co., Chicago, Ill., as a technical specialist in Army and Navy Ordnance and Quartermaster Corps paints.

Marston T. Bogert, professor emeritus of organic chemistry at Columbia University, has been elected an honorary life member of the Council of the Society of Chemical Industry. Dr. Bogert was president of the society in 1912–13. At the recent annual meeting of the Supervisory Board of the American Year Book, Dr. Bogert, representative of the AMERICAN CHEMICAL SOCIETY, was elected to the presidency.

On June 30 **G. Lee Camp** will retire as vice president, member of the board of directors, and co-general manager of the Organic Chemicals Division, Monsanto Chemical Co., St. Louis, Mo. Mr. Camp joined the organization 12 years ago, as assistant to the president and will retire immediately after his 60th birthday. He has been active in the chemical industry for 41 years.

Clayton C. Carroll is now production control and research chemist with the United States Radium Corp., New York, N. Y. He was formerly junior chemist with the U. S. Bureau of Animal Industry, stationed in the meat-inspection laboratory at St. Louis, Mo.

Charles H. Currier has been elected president of the Tubular Exchanger Manufacturers' Association. Mr. Currier is vice president and general manager of the Ross Heater and Mfg. Co., a division of the American Radiator and Standard Sanitary Corp., Buffalo, N. Y.



Willard A. Doehnert, Pennsylvania State College 1940 and formerly with Eastern States Manufacturing Co., has joined the research staff of the Central Soya Co., Decatur, Ind.

Harold R. Murdock has been made vice president and general manager of the Hamilton Laboratories, an associate company of the Champion Paper and Fibre Co., manufacturing phenylmercuric compounds at Hamilton, Ohio.

Carl A. Ostling has resigned his position as production vice president of the Carrier Corp., Syracuse, N. Y., to become director of industrial engineering for the U. S. Rubber Co., where he will act as assistant to the president on matters relating to conversion of company properties to war work. **John H. Holton** will become works manager of Carrier, with the title of vice president, and will have as assistants **R. N. Campbell** and **Earle D. Williams. F. F. Hoyt** has been elected vice president.

Robert M. Salter, since October 1941 head of the Division of Soil and Fertilizer Investigations, U. S. Department of Agriculture, Washington, D. C., has been appointed chief of the Bureau of Plant Industry, succeeding E. C. Auchter, recently appointed administrator of the Agricultural Research Administration. **R. O. E. Davis** has been designated acting head of the Division of Soil and Fertilizer Investigations.

Frank J. Tone retired on April 22 as president of the Carborundum Co., Niagara Falls, N. Y., with which he had been associated since 1895. He has been appointed chairman of the board of directors, and **Arthur A. Batts,** formerly secretary, has become president.

Wilfred H. White, formerly with the Jamestown Malleable Iron Corp., has accepted a position with the War Production Board, Tungsten Division, Washington, D. C.

J. T. Baker Fellowship Award

THE 1942–43 J. T. Baker Chemical Co. Research Fellowship in Analytical Chemistry (Eastern Division) has been awarded to A. Letcher Jones. Mr. Jones will work under John H. Yoe at the University of Virginia. The committee making the award was composed of: N. H. Furman, chairman, Princeton University; J. H. Yoe, secretary, University of Virginia; G. P. Baxter, Harvard University; H. A. Fales, Columbia University; and C. W. Mason, Cornell University.

M. I. T. Gives Public Health Training

THE Department of Public Health at Massachusetts Institute of Technology is offering an accelerated program of public health training beginning June 8 and allowing for the completion of a master's degree on February 6. These training programs are organized for public health engineers, health educators, and public health laboratorians, as well as for administrators. Special summer courses are also being offered. Further information may be obtained from the Department of Health, M. I. T., Cambridge, Mass.

Scientific Medals Awarded

THE coveted Franklin Medal of the Franklin Institute was awarded April 15 to Jerome Clarke Hunsaker, general coordinator of the Naval Research and Development Board and chairman of the National Advisory Committee for Aeronautics, and Paul Dyer Merica, vice president of the International Nickel Co. of Canada. War industries are now finding wide use for Dr. Merica's discoveries in the use of a variety of alloys for commercial purpose and are applying the principle of precipitation hardening developed by him. Dr. Hunsaker, designer of the *Shenandoah,* first large airship to be built in the United States and the NC type of flying boat which made aviation history on its transatlantic flight in 1919, is guiding research aimed at giving America the best equipped flying forces in the world.

Elliott Cresson medals have been awarded to Claude S. Hudson, National Institute of Health, for studies of the chemistry of sugars, and to Isidor I. Rabi, Columbia University, for making possible the exploration of secrets of the atom by his magnetic resonance method.

A Howard N. Potts medal goes to Jesse W. Beams, University of Virginia, for his ultra-high speed centrifuges.

NECROLOGY

Loy B. Cross

LOY B. CROSS, of Emory University, died April 22 in Memphis, while attending the 103rd meeting of the AMERICAN CHEMICAL SOCIETY there. He was 32 years old.

Dr. Cross was born at Lubbock, Tex., was graduated from Texas Tech, and received his M.A. from Yale and his Ph.D. from the University of Texas. He was assistant instructor in chemistry at Emory University.

Eugene Fitzpatrick

EUGENE FITZPATRICK, chief chemist of Phelps Dodge Refining Corp., Long Island City, died recently. He was 65 years old. Mr. Fitzpatrick was the holder of patents on numerous processes for the manufacture and refining of copper. He was a member of the American Institute of Mining and Metallurgical Engineers.

R. S. Fleming



R. S. FLEMING, director of research of the Borden Co., Syracuse, N. Y., died suddenly on April 18, 1942, at the age of 65.

Mr. Fleming was born near Owen Sound, Ontario, Canada, and received his A.B. degree from the University of Toronto in 1904. From 1904 to 1909 he was chemist for the Canadian Milk Products Co. of Toronto. From 1909 to 1928 he was chief chemist in charge of research and control for the Merrell-Soule Co., Syracuse, and when that company was combined with the Borden Co. he continued as director of research. His work was concerned chiefly with the drying of milk and other food products. He was granted several patents on the drying of fruit juices.

He was a member of The Chemists' Club (New York City), American Dairy Science Association, and Institute of Food Technologists, a fellow of the American Association for the Advancement of Science, and had belonged to the AMERICAN CHEMICAL SOCIETY since 1907.

From 1918–20 he was Chairman of the Syracuse Section of the AMERICAN CHEMICAL SOCIETY and from 1922–26 he served as Councilor.

Walter S. Frisbie



WALTER S. FRISBIE, chief of the Division of State Cooperation, Food and Drug Administration, died February 19 in Washington, D. C. He was 60 years old.

Mr. Frisbie was born in New Haven, Conn., and graduated in 1901 from Yale University with a Ph.B. degree. From 1901 to 1903 he studied medicine at Cornell Medical College and Johns Hopkins University Medical School. He was associated with the New York State Pathological Laboratory, Colgate & Co., and Parke, Davis & Co. before going with the Dairy and Food Commission in Des Moines, Iowa, as assistant chemist in 1907. Seven years later he became state chemist with the State Food, Drug, Dairy, and Oil Commission, Lincoln, Nebr. In 1919 Mr. Frisbie was appointed chief of the Bureau of Food, Drugs, and Oil, Nebraska State Department of Agriculture. Two years later he accepted the position he held until his death.

Mr. Frisbie was a member of the Joint Committee on Definitions and Standards and in 1927 was elected chairman of the committee, which has been known recently as the Food Standards Committee.

He had belonged to the AMERICAN CHEMICAL SOCIETY since 1924. In 1925 Mr. Frisbie joined the American Public Health Association, of which he became a fellow in 1930. He was identified with its Food and Nutrition Section, serving as vice chairman in 1936 and chairman in 1937. For many years he was a member of the association's Committee on Research and Standards. Mr. Frisbie had been identified with the Association of Official Agricultural Chemists since 1920. In 1929 he was appointed to the board of editors of its journal and was chairman of the committee and editor of the journal in 1932, the same year in which he was one of the incorporators of the association. At the 1934 meeting he was appointed to the executive committee, in 1938 he became vice president, and in 1939 president.

Other organizations in which Mr. Frisbie actively participated were the Association of Food and Drug Officials of the United States, Association of American Feed Control Officials, and National Conference on Weights and Measures.

Insect Extinguisher Patented

BY USING a liquified gas as a "carrier" of poison spray material, U. S. Department of Agriculture entomologists find it possible to divide the poison into much smaller particles than with liquid sprays. Since the poison particles stay longer in the air and do not settle so quickly, there is a gain in effectiveness against flying pests.

This is the secret of the aerosol method on which the department's entomologists have devised and patented for public use a new improvement. The first aerosol experiments involved spraying a volatile liquid on a hot plate. The poison was dissolved in the liquid and carried into the air on the gas that formed. The improvement comes from using one of several chemicals that are gases at ordinary temperatures and are liquids only when under pressure.

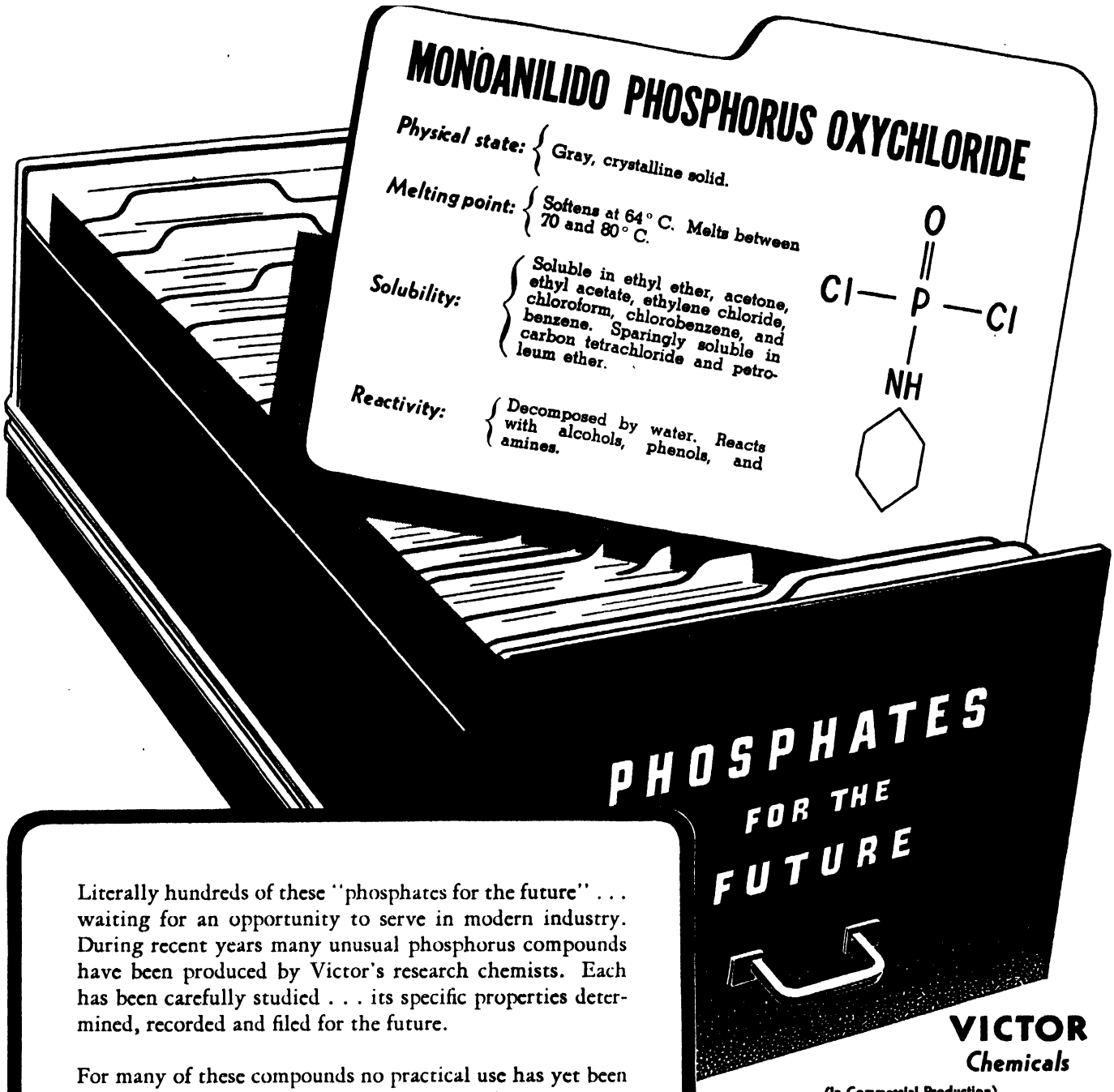
By loading a cylinder with a minute dose of such a poison as nicotine, pyrethrum extract, or rotenone and filling the cylinder with the liquified gas under pressure, the scientists have devised equipment resembling a common type of fire extinguisher that will spray out the liquified gas under its own pressure.

Patents on Wrinkle Finish Upheld

ON MARCH 26 the United States Court at Buffalo, N. Y., rendered a decision in the case of New Wrinkle, Inc., Dayton, Ohio, owner of patents on wrinkle finishes upholding the validity and infringement of these basic patents. The case was defended by the Pontiac Varnish Co., Pontiac, Mich., a manufacturer of varnishes and enamels.

The Court found that wrinkle finishes were broadly new as covered by the patents in suit. These patents are licensed to 160 leading paint manufacturers of the United States and also to manufacturers in England and other foreign countries.

New Wrinkle, Inc., maintains an extensive research laboratory at Dayton, Ohio, where it conducts research in the development of new types of wrinkle finish for industrial use. Wrinkle finishes are used almost universally on business machines such as cash registers, typewriters, adding machines and on industrial products such as instruments, machine tools, heaters, motors, sewing machines.



Literally hundreds of these "phosphates for the future" . . . waiting for an opportunity to serve in modern industry. During recent years many unusual phosphorus compounds have been produced by Victor's research chemists. Each has been carefully studied . . . its specific properties determined, recorded and filed for the future.

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- Calcium Phosphates
- Magnesium Phosphates
- Potassium Phosphates
- Sodium Phosphates
- Sodium Pyrophosphates
- Potassium Pyrophosphate
- Alkyl Acid Pyrophosphates
- Formic Acid
- Aluminum Formate
- Sodium Formate
- Sodium Boroformate
- Oxalic Acid
- Calcium Oxalate
- Sodium Oxalate
- Magnesium Sulphate
- Sodium Aluminum Sulphate
- Ferrophosphorus

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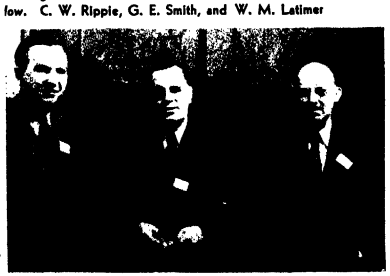
Above. President Holmes and President-Elect Frolich at the banquet during the A. C. S. Memphis meeting



Above. Walter Schmidt and A. A. Ross at luncheon of the Division of Industrial and Engineering Chemistry



t to right: Above. R. C. Palmer and F. W. Kressman. *low.* C. W. Rippie, G. E. Smith, and W. M. Latimer



Below. Southern melodies at the barbecue. *Right below.* Beale Street blues, barrelhouse, and boogie woogie band



Above. The medalists G. E. Holm and Earl A. Evans, *Jr.,* at the banquet. *Right.* Dr. and Mrs. C. S. Hudson. *Below.* F. T. Wall

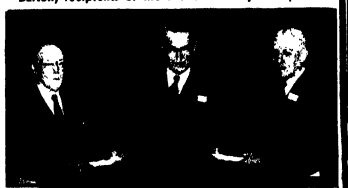


Below. E. T. McBride of Army Ordnance





Below. President Holmes with A. L. Smith and G. E. Barton, recipients of the A. C. S. 50-year diplomas



Below. Earl A. Evans, Jr., Virginia Bartow, W. F. Bowld, and Mrs. V. A. Coulter at banquet head table



Below. More melodies at the barbecue



Above Colonel A. Gibson, C. W. S.

low. B. L. West and Arthur A. Ticknor



Below. The A. C. S. Employment Clearing House





Below. E. T. McBee. *Right.* Dr. May Whitsitt and Colonel Paul Howe at the banquet head table





Above. The barbecue stand at Tuesday night's gathering. *Left.* At the head table at the banquet, A. B. Lamb and Mrs. Holmes



Right. Sidewalk conferences in front of the auditorium as the AMERICAN CHEMICAL SOCIETY members gather for the various meetings. *Below.* H. S. Taylor



Right. Mrs. Langford drawing numbers to determine winners of the door prizes at the banquet. The prizes, which were $5.00 defense stamps, went to 19 persons. *Below.* Book exhibit arranged by the Division of Chemical Education on the mezzanine floor of Hotel Peabody

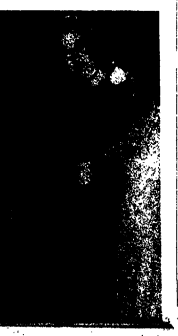




Above. L. W. Bass, recently appointed director of the newly established New England Industrial Research Foundation. Dr. Bass had previously served as assistant director of Mellon Institute since 1937. For further details see page 608. *Right.* M. Raney

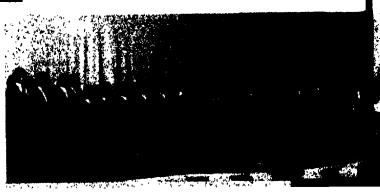


Above. Schwarz and Bish(receiving a handout at th barbecue on Tuesday nig















American Chemical Society[1]

104TH MEETING. Buffalo, N. Y., September 7 to 11, 1942.

105TH MEETING. Indianapolis, Ind., spring of 1943.

106TH MEETING. Minneapolis, Minn., fall of 1943.

NATIONAL CHEMICAL EXPOSITION. Stevens Hotel, Chicago, Ill., November 17 to 22, 1942.

NINETEENTH NATIONAL COLLOID SYMPOSIUM, Division of Colloid Chemistry. University of Colorado, Boulder, Colo., June 18 to 20, 1942.

Other Scientific Societies

AMERICAN ASSOCIATION OF CEREAL CHEMISTS. Edgewater Beach Hotel, Chicago, Ill., May 18 to 22. Annual meeting.

AMERICAN ASSOCIATION OF PHYSICS TEACHERS. State College, Penna., June 25 to 27.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Boston, Mass., May 11 to 13.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Chicago, Ill., June 22 to 26.

AMERICAN LEATHER CHEMISTS ASSOCIATION. Deshler-Walleck Hotel, Columbus, Ohio, June 1 and 2.

AMERICAN PHYSICAL SOCIETY. State College, Penna., June 25 to 27.

AMERICAN SOCIETY OF BREWING CHEMISTS. Hotel Netherland-Plaza, Cincinnati, Ohio, May 25 to 27.

AMERICAN SOCIETY OF REFRIGERATING ENGINEERS. Skytop Club, Skytop, Penna., June 7 to 9.

AMERICAN SOCIETY FOR TESTING MATERIALS. Atlantic City, N. J., June 22 to 26.

EASTERN PHOTOELASTICITY CONFERENCE. University Club, Boston, Mass., June 20. Semiannual meeting.

INSTITUTE OF FOOD TECHNOLOGISTS. Hotel Nicollet, Minneapolis, Minn., June 15 to 17. Annual meeting.

SCIENTIFIC APPARATUS MAKERS OF AMERICA. Hotel Hershey, Hershey, Penna., June 1 to 3.

SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION. Columbia University, New York, N. Y., June 27 and 28. Annual meeting.

[1] The list of the SOCIETY's National Officers and Directors, Editors, members of Council, Divisional and Local Section Officers, Committees, and Chapters of Student Affiliates appears in CHEMICAL AND ENGINEERING NEWS three times a year—usually February 10, May 10, and October 10. The latest list is printed on page 601 of this issue.

Local Sections

SECTION AND PLACE	MAY	SPEAKER	SUBJECT
Binghamton, N. Y., Carlton Hotel	20	A. E. Marshall	History of Glass Manufacture
Central Texas, Chemistry Building 15, University of Texas, Austin	19	S. B. Hendricks	Ion Exchange in Heterogeneous Systems
Chicago, Stevens Hotel	22	Thomas Midgley, Jr.	Willard Gibbs Medal Award
Cleveland, Cleveland Engineering Society	20	John R. Bates	Houdry Process
Connecticut Valley, Chemistry Building, Smith College, Northampton, Mass.	16	James A. Lee	American Magnesium Industry
Dallas–Fort Worth, Fondrew Library, Southern Methodist University, Dallas	18	S. B. Hendricks	The Nature of Clays and Soils
Louisiana, Auditorium, Chemistry Building, Tulane University, New Orleans	21	S. B. Hendricks	The Nature of Clays and Soils
Memphis, University Center	22	S. B. Hendricks	Crystal Chemistry
Mid-Hudson, Vassar Alumnae House, Poughkeepsie, N. Y.	19	Per K. Frolich	Charter meeting. Banquet, 7:00 P. M.
Oklahoma, Tulsa	23	C. R. Wagner	Profitable Problems for Future Petroleum Research
Panhandle Plains, Blackstone Hotel, Amarillo, Tex.	16	S. B. Hendricks	The Nature of Clays and Soils
Philadelphia, Franklin Institute	21	John H. Yoe	Inorganic Analysis with Organic Reagents
Pittsburgh, Mellon Institute Auditorium	21	Harry N. Holmes	Vitamins and Public Health
Rochester, Lower Strong Auditorium, River Campus, University of Rochester	18	Peter Debye	Coagulation of Colloids
Southeastern Texas, University of Houston	20	S. B. Hendricks	The Nature of Clays and Soils
Virginia, University of Virginia, Charlottesville	29	Warren T. Vaughan	Chemical Aspects of Allergy
Western Connecticut, Hubbard Heights Golf Club, Stamford	25	Foster D. Snell	Some Factors in Detergency
Western New York, University of Buffalo	19	Lawrence H. Flett	Jacob F. Schoellkopf Medal Award

International Meeting of Rubber Chemists

THE annual international meeting of the Buffalo Group, Division of Rubber Chemistry, AMERICAN CHEMICAL SOCIETY, the Canadian Rubber Group of the Canadian Chemical Association, and the Quebec Rubber and Plastics Group was held in the General Brock Hotel, Niagara Falls, Canada, on April 30.

E. G. Holt, chief, Rubber Staff, U. S. Department of Commerce, and Arthur W. Carpenter, Bureau of Industrial Conservation, War Production Board, were the speakers.

Nutrition Institute Chooses Officers

AT THE meeting of the American Institute of Nutrition in Boston, April 1, L. A. Maynard was elected president for the coming year. Other officers are vice president, H. B. Lewis; secretary, A. H. Smith; treasurer, W. H. Sebrell, Jr.; and councilor, T. H. Jukes.

Quebec Rubber and Plastics Group Meetings

THE April meeting of the Quebec Rubber and Plastics Group was held April 10 in the Chemistry Building of McGill University, Montreal. More than 60 members were fortunate in hearing J. M. Ball speak on the timely subject, "Synthetic Rubber Compounds".

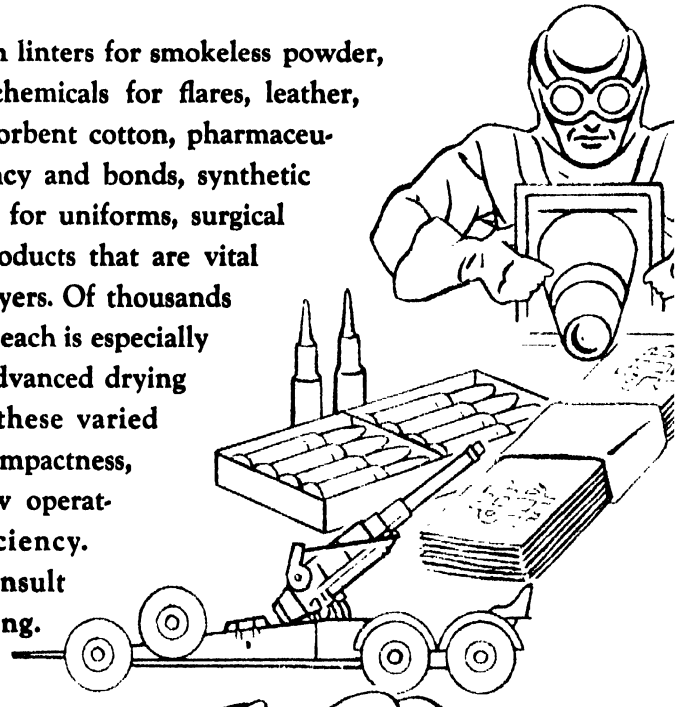
Mr. Ball, editor of *Vanderbilt News* and author of many articles on rubber compounding and research, has been connected with the R. T. Vanderbilt Co. for many years, and has recently been appointed rubber consultant of the WPB in Washington. Since his engagement to speak to the group was made before his appointment, he spoke as a Vanderbilt representative. Some of the milling, plasticizing, and compounding properties of seven different synthetics were discussed, slides and samples being used. Rebound tests were conducted on several synthetic compounds at room and elevated temperatures to illustrate differences in resilience between the synthetics at various temperatures.

An additional plastics meeting was held May 8 with A. E. Byrn, Canadian General Electric Co., as speaker. He discussed plastics in general and the Glyptal resins in particular.

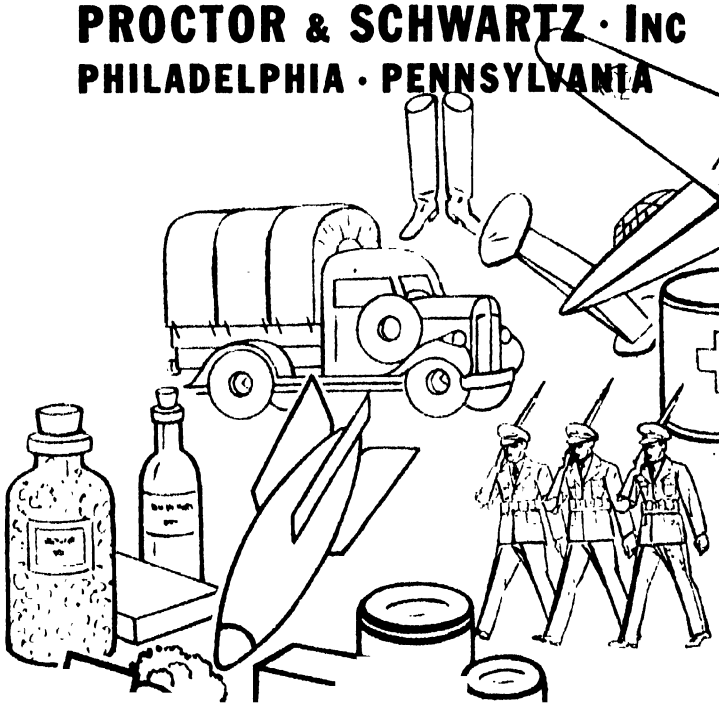
Drying

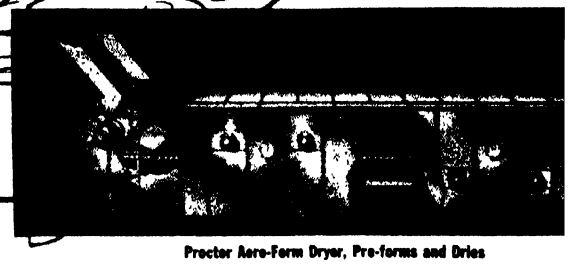
DRIES THOUSANDS OF DIFFERENT PRODUCTS THAT ENTER INTO THE PRODUCTION OF WAR MATERIALS

Motion picture films for sea plane tenders, cotton linters for smokeless powder, veneer for airplanes, tracer bullet mixtures, chemicals for flares, leather, textiles, chemicals, cartridge cases and shells, absorbent cotton, pharmaceuticals, tetryl for bombs, gun wads, paper currency and bonds, synthetic rubber, foodstuffs, primer parts, dyestuffs, wool for uniforms, surgical gauze, and many, many other widely varied products that are vital to the war effort are being dried on Proctor Dryers. Of thousands of Proctor Dryers now in use—each is different—each is especially designed to do a particular job the best that advanced drying knowledge says the job can be done. Yet all these varied machines have certain things in common . . . compactness, sturdy construction, freedom from trouble, low operating and upkeep costs, and all-around efficiency. Which are essentials in today's scheme. Consult Proctor & Schwartz if it's a matter of drying.

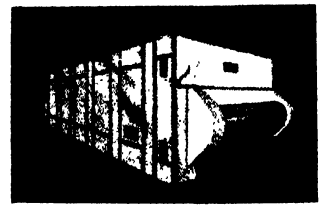


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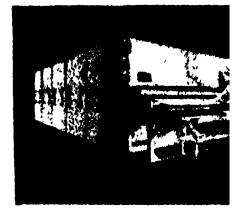




Proctor Aero-Form Dryer, Pre-forms and Dries Wet-Solid Chemicals



Proctor Impact Dryer for Cotton Linters Fi...



Proctor Dryer for Foam Veneers

Seattle Convention of A. I. Ch. E. Students

THE University of Washington student chapter was host to the Northwest annual convention of the American Institute of Chemical Engineers at Seattle, Wash., April 17 and 18, 1942.

Following registration W. L. Beuschlein, Chemical Engineering Department, gave a welcoming address. Edwin Korpi, University of Washington, opened the series of technical discussions with a talk on "Reactions of Ethylene Diamine". Harold Frisbie, Oregon State College, followed with the "Cost Involved in Pressure Vessel Design", deriving a series of formulas for the most economical designs. A description of the apparatus used for the determination of the "Viscosity of Propane Oil Mixtures at Low Temperatures" was presented by James Mitchell from Washington. In the afternoon Joseph McCarthy outlined the "Chemical Utilization of Wood".

Donald Meyers, University of Washington, opened Saturday's session with a discussion of the "Theory of Wood Coke Production from Wood Waste". Lyle Pollock concluded the technical talks with a description of "Building a Pilot Plant for Production of Wood Coke".

Inspection of the modern chemical engineering laboratories was conducted by H. K. Benson, head of the Department of Chemistry and Chemical Engineering.

At the formal banquet Saturday evening A. L. Williams, assistant to the president of Puget Sound Power and Light, gave an inspiring talk entitled "Preparing Yourself for Management".

Assisting Jack Newman, local chapter president, and Glendon Andrews, conclave chairman, were Arvid Anderson, Don Chaffee, Frank DeVry, Dick Graham, Chris Gregores, Jim Hamilton, Verne Loop, Jim Mitchell, Wesley Pearl, Rolvin Petrie, Bob Shervem, and Sam Yankelowitz. Schools represented were Oregon State College, Washington State College, and the University of Washington.

Electrochemists Hold 81st Annual Meeting

EDWARD MYRON BAKER was elected president of the Electrochemical Society at the recent 81st annual meeting in Nashville, Tenn. R. M. Burns, Bell Telephone Laboratories, was re-elected treasurer and Colin G. Fink, Columbia University, was re-elected secretary.

The $1,000 Weston Fellowship Award, made to the most deserving young student, was presented to William E. Roake, graduate student of Oregon State College, at the annual dinner. The Young Author's Prize for the best electrochemical paper published during the past year went to Edward Adler, Department of Chemistry, College of the City of New York.

Conference on the Physics of Pigments and Glasses

SEVEN prominent authors will present technical papers in a Conference on the Physics of Pigments and Glasses, May 15 and 16, 1942, at Houston Hall, University of Pennsylvania, Philadelphia. The conference is being sponsored by the Department of Physics, University of Pennsylvania, and the Philadelphia District Committee, American Society for Testing Materials.

Arrangements for the meeting have been made by a joint committee headed by Frederick Seitz, Department of Physics, University of Pennsylvania. Further information can be obtained by writing to the Department of Physics, University of Pennsylvania, or A. S. T. M. Headquarters 260 South Broad St., Philadelphia, Penna. All concerned with the subjects to be discussed are cordially invited to attend the conference.

Registry of Rare Chemicals

ESTABLISHMENT of a National Registry of Rare Chemicals has been announced by Harold Vagtborg, director of the Armour Research Foundation, Chicago, Ill., as the newest service of the foundation to American science and industry.

Information on chemicals too rare to be listed in the catalogs of regular chemical supply houses will be filed with the registry and indexed according to name, location, and amount available. Martin H. Heeren, chairman of chemical engineering research in the foundation, will direct this work and has been named director of the registry. No other complete listing of uncommon chemicals exists, nor has any ever been attempted on a complete basis.

Throughout the country's laboratories, schools, and industrial plants exist uncommon chemicals made for a highly specialized market and not generally known to exist, but which are constantly needed by research.

The registry does not store the actual chemicals, it does not buy or sell them, but merely maintains an indexed file of their sources and supplies. Chemicals to be found in the catalogs of supply houses are not included, but all those not available through regular channels will be listed.

The file will be regarded as confidential and will not be open to general inspection. Specific inquiries will be answered by the registry. Requests for data have been made of approximately 2,000 industrial and educational laboratories, and sources which have not been contacted are asked to cooperate in voluntarily submitting information needed in the files. Incomplete filings of certain specialized chemicals already indexed by private laboratories have been incorporated into the registry files. Pioneer work of the American Association of Scientific Workers toward a central informational clearing house on chemicals is included in that category.



Copperweld Holds Defense Bond Rally

Speakers who led a stars and stripes rally on defense bond sales and full-steam-ahead output on war-needed steels before employees of Copperweld Steel at Warren, Ohio. *Left to right.* D. G. Baxter, Copperweld plant superintendent; Robert H. Roberts, Warren mayor; Harry Wines, S. W. O. C. field representative; Sidney D. Williams, Copperweld executive vice president; S. E. Bramer, president; Clarence H. Klinger, attorney; and Frank Hunt, president of Copperweld S. W. O. C. Local 2243.



Industrial Waste Treatment Practice. *E. F. Eldridge.* 1st ed. 401 pages. McGraw-Hill Book Co., Inc., New York, N. Y., 1942. Price, $5.00.

THE author has drawn on his extensive experience at the Engineering Experiment Station, East Lansing, Mich., supplemented by the more recent literature, to prepare a comprehensive presentation of the treatment of industrial waste. Introductorily the general nature of the industrial waste problem is briefly presented. Methods of surveying stream pollution and the capacity of a stream for self purification constitute the first chapter. That leads to general characteristics of industrial wastes and methods of classification. Standard methods of treatment with the necessary structures and equipment follow. Having covered these topics in less than one quarter of the space, the author turns to specific industries, first outlining the commercial operations from which the waste originates, following it through treatment with numerous tables of characteristics before and after treatment.

The industries covered are beet sugar including utilization of Steffens waste; milk products; canning with particular attention to peas, tomatoes, beets, and corn as well as the full-line cannery; tanning of unhaired hides and sheepskins; pulp and paper with particular attention to recovery from white water and including strawboard; textile wastes from deterging, bleaching, dyeing, printing, and miscellaneous operations such as desizing, mercerizing, weighting, and carbonizing; meat packing and animal slaughtering; laundering; acid or alkaline metal-pickling solutions, waste cyanide solutions, and cyanide wastes from heat treating; gas and coke production including recovery and disposal of phenol; fermentation with attention concentrated on beer slop and malthouse wastes; oil production and refining. Each of these wastes is considered when combined with domestic sewage. Finally 18 pages summarize methods of analysis of industrial waste.

Treatment by the activated sludge process tends to accentuate Mallory's oxidized sludge. Emphasis is placed on recovery of materials for re-use where possible and on segregation of concentrated wastes. Yet recovery of tall oil from kraft waste is not mentioned, probably because of its location in a different region from the plants cited. Some industrial processes presented as yielding waste are not commercially important, "frosted" wool for example, but the author usually so states. By cross reference from given type of equipment in one industry where applicable to another, a great deal of repetition is avoided. The book is well printed. No significant errors were found; naturally there are a few minor ones.

The reviewer believes that this is a valuable reference for any engineer dealing with waste treatment as well as a suitable text for courses in sanitary engineering.

FOSTER DEE SNELL

Advances in Colloid Science. *Elmer O. Kraemer,* Editor, in collaboration with *Floyd E. Bartell* and *S. S. Kistler.* Vol. 1, 1st ed. 434 pages, 161 illustrations. Interscience Publishers, Inc., New York, N. Y., 1942. Price, $5.00.

THIS is the first of a series of volumes intended to provide a medium in which recent significant discoveries or advances in colloid science, either experimental or theoretical, may be presented in a more comprehensive and unified fashion than is possible in the regular technical periodicals.

This first volume contains the following 12 papers:

P. H. EMMETT. The Measurement of the Surface Areas of Finely Divided or Porous Solids by Low Temperature Adsorption Isotherms.
R. R. SULLIVAN AND K. L. HERTEL. The Permeability Method for Determining Specific Surface of Fibers and Powders.
ARNE TISELIUS. A New Method of Adsorption Analysis and Some of Its Applications.
JAMES W. MCBAIN. Solubilization and Other Factors in Detergent Action.
KURT H. MEYER. Recent Developments in Starch Chemistry.
R. E. POWELL AND HENRY EYRING. Frictional and Thermodynamic Properties of Large Molecules.
HARRY B. WEISER AND W. O. MILLIGAN. The Constitution of Inorganic Gels.
G. E. VAN GILS AND G. M. KRAAY. The Creaming of Rubber Latex.
JOHN T. EDSALL. Streaming Birefringence and Its Relation to Particle Size and Shape.
ROBERT J. MYERS. Synthetic-Resin Ion Exchangers.
THOMAS F. ANDERSON. The Study of Colloids with the Electron Microscope.
ERNST A. HAUSER. Anomalies in Surface Tensions of Solutions.

It is frankly stated in the preface that "the contributions should have an individualistic point of view, and should show a definite emphasis upon the author's own part in the development in question"; consequently it is not surprising that what may be considered undue emphasis on the work of certain individuals is encountered. The contributions are "not intended to be reviews or compilations from the literature in the usual sense"; consequently one cannot legitimately criticize them for what they were not intended to be.

Meyer's article on recent developments in starch chemistry, written from the point of view of both organic and physical chemistry is timely and an excellent presentation. The article by Edsall concerning birefringence and its relation to particle size is also outstanding. The articles by Tiselius and by Anderson describe two new and important experimental techniques. The adsorption analysis diagrams of the former and the electron microscope photographs of the latter are well chosen and the descriptions in each case are excellent.

Two articles, one by Emmett and the other by Sullivan and Hertel, describe different methods for the determination of the surface area of finely divided solids. The limitations of the methods as well as their applicability are set forth. Anderson's article gives information on distribution of particle size and is complementary to these two articles.

Powell and Eyring attempt to extend the statistical approach to the problems of chemical reaction rates and dynamic properties to the study of large and long molecules and their behavior in solution. A provocative article, but it may be a bit early to theorize about rates of diffusion, sedimentation, and dielectric relaxation for such systems when so little is known about these properties from an experimental point of view. In the sedimentation velocity section, a possible effect of variation of rotor speed on the sedimentation constant is discussed. Actually in the most modern analytical ultracentrifuges the solution in the cell is never, under any circumstances, subjected to a hydrostatic pressure of more than 500 to 600, usually not more than 300, atmospheres and, as a matter of experimental fact, no variation in the value of the sedimentation constant with rotor speed has ever been observed. In the treatment of dielectric behavior it seems that the various types of system, viz., solids, gases, pure liquids, and dilute solutions, are not sharply differentiated. Theories which

are developed to describe one situation may fail completely in another.

Weiser and Milligan present a summary of their own interesting work on the constitution of inorganic oxide and salt gels by the use of phase rule and diffraction techniques. Myers' article on synthetic-resin ion exchange reactions is a typical good review article on an interesting and relatively new subject. The contributions by McBain, Hauser, and Van Gils and Kraay are descriptive and of the type commonly found in the classical colloid chemistry.

The article by Van Gils and Kraay emanated from Java. Let us hope that it will not be long before the Dutch are again writing scientific articles in Java!

J. H. MATHEWS
J. W. WILLIAMS

British Plastics Year Book, 1942. 12th ed. 464 pages. Plastics Press, Ltd., Sidney Road, Bedford, England. Price, 15s.

NOTWITHSTANDING handicaps of wartime censorship and paper shortages, the annual British Plastics Year Book has appeared very much as usual and offers much of interest to those concerned with various plastic materials.

The editorial section is necessarily curtailed somewhat, but includes reviews of patents on phenol formaldehyde and ethenoid resins and on nylon, as well as one on progress in cellulose acetate during 1941. Patents for the latter are not included, but are being published in the monthly journal *British Plastics*.

The remainder of the book follows the general plan of its predecessors and includes the following sections: names and addresses of producers, associations, institutes, consultants and imperial trade inquiry offices; proprietary names and trademarks of the industry; materials used; plant and equipment; manufactured products; associations, federations, etc.; Who's Who; and miscellaneous data.

Handbook of Civilian Protection. *Civilian Defense Council, College of the City of New York.* 1st ed. 184 pages, 5.25 × 7.5 inches. Whittlesey House, McGraw-Hill Book Co., Inc., 330 West 42nd St., New York, N. Y., 1942. Price, $1.25.

IN BRIEF, clear fashion this pocket-size handbook discusses effective civilian organization for defense, responsibilities of air-raid wardens and home owners, duties of auxiliary firemen and individual fire fighters, the way to deal with incendiary bombs, precautions to take with high explosives, what to do in case of gas attacks, and effective first aid. Other chapters tell how to save materials ordinarily wasted and how to maintain health by following rules for a well-balanced diet.

There is a selected bibliography under each of the following headings: Total War and the Civilian, Air Raid Conduct and Services, Fire Fighting, Incendiary Bombs and High Explosives, Poison Gas, First Aid, Civilian Conservation and Salvage, and Nutrition in Wartime Emergency. Available motion pictures relating to civilian defense are listed.

For those actively engaged in civilian defense work the book provides a convenient and useful reference. For those who are not, it can be recommended as a clear, concise treatment of complex problems which no one can overlook today. Royalties from sales of the book will go to the Civilian Defense Council of the College of the City of New York to be used in furthering civilian defense activities.

Safe Practice Bulletins

Two new Safe Practice Bulletins have been released by the Department of Labor and Industry, Harrisburg, Penna. They are No. 94, "Removal of Volatile Fumes in Photolithographic Printing in Manufacture of Bottle Caps" by J. A. Cummings, Armstrong Cork Co.; and No. 95, "Safe Practice in the Manufacture and Application of Acrylic Plastics" by D. S. Frederick, Röhm & Haas Co. The publications are available free of charge on request to the department.

Journal of Chemical Education for May

THE *Journal of Chemical Education* for May contains, among others, the following articles:

C. R. ADDINALL. The Vitamins.
WALTER C. BEARD, JR. A Simple Sodium Press for the Small Laboratory.
FREDERICK H. GETMAN. The Old Tungsten Mine at Long Hill, Conn.
JACOB CORNOG AND FLOYD O. KRAUSE. Apparatus for Semimicro Filtration.
HOMER ADKINS. Carbonyl Compounds as Oxidizing Agents.
DAVID DAVIDSON. The Indicator Method of Classifying Acids and Bases in Qualitative Analysis.
RICHARD S. BEAR. Construction of Complex Molecular Models with Application to Carbohydrates.
F. W. FROMM. Lecture Experiment on the Synthesis and Combustion of Ammonia.
RAYMOND M. FUOSS. Electrical Properties of Solids. Part II.
LUIS F. LEROY. A Device to Demonstrate Electronic Transfer in Redox Reactions.
HAROLD BECHER. A Method of Teaching Thermodynamic Functions.
PAUL PORTER SUTTON. Phase Models for Ternary Systems.
C. H. JEGLUM. Liquid Glass and Solid Solutions.

Producing for War

"PRODUCING FOR WAR" is the title of a 115-page booklet prepared by the War Economics Division of the Research Institute of America and published in March this year. It is intended to help business men both in converting to war production and in obtaining suitable war jobs. There are details on government contracting and subcontracting, finance, and operation, together with discussions on efficiency and maintenance of labor supply. The compilation contains much additional specific information, including addresses of those in charge of government buying, construction, etc., for war needs.

The publication should be of value to those whose present problems relate to war production. It can be obtained from the institute, 292 Madison Ave., New York, N. Y., the price being $2.00 a copy.

Cleaning Gasoline Tanks

RECOMMENDED safe practices for cleaning crude petroleum and gasoline storage tanks are described and illustrated in two manuals published by the American Petroleum Institute's Department of Accident Prevention. Copies of the manuals, revisions of the single manual previously issued, may be obtained from the institute, 50 West 50th St., New York, N. Y., at 25 cents each.

THE Pfaudler Co., Rochester, N. Y., has devoted its April-May issue of *The Glass Lining* to wake-up-America appeal, from the red, white, and blue Uncle Sam poster cover through the publication's 15 pages. Articles are on America's rubber raw material problem, obtaining greater service from present dairy equipment, food and the war, manufacturing in Argentina, and other timely items.



Rubber and Plastics Research Center

A CENTER for study and research in rubber and plastics has been proposed by the Detroit Rubber and Plastics Group, Inc., Detroit, Mich. With the help of interested individuals and industries it is planned to establish a complete rubber and plastics laboratory at Wayne University, where arrangements have been made for allocation of space in the special problems laboratory of the Department of Chemical Engineering. It is expected that by September 1, 1942, equipment will be installed and courses available which will include an introductory course covering the properties and testing of rubber and plastics; compounding, molding, and testing of rubber and plastics; chemistry and advanced study of rubber and plastics; and research projects in both fields. The first three are to be one-semester courses, giving a knowledge of the fundamentals involved. C. W. Selheimer will be in charge of the instruction.

The group consists of approximately 450 members drawn largely from the industrial and educational plants in the Detroit area, with others from all sections of Michigan, northern Ohio, and Indiana. It was organized in 1927 with a nucleus of 12 members. The group plans to equip the laboratory complete with materials for experimentation and literature for reference, to supply lecture notes and lectures as needed, to maintain a committee to which questions may be referred, and to give actual training in laboratory processing.

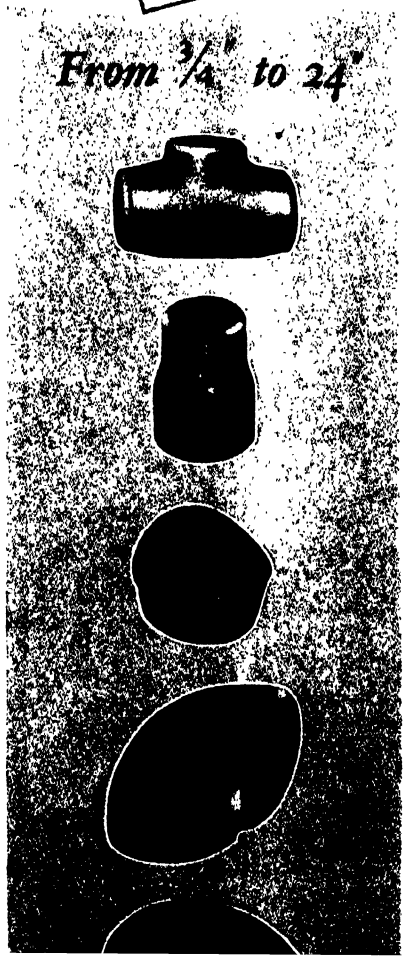
Donations of some equipment as well as cash have already been received. J. C. Dudley, Chrysler Corp., Detroit, Mich., is handling the acquisition of equipment, while cash donations should be sent to E. J. Kvet, Baldwin Rubber Co., Pontiac, Mich., secretary-treasurer of the group. The executive committee is made up of J. H. Doering, chairman, W. B. Hoey, vice chairman, W. G. Nelson, counselor, F. Wehmer, J. C. Dudley, J. R. Shroyer, J. Miller, E. F. Riesing, and W. M. Phillips.

Cowgill Awarded Mead Johnson Research Prize

FOR research on the B vitamins, George R. Cowgill, associate professor of physiological chemistry at Yale University, was awarded the annual $1,000 Mead Johnson & Co. prize by the American Institute of Nutrition. Dr. Cowgill, in early experiments with the vitamin B complex, found that it had a remarkable effect on the urge to eat—the so-called "appetite effect". Most recent research at Dr. Cowgill's laboratories at Yale is concerned with perfection of completely artificial diets for mice to assist studies concerning the relation of cancer to diet.



Minutes here save hours later



WELDING FITTINGS BY

GRINNEL

Industrial Heating with Creosote Pitch[1]

C. H. S. TUPHOLME, 65 Kinnerton St., Knightsbridge, London, S. W. 1., England

TO REDUCE the demand for imported petroleum fuel oil, some British plants are using a mixture of creosote and pitch, obtained during the manufacture of city gas. This material is produced in all gas plants in this country and substitution of this for fuel oil in installations has already resulted in a saving of tanker space amounting to hundreds of thousands of tons a year.

This mixture is viscous at ordinary temperatures, since it contains naphthalenes and anthracenes which tend to solidify and crystallize at temperatures below 90° F. to 110° F. The solidifying temperature is dependent upon the actual composition of the mixture and, unfortunately, the action is not reversible. Thus these tar oils, the most commonly used being creosote pitch, must be maintained at a temperature of not less than 90° F. at all times and delivered warm into suitably heated tanks. Before the creosote pitch can be atomized satisfactorily, its viscosity must be further reduced by heating it, immediately prior to burning, to a temperature of about 200° F.

In practice the warm oil is delivered into heated storage tanks and distributed to the various oil-burning equipments by a ring main system. An oil pump is employed to pump the oil through the ring main. From the ring mains, tappings are taken to the oil burners or to the burner feed pipe. The ring mains also require heating to prevent cooling of the oil during its circulation. The main storage tanks should not have a smaller capacity than 6 tons each, to be able to take standard 5-ton tanker deliveries. These tanks are heated with a withdrawable flexible heater, consisting of steel tubes welded into tanks, made in lengths up to 10 feet, and with a flexible withdrawable core inserted inside each tube. Heater cores can be withdrawn for inspection or renewal at any time without disturbing the contents of the tank, and the flexible feature enables a 10-foot core to be withdrawn in a space not exceeding 3 feet 6 inches. Modified standard straight-length heaters in 10-foot lengths, suitably connected in series, are clamped to the heat-insulated ring main pipes. This method of pipe heating has been satisfactorily employed for other purposes besides fuel oil and for temperatures to 662° F.

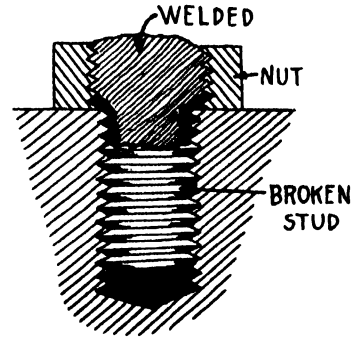
The burner oil preheaters consist of small chambers adjacent to the burners themselves, which are equipped with withdrawable-type flexible heaters, thermostats, and safety devices in the form of fusible plugs and pressure release valves. This method of heating has been used satisfactorily for large boilers, glass melting tanks, metallurgical furnaces, tube welding, vitreous enamel furnaces, and other types of furnaces including drying and enameling stoves and air heaters.

[1] The term "creosote pitch" is apparently a "topped tar" of American parlance, according to Wilbert J. Huff, U. S. Bureau of Mines. Crude tar and to some extent, perhaps, light topped tar have been used for industrial heating by American industries for a long time. Such installations were in operation in steel mills near Pittsburgh and Chicago in the early 1920's and it is understood the practice of burning tar, at least raw tar, has extended greatly since that time. Plants at which natural gas is available during the summer store the tar from their coke-oven installations at that time and burn the tar in the winter as their natural gas is purchased on an off-peak basis and is shut off when the residential heating load comes on in the winter.

How to Remove Broken Studs by Welding

W. F. Schaphorst
45 Academy St., Newark, N. J.

THE accompanying sketch shows a simple method of removing broken studs by welding. Now that even the smaller plants are provided with electric welding equipment, this method is within the reach of everyone.

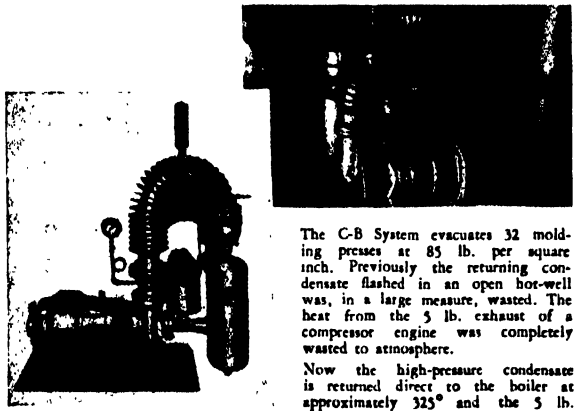


An amply large nut is placed over the broken stud and the stud is built up by welding onto it and then welding to the nut. In that way the stud and nut become one solid piece and the stud can be taken out with a wrench. The welding process also heats the stud, causes expansion, and aids in loosening it.

W. C. Buchanan has resigned as president of the Allis-Chalmers Manufacturing Co., Milwaukee, Wis., because of ill health, but retains his membership on the board of directors and executive committee. **Walter Geist**, formerly vice president, has been elected executive vice president.

F. L. Craddock has been appointed by the Edge Moore Iron Works, Inc., Edge Moore, Del., as sales manager of the Mixing and Processing Equipment Division. Mr. Craddock was formerly president of the Mixing Equipment Co.

COCHRANE-BECKER SYSTEM
of HIGH PRESSURE CONDENSATE RETURNS at PIERCE-ROBERTS RUBBER CO., TRENTON, GIVES
INCREASED PRODUCTION
MORE ACCURATE TIMING OF CURE
FEWER REJECTS
+ 28% SAVING IN FUEL



The C-B System evacuates 32 molding presses at 85 lb. per square inch. Previously the returning condensate flashed in an open hot-well was, in a large measure, wasted. The heat from the 5 lb. exhaust of a compressor engine was completely wasted to atmosphere.

Now the high-pressure condensate is returned direct to the boiler at approximately 325° and the 5 lb. compressor exhaust is completely used in heating makeup.

Write for Publication 3025.

Cochrane
CORPORATION
3132 N. 17th STREET, PHILADELPHIA, PA.

COCHRANE-BECKER SYSTEM *APPLICABLE TO*



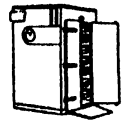
JACKETED KETTLES



DRYING ROLLS

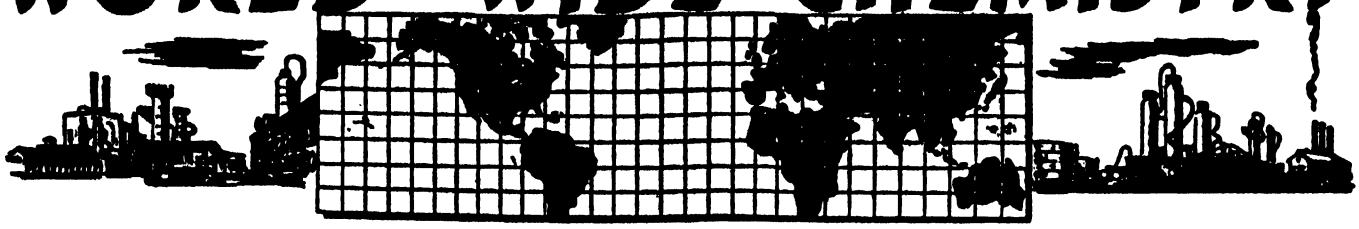


UNIT HEATERS



DRYERS

WORLD-WIDE CHEMISTRY





Increased interest by foreign manufacturers of beverages has caused the government to sign a decree approving specifications for guaraná destined to export trade and providing measures for supervision of such trade. Guaraná, a plant growing in the Amazon basin, produces a stimulating beverage used by the old Indians as a nourishing product. The average annual production of seeds was estimated recently at about 200 metric tons, of which half was exported. The fruit of the guaraná tree is a little larger than a hazelnut and contains two or three seeds covered by a thin shell. Formerly Poland, Germany, France, and the United States were the best buyers of guaraná, but at present all exports are confined to the United States. Introduction of guaraná in other South American countries is being considered since it is thought that the beverage may compete favorably with others sold in those markets.

Production of Vegetable Oils and Fats Advances

The *Bulletin of the Federal Council for Foreign Trade* recently disclosed data on production of vegetable oils and fats in Brazil during 1940. A total of 124,483 metric tons was produced, against 101,140, 102,739, and 82,071 tons during 1939, 1938, and 1937, respectively. Of the total production 95.5 per cent was represented by the following oils: cottonseed 75.7 per cent; oiticica 6.3; babaçú 5.2; linseed 4.75; and castor 3.6. A new item, tung oil, appeared for the first time in the statistics of Brazilian oils with a production of approximately 52 metric tons. Production of another drying oil, taken from the iguapê nuts, increased to 96 metric tons against 34 in 1940. Output of coconut and babaçú oils also gained steadily. Another fat, called ucuuba and known also as vegetable tallow, is finding a steady market. It first appeared in the statistics during 1940 with 1,085 metric tons, rising to 1,357 metric tons in 1941. The ucuuba fat is obtained from seeds of a native tree which contain about 55 per cent kernel having from 60 to 70 per cent of a hard and yellowish fat used for edible purposes as well as for soaps and candles. The ucuuba fat is being used as a substitute for paraffin wax received from the United States. Production of corn, mustard pracaxí, and tucum oils disappeared from the statistics, signifying that such products were not produced during 1940.

Exports of Cotton Linters, Bran, Oil, Residues to U. S. Increased

Because of increased shipments of linters, residues, bran, and oil at higher unit prices, the value of exports through Santos set a record last year. About 400,000 metric tons of cotton products valued at 1,081,405 contos de reis (about $54,070,250) were exported by the state of São Paulo, against 371,680 metric tons valued at 801,328 contos de reis during the year of 1940. Exports of cotton amounted to 256,596 metric tons in 1941, compared with 185,525 in 1940. Linters increased in exportation from 37,909 metric tons in 1940 to 67,366 in 1941. During 1938 Brazil exported 559 metric tons of linters to the United States, while in the following years of 1939 and 1940 the quantities rose to 4,103 and 20,547 metric tons, respectively. Exports during 1941 will probably surpass all expectations since during the first nine months of 1941 the amount exported was over 45,000 metric tons of cotton linters.

Exports of cottonseed cake, however, dropped only 19,076 metric tons in 1941 against 118,328 in 1940. Residues, bran, and oil showed remarkable increase in exports during 1941, amounting to 2,178, 18,607, and 36,800 tons, respectively, against 431, 8,343, and 21,144 metric tons during 1940.

Brazil's Export Trade Continues to Improve

Because of the decrease in imports during 1941, coupled mainly with larger exports to the United States, Brazil's export trade continues to improve. Compared with 1940, exports during 1941 increased approximately 9.2 per cent in volume and 35.6 per cent in value. Imports during the same period declined about 6.6 per cent in volume and 11 per cent in value. Indicative of the increasing industrialization of Brazil are exports of cotton textiles which during 1941 amounted to 9,238 metric tons against only 3,959 metric tons during 1940. Exports of other manufactured articles rose to 39,611 metric tons from 29,948 during 1940. The largest market for Brazilian textiles continues to be Argentina and other South American countries, although shipments of cotton goods have been made to South Africa. Chemical and pharmaceutical exports amounted to 575 metric tons valued at 29,217 contos de reis in 1941 against only 345 metric tons valued at 16,245 contos de reis in 1940. These export products are mainly confined to other South American countries. Exports of iron and steel during 1941 totaled 55,434 metric tons against 31,098 tons in 1940; 24,031 tons in 1939, and only 5,766 tons in 1938. Despite the shortage of fuel oil used by cement factories, production of cement during the first six months of 1941 was 370,000 metric tons against 373,000 during the same period of 1940.

Increase of Sugar Output and Exportation Expected

Production of sugar in Brazil, the second largest sugar cane producing country in the world, has for some years been prorated among the large number of sugar mills. Production from the 1941–42 crop will exceed 1,200,000 metric tons and, although exports during the year of 1941 amounted to only 25,049 metric tons, Brazil will be able to increase the production in order to export a large quantity. It was reported in the *Bulletin of the Federal Council for Foreign Trade* that the Sugar Control Agency, the Institute of Sugar and Alcohol, is now studying with the American Embassy at Rio de Janeiro the possibility of increasing Brazilian sugar production to compensate for loss of Philippines production.

Exports of sugar during 1941 were made to Uruguay, Switzerland, Great Britain, Spain, Portugal, Egypt, Bolivia, Colombia, and Peru. Uruguay took 48 per cent of the total exports. About

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EDITOR'S NOTE. Those interested in further details should address the correspondent whose name and address appear for each country, and enclose sufficient international coupons to prepay the reply. United States stamps should not be sent.

100,000 tons could easily be exported from the 1942–43 crop, it is estimated, with further increases for future crops if some arrangements be made for postwar conditions.

Deposits of Strategic Minerals in Brazil Reviewed

Although Brazil is considered as possessing a large mineral resource of some strategic materials, very little has been disclosed regarding some minerals only mentioned as a matter of curiosity. Beryllium is undoubtedly one of the most important mineral resources, as Brazil is one of the world sources. However, the mining of beryl ores in Brazil is very recent. Export of this mineral started during 1938, with some 202 metric tons to Italy. In 1939 exports increased to 275 metric tons of which 204 were purchased by Italy, 68 by the United States, the balance by Germany and Great Britain. Exports during 1940 amounted to 1,472.5 metric tons distributed as follows: Germany 1,052 tons; the United States 419; Japan 1.5 tons. During 1941, however, all shipments of beryl ores totaled 1,702 metric tons of which 1,332 tons were destined to the United States and the balance to Germany and Japan, shipments being made during the first months of 1941. Brazilian ores contain an average of 10 to 11 per cent beryllium oxide, although several shipments were reported to have a 13 per cent content. Brazilian deposits are located in the States of Minas Gerase, Baía, and Rio Grande do Norte, and recently a new deposit was discovered in the State of Paraíba.

Several occurrences of antimony have been reported and the deposits of Morro do Bule, near Ouro Preto, State of Minas Geraes, and Cananéa, State of São Paulo, are considered of value for commercial exploitation.

Only one mercury deposit has been located in Brazil. The ore is cinnabar and was discovered in the vicinity of Dom Bosco city, State of Minas Geraes. Analysis in the Laboratorio da Produção Mineral showed a 79.45 per cent content of metallic mercury. The laboratory is studying ways to industrialize this deposit.

Although not yet produced on a commercial scale, some mineral containing radioactive metals could be obtained in Brazil. The most important deposit is located at Divino, State of Minas Geraes, where some samarskite and columbite also occur. In Divino, the pegmatite veins exploited for mica revealed by analysis contents varying from 13 to 18 per cent of uranium oxide. This deposit is constituted by 75 per cent samarskite, 15 per cent monazite, and 10 per cent columbite. Occurrences of other radioactive mineral ores were located in Ribeirão de Santa Clara, near Pomba city, State of Minas Geraes, and Cachoeiro de Itapemirim, State of Espirito Santo.

Zinc is another mineral now being commercially developed, although on a reduced scale. The main deposits of zinc ore are found in the Iporanga region, State of São Paulo, Morro do Bule and Januaria, State of Minas Geraes. The deposits of Morro do Bule are the largest in the State of Minas Geraes and consist of a blende with a zinc content of about 62 per cent. Small quantities of gold and silver were found associated with zinc. However, the Iporanga deposits are the most important in all Brazil. The reserves of this region were estimated to be about 30,000 metric tons with a zinc content varying from 31 to 36 per cent.

Cobalt is found associated with nickel in deposits at São José do Tocantins, State of Goiás. No production of this metal has been reported up to now, while exports of nickel ores containing cobalt were made previous to 1940 to Germany from which we imported 7,741 kg. of cobalt oxide in 1939 and 4,865 kg. in 1940.

Asbestos is produced in Brazil, although in insufficient quantity to meet local requirements. Some 610 metric tons of asbestos were produced in 1940, and estimated output for 1941 was around 800 metric tons. Asbestos deposits are located in the States of Minas Geraes and

CONTINUED ON PAGE 624

The Engelhard Flualyzer

YOUR GUIDE TO

BALANCED COMBUSTION

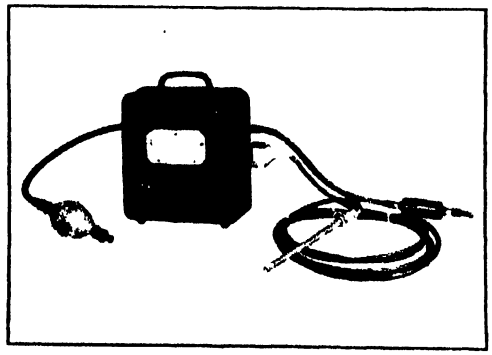
Checks Flue Gas Temperatures and CO_2 Content... *Simultaneously!*

For maintaining the balanced combustion that indicates full boiler or burner efficiency, the Engelhard Flualyzer is a fast, efficient and reliable instrument. It determines with extreme accuracy the carbon dioxide content of exhaust gases *and their temperature.* Only one flue tap is required for a simultaneous determination of both factors.

Readings in each instance are taken from a double range indicator calibrated from 0 to 20% of CO_2 and from 32 to 1000° F.

The Flualyzer's construction combines the time-proven Wheatstone Bridge Circuit for CO_2 analysis with a thermocouple circuit. It is portable, light weight and engineered to meet the most exacting requirements.

Write for Bulletin 700.



CHARLES ENGELHARD, INCORPORATED
90 CHESTNUT ST., NEWARK, NEW JERSEY



RESIN DESIGN

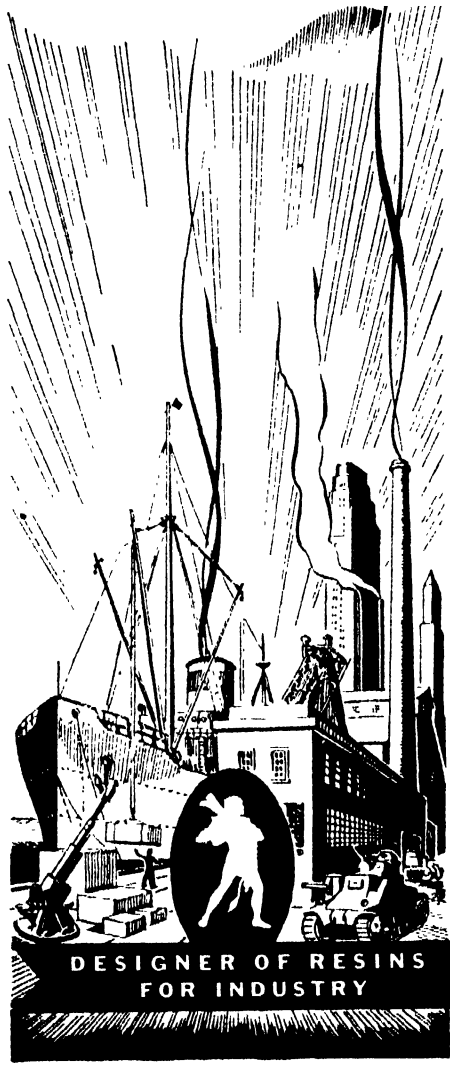
GOES TO WAR!

Not every resin is equally useful on the firing line—protecting our guns, ships, planes, and tanks. Some are more suited for camouflage, for surgical dressings,  for grease-proofing tough wrapping paper— or even for the prosaic but equally important things like locomotive paints or masking tapes.

Yet all are useful . . . somewhere. Our job, and it's yours, too, is to fit each pound of resin into its most effective niche in total production for Victory.

Ask us for a full  and frank discussion... going far beyond the limits possible in public print . . . about the established Hercules Rosin Esters . . . and the even more interesting potentialities of some brand-new Hercules resins.

Let's put our heads together  on how they can help your war effort. Thus your specific requirements can focus our knowledge of resin chemistry for a speedier victory — and to build toward a better future.



SYNTHETICS DEPARTMENT

INCORPORATED

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SC-16

World-Wide Chemistry

CONTINUED FROM PAGE 622

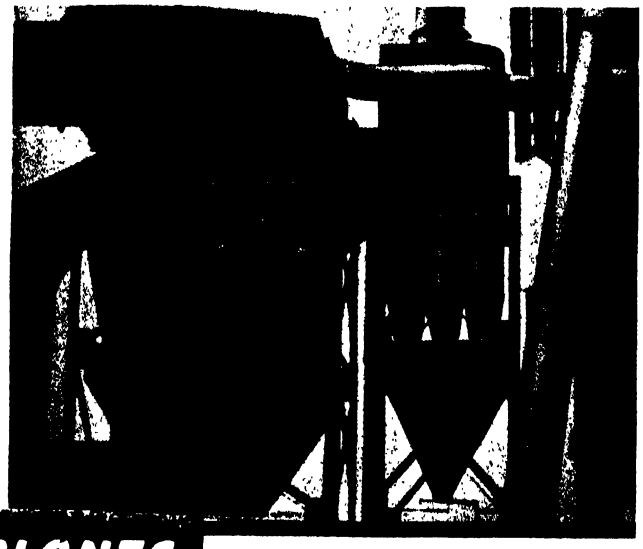
Bafa, and small ones exist in the States of Rio Grande do Norte and Paraíba. A very important deposit was discovered about a year ago and, although not yet completely inspected for reserve calculations, it was estimated as possessing more than 5,000,000 metric tons with an average content of 2.5 per cent of asbestos.

Tungsten is found in Mariana and Encruzilhada in the State of Minas Geraes under the form of stolzite and wolframite ores. The deposit of wolframite in Encruzilhada is the only one now worked. Exports of this mineral, previously made to Germany, are now prohibited with exception of shipments to the United States, due to necessity of filling demands of the national defense industries.

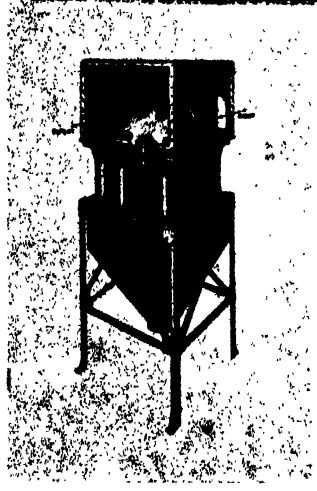
Tin will be produced on a large scale in Brazil as soon as installations for this production are finished in the State of Rio Grande do Sul. Deposits there are estimated at more than 400,000 metric tons with 60 to 65 per cent of tin.

C. E. NABUCO DE ARAUJO, JR.

CAIXA POSTAL 970
RIO DE JANEIRO
March 26, 1942



MULTICLONES KEEP PACE WITH THE BATTLE OF PRODUCTION



Typical MULTICLONE Assembly

With war demands calling for production and *more production*, additional plant capacity is being required. The capacity of MULTICLONE Collectors can be increased by any multiple of the predetermined single tube capacity and efficiency. Additions to present initial installations can be made at any time and to any desired increase. A 50% increase over the original installation is illustrated above.

WESTERN PRECIPITATION CORPORATION
Engineers, Designers and Manufacturers of Equipment for Collection of Suspended Materials from Gases and Liquids
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PRECIPITATION COMPANY OF CANADA
Dominion Square Building, Montreal

WRITE FOR THIS BULLETIN



MULTICLONE COLLECTORS

U. S. Supplies 99.78 Per Cent of Chile's Rising Acetone Imports

MORE than 31 metric tons of acetone imported into Chile in 1941 continued the upward trend marking imports of this article in the past five years, the U. S. Department of Commerce indicates. The annual average for 1937–41 was 26.5 metric tons.

Germany, Great Britain, and the Netherlands accounted for about a fourth of the supplies until 1940 when the United States, in place of supplying the remaining three quarters of Chile's imports, accounted for 99.78 per cent of the trade.

Although acetone has a wide use in Chile, only small amounts are made there. Most important are the uses in metal working establishments, shipbuilding and repair plants, and as an absorbent for acetylene gas. It also is used as a cleansing material and in preparation of chloroform, pharmaceuticals and medicinal products, and miscellaneous antiseptics.

Gains Predicted for 1941 Cuban Insecticide Imports

INSECTICIDE and fungicide imports into Cuba probably will be found to have exceeded 1940 figures when the latest data have been compiled, official sources report. Drought conditions in 1941, coupled with excessive and unseasonable heat during the winter, brought a vast increase in the number of insect pests, including varieties hitherto unknown to Cuban farms and truck gardens.

Imports of insecticides by Cuba amounted to 306,755 kg. in 1939 and 226,378 in 1940. About four fifths of imports of this type were of United States origin in 1939. The most popularly used fungicides in Cuba are combinations of copper and some other chemicals and Bordeaux mixture.

United Kingdom Finds Substitutes in Empire

A PROMISING substitute for asbestine has been reported in technical sources in the United Kingdom, which also have reported sources within the Empire of cassava starch for use in cold adhesives. Previously the latter was obtained almost wholly from the Netherlands Indies and Madagascar. Tung oil produced in India has been found to be of high quality.

Chemical Imports into New Zealand Increase

WHILE no recent statistics have been released, trade observers report from New Zealand that chemical imports into that country increased greatly and were at a fairly satisfactory level in 1941 compared to immediately preceding years. Normally such imports approximate $15,000,000 annually.



FURFURYL ALCOHOL has found ready employment as a satisfactory alternative in many industries and production has not only continued satisfactorily but new and improved products have been created.

Furfuryl ALCOHOL

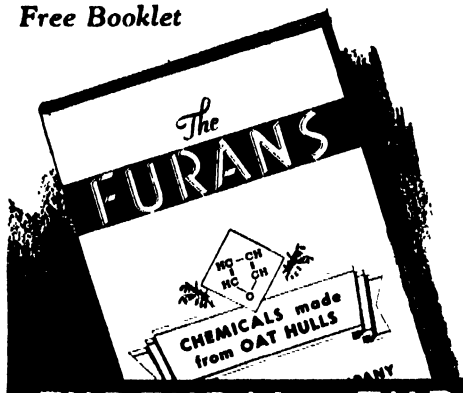
is proving itself in a field it entered recently. When faced with a shortage of anhydrous solvents heretofore universally used in making certain printing plates, lithographers turned to Furfuryl Alcohol. What was to be merely a substitute was found to be an excellent selective solvent, while one-quarter or less was needed to do a good job.

In many other fields Furfuryl Alcohol is finding profitable employment — as a dye and resin solvent, for acid-resistant coatings and as a highly satisfactory heat setting binder. It is worth your investigation. Try it. Write for complete information today.

The Furans

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FURFURYL ALCOHOL
TETRAHYDROFURFURYL ALCOHOL
HYDROFURAMIDE

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The Quaker Oats Company

TECHNICAL DIVISION 1-5
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FURFURAL – FURFURYL ALCOHOL – HYDROFURAMIDE
. . . TETRAHYDROFURFURYL ALCOHOL . . .



As In '17-

IT'S LAYNE WATER SYSTEMS FOR THE ARMY, NAVY & WAR NEEDS

Built under extreme emergency and with amazing speed, thousands of Layne Wells and Pumps are providing billions of gallons of water for war needs—Army Camps, Flying Fields, Naval Stations, Ordnance Works, Chemical Plants, Munition Plants and numerous fortified outposts. Though built with utmost speed, those Layne Water Systems have the strength and ruggedness which will last for years and years.

Layne Well Water Systems, regardless of when, where or how speedily built, are the finest that can be constructed. They will faithfully fulfill their mission until victory comes, whether this year, next year or years from now.

Those men of the Army, Navy and Marine Corps who some day will return to civilian life may well remember that it was Layne who built the well water systems which helped to win the war.

In the meantime, essential civilian water supply service continues. The Layne organization is fulfilling its pledge of "Keep Them Flowing!"

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Memphis, Tenn.

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International Water Supply, Ltd. ... London, Ont.

THE WALL STREET OF CHEMISTRY

	First Quarter Earnings		Per Common Share	
	1941	*1942*	*1941*	*1942*
Air Reduction Co.	$1,590,251	$1,495,548	$0.59	$0.55
Corn Products Refining Co.	2,496,983	2,151,344	0.81	0.68
Celotex Corp.	456,865	278,291	0.66	0.37
E. I. du Pont de Nemours & Co., Inc.	18,854,205	12,410,201	1.77	1.18
Freeport Sulphur Co.	697,986	549,611	0 87	0.69
Harbison-Walker Refractories Co.	504,100	500,900	0.34	0.34
Hercules Powder Co.	1,360,426	1,201,810	0.93	0.81
McKesson & Robbins	...	708,981	...	0.38
Mathieson Alkali Works	403,515	344,861	0.44	0.37
Libbey-Owens-Ford Glass Co.	3,400,917	534,186	1.35	0.21
West Virginia Pulp & Paper Co.	957,301	1,137,939	0.80	1.00
	Six Months Earnings			
International Industries	39,728	92,106	0.10	0.23
	Nine Months Earnings			
American Agricultural Chemical Co.	153,206	1,169,983	0.24	1.86
Lehn & Fink Products Corp.	501,956	555,500	1.25	1.38
	Twelve Months Earnings			
	1940	*1941*	*1940*	*1941*
Barium Stainless Steel Corp. (loss)	83,791	99,129	...	...
Intercontinental Rubber Co.	323,614	370,233	0.54	0.62
Pennsylvania Glass Sand Corp.	806,837	746,937	1.97	1.83

Low-Grade Chromite Ores Treated Successfully

A METALLURGICAL process for treatment of the large American deposits of low-grade chromite ores to help meet wartime demands for chromium essential for armor plate, projectiles, and other vital military materials has been developed by the U. S. Bureau of Mines. Definite recommendations for the construction of commercial plants will be made when final data are received on additional tests now being made, according to the bureau.

The new method, known as a roasting and leaching process, is designed to convert chromite concentrates into a higher grade of material which may be used to produce either high-purity chromium or standard ferrochromium for the manufacture of alloy steel. The process was developed in the bureau's laboratories at Boulder City, Nev., and Salt Lake City, Utah, under direction of R. S. Dean, chief of the Metallurgical Division. It is capable not only of increasing the chrome content of the ore but can also raise the ratio of chromium to iron from about 1.7 to 1 up to as much as 30 or 40 to 1.

Vast deposits of low-grade chromite reserve ores in Montana, estimated at 2,500,000 tons, and deposits of similar ore in other western states are expected to furnish the raw materials for concentration plants and proposed processing plants. The Montana deposits are believed to contain enough chromium to yield over 900,000 tons of chromite (concentrates containing 45 per cent or more chromic oxide) of a grade suitable for making ferrochromium. This is equivalent to four and a half times the total amount of chromite shipped from domestic mines in the past 28 years.

Liquid Anesthetics Vaporized in Britain

ONE thousand apparatus at £125 each for vaporizing liquid anesthetics have been offered to the British war services by Lord Nuffield, the automobile manufacturer sometimes called "the Henry Ford of Britain". The machines were developed at the Nuffield Department of Anesthetics in the University of Oxford, which he endowed with five other medical departments in the university.

The machines are said to work without the aid of cylinders of gases necessarily employed in the customary apparatus. The patient breathes air through the machine, in which a chemical substance has been used to provide the vapor of the liquid anesthetic in the desired concentrations. For example, a pint bottle of liquid ether is transformed by the Oxford vaporizer into ether vapor and then automatically mixed with air to form approximately 5,000 times that volume of gaseous ether to be used as an anesthetic. The economy of space is particularly important in the present shipping shortage.

H. E. Doughty has been appointed assistant sales manager of the Jessop Steel Co., Washington, Penna.

U. S. Supplies Campeachy Extract, Hematin to Peru

THE United States in recent years has been a principal source of Peru's imports of hematin and campeachy extracts, accounting for 72 5 per cent of such trade in 1940 and sharing the market with Great Britain and France to minor degrees in that year.

Consumption of natural dyes in Peru is relatively small compared to use of coal-tar dyes. Imports of hematin and campeachy extracts are principally used in the tanning industry for dyeing leather black and by the Indians for coloring yarns.

Such imports amounted to 12,075 kg. in 1937; fluctuating in the intervening years, they amounted to 4,782 kg. in the first nine months of 1941. In 1937 the United States furnished 51 per cent and Germany 46 per cent of these imports by Peru. Germany dropped from the market in 1940.

U. S. Furnishes 37 Per Cent of Peru's Coal-Tar Dye Imports

THE United States furnished some 37 per cent of Peru's coal-tar dye requirements in 1940. The textile industry of Peru uses about 90 per cent of imports, followed by leather tanneries and dyeing plants for hats, paper, buttons, and other products.

Until 1939 Germany led in supplying coal-tar dyes, with other European countries as large sources, so that in 1937 the United States supplied only about 4 per cent of Peru's requirements. In 1940, however, Germany was still sending 27 per cent, with France, Great Britain, the Netherlands, Italy, Japan, and Switzerland as other sources.

Imports for the first nine months of 1941 were 194,458 kg., compared to 244,093 in 1940 and 171,947 in 1938, illustrating the fluctuating character of coal-tar dye sales in this market.

War Spurs Trade of U. S. and New Zealand

STIMULATION of United States–New Zealand trade by war has been revealed by a number of United States inquiries at Wellington, N. Z., for key raw materials. Talc, of which New Zealand is reported to possess promising deposits, and magnesite, of which there are millions of tons of high-grade quality in one region alone, were sought.

Ministry of Supply studies are being followed up by plans for government-controlled manufacture of agar from seaweed. Peat from the Chatham Islands, a New Zealand dependency, has been found to contain 10 per cent of montan wax. Development of wolfram is being pushed. Mercury is being produced in a region where cinnabar deposits exist, but production is not yet in quantity.

Portugal to Continue Argol, Wine Lees Exports to U. S.

INDICATIONS have been received from Portugal that large quantities of argols and wine lees will continue to be available during 1942 for shipment to the United States. Imports by this country from Portugal expanded to 5,674,000 pounds during the first nine months of 1941 alone, compared with 4,870,000 for the whole year of 1940.

The United States and United Kingdom are the principal importers of argols and wine lees from Portugal. It is reported that a factory is being established in Oporto to manufacture tartaric acid and baking powder, as a further enterprise in this direction.

United Kingdom May Buy Canadian Pine Tar

WHILE the United States furnishes the United Kingdom with higher grades of pine tar, a report indicates that the trade is studying samples of pine tar from Canada. Under present conditions, if sufficient quantities are available, this pine tar might find a ready market abroad.

Tar derived from jack pulpwood is not favored, however, since there is usually an admixture of residue from pulp operations. Pine tar imports are dependent upon granting of import licenses, which limited such imports to the United Kingdom to 300 tons in September to December 1941.

Market in Chile for Insecticides Declines

A RELATIVELY large production of rat poisons and insecticides combines with a somewhat smaller demand, in Chile, to lessen the market for these commodities. United States exports of these articles to Chile, including insecticides, fungicides, and disinfectants, amounted to 545,000 pounds valued at $72,000 in 1940, compared to 480,000 pounds at $43,700 in 1939. Only a small proportion of these sales, however, represent the household forms of the commodities, the bulk being for agricultural use.

Trinidad's Demand for Lime Products Increases

INCREASED demand abroad for some lime products is indicated by a recent consular report from Trinidad, British West Indies. Exports of distilled lime oil rose from 49,373 pounds in 1940 to 64,798 pounds in 1941. Exports of hand-pressed lime oil, however, dropped from 1,505 to 515 pounds. Raw lime juice exports for 1940 were 110,841 gallons, compared to the 1941 figure of 82,361 gallons. Exports of green limes were 443 barrels in 1941, representing a 291-barrel gain over the previous year.

U. S. Part in Peruvian Pyroxylin Imports Rises

THE United States in 1940 became the source for 71 per cent of pyroxylin lacquers used by the Peruvian shoe and leather trade. This country's share in the total of such trade was 95.6 per cent, counting all pigments. Most kinds of leather, except sole leather and some blacks, are finished with pigments and lacquers in Peru, and imports of pigments for leather by that country have advanced steadily from the 17,546 kg. reported in 1937.

In the following year they had risen to 21,753 kg., in 1939 to 26,119; 1940 to 26,692; and for the first nine months of 1941 18,894 kg. The increase in pyroxylin imports has paralleled that for pigments, from 4,350 kg. in 1937 to 14,456 kg. for the first nine months of 1941. Pyroxylin lacquers are used in Peru particularly in finishing and waterproofing white shoe leather.

Casein Supply in Canada Runs Low

CANADA is having trouble obtaining adequate supplies of casein needed for war work, and a temporary tariff reduction is in force to stimulate supplies. Normal requirements are about 2,500,000 pounds annually, of which domestic sources furnish 1,000,000 and New Zealand an equal amount. The latter country has ceased granting permits for export of casein, however, so is no longer a source for Canada. Certain large Canadian paper companies, it is stated, are no longer able to obtain supplies for coating paper as a result of pressure on casein stocks.

Imports into Uruguay of Carbon Tetrachloride Gain

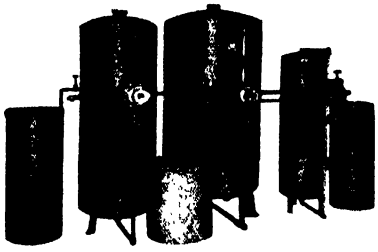
IMPORTS in 1941 by Uruguay of carbon tetrachloride were up 25 per cent compared to former years. Imports were 99,600 pounds in 1939 and 190,400 pounds in 1940. Prior to 1939 the demand was comparatively light. Carbon tetrachloride is used in preparation of worming formulas for sheep raising in that country.

New Refrigeration Plants Established in Ecuador

REFRIGERATION and ice-making plants are a necessity in Ecuador, and a number of small plants are found throughout the country. All use anhydrous ammonia. Two new plants were recently reported placed in operation in Ambata and Ibarra, in addition to a plant at Quito for a concern manufacturing beer.

FORMATION of an association of importers and distributors of arsenic in the United Kingdom to handle all supplies of this material is reported. Supplies will be allotted on a quota basis.

We Can Save Money
for Users of
DISTILLED
WATER
by chemical treatment
WITHOUT HEAT!



OPERATION — The process is one of ion exchange using the Amberlite synthetic resins. In operation, water passes through two beds of special minerals, the first of which removes, by base exchange, the positive ions, such as calcium, magnesium, sodium, or iron, substituting hydrogen. The hydrogen combines with the negative sulphate, chloride, and nitrate ions to form the equivalent acids. (The carbonates form carbonic acid which passes on through as CO_2 and water, and the CO_2 can be very largely dispelled by aeration if its presence is undesirable.) This acidic water passes to a second tank where the negative ions (chlorides, sulphates, and nitrates) are removed by adsorption, giving a final effluent which compares very favorably with single distilled water.

1,000 gallons for less than a dollar!

Water produced by the Illco-Way method replaces distillation at *a fraction of the cost* . . . and meets the exacting standards of pharmaceutical houses, chemical plants, distilleries, mirror and battery manufacturers, porcelain enamelling plants and other industrial concerns requiring purified water.

Completely automatic (between periodic regenerations) — water is not evaporated, so no heat is required — pipes will not lime up — minimum maintenance cost. A unit delivering 300 gallons an hour occupies space about 4 x 10 feet. Made of finest material to protect purity of water. Available in units affording from 150 gallons an hour to 15,000 gallons an hour.

WRITE FOR FULL FACTS. *Get complete details of operation and examples of remarkable savings. Write today.*

TESTED IN THE LABORATORY · PROVED IN THE FIELD
ILLCO-WAY

ILLINOIS WATER TREATMENT CO.
845 Cedar St., Rockford, Illinois

Nitric Acid Needs May Be Cut by Metal-Treating Process

QUANTITIES of nitric acid, vital ingredient of high explosives, may be released for war use if a new process of treating stainless steel proves commercially successful. The method was described before the meeting of the Electrochemical Society April 18 by Herbert H. Uhlig, General Electric Research Laboratory, Schenectady, N. Y.

To improve appearance and give greater resistance to corrosion, stainless steel is usually treated with nitric acid to which a little hydrochloric acid has been added. Dr. Uhlig explained that the metal surface consists of microscopic peaks and valleys, and the effect of the acid is to eat away the peaks while only slightly affecting the valleys, making the surface smoother. Hydrochloric acid alone will produce a different effect, he said, for it attacks both peaks and valleys and the appearance and corrosion resistance are not improved.

By adding a chemical inhibitor to the hydrochloric acid, Dr. Uhlig found that the valleys are protected. This produces on the stainless steel a surface equal to that with nitric acid. The hydrochloric acid treatment for stainless steel may help prevent any shortage in the explosives industry, he suggested.

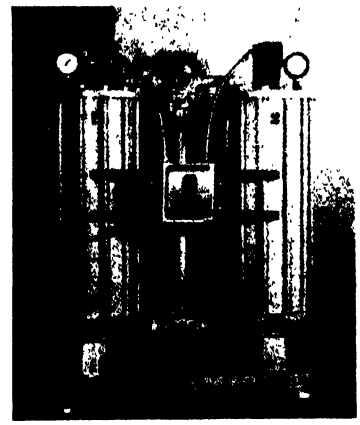
Kenneth H. Barnard, for several years assistant superintendent and chief chemist of the Print Works Division, Pacific Mills, Lawrence, Mass., has been transferred to the New York Sales Department at 40 Worth St. He will be director of the company's new Products Research Laboratory where the textile requirements of large textile buyers will be investigated and new products developed to meet them.



Preparing Intravenous Solutions

Intravenous dextrose and saline solutions for hospital use are subjected to exacting control at the Sterisol Division, Schering & Glatz, Inc., New York. Pyrex glass is used in the tubing through which liquids flow while the solutions are in preparation, simplifying supervision and guarding against contamination of the contents.

WHY WORRY ABOUT MOISTURE IN COMPRESSED AIR



Lectrodryer using activated aluminas provides freedom from moisture problems in air operated controls.

Many users of air operated control equipment have found that LECTRODRYER thoroughly dries their compressed air. LECTROFILTERS used with LECTRODRYERS provide freedom from oil vapor troubles.

If you want more information on LECTRODRYER equipment for this purpose tear out this page, fill in the blanks, and mail it to us so that we may quote you on LECTRODRYER equipment for handling your requirements.

1. *Do you want to dry compressed air continuously 24 hours a day?* _____

   If not, how long are the drying periods?

   _____

   This information will enable us to determine whether a single or dual adsorber LECTRODRYER should be used. Single adsorber LECTRODRYERS dry air intermittently, dual adsorber LECTRODRYERS operate continuously.

2. *What is the volume of air to be dried at atmospheric temperature and pressure and at what pressure will the drying be carried on?* _____

3. *At what temperature will the air enter the LECTRODRYER?* _____

   Will the air or gas be saturated at this temperature? _____

   The answers to the two questions above will enable us to determine the proper size and type LECTRODRYER for your use.

   Air-cooled electric reactivated LECTRODRYERS handle small quantities of compressed air; larger quantities sometimes require water-cooled LECTRODRYERS which may be steam reactivated or electrically reactivated.

4. *How dry do you want the air?* _____

   LECTRODRYERS dry compressed air to dew points as low as minus 60 degrees C and even lower. If you don't know exactly how dry the air should be, indicate whether extreme dryness or moderate dryness is desired.

5. *Do you have 110 volt, single phase, 60 cycle power available?* _____

   Most small LECTRODRYERS operate from this power supply.

6. *Do you have 220 volts, single phase, 60 cycle power available?* _____

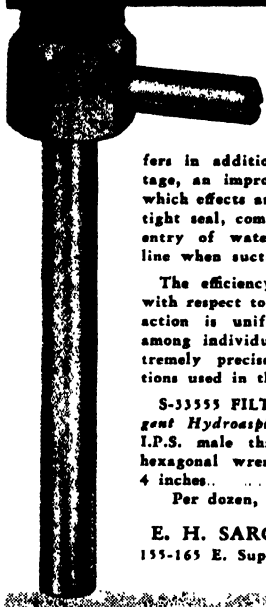
   Do you have steam at approximately 100 pounds pressure? _____

   Larger LECTRODRYERS operate either from 100 pounds steam or 220 volt power supply as specified by the Purchaser.

PITTSBURGH LECTRODRYER COMPANY

32ND STREET AND A. V. R. R., PITTSBURGH, PA.

SARGENT HYDROASPIRATOR IMPROVED



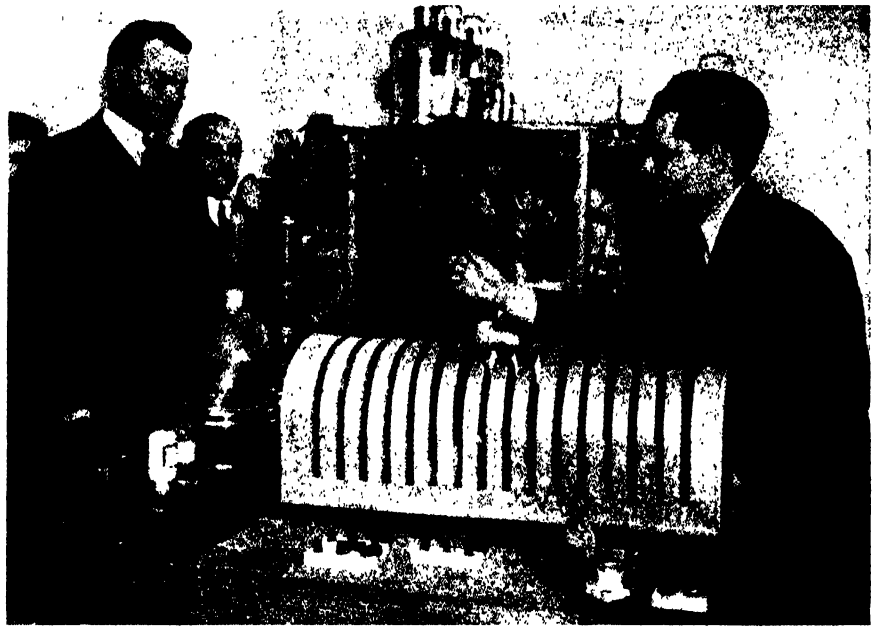
Already rated as one of the fastest filter pumps available, the Sargent Hydroaspirator now offers in addition to this advantage, an improved valve system which effects an *immediate* water tight seal, completely preventing entry of water to the suction line when suction is stopped.

The efficiency of these pumps with respect to speed and sealing action is uniformly maintained among individual pumps by extremely precise machine operations used in their production.

S-33555 FILTER PUMP — *Sargent Hydroaspirator.* With ⅛" I.P.S. male thread at top and hexagonal wrench seat. Length, 4 inches.. ... ... each $1.25
Per dozen, 20% discount

E. H. SARGENT & CO.
155-165 E. Superior St., Chicago

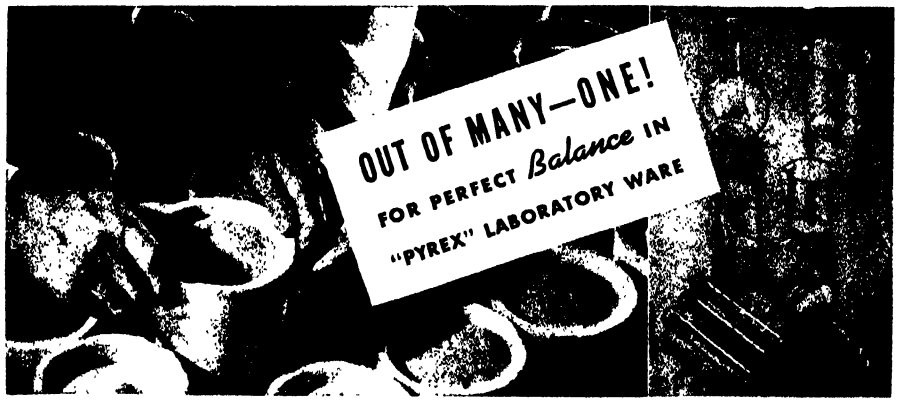
SARGENT
SCIENTIFIC
LABORATORY SUPPLIES



WIDE WORLD PHOTO

Extraction of Aluminum from Clay

Alfred R. Globus, right, 21-year-old Brooklyn, N. Y., resident, demonstrates his method of extracting aluminum from common clay to Walter L. Rice, vice president of the Reynolds Metal Co., Richmond, Va., one of several representatives of metal firms and the press who saw the demonstration. The process is basically one of dissolving the clays with sulfuric acid and sodium hydroxide. Electrolysis is used to recover the acids. Where there is a lot of iron in the clay, the electrolysis serves to separate it from the aluminum and to recover the iron as a by-product. Experiments are still in the laboratory and pilot-plant stage, and experts at the demonstration said that probably an industrial trial only could show whether the process is worth while. Mr. Globus claims he will be able to produce 200 to 250 pounds of aluminum from a ton of usable clay at a cost of 1 to 2 cents per pound.



During its many years of glass making, Corning Glass Works has developed more than 25,000 glass formulae. More than 250 different formulae are used in daily production.

Of all these formulae, none is more important to the laboratory than the formula used for PYREX brand Chemical Glass No. 774. For the development of this glass not only made America independent of foreign sources for heat-resistant laboratory ware, it did far more.

In 1915, for the first time, America had a *Balanced Glass* whose properties—mechanical and thermal strength and chemical resistance—were *scientifically balanced* for maximum laboratory usefulness, and economy through long life. Its balance gives to "PYREX" Laboratory Glassware the important qualities that make it the all-around glassware for all-around laboratory use. Consult your regular laboratory supply dealer.

"PYREX" and "VYCOR" are registered trade-marks and indicate manufacture by

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PYREX CORNING VYCOR

Educational Movie on Arc Welding Available

EXPECTED to play a part in speeding the training of thousands of metal arc welding operators needed for the fabrication of war equipment is the new six-part, all-color General Electric sound movie, "The Inside of Arc Welding". The first part of the movie, complete in itself, is now available. The other five parts will be ready early in June.

It has been estimated that use of the film should help cut the training time of new welders 20 per cent in addition to giving trainees a better understanding of the principles of arc welding. Vivid charts, animation, demonstrations by expert operators, closeups of the arc in action, as well as cross sections of good and bad welds are combined to bring to even the largest of classes the benefit of individual instruction.

Each of the six parts of "The Inside of Arc Welding" is 400 feet long, 10 minutes in duration, and can be used on sound-equipped 16-mm. projectors only. The films may be obtained for single showings or bought at print cost by writing General Electric's Visual Instruction Section, Schenectady, N. Y.

Howard W. Broecker has been appointed assistant district manager of the Copperweld Steel Co. in the Chicago district.

INDUSTRIAL PRODUCTS BY FERMENTATION PROCESSES

NOAH has received credit for one of the earliest recorded chemical discoveries. He found that under some conditions grape juice underwent a change and the resulting product, when imbibed, produced a pleasant physiological effect entirely different from that which the original juice gave. Unfortunately, as a result of continuing his testing "not wisely but too well", he has received some undesirable notoriety.

It was also observed at an early date that sometimes fruit juices underwent another type of change which resulted in the development of sourness. Milk was also found to become sour on storage. Since the resulting products found practical use, empirical methods of regulating these alterations were developed.

Not until the investigation of Pasteur was it recognized that these changes were due to the growth of various microscopic organisms. It had been noticed earlier, however, that the development of visible organisms, termed molds, also resulted in changes of the medium on which they grew.

Since Pasteur a large number of experimenters have developed methods not only of preventing, but also of encouraging, the growth of these organisms, both visible and microscopic. Others have studied the chemical changes brought about by them. It is now recognized that these reactions are similar to, or in many cases the same as, those occurring during the development of a fruit or vegetable and are natural vegetative processes.

As a result of some of these researches a considerable variety of products of industrial importance is now being manufactured by the careful cultivation of a number of these organisms. Since this is a comparatively new field, it can safely be assumed that with time the number of compounds produced by such methods will be greatly enlarged. The probability of this is increased by the fact that the raw materials for such processes are generally of American agricultural origin, thus removing any dependence on foreign products.

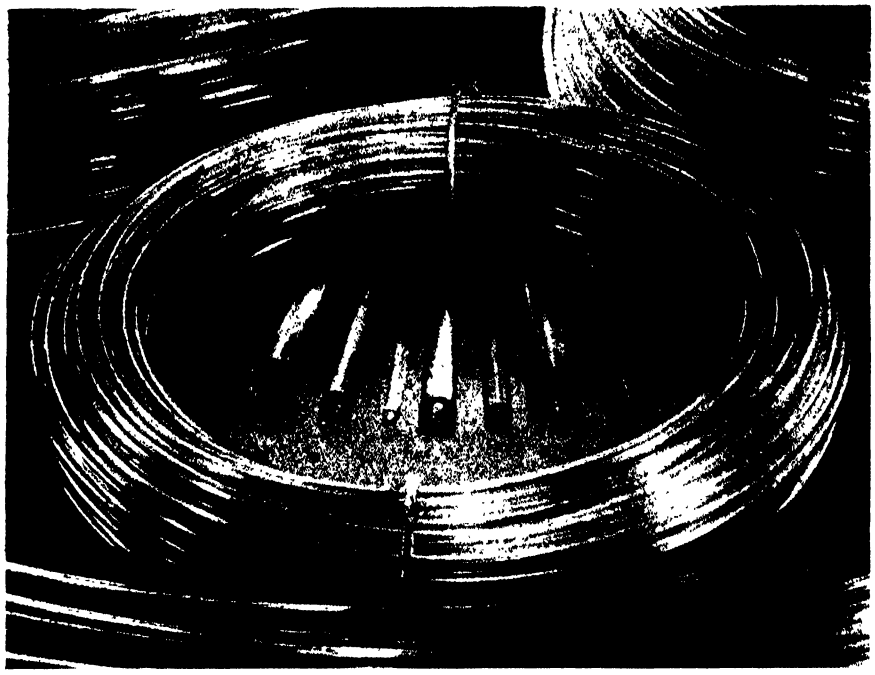
Chas. Pfizer & Co., Inc. has been one of the leaders in this field and is at present producing Citric Acid, Gluconic Acid, Fumaric Acid, and Oxalic Acid by such methods. From these acids a wide variety of derivatives is being manufactured. A well-trained research staff is engaged in the improvement of present processes and in the development of new products. Results in many of these latter investigations indicate that products of possible importance in a variety of fields will in time be made available.

PFIZER QUALITY

MANUFACTURING CHEMISTS · ESTABLISHED 1849

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Tubing of Transparent Plastic

Transparent Tenite tubing in sizes ranging from 3/16 to 3/4 inch in diameter is unbreakable and may be readily bent, formed, or curved to fit almost any condition. The ends may be adjusted to standard flared fittings with the same tools that are used for copper tubing. Large diameter tubing with a wall thickness of 1/16 inch can be threaded with standard thread-cutting tools. The tubing is extruded by Extruded Plastics, Inc., from a cellulose acetate butyrate formula of Tenite produced by Tennessee Eastman Corp., Kingsport, and distributed by Julius Blum & Co., Inc.

Plants for Butadiene to Be Built

PLANS for production of butadiene, synthetic rubber base, have been announced by the Gulf Oil Co. and Standard Oil Co. of Indiana. Gulf and four other concerns have organized the Neches Oil Co. to design and build a plant in Texas. Location of the Indiana Standard plant has not been selected.

Project Sponsored at Institute of Gas Technology

REMOVAL of organic sulfur from manufactured gas will be studied at the Institute of Gas Technology under a $12,000 project sponsored by the Rochester Gas and Electric Corp. Such sponsored programs are a part of the research activities of the eight-month-old institute, which is located at and affiliated with the Illinois Institute of Technology in Chicago. The Rochester project is one of the initial sponsored studies established at the institute.

Reichhold to Expand Output

A $2,000,000 expansion program is planned by Reichhold Chemicals, Inc., Detroit, Mich. The project calls for erection of a $1,500,000 plant for production of phthalic anhydride, chemical plasticizers, aldehydes, and alcohol. The new expansion is a step toward doubling output of the company in 1942. Production was also doubled in 1941.

War Production of General Electric

THE General Electric Co., Schenectady, N. Y., has thrown into wartime production every available employee, has added to its manufacturing facilities beyond the company's wildest peacetime dreams, and its 130,000 workers, 50 per cent more than a year ago, are committed to a determination of victory against the aggressors in this war, Charles E. Wilson, president of the company, declared recently. Mr. Wilson explained:

Conversion has not been a simple matter. You do not just stop making refrigerators and radios and washing machines and heating plants. Stopping had to be a gradual process if partially fabricated materials were not to be wasted, if our commercial system was not to fall into chaos overnight, if we did not want to add an agonizing unemployment headache to our other troubles. I doubt if most people today know how long ago business began the job and how hard it has worked to make conversion take place fast and efficiently.

Citing as an example of how this conversion process works, Mr. Wilson told of a visit to the world's largest electrical appliance manufacturing plant:

You would have been cheered, as I was, in seeing room after room filled with fascinating war devices. These were not just ideas and blueprints and samples. They were weapons well along in production at the hands of trained workers—things that are coming off the line. Many of them came as ideas or hunches from the armed services, ideas that needed hours of practical engineering magic to make them come true. There was a bombing device that had seen years of service in Europe, complicated and expensive to make. Now it has been Americanized—75 per cent simpler and 80 per cent cheaper. There are devices that take searchlight beams and tie them in knots around enemy aircraft so they cannot get away. There are synchronized firing devices for guns. There are strange applications of invisible light. The men who designed the new radio which you may have purchased this year have been engaged for more than a year in building vital electronic devices for combat and protection; they started early in the game, converting their special skills.

SOLIDS-LIQUIDS-GASES-SOLIDS-LIQUIDS-GASES-SOLIDS-LIQUIDS-GASES

DRIERITE

"The Versatile Desiccant"

For Drying—SOLIDS—LIQUIDS—GASES

For seven years serving the

INSTITUTIONS—INDUSTRIES

LABORATORIES—PLANTS

in the solution of their drying problems

Write for Literature

W. A. HAMMOND DRIERITE COMPANY

Yellow Springs, Ohio

Specify Florite Desiccant



For Efficient Dehydration of GASES and LIQUIDS

FLORITE, the new granular drying agent, is now being used successfully for dehydrating natural gas, propane, gasoline, air, nitrogen, carbon dioxide and other gases and liquids where high drying efficiency is required.

It selectively adsorbs 4 to 20% of its weight in water, depending upon the particular application, and is regenerated by heating to 300–350°F. FLORITE is hard, stable, non-corrosive, non-poisonous, and is available in a variety of particle size classifications.

WRITE FOR COMPLETE DETAILS

Floridin Company, Inc.

ADSORBENTS

159 LIBERTY AVE. WARREN PENNA.

ULTRAVIOLET RAYS IN OUR WAR EFFORT

Chemical action is in many cases accelerated by the actinic radiations of the quartz mercury vapor arc lamp; as in the chlorination of hydro carbons. In numerous other instances Ultraviolet Rays are the prime factor for causing a chemical action to occur; as in the formation of Vitamin D from sterols. In the metal plating industry ultraviolet rays are used to examine surfaces prior to introduction in the plating bath. Mineral oil or other foreign deposits are immediately visible if present. There are many other applications. Write for information - -stating your interest.

HANOVIA CHEM. & MFG. CO. NEWARK, N. J.

DEPT. 351-E RESEARCH APPARATUS DIVISION

INVESTIGATE *Resin and Lacquer Emulsions* as LATEX SUBSTITUTES

—Extenders and Modifiers

Resin and Lacquer Emulsions have been finding an ever-widening use in many industries. They have proved invaluable in replacing other materials in adhesives, modifiers, binders and fillers, grease proofing, waterproofing, sizing, impregnating, coating, color dispersions and innumerable other uses.

In the Rubber Industry these emulsions are being used today as *Latex Modifiers* and *Complete Latex Replacements* to extend, thicken, stabilize, increase penetration, improve resistance to acids, oils and solvents, and to mechanical coagulation, etc.; *in Coatings* to produce adherent pigmented coatings and as intermediate coats for lacquer on rubberized cloth: in *Rubberizing* textiles; in *Latex Treated Papers* to increase strength and improve ageing; in *Adhesives*, for paper, for leather to cloth, and cloth to cloth.

These are just a few of the known applications in the rubber field. Undoubtedly in your own plant you will find many uses for these emulsions to improve your products and extend the supply of the vital materials, LATEX and RECLAIMS.

Our Technical Staff will be glad to make recommendations to meet your specific problems. Write today for additional information.

AMERICAN RESINOUS CHEMICALS CORPORATION

Coatings • Pigment Dispersions • Resin, Wax, Lacquer Emulsions

MAIN OFFICE and LABORATORIES, PEABODY, MASS.

Factory Branches: Newark, N. J. and Chicago, Ill.

A Few of Our Products of Interest to the Rubber Industry

•

ALKYD 17-B A permanently tacky, alkyd type resin emulsion containing 40% solids. When mixed in equal proportions with normal latex, the mixture for all practical adhesive purposes is indistinguishable from latex.

ALKYD 18 An alkyd type resin emulsion which is non-yellowing and non-oxidizing. Film is water-white and non-tacky. Preferred where slight oxidizing action may be considered harmful to rubber. Extender for latex in coating, combining and impregnating processes.

EMULSION 58-B A series of emulsified elastometers containing up to 65% solids. Recommended for use as full latex replacements in impregnation and combining

PIGMENT BASES Concentrated aqueous dispersions of pigments in resin bases, available in all shades and viscosities, suitable for spreading, spraying, etc.

Also Acrylic, Vinyl, Maleic, Phenolic, Hydrocarbon, Ethyl Cellulose, Cellulose Acetate and Nitrate emulsions and solutions for various applications.

GREATER PRODUCTION *DEMANDS* GREATER CONTROL



Control in processing is going to become more difficult — as it becomes more necessary. Organizations are being disrupted at a time when greater demand for war material and substitutes for metal are adding an increased load to the process industries.

Investigate Prater equipment — for many phases of grinding and mixing it offers complete uniformity of results unfailingly delivered.

Every Prater Mill is sold on a basis of guaranteed output per horsepower hour and control of quality of grind and grain size.

May we analyze your problem?

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1825 S. 55th Ave., Chicago, Ill.

Please send me complete information on Prater Processing Equipment

Name .....

Address .....

City .....State.....IEC

PRATER
PULVERIZER COMPANY
1825 South 55th Avenue, Chicago, Illinois

Business Statistics

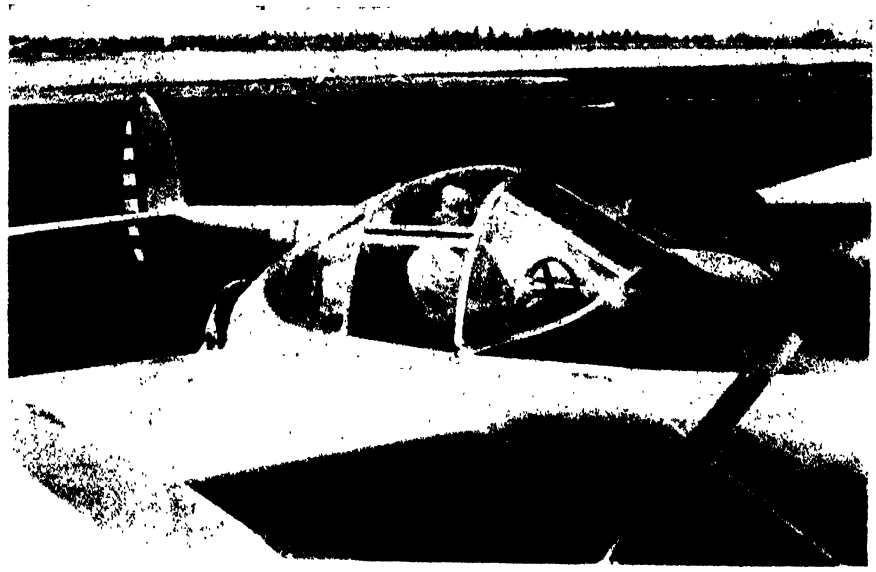
WE ARE indebted to the Manufacturing Chemists' Association, 608 Woodward Bldg., Washington, D. C. for the following figures showing business conditions.

Monthly Statistical Report on Business Conditions

	Seasonally Adjusted			Without Adjustment		
	March 1942	Feb. 1942	March 1941	March 1942	Feb. 1942	March 1941
(Base 1935–39 = 100)						
Industrial production[a]	172[b]	172	147	168[b]	166	144
Chemical production	160[b]	158	125	165[b]	158	129
Steel production	216	210	192	216	210	192
Pig iron production	194	189	178	194	189	178
Freight car loadings	136	139	126	129	129	121
(Base 1923–25 = 100)						
Construction contracts, residential	105[b]	100	74	110[b]	89	78
All other	159	151	109	156[b]	129	107
Department store sales, value	122[b]	126	103	116[b]	99	93

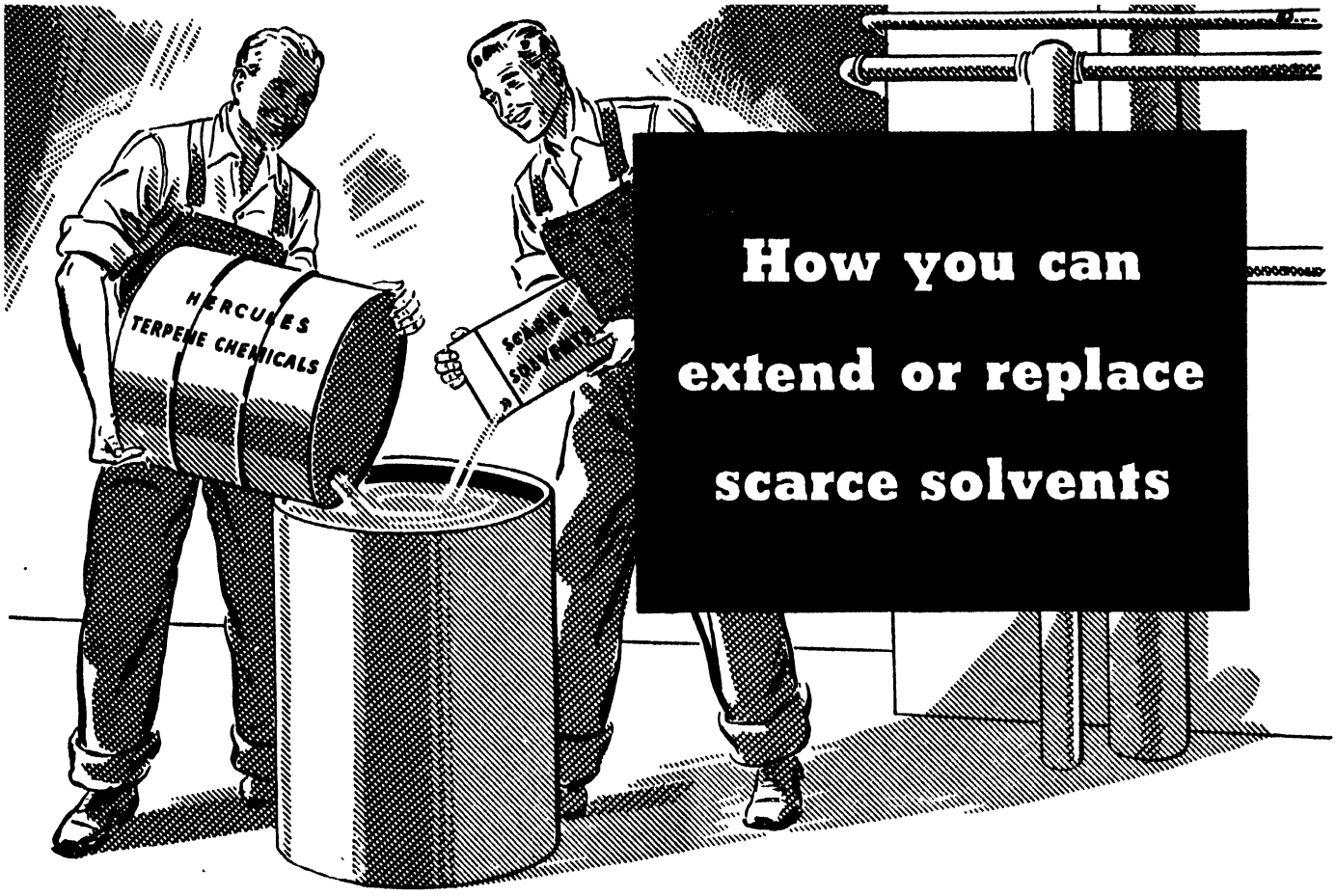
	March 1942	Feb. 1942	March 1941
Index of factory employment[c]:			
All manufacturing	134.5[b]	133.6	119.9
Chemicals	185.9[b]	188.1	159.3
Drugs	155.1[b]	154.5	120.9
Fertilizers	173.2[b]	159.1	140.9
Compressed gases	154.4[b]	151.1	133.1
Index of factory pay rolls[c]:			
All manufacturing	181.9[b]	178.2	131.2
Chemicals	275.8[b]	278.3	201.7
Drugs	194.2[b]	192.9	137.7
Fertilizers	177.3[b]	155.4	116.9
Compressed gases	203.4[b]	200.4	162.9
(Base 1926 = 100)			
Wholesale price indexes:			
All products (except farm products and foods)	95.2	94.9	84.9
Chemicals	96.4	96.3	85.9
Drugs and pharmaceuticals	126.5	126.5	97.2
Fertilizer materials	79.5	79.3	70.4
Purchasing power of the dollar:			
All products (except farm products and foods)	$1.050	$1.053	$1.178
Chemicals	1.037	1.039	1.164
Drugs and pharmaceuticals	0.790	0.790	1.030
Fertilizer materials	1.258	1.261	1.420

[a] Source of statistics in first seven items: Federal Reserve Board.
[b] Preliminary figures.
[c] U. S. Department of Labor.



Plexiglas for Protection and Visibility

Seated inside a Plexiglas enclosure, the Lockheed P-38 pilot enjoys excellent visibility and complete protection from the elements. The permanent clarity and high impact strength of the Röhm & Haas product, Plexiglas, assure these design advantages while its light weight and ease of forming make it practical for aircraft use.



How you can extend or replace scarce solvents

The shortage of many solvents, thinners, wetting and dispersing agents can be greatly relieved by making full use of terpene chemicals developed by Hercules.

These terpene derivatives — Solvenol* No. 1, Dipentene No. 122*, Yarmor* 350, Hercosol* No. 80, the Terposols*, and others—have different characteristics, but when properly combined with other solvents, they offer a wide choice of such desirable properties as solvent power, evaporation rate, tolerance for thinners, anti-skin effect, and promotion of flow. Certain of them are also useful in reclaiming rubber, in textile chemicals, perfumes, insecticides, processing leather, and other important applications.

Through our research, we have learned a good deal about successful methods of fitting these terpenes into various processes. This knowledge is at your disposal. We shall be glad to work closely with you, or to mail you literature, which gives typical analyses and describes the characteristics of each of the Hercules Terpene Chemicals. Just write or mail the coupon below.

*Reg. U. S. Pat. Off.

NAVAL STORES DEPARTMENT

HERCULES POWDER COMPANY

INCORPORATED

Wilmington, Delaware

Please make suggestions pertaining to terpenes in (state process or application) . . . . . .

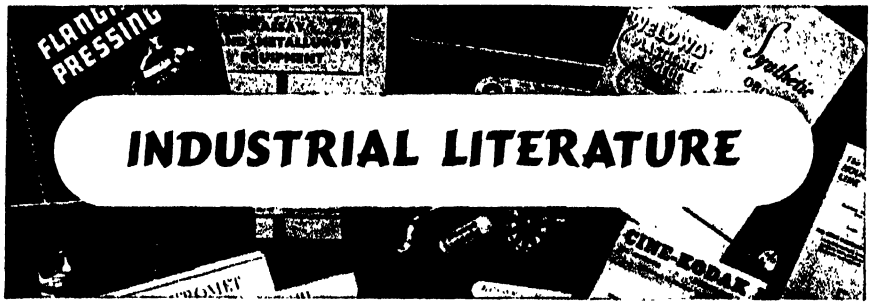
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LL-67



Listed publications should be requested directly from the company concerned. Use business stationery, mention bulletin numbers, and refer to this journal. Publications will be sent free unless otherwise noted.

Absolute Pressure Gage. Designed particularly for the measurement of pressures low enough to be seriously affected by variation in barometric pressures, this recording gage is described in an 18-page bulletin. *Bulletin 70-11 CEN.* BROWN INSTRUMENT Co., Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Penna.

Activated Carbon. A 12-page bulletin discusses factors entering into the economical selection and use of activated carbon in purifying liquids. *Eight ways to get the most from Darco Bulletin CEN.* DARCO CORP., 60 East 42nd St., New York, N. Y.

Blowers. Centrifugal blowers suitable for heating, ventilating, and air-conditioning application are covered in a 16-page catalog. These blowers are of two types—one with a forwardly and the other with a backwardly curved blade wheel. *Catalog 303 CEN.* AUTOVENT FAN AND BLOWER DIV., HERMAN NELSON CORP., Chicago, Ill.

Capillary Air Conditioners. A 24-page bulletin gives information on the application and operating characteristics of glass filament capillary cells when used in air conditioning. Performance when used in different positions and arrangements is discussed. *Bulletin G-2 CEN.* AIR & REFRIGERATION CORP., 475 Fifth Ave., New York, N. Y.

Centrifugal Pumps. A 6-page folder describes a line of centrifugal pumps which have no stuffing boxes. While running, there is no rubbing contact between rotating or stationary parts. *Bulletin E-1415 CEN.* A. R. WILFLEY & SONS, INC., Box 2330, Denver, Colo.

Cupola Dust Control. This combination blower and dust collector is described in a single-page folder. In addition to reducing the dust discharged, it also serves to "blackout" the cupola. *Bulletin 342 CEN.* CLAUDE B. SCHNEIBLE CO., 3951 Lawrence Ave., Chicago, Ill.

Cyclone Dust Collector. An illustrated catalog explains construction and operating details of the high-efficiency cyclone dust collector. A complete engineering manual section gives essential data for efficient operation of a dust control system, technical layouts, and engineering tables and charts. The publication is spiral bound, 8.5 by 11 inches. *Catalog 82 CEN.* AMERICAN FOUNDRY EQUIPMENT Co., 555 South Byrkit St., Mishawaka, Ind.

Fine Organic Chemicals. This 30-page catalog details a line of chemicals, giving the melting point and boiling point ranges for each. *Fine Organic Chemicals List 3 CEN.* PARAGON TESTING LABORATORIES, Orange, N. J.

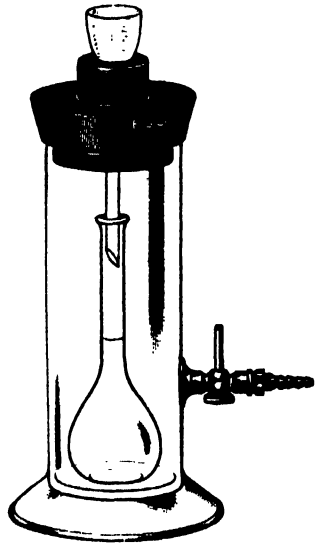
Flow Indicators. This 8-page bulletin lists liquid flow indicators of both sight and dial types. *Flow Indicating Devices Bulletin CEN.* S. F. BOWSER & CO. INC., Fort Wayne, Ind.

Induction Heating. This data sheet, the first of a series, discusses the elemental theory of induction heating. *Funda-*

CONTINUED ON PAGE 638

SV FILTRATION CYLINDER

The Standard Volume Filtration Cylinder was designed to permit filtration directly into a 100 ml. volumetric flask. The apparatus, as illustrated, consists of a heavy wall glass cylinder approximately 9" high × 3" I.D. with a heavy base, and a special heavy rubber stopper of sufficient thickness to prevent flexing when the suction is applied. The flat edge of the stopper sits on the rim of the cylinder. In use, this stopper gives an air-tight seal without any danger of splitting the cylinder as would be the case if the taper of the stopper were involved. A center hole in the large stopper accommodates an ordinary Gooch Crucible Adapter.



M 7458

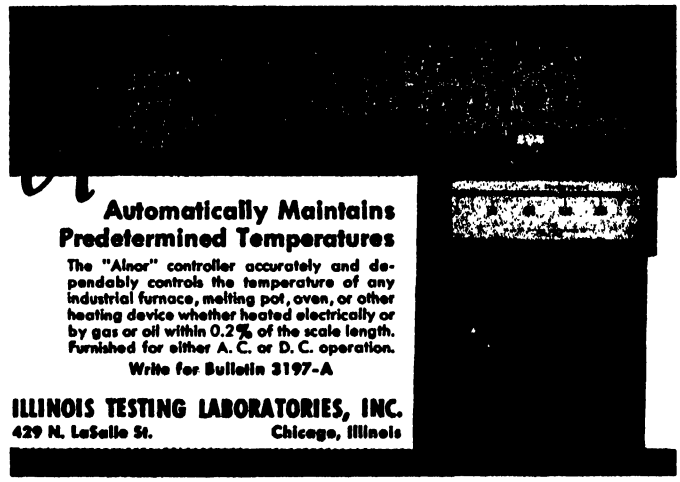
A glass funnel tube with a finely drawn tip is provided to give a fine stream to prevent the filtrate from blocking the neck of the volumetric flask which would result in the solutions being lost in bubbling.

A three-way metal stopcock is supplied to which the suction line is connected and need not be removed during use. In one position the stopcock admits air to the filtration cylinder and turns off the suction. In the other position, the air inlet is closed, and the suction is connected to the filtration cylinder.

M 7458 SV Filtration Cylinder, complete as described, with Crucible, Rubber Adapter and Volumetric Flask, **$12.50**

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Automatically Maintains Predetermined Temperatures

The "Alnor" controller accurately and dependably controls the temperature of any industrial furnace, melting pot, oven, or other heating device whether heated electrically or by gas or oil within 0.2% of the scale length. Furnished for either A. C. or D. C. operation.

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ILLINOIS TESTING LABORATORIES, INC.

429 N. LaSalle St. Chicago, Illinois

STEAM JET EVACTORS

AIDING NATIONAL DEFENSE

Numerous Croll-Reynolds Evactors are working overtime maintaining high vacuum in plants making explosives, synthetic rubber, airplane lubricants and a long list of other ordnance materials. They are maintaining high vacuum on engines and turbines of dozens of American ships sailing the seven seas.

While the large and special units require up to three months or more for fabrication the smaller ones are sometimes made in two weeks, or less, when the demand is urgent. These include single and multi-stage units for vacuum up to a small fraction of 1 mm. absolute, also small condensers and vacuum chilling equipment.

A recent development is a vacuum-cooled condenser for maintaining condensing temperatures down to 34° F. Inquiries will be handled as promptly as possible under the circumstances.

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ANHYDROUS ALUMINUM CHLORIDE in ORGANIC CHEMISTRY

CHARLES ALLEN THOMAS, Central Research Director, Monsanto Chemical Company

In collaboration with Mary Baluk Moshier, Herbert E. Morris and R. W. Moshier, Thomas and Hochwalt Laboratories, Monsanto Chemical Company

A. C. S. Monograph No. 87

This volume has been eagerly awaited for some time by all those concerned with the catalysis and isomerization of organic compounds. The reactions of aluminum chloride with hundreds of compounds are discussed in detail; and a feature of the book is the presentation of the exact changes which occur in structure. A résumé of the work of Friedel and Crafts, who did the pioneer work in this field, is included. This is indeed a monumental compilation which will be invaluable to research workers in the fields of petroleum, plastics, rubber, synthetic coatings, flotation agents, dyes, fats and waxes, cleansing and dry-cleaning agents, perfumes and textiles.

—Chapters—

Introduction
Historical Sketch of Charles Friedel and James Mason Crafts
Physical Properties of Anhydrous Aluminum Chloride
Mechanism of Reactions Catalyzed by Anhydrous Aluminum Chloride
Friedel-Crafts Syntheses. Part I. Reactions of Aromatic Hydrocarbons with Halogenated Compounds other than Acyl Halides
Friedel-Crafts Syntheses. Part II. Ketone Syntheses
Friedel-Crafts Reactions. Part III. Ring-closure with Evolution of Hydrogen Halide
Addition Reactions. Part I.
Addition Reactions. Part II. Syntheses of Keto-Acids from Dicarboxylic Acid Anhydrides
Aldehyde Syntheses
Aromatic Halogenation
Dehydrating Condensations
Dehydrogenating Condensations and Reduction Phenomena
Miscellaneous Condensations
Aromatic Rearrangements and Migrations
Effect of Anhydrous Aluminum Chloride on Aromatic Compounds
Anhydrous Aluminum Chloride in Aliphatic Chemistry
Polymerization
Anhydrous Aluminum Chloride in the Petroleum Industry
Preparation, Manufacture, and Purification of Anhydrous Aluminum Chloride
Notes on Application of Anhydrous Aluminum Chloride. Author Index, Subject Index.

990 Pages Illustrated $15.00

MANUFACTURE OF SODA

Second Edition

by Te-Pang Hou, Ph.D.

A. C. S. Monograph No. 65

THE present acute shortage of soda ash and the consequent rapid expansion of existing plant facilities make the publication of this volume an event of the first importance not only to the soda industry itself, but to others closely related to it. New plants will be brought into production, older ones enlarged, and every effort will be made to attain maximum operating efficiency from all. It is in this connection that this book will be of particular value, for it constantly stresses the importance of efficiency, and explains precisely the best methods of attaining it.

—Chapters—

Introduction. Historical Survey of Alkali Industry and Relation of LeBlanc Soda Industry to Development of Other Chemical Industries
Natural Soda
History of Ammonia Soda Process: Statistics
Preparation of Brine: Rock Salt and Sea Salt
Purification of Brine
Burning of Limestone
Ammoniation of Saturated Brine
Carbonation of Ammoniated Brine
Working of Carbonating Towers or "Columns"
Filtration of Crude Sodium Bicarbonate (Ammonia Soda): Composition of the Bicarbonate
Composition of Mother Liquor from Carbonating Towers
Phase Rule in Tower Reactions: Graphical Representation of Ammonia Soda Process
Decomposition of Sodium Bicarbonate by Calcination
Recovery of Ammonia—Efficiency of Operation in Ammonia Still
By-Products from Distiller Waste
Allied Products of Ammonia Soda Industry
Position of Ammonia Soda Industry
Manufacture of Refined Sodium Bicarbonate
Manufacture of Caustic Soda—Chemical Process
Manufacture of Electrolytic Caustic, Chlorine, and Chlorine Products
Wet Calcination of Sodium Bicarbonate
Generation of Power for Ammonia Soda Plants
Boiler Operation and Conditioning of Boiler Feed and Cooling Water in Ammonia Soda Plant
Special Requirements of Ammonia Soda Industry
Control in Ammonia Soda Process
Losses and Consumption of Raw Materials in Ammonia Soda Process
Modifications and New Developments of Ammonia Soda Process
Chemical Analyses and Tests in Alkali Industry
Behavior of Soda Ash in Storage
Layout, Design and Location of Ammonia Soda Plant
Centrifugal Pumps Applied to Ammonia Soda Industry
Appendix, Index

590 Pages 182 Tables 149 Illustrations $9.50

REINHOLD PUBLISHING CORPORATION, 330 W. 42nd Street, New York, N. Y.

Industrial Literature

CONTINUED FROM PAGE 636

mentals of Induction Heating Data Sheet CEN. INDUCTION HEATING CORP., 389 Lafayette St., New York, N. Y.

Infrared Finishing. A 12-page bulletin discusses the finishing of industrial products, using infrared radiation to accelerate drying. *New Facts about Infra-Red Bulletin CEN.* AULT & WIBORG CORP. SUBSIDIARY OF INTERCHEMICAL CORP., 75 Varick St., New York, N. Y.

Perbunan. A 36-page manual gives information on compounding and processing Perbunan. Also covered are softeners, pigments, accelerators, mixtures with rubber and other polymers, specific properties, and product compounding. *Perbunan Compounding and Processing Manual CEN.* STANCO DISTRIBUTORS, INC., CHEMICAL PRODUCTS DEPT., 26 Broadway, New York, N. Y.

Piston Pumps. This 4-page bulletin describes a line of horizontal piston pumps available for boiler feed or light-pressure service. *Bulletin 230–1 CEN.* WARREN STEAM PUMP CO., INC., Warren, Mass.

Plastics Testing. Equipment for testing tensile and compressive strengths, flexure, stiffness, resistance to impact, flow, and distortion is detailed in this 16-page booklet. *Bulletin 23 CEN.* TINIUS OLSEN TESTING MACHINE CO., 500 North 12th St., Philadelphia, Penna.

Potentiometer Temperature Indicators and Indicating Resistance Thermometers are described in an illustrated bulletin. Included are single-point and multiple-point models and those equipped with selective key switches for as many as 82 contact points, as well as the popular portable models. A complete list of standard ranges is given. *Bulletin A-305 CEN.* FOXBORO CO., Foxboro, Mass.

Pour-Point Depressant. A depressant developed primarily for use in heavy wax-bearing paraffinic-type lubricating oils is described in a 10-page file size booklet. It is claimed that, through the use of this product, the pour-point may be lowered as much as 50° F. *Application Data Bulletin 120 CEN.* MONSANTO CHEMICAL CO., St. Louis, Mo.

Pressure Recorder. A 32-page catalog describes the Foxboro line of pressure recorders, with list of standard ranges and reproductions of specimen charts. *Catalog 22-A-CEN.* THE FOXBORO CO., Foxboro, Mass.

Pressure Seal. This 4-page bulletin covers a mechanical seal for rotating shafts. The packing used is made of synthetic rubber. A table of dimensions is given. *Bulletin 1 CEN.* STEVENSON ENGINEERING CORP., 45 Willard Ave., Providence, R. I.

Process for Blackening Copper and Its Alloys. A 4-page folder describes a new process called Ebonol C for direct, simple, low-temperature blackening of copper and copper alloys, including bronze and brass. The characteristics of the coating obtained and the procedure used, as well as other blackening processes are discussed. *Folder CEN.* THE ENTHONE CO., 442 Elm St., New Haven, Conn.

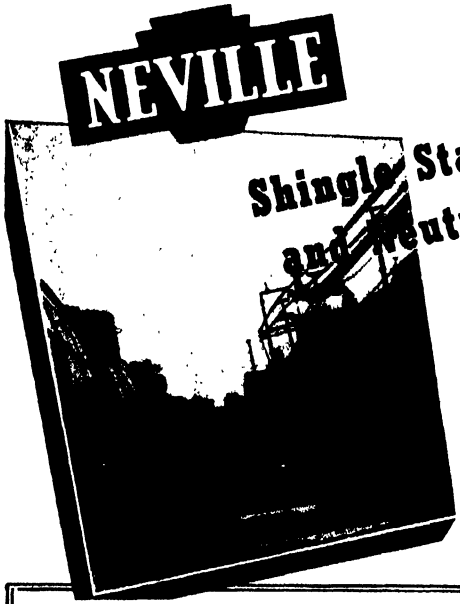
Pulverizing and Separating Equipment. An 8-page bulletin describes equipment for pulverizing a wide range of materials. *Bulletin 52 CEN.* RAYMOND PULVERIZER DIV., COMBUSTION ENGINEERING CO., INC., 1315 North Branch St., Chicago, Ill.

Refrigeration Valves and Fittings. This illustrated folder gives a brief description of semisteel valves and fittings designed for use with refrigerants. *Bulletin 191-A CEN.* FRICK CO., Waynesboro, Penna.

Safety Equipment. This 114-page illustrated catalog lists first aid, respiratory, gas alarm, electrical and high-temperature garment equipment. *Catalog 6 CEN.* DAVIS EMERGENCY EQUIPMENT CO., INC., 45–57 Halleck St., Newark, N. J.

Safety Equipment. This 8-page bulletin lists helmets, respirators, protective garments, etc., used in industrial plants. A folding stretcher and a wood traction splint are announced as new items. *Bulletin G-5 CEN.* MINE SAFETY APPLIANCES CO., Braddock, Thomas, and Meade Streets., Pittsburgh, Penna.

Synthetic Rubber Sponge. Ameripol synthetic rubber sponge is described in this 4-page catalog. Among its character-



CLEAR, clean dark red oils. Non-corrosive and of low volatility

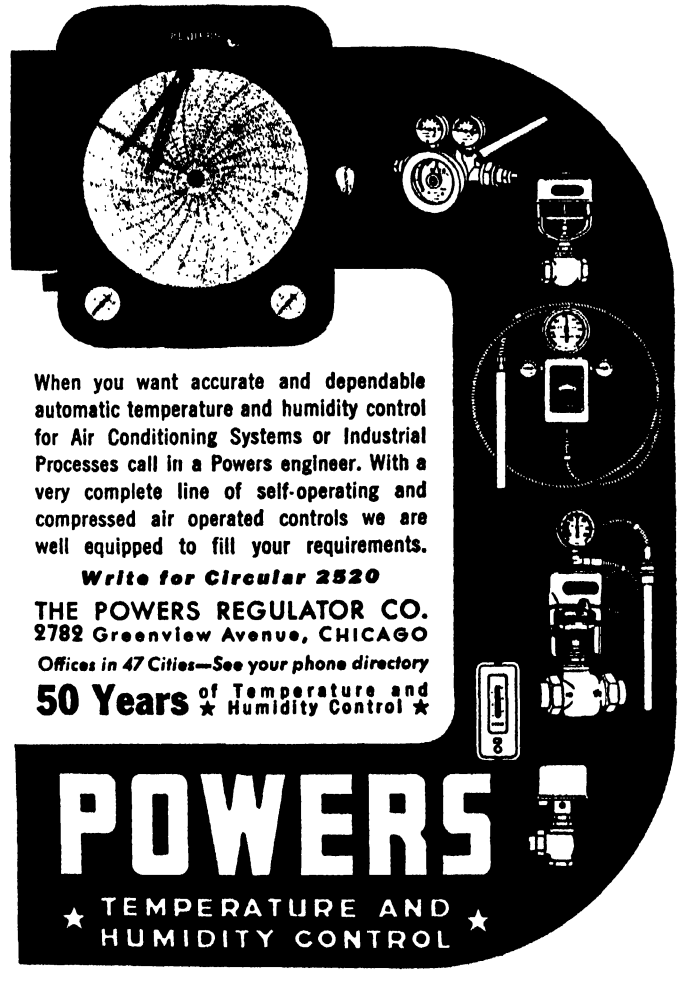
NEVILLE SHINGLE STAIN OIL is suitable for thinning low cost high-baking japans. It is an excellent vehicle for pigmented shingle stains.

NEVILLE NEUTRAL OIL serves as cut-back solvent for tars, asphalts, and other bitumens. Important as inexpensive vehicle for tar acids, or cut-back solvent for tar acid oils, in manufacture of emulsifying-type coal-tar disinfectants, cattle and sheep dips.

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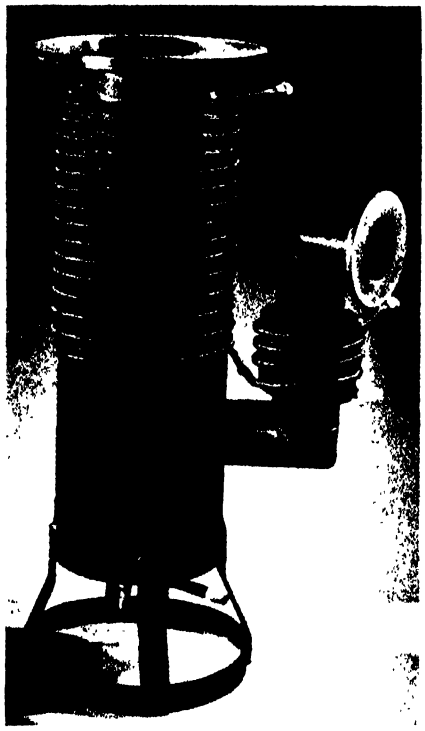
istics said to be superior to those of natural sponge rubber are resistance to oils and fats, oxidizing influence of metallic soaps, hydrocarbons, and heat. A table compares the properties of Ameripol sponge with natural rubber sponge. *Catalog Section 8010 CEN.* B. F. GOODRICH CO., Akron, Ohio.

Temperature Indicators. Potentiometer-type units are described in a 16-page bulletin. Single- and multiple-point panel and portable models are covered. *Bulletin A-305 CEN.* FOXBORO CO., Foxboro, Mass.

Variable-Speed Drives. Variation of machine speed through the use of changeable-pitch sheaves is discussed in this 16-page bulletin. Variation to 25 per cent can be obtained through the use of one sheave or to 50 per cent with two sheaves. *Bulletin B6082-A CEN.* ALLIS-CHALMERS MFG. CO., Milwaukee, Wis.

Votator. A 24-page booklet describes a heat exchanger which may be used to aerate, mix, or emulsify liquid passing through it. Viscous liquids may be handled. *The Votator CEN.* GIRDLER CORP., VOTATOR DIV., Louisville, Ky.

Metal Booster Pump



DESIGNED for use with forepumps having low volumetric efficiency at pressures below 1 mm. of mercury, a new high-capacity metal vacuum pump, known as the metal booster pump, Type MB-200, has been announced by Distillation Products, Inc., Rochester, N. Y.

This 2-stage oil diffusion unit will boost the pumping speed to 200 l/s. and will carry the vacuum from 0.5 to 5 × 10^{-5} mm. of mercury.

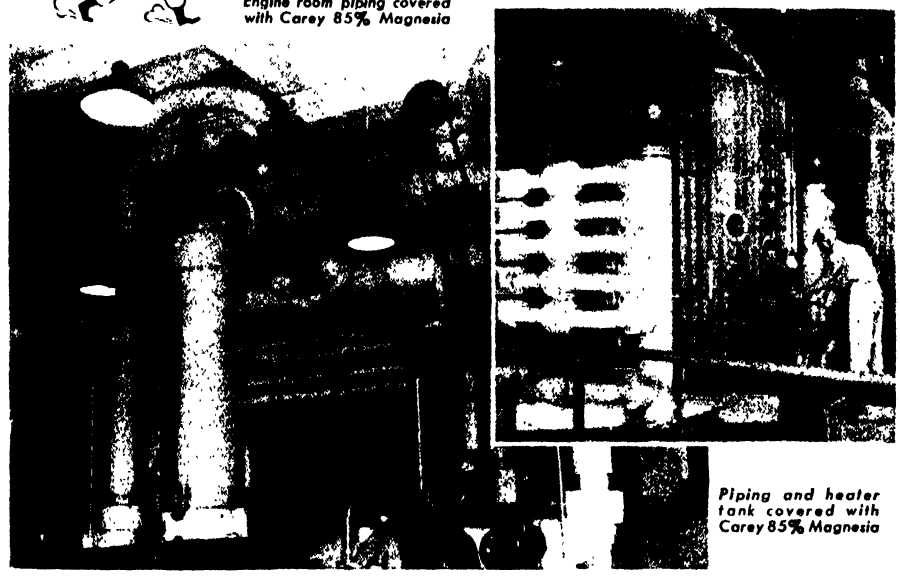
The unit is small and compact, and is readily connected to large mechanical pumps. The vacuum attainable is sufficient for metal sputtering and evaporation, ultracentrifuges, vacuum-insulated flasks, and drying chambers.

Carey HEAT INSULATIONS



HELPING PRODUCE SWEETS ECONOMICALLY for America at War!

Engine room piping covered with Carey 85% Magnesia



Piping and heater tank covered with Carey 85% Magnesia

The American Molasses Company, Brooklyn, N. Y., manufacturer of molasses and syrups of many kinds, is doing its bit to meet the nation's urgent "sweets" requirements. Their Grandma's Molasses is rich in nature's iron—needed in the daily diet to help build buoyant health, the goal of the National Nutrition Program. In processing the raw materials brought by boat from the West Indies and other sources, CAREY INSULATIONS are performing an essential service.

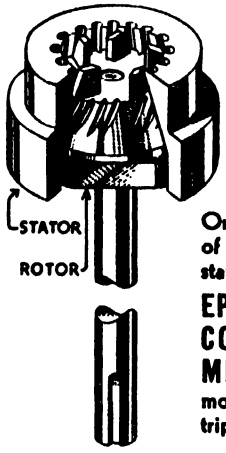
Because of the exposed location of the company's plant, correct insulation of the long, low-pressure steam lines going to the processing machines, is necessary to prevent excessive heat losses. These lines, together with the high pressure steam piping, are insulated with CAREY 85% Magnesia. Referring to this insulation, Mr. John Dobson, the Company's chief engineer, says: "No repairs whatsoever have been necessary on the Carey Insulation during the six-year period it has been in use; it looks good for another 20 years."

When you buy insulations, look for permanence as well as efficiency. CAREY insulations provide BOTH in outstanding measure, as demonstrated in many of the nation's leading industrial and power plants. Whatever your insulation needs, you're SAFE with CAREY. A national organization is at your service. For details address Dept. 64.

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...AND SHOW A
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Original design of rotor and stator in
EPPENBACH COLLOIDAL MILL assures more efficient triple action.

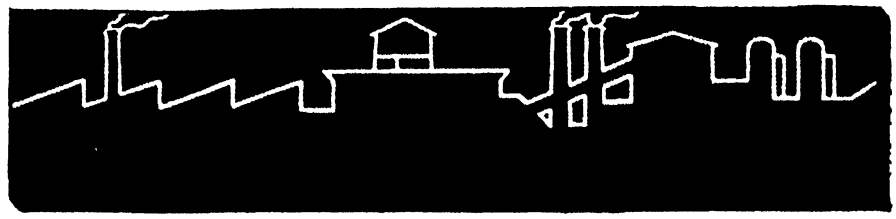


AMAZING RESULTS have been achieved with the Eppenbach Colloidal Mills. Products, as wide apart as emulsions, serums, lipsticks, rubber compounds, have acquired new, improved qualities, because the Eppenbach is so far ahead in its triple action.

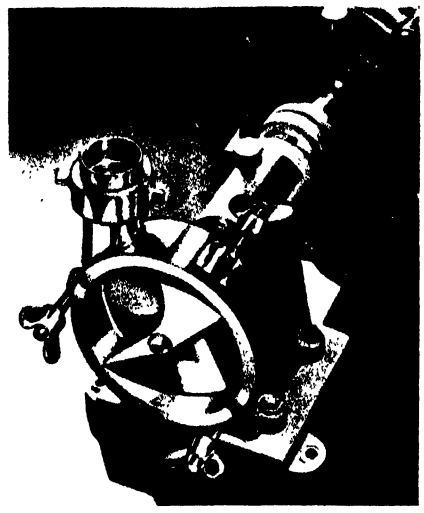
It's more powerful, the mixing turbines break liquids more violently. Clearances can be so finely adjusted, they seem practically closed. The teeth in the rotor and stator shear the materials mechanically — then the smooth surfaces hydraulically shear to any required particle size.

Perfect control is assured. No air is sucked in. Micrometric adjustments are made without stopping. Water jackets provide right temperatures. Rotor is only moving part — and it's conically shaped to take up wear. Self-cleaning, simple, rugged. *Write us.*

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PROCESSING EQUIPMENT
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Centrifugal Pump



THE Tri-Clover Machine Co., Kenosha, Wis., announces that a rubber manufacturer has achieved astonishing results with its centrifugal pump, which was originally designed to handle milk, sirups, chemicals, and foods with a minimum of agitation. According to this manufacturer's experiences, it is the first time that he has found a pump that will pump latex of 30 per cent concentration, or higher, with no resultant ill effects.

Two features stood out—the ease of handling the latex without shock and the ease of cleaning, which required only a few minutes of flushing with water.

Peerless Pump Co. Expansion

THE Peerless Pump Division of the Food Machinery Corp., Los Angeles, Calif., and Canton, Ohio, has acquired the Sterling Pump Corp., Hamilton, Ohio, and Stockton, Calif. The Hamilton plant will be consolidated with the new Peerless plant at Canton, Ohio, and the Stockton plant will be merged with the John Bean Manufacturing Co., Division of the Food Machinery Corp., San Jose, Calif.

New Types of Hydrocarbon Wax

THREE new types of hydrocarbon wax have been developed by Phosphate Division of Monsanto Chemical Co., St. Louis, Mo. The new materials are supplements to Santowax regular, and two of them have unusually high melting points and stability to heat. The products are designated as Santowax M, O, and P.

Preliminary investigations indicate they may have usefulness in improving the stability of candles and other formed wax articles, as lubricants in specialized high-temperature service, in compounding polishes and waxes, and as plasticizers in coatings and finishes.

Santowax M is a microcrystalline wax with a melting point between 181° and 194° F. Santowax O is an oily crystalline material with a melting point of less than 122° F. Santowax P is a nearly white crystalline material with a melting point around 410° F.

Plastic Wallboard Shapes

NEW extruded Tenite shapes for use with heavy wallboards and insulation materials such as Celotex are now available. They are designed to cover unsightly seams and joints. No nails, adhesives, or other means of attachment are necessary in installation. The resilient Tenite strips are so shaped that they become automatically secured when forced into the seams. Strips are provided for inside and outside corners, flat panels, and 130° panels. Tenite comes in all colors and has a smooth lustrous surface, eliminating any need for paint or lacquer finishes. The strips lend themselves readily to wall and ceiling constructions and offer possibilities for use in prefabricated and semiprefabricated houses. At present the shapes are stocked in red only and in 12-foot lengths. White is expected to be carried in stock shortly, but any desired color may be had upon special order.

The strips are extruded by Extruded Plastics, Inc., Norwalk, Conn., from a cellulose acetate butyrate formula of Tenite manufactured by Tennessee Eastman Corp., Kingsport, Tenn. They are distributed by Julius Blum & Co., Inc., 532 West 22nd St , New York, N. Y.

Plastic Cup

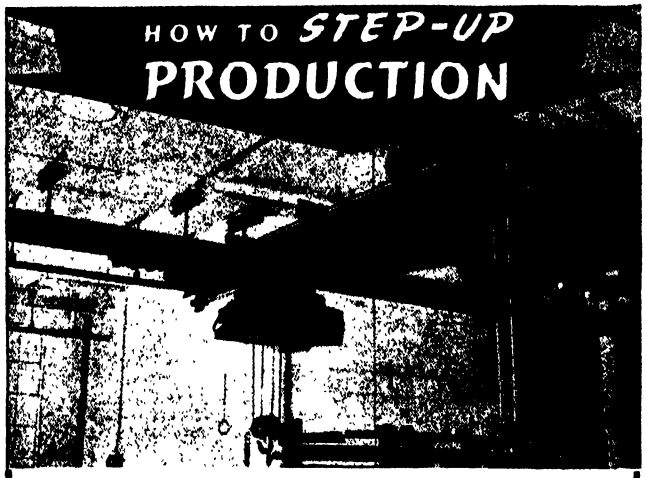
A SMALL cup of Plastacele cellulose acetate plastic, together with an oxide solvent, is being used for quick loosening of frozen studs in a cylinder head, according to the du Pont company, Wilmington, Del. Cylinder heads badly corroded with heat-hardened rust formations often are broken or damaged in removal, and four to six hours sometimes are required to pry loose the frozen studs.

The plastic cup is attached to the stud and solvent is poured in. It trickles down through tiny holes in the bottom of the cup. The cup is transparent, permitting a full view of operations which indicate how fast the solvent is used. It is not affected by the solution and is shatter-resistant and easily cleaned. The cups are made in two thread sizes to fit standard $^{7}/_{16}$-inch and $^{9}/_{8}$-inch studs. The cups are injection molded by Caldwell Products, Inc., for Anti-Rust Corp. Plastacele molding powder is produced by du Pont.

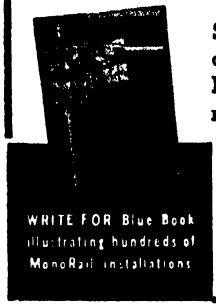
Modern Fire Truck

A MODERN fire truck, manufactured under wartime regulations by the Cardox Corp., Chicago, Ill., is equipped with a refrigerated tank that holds 3 tons of liquid carbon dioxide. The truck is therefore independent of pumps, hose connections, water supplies, or water mains.

CONTINUED ON PAGE 647



LET an American MonoRail engineer show you how an overhead handling system can reduce idle machine time, coordinate handling with process, eliminate multiple handling, avoid damage in transit, and enable you to plan exact schedules of production.



Size of plant, nature of product, weight of load make little difference; American MonoRail equipment is engineered to meet the particular requirement of each problem. This expert advice is yours for the asking.

THE AMERICAN MONORAIL CO.
13122 Athens Ave. Cleveland, Ohio



Barnstead Water Stills

Barnstead steam-heated Extra Duty Stills—the stills that are specially designed for distilling hard or badly contaminated water—are very easy to keep clean and efficient. The small stills—1 to 5 gallons per hour—have quickly removable Bayonet Type heaters. And the larger units have hand holes or trap doors with removable heating coils attached. With these features it is far easier to clean both the heating coils and the stills' interiors.

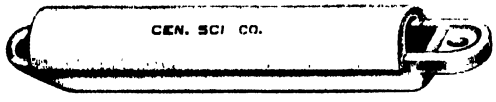
Other features worth noting are the constant bleeder device that prevents rapid scale formation—and the extra high evaporator to eliminate entrainment due to surging and foaming.

Send for complete catalog.

Barnstead
STILL & STERILIZER CO. Inc.
19 LANESVILLE TERRACE, FOREST HILLS, BOSTON, MASS.

Use Once and Throw Away

LECO COMBUSTION BOATS



26278 Boat with No. 26279 Cover.

Withstands temperature of 2300° F
No need for refractory lining
Resists Slag Penetration
Dimensions, inside: 3¼ by 5/16 by ¼ inches
Packed in boxes of 100

26278 Leco Boats Per Pkg. $4.50
Per 1000 Boats $35.00

LECO BOAT COVERS

For No. 26278 Combustion Boats
Effectively prevent spatter
Length—3 inches
Packed in boxes of 100

26279 Leco Covers Per Pkg. $3.50
Per 1000 Covers.....$27.00

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- Various capacities as required
- Motor types and drives to meet your specifications
- Underwriters' approved explosion-proof motors
- Several alloys for all liquids corrosive or non-corrosive

You will want our Midget Pump Catalog for valuable reference. Write . . .

EASTERN ENGINEERING CO.
41 Fox St., New Haven, Conn.

CHEMICAL MARKET PRICES

May 1, 1942

Compiled from weekly current price listings in the *Oil, Paint and Drug Reporter*, with permission of the publisher under its copyright. These prices, unless otherwise specified, are those prevailing in the New York market for technical grades in usual large commercial quantities.

Acetaldehyde, drums, c/l., wks.	lb.	.11
Acetamide, tech., kegs, 500-lb. lots, works	lb.	.30
Acetanilide, tech., powd., bbls.	lb.	.27
Acetic anhydride, drums, c/l., frt. allowed	lb.	.11½
Acetone, C. P., drums, c/l., dlvd.	lb.	.08½
Acetophenetidin, bbls., 1000 lbs.	lb.	1.00
Acetophenone, drums, 100 lbs.	lb.	1.55
Acid, abietic, drums, c/l.	lb.	.08¾
Acetic, 28%, bbls., c/l.	100 lbs.	3.38
56%, bbls., c/l.	100 lbs.	5.58
Glacial, synth., drums, c/l.	100 lbs	9.15
Glacial, U. S. P., drums, c/l.	100 lbs.	10.95
Acetylsalicylic, U. S. P., bbls.	lb.	.40
Anthranilic, tech., bbls.	lb.	.95
Battery, cbys., c/l., E. wks.	100 lbs.	1.60
Benzoic, tech., bbls.	lb.	.43
Boric, tech., gran., bags	ton	99.00
Butyric (99%), drums, c/l., wks.	lb.	.22
Chloroacetic, mono-, tech., bbls. wks.	lb.	.17
Chlorosulfonic, drums, c/l., wks.	lb.	.03
Chromic, 99%, drums	lb.	.16¼
Cinnamic, bottles	lb.	3.50*
Citric, cryst., bbls., c/l.	lb.	.20
Cresylic, H. B., 210–215°, drums, c/l., wks., frt. equal	gal.	.81
Formic, 90%, cbys., f. o. b. works, c/l.	lb.	.10½
Gallic, tech., bbls.	lb.	1.10
Hydriodic, 57%, 5-lb. bot.	lb.	2.90
Hydrobromic, 34%, cbys.	lb.	.35
Hydrochloric, 20°, tanks, wks.	100 lbs.	1.75
Hydrofluoric, 30%, bbls., wks.	lb.	.06
60%, lead cbys.	lb.	.14
Hydrofluosilicic, 30%, bbls., wks.	lb.	.09
Hypophosphorus, U. S. P., 30%, 5-gal. demis.	lb.	.75
Lactic, dark, 22%, bbls.	100 lbs.	2.90
Light, 22%, bbls., wks.	100 lbs.	3.90
Maleic, powd., drums	lb	.30
Mixed, tanks, wks. N unit.	lb.	.05
S unit.	lb.	.0085
Naphthenic, 220–230, drums	lb.	.13
Nitric, C. P., cbys.	lb.	.13
36°, cbys., c/l., wks.	100 lbs.	5.00
Oxalic, bbls., wks.	lb.	.11¼
Phosphoric, U. S. P., 50%	lb.	.10½
Picramic, kegs	lb.	.65
Picric, bbls.	lb.	.35
Pyrogallic, tech., bbls.	lb.	1.45
Salicylic, tech., bbls.	lb.	.33
Stearic, distilled, d. p., bags, dlvd.	lb.	.1580
Sulfanilic, tech., 250-lb. bbls.	lb.	.17
Sulfuric, 66°, cbys., c/l., E. wks.	100 lbs.	1.50
66°, tanks, E. wks.	ton	16.50
60°, tanks, E. wks.	ton	13.00
Oleum, 20%, tanks, E. wks.	ton	19.50
Tannic, tech., bbls.	lb.	.71
Tartaric, U. S. P., cryst., bbls.	lb.	.70½
Tungstic, pure, 100-lb. pkg.	lb.	2.86
Alcohol, ethyl, 190 proof, from molasses, drums, c/l.	gal.	8.19
Amyl, from pentane, tanks	lb.	.131
Butyl, normal, tanks, frt. allowed.	lb.	.12½
Cinnamic, bottles	lb.	3.00
Denatured, C. D. 14, drums, c/l., wks., E.	gal.	.65
Diacetone, tech., drums, c/l.	lb.	.11
Furfuryl, tech., drums, c/l., wks.	lb.	.20
Isobutyl, ref., drums, works	lb.	.0860
Alcohol, isopropyl, ref., 91%, drums, c/l., f. o. b. dest.	gal.	.40½
Wood, *see* Methanol		
Aldol, 95%, drums, c/l., wks.	lb.	.12
Alpha-naphthol, bbls.	lb.	.52
Alpha-naphthylamine, bbls.	lb.	.32
Alum, ammonia, lump, bbls., wks.	100 lbs.	4.25
Chrome, bbls.	lb.	.12½
Potash, lump, bbls., wks.	100 lbs.	4.50
Soda, bbls., wks.	100 lbs.	3.25
Aluminum, metal, 98–99%, drums, c/l.	lb.	.15
Chloride, anhyd., commercial, drums extra, c/l., wks.	lb.	.08
Stearate, bbls., c/l.	lb.	.23
Sulfate, comm'l, bags, c/l., wks., frt. equal	100 lbs.	1.15
Iron-free, bags, wks.	100 lbs.	1.75
Ammonia, anhydrous, fertilizer, f. o. b. wks., frt. equalized	ton	90.00
Pure, cyls.	lb.	.16
Ammonia, aqua, 26°, tanks (on NH_3 content), f. o. b. wks.	lb.	.04
Ammonium bicarbonate, drums	lb.	.0564
Bifluoride, bbls.	lb.	.15½
Bromide, bbls.	lb.	.31
Carbonate, tech., bbls.	lb.	.08¾
Chloride, gray, bbls.	100 lbs.	5.50
U. S. P., gran., bbls.	lb.	.12
Iodide, 25-lb. jars	lb.	3.65
Linoleate, 80%, anhyd., bbls.	lb.	.12
Nitrate, tech., bags, c/l., wks.	100 lbs.	4.35
Oleate, bbls.	lb.	.14
Oxalate, kegs	lb.	.23
Persulfate, cases	lb.	.21
Phosphate, dibasic, tech., bbls.	lb.	.07¼
Sulfate, bulk, c/l., f. o. b. cars, ports contract	ton	29.00
Sulfide, liq. 40–45%, basis 100%, tanks, dlvd.	lb.	.07½
Amyl acetate, from pentane, tanks, frt. allowed	lb.	.14½
Chloride, mixed, tanks, wks.	lb.	.06
Mercaptan, drums, l. c. l., wks.	lb.	1.10
Oleate, drums, l. c. l., wks.	lb.	.31
Stearate, drums, l. c. l., wks.	lb.	.32½
Amylene, tanks, wks.	lb.	.09
Anilin oil, drums	lb.	.15
Anthraquinone, subl., bbls.	lb.	.70
Antimony, chloride, soln., cbys.	lb	.17
Needle, Bolivian, 67%	lb.	.18½
Oxide, bags, c/l.	lb.	.15
Salts, 65%, bbls.	lb.	.40
Argols, test 75–80%, basis 100%, f. o. b. Spanish ports	100 kilos	105.00
Arsenic, metal, kegs	lb.	No prices
White, c/l., kegs	lb.	04
Arsenous chloride, cans	lb.	4.85
Barium carbonate, natural, 99%–200 mesh, bags, c/l., wks.	ton	43.00
Chloride, tech., cryst., bgs., c/l.	ton	77.50
Dioxide, drums, wks.	lb.	.10
Hydroxide, bbls., wks.	lb.	.06
Nitrate, casks	lb.	.11
Barytes, floated, 350-lb. bbls., wks.	ton	27.65
Benzaldehyde, tech., drums	lb.	.45
Benzidine base, bbls.	lb.	.70
Benzol, tanks, frt. allowed E. of Omaha	gal.	.15
Benzoyl chloride, carboys	lb.	.23
Benzyl acetate, F. F. C., drums	lb.	.55*
Beta-naphthol, tech., bbls.	lb.	.23
Beta-naphthylamine, tech., kegs	lb.	51
Bismuth, metal, ton lots	lb.	1.25
Bismuth nitrate, cans	lb.	1.30
Oxychloride, kegs	lb.	3.10
Subnitrate, powd., barrels	lb.	1.20
Blanc fixe, dry, bags, c/l.	ton	60.00
Bleaching powder, drums, wks. 100 lbs.		2.25
Bone black, 4, bbls., c/l., frt. allowed E.	lb.	.11
Borax, tech., gran., bulk, c/l., frt. allowed	ton	41.50
Bordeaux mixture, drums	lb.	.11
Bromine, cases	lb.	.25
Bromoform, cbys.	lb.	1.42
Butyl acetate, drums, c/l., frt. allowed	lb.	.14½
Aldehyde, drums, l. c. l.	lb.	.16½
Lactate, drums	lb.	.26½
Stearate, drums	lb.	.31
Cadmium, metal, ingots, cases	lb.	.90
Bromide, 25-lb. jars	lb.	1.65
Sulfide, boxes	lb.	1.35
Caffeine, 100-lb. drums, 10,000 lbs. or more	lb.	2.60
Calcium acetate, bags	100 lbs.	3.00
Arsenate, bgs., c/l.	lb.	.07
Carbonate, precip., bags, 50 lbs., c/l., wks.	lb.	.02½
Chloride, bags, flake, c/l., dlvd.	ton	18.50
Gluconate, U. S. P., bbls., 150 lbs.	lb.	.52
Phosphate, dibasic, 38-40% P_2O_5, bags, Atlan. pts.	unit-ton	No prices
Tribas., bbls.	lb.	.0635
Calomel, bbls., kegs, 50 lbs. or more.	lb.	2.95
Camphor, synthetic, gran., powd., drums, ton lots	lb.	.42
Carbazole, 95%, drums, ton lots, wks.	lb.	.70
Carbon bisulfide, drums, c/l.	lb.	.05
Black, reg., uncomp., bgs., c/l., works	lb.	.03625
Dioxide, liq., cyl.	lb.	.06
Tetrachloride, drums, c/l., frt. allowed	gal.	.73
Casein, dom., 20–30 mesh, bags, c/l.	lb.	.21
Cerium oxalate, bbls., wks.	lb.	.35
Charcoal, willow, powd., bbls.	lb.	.06
China clay, bulk, c/l., wks.	ton	7.60
Chloral hydrate, drums	lb.	.90
Chlorine, liq., c/l., cyl., dlvd.	lb.	.05¼
Tanks, wks., frt. equal	100 lbs.	1.75
Chlorobensene, mono-, drums	lb.	.07
Chloroform, tech., drums	lb.	.20
Chromium acetate, 24%, powd., bbls.	lb.	.22
Sulphate, pearls, dms.	lb.	.40
Coal tar, crude, bbls., c/l., wks.	bbl.	7.50
Cobalt oxide, black, kegs	lb.	1.84
Copper carbonate, 52–54%, bbls.	lb.	.18
Chloride, bbls.	lb.	.20½
Cyanide tech., bbls.	lb.	.34
Metal, elec.	lb.	.12
Oxide, black, bbls., tons, wks.	lb.	.19½
Sulfate, bbls., c/l., wks.	100 lbs.	5.15
Copperas, cryst., bulk, c/l., wks.	ton	14.00
Cream of tartar, bbls.	lb.	.57½
Cresol, U. S. P., drums, c/l., wks.	lb.	.11
Crotonaldehyde, 97%, c/l., wks.	lb.	.15
Cyanamide, 22% N, pulvd., dlvd., contracts	Nitrogen unit	No prices
Diamylamine, drums, c/l., wks.	lb.	.61
Diamylene, tanks, wks.	lb.	.09½
Diamyl phthalate, tanks	lb.	.21
Diatomaceous earth, dom., bags, c/l., Pacific Cst.	ton	22 00

Dibutylamine, drums, l. c. l., wks.	lb.	.64
Dibutylphthalate, drums, c/l., dlvd.	lb.	.21
Tartrate, drums	lb.	.87
Dichloroethyl ether, drums, c/l., wks.	lb.	.15
Diethanolamine, drums, c/l., wks.	lb.	.23½
Diethylaniline, drums	lb.	.40
Diethylene glycol, drums, c/l., wks.	lb.	.14
Monobutyl ether, drums, wks.	lb.	.22½
Monoethyl ether, drums, c/l., wks.	lb.	.14½
Diethyl phthalate, drums, c/l.	lb.	.21½
Sulfate, tech., drums, wks.	lb.	.13
Diglycol oleate, light, bbls.	lb.	.17
Dimethylaniline, drums	lb.	.23
Dimethyl phthalate, drums, c/l., dlvd.	lb.	.20
Dinitrobensene, tech., drums	lb.	.18
Dinitrochlorobensene, bbls.	lb.	.14
Dinitronaphthalene, bbls.	lb.	.35
Dinitrophenol, bbls.	lb.	.22
Diphenyl, bbls., c/l., wks.	lb.	.15
Diphenylamine, bbls.	lb.	.25
Diphenylguanidine, bbls.	lb.	.35
Epsom salt, tech., bags	100 lbs.	1.80
Ether, cone., drums	lb.	.11
Nitrous, bots., 100 lbs.	lb.	.73
Ethyl acetate, 85-90%, tanks, frt. allowed	lb.	.11
Acetoacetate, drums, c/l., wks.	lb.	.37½
Bromide, drums	lb.	.50
Chloride, drums	lb.	.18
Formate, drums	lb.	.27¾
Methyl ketone, drums	lb.	.09
Ethylene dichloride, drums, c/l., wks., frt. allowed	lb.	.0742
Glycol, drums, c/l.	lb.	.14½
Monobutyl ether, drums, wks.	lb.	.16½
Monoethyl ether, drums, wks.	lb.	.14½
Monoethyl ether acetate, drums, wks.	lb.	.11½
Monomethyl ether, drums, wks,	lb.	.15½
Feldspar, 20 mesh, bulk, wks.	ton	9.75
Film scrap colors, dk., cs., 1000 lbs., E. wks.	lb.	.14
Fluorspar, 95%, bags, f. o. b. mines	ton	33.00
Formaldehyde, bbls., c/l.	lb.	.05½
Fuller's earth, bags, c/l., mines	ton	8.50
Furfural, tech., drums, contract, works	lb.	.10
Glauber's salt, bbls., c/l.	100 lbs.	1.05
Glycol phthalate, drums	lb.	.38
Stearate, drums	lb.	.26
Hexamethylenetetramine tech., drums	lb.	.32
Hydrogen peroxide, 100 vol., cbys., c/l.	lb.	.16
Hydroquinone, kegs	lb.	.90
Indigo, synth., liq., bbls.	lb.	.16½
Iodine, resubl., jars	lb.	2.00
Iodoform, drums, 100 lbs.	lb.	3.95
Iron acetate, N. F. IV, cbys.	lb.	.15
Iron chloride, tech., cryst., bbls., wks., frt. allowed	lb.	.05
Isopropyl acetate, tanks, frt. allowed	lb.	.07½
Lead acetate, white, broken	lb.	.12¾
Arsenate, bbls.	lb.	.11
Metal, N. Y.	1 lb.	.0650
Oxide, litharge, bbls., 20-ton lots	lb.	.0790
Peroxide, powd., tech	lb.	.23
Red, bbls., 20-ton lots	lb.	.09
Sulfate, bbls.	lb.	.0725
White, basic carb., bbls.	lb.	.0825
Lecithin, edible, grade 1, drums, c/l.	lb.	.45
Tech., Grade 1, dms., c. l.	lb.	.35
Lime, live, chemical, bulk, wks.	ton	7.00
Lime-sulfur, dry, bags, c/l.	lb.	No prices
Lithopone, ordinary, bbls.	lb.	.04½
Magnesite, calcined, dom., bags.	ton	80.00
Magnesium carbonate, tech., bags, c/l.	lb.	.06¼
Chloride, drums	ton	32.00
Fluosilicate, cryst., bbls.	lb.	.20
Oxide, light, bbls.	lb.	.26
Manganese chloride, bbls.	lb.	.14*
Dioxide, 85-90%, bbls., c/l., wks.	ton	74.00
Sulfate, anhyd., bbls., wks.	lb.	.10½
Mannitol, commercial, bbls., wks.	lb.	.35
Menthol, nat., cans	lb	13 50
Mercury bichloride, cryst., drums, 50 lbs. or more	lb.	2.39
Mercury, flasks, 76 lbs., mines	flask	191.00
Meta-phenylenediamine, kegs	lb.	.65
Meta-toluylenediamine, kegs	lb.	.70
Methanol, synthetic, drums, frt. allowed, c/l.	gal.	.34½
Tanks, frt. allowed	gal.	.28
Methyl acetate, 97-99%, tanks	gal.	.09½
Chloride, cylinders	lb.	.32
Formate, l. c. l., drums	lb.	.89
Hexyiketone, drums, tech., wks.	lb.	.60
Salicylate, drums	lb.	.35
Monoamylamine, drums, c/l., wks.	lb.	.61
Monobutylamine, drums, l. c. l., wks.	lb.	.51
Monoethanolamine, drums, wks.	lb.	.24
Naphthalene, crude, dom., 74 deg., bags, c/l., wks.	100 lbs.	2 50
Nickel salt, single, bbls.	lb.	.13
Niter cake, bulk	ton	16.00
Nitrobensene, drums	lb.	.08
Nitrocellulose, alcohol-sol., bbls., wks.	lb.	.28
Nitrogen solution	unit	1.2158
Octanol, normal, drums	lb.	.85
Oil, castor, No. 3, tanks	lb.	.12¾
China wood, dms.	lb.	.40¼*
Coconut, crude, tanks	lb.	No prices
Cod, Newf., bbls.	gal.	.85
Corn, crude, tanks, mills	lb.	.12¾*
Cottonseed, cooking, bbls.	lb.	.16¾
Linseed, raw, tanks	lb.	.1300
Menhaden, crude, tanks, f. o. b. Baltimore	gal.	.6660
Neat's-foot, pure, bbls.	lb.	.19¼
Oiticica, bbls.	lb.	.25¾*
Oleo, No. 1, bbls.	lb.	.13¾
Olive oil, denat., bbls.	gal.	4.40
Edible, Calif., drums	gal.	5.00
Palm, Niger, bbls.	lb.	.09½*
Sumatra, bulk	lb.	No prices
Peanut, crude, tanks	lb.	.13*
Perilla, drums	lb.	.2460
Rapeseed, tax incl., bbls.	gal.	.15½*
Red, bbls.	lb.	.1330
Soy bean, crude, tanks	lb.	.12½*
Sperm, 38°, bbls.	lb.	.1301
Whale, bbls., natural, refined	lb.	.1070*
Ortho-dichlorobensene, drums	lb.	.06
Ortho-nitrochlorobensene, kegs	lb.	.15
Ortho-nitrotoluene, drums	lb.	.09
Ortho-toluidine, bbls.	lb.	.19
Para dichlorobensene, drums, c/l.	lb.	.11
Para-formaldehyde, drums	lb.	.23
Paraldehyde, tech., drums	lb.	.12
Para-nitraniline, drums	lb.	.45
Para-nitrochlorobensene, drums	lb.	.15
Para-nitrotoluene, bbls.	lb.	.30
Para-phenylenediamine, bbls.	lb.	1.25
Para-toluidine, bbls.	lb.	.48
Paris Green, 250-lb. kegs	lb.	.24
Perchlorethylene, drums, c/l., wks.	lb.	.08
Phenol, drums, c/l., wks.	lb.	.12½
Phenolphthalein, yellow, drums, ton lots	lb.	.80
Phenylethyl alcohol, bottles	lb.	2.10
Phloroglucinol, tech., tins, wks.	lb.	15.00
C. P., tins, wks.	lb.	20.00
Phosphorus, red, cases	lb.	.40
Oxychloride, 175-lb. cylinders	lb.	.15
Trichloride, cyl.	lb.	.15
Phthalic anhydride, bbls., c/l.	lb.	.14½
Platinum, metal, solid	os.	36.00
Potash, caustic, solid, drums	lb.	.06¼
Potassium acetate, tech., bbls.	lb.	.28
Bicarbonate, gran., bbls.	lb.	.14
Bichromate, casks, c/l., wks.	lb.	.09½
Bromide, U. S. P., gran., bbls.	lb.	.27
Carbonate, 80-85%, calc., casks.	lb.	.06½
Chlorate, cryst., kegs	lb.	.11*
Chloride, tech., cryst., bgs.	lb.	.08*
Cyanide, drums	lb.	.55
Meta-bisulfite, bbls.	lb.	.18
Muriate, fert., bulk	K_2O unit	.53½
Permanganate, tech., drums	lb.	.19¾
Prussiate, red, casks	lb.	No prices
Yellow, casks	lb.	.17
Pyridine, denat., drums	gal.	1.71
Pyrocatechin, C. P., drums	lb.	2.15
Quinine, 100-os. cans	os.	.97½
Resorcinol, tech., kegs	lb.	.68
Rochelle salt, powd., bbls.	lb.	.43½
Saccharin, drums	lb.	1.45
Salt cake, bulk, wks.	ton	15.00
Saltpeter, gran., bbls.	100 lbs.	8.20
Silica, amorph., 96%, 325 mesh, bags, c/l., wks.	ton	20.00
Silver nitrate, vials	os.	.26½
Soda, ash, 58%, light, paper bags, contract, wks.	100 lbs.	1.05
Caustic, 76%, solid, drums, contract, wks.	100 lbs.	2.30
Sodium acetate, flake, 60%, bbls.	lb.	.05
Alginate, drums	lb.	.69
Antimoniate, bbls.	lb.	.15
Benzoate, U. S. P., bbls.	lb.	.46
Bicarbonate, U. S. P., powd., bbls., c/l., wks.	100 lbs.	1.85
Bichromate, c/l., wks.	lb.	.07½
Bisulfite, bbls.	100 lbs.	3.00
Bromide, U. S. P., bbls.	lb.	.27
Chlorate, cryst., bags	lb.	.06¼
Chloride, bags	ton	15.70
Cyanide, 96-98%, dom., drums	lb.	.14
Fluoride, white, 90%, bbls., c/l., frt. alld.	lb.	.08
Metallic, untrimmed bricks, drums, f. o. b. Niagara Falls	lb.	.15½
Metasilicate, gran., bbls.	100 lbs.	2.50
Naphthionate, bbls.	lb.	.50
Nitrate, crude, bulk, works	ton	27.00
Nitrite, bbls.	lb.	.06¾
Perborate, bbls.	lb.	.14¾
Phosphate, disodium, cryst., bags, c/l., wks.	100 lbs.	2.55
Phosphate, trisodium, bags, c/l., wks.	100 lbs.	2.70
Picramate, kegs	lb.	.65
Prussiate, yellow, bbls.	lb.	.11
Silicate, drums, c/l., 40°	100 lbs.	.80
Silicofluoride, dom., bbls.	lb.	.12
Stannate, drums	lb.	.33½
Sulfate, anhyd., bags	100 lbs.	1.70
Sulfide, cryst., bbls.	100 lbs.	2.40
Solid, 60%	100 lbs.	3.15
Sulfocyanide, C. P., bbls.	lb.	.55
Thiosulfate, reg., cryst., bgs.	100 lbs.	2.25
Tungstate, tech., kegs	lb.	No prices
Strontium carbonate, tech., bbls.	lb.	.25*
Nitrate, bbls.	lb.	.07¾
Sulfur, bulk, mines	ton	16.00
Chloride, drums	lb.	.03
Dioxide, commercial, cyl., wks.	lb.	.07
Tetrachloroethane, 50-gal. drums.	lb.	.08
Thiocarbanilid, bbls.	lb.	.24
Tin, Straits	lb.	.52
Crystals, bbls.	lb.	.39
Oxide, bbls.	lb	.55
Tetrachloride, anhydrous, drums, bbls.	lb.	No prices
Titanium dioxide, bags	lb.	.14¾
Toluene, tanks	gal.	.28
Triamylamine, drums, c/l., wks.	lb.	.98
Triamylborate, drums, l. c. l., wks.	lb.	.33
Tributylamine, drums, c/l., wks.	lb.	.78
Trichloroethylene, drums, wks., frt. allowed	lb.	.08
Tricresyl phosphate, tech., drums.	lb.	.25
Triethanolamine, drums, c/l., wks.	lb.	.19
Triphenyl phosphate, barrels	lb.	.31
Tungsten, tech., powder	lb.	2.60
Urea, dom., 46 + % N., bags, f. o. b. wks. or seaboard	ton	80.00
Vanillin, 25-lb. tins	lb.	2.35
Whiting, comm., dry-grd., bags, c/l., wks.	ton	18.00
Xylene, 10°, tanks	gal.	.30
Xylidine, drums	lb.	.35
Zinc ammonium chloride, bbls.	lb.	.0565
Chloride, tech., fused, drums	lb.	.05
Dust, bbls., c/l.	lb.	.1035
Metal slabs, at N. Y.	lb.	.0665
Oxide, Amer., bags	lb.	.0725
Stearate, tech., bbls.	lb.	.30
Sulfate, cryst., bgs., c/l., wks.	100 lbs.	3.60

* Nominal.

EMPLOYMENT INFORMATION

RATES to be paid in advance. Standard setting 5c a word, minimum charge $2.00 each; include 8 words for box address. Exceptions see ⟶ Display, $10.00 per column inch. 2 inches maximum, larger units at regular display unit rates. No discounts or allowances.
SEND advertisements with remittance to INDUSTRIAL AND ENGINEERING CHEMISTRY, 332 West 42nd St., New York, N. Y., to reach there not later than 10:00 A.M. on the 10th and 25th, closing dates for editions of CHEMICAL and ENGINEERING NEWS of the 25th and 10th, respectively. Insertions made in order of receipt provided necessary remittances are complete.
EMPLOYERS are requested to mention in their announcements the section of the country in which the open position is located to ensure replies only from those who are geographically available.
In printing these advertisements the SOCIETY assumes no obligations as to qualifications of prospective employees or responsibility of employers.

UNEMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking employment for themselves are allowed in one calendar year 3 announcements free (one per issue) set in standard style and limited to 50 words each, including 8-word box address, and 3 additional standard announcements at 50% of regular rate. Further announcements and excess words at full rate.

EMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking new positions are permitted 3 standard announcements during the calendar year at 50% of the regular rate—include 8 words for box address.

EMPLOYERS seeking chemists and chemical engineers are permitted 3 standard announcements, not to exceed 50 words each including box address and not more than one per issue, during the calendar year without charge, provided they agree in writing to acknowledge all replies (excess words 5c each), otherwise full rate applies.

The AMERICAN CHEMICAL SOCIETY is vitally interested in the welfare of its members and in seeing that the chemical industry is manned with competent chemists and chemical engineers. These pages are part of our service in that connection. In addition most of the larger sections of the AMERICAN CHEMICAL SOCIETY and several of the smaller ones have active employment committees. Local section secretaries in your area will inform you as to any employment aids that may be available locally.

An Employment Clearinghouse is operated at each national meeting of the SOCIETY for the purpose of bringing together representatives of industry looking for chemists and members and student affiliates in attendance wishing to make such contacts. For further details, consult the preliminary and final programs as printed in the NEWS EDITION prior to each meeting.

In the New York area, special employment facilities are offered by the Employment Bureau of the Chemists' Club, 52 East 41st St., New York, N. Y. In the Chicago area, the Chicago Section maintains an employment service at 413 Stevens Hotel, Chicago, Ill.

Those replying to announcements should be careful to send copies and not original documents. Advertising circulars will not be forwarded and to that end all letters will be opened at the forwarding office.

SITUATIONS OPEN

Those announcements in which the letter "P" is part of the address key have paid in full and are not committed to acknowledge replies. The Society regards acknowledgment by employers of all applications as an act of common courtesy but can assume no responsibility for their failure to do so.

EXECUTIVES, CHEMICAL ENGINEERS AND CHEMISTS with exceptional backgrounds of experience should use our confidential and individual method of contacting responsible employers. No limit to territory. We negotiate all overtures. Established 1915. The National Business Bourse, 20 W. Jackson Blvd., Chicago, Ill.

CHEMIST: At least ten years' diversified industrial experience. Take complete charge modern industrial research and development laboratory for small, well-known, well established manufacturer of organic chemical specialties. New York City district. Good salary and bonus. Work includes special war production problems. All replies should give full data and will be held in strict confidence. No discrimination because of race, creed or color.
Box 17-N-4, Ind. & Eng. Chem., Easton, Pa.

GRADUATE ASSISTANTSHIPS, Chemical Engineering, University of Rochester, beginning September 1, completing M.S. program in one year. Stipend $700 plus tuition. Request further information or apply by sending complete personal data, photograph, transcript and two reference letters to Howard S. Gardner, Dept. of Engineering, University of Rochester, Rochester, New York.

CHEMICAL ENGINEER, American citizen, wanted for sales training in highly specialized technical field. Location, New York City. State age, draft status, education, experience and salary record. Enclose photo. Replies considered confidential.
Box 30-T-4, Ind. & Eng. Chem., Easton, Pa.

A LARGE pharmaceutical manufacturer is seeking a person to serve, after adequate training, as administrative manager of a manufacturing plant. In addition to a broad background in organic and pharmaceutical chemistry, he must have executive ability. Send a statement of education, experience and qualifications.
Box 71-TP-4, Ind. & Eng. Chem., Easton, Pa.

PROCESS ENGINEER. Company manufacturing processing machinery wants engineer of sufficient experience to take over the designing of Mixers, Kettles, Autoclaves, Attrition machinery and other process equipment. Location—Southern Ohio, and all organization executives are familiar with this ad. Excellent position for the future for proper experienced man.
Box 110-TP-4, Ind. & Eng. Chem., Easton, Pa.

TECHNICAL MEN WANTED

Metallurgists, hydrometallurgists, and chemical engineers with milling experience, mechanical engineers, and welding engineers. For research on problems relating to war industries.

BATTELLE MEMORIAL INSTITUTE
COLUMBUS, OHIO

MUCILAGE and VISCOSITY research Chemist required to investigate substitutes of vegetable or synthetic origin. Properly educated, experienced man only
Box 21-NP-5, Ind. & Eng. Chem , Easton, Pa.

INSTRUMENT and APPARATUS Engineer with chemical, mechanical, and electrical experience for development department of laboratory supply concern. Experience in developing scientific laboratory equipment preferred. When submitting application, give full details of education, age, experience, salary expected. Personnel of this company have notice of this advertisement.
Box 13-NP-5, Ind. & Eng. Chem., Easton, Pa.

Chemist Wanted

Preferably experienced in shoe cements, finishes, etc. Write stating age, experience, technical education, salary wanted.

Box 14-NP-5 Ind. & Eng. Chem.

Easton, Pa.

CHEMIST or CHEMICAL Engineer having knowledge of and preferably experience in the production of synthetic rubber, particularly in the use of alcohol and waste agricultural materials therefore. Give complete information on education, experience and personal qualifications.
Box 16-N 5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST or CHEMICAL Engineer; preferably recent graduate with some experience in vegetable oil and soap analytical work wanted as assistant to Superintendent of an edible oil and soap factory in Honduras. Good climate and living accommodations. Single man preferred but no objection to married man. Applicant should have some knowledge of Spanish. Send recent snapshot, personal information and salary required.
Box 20-NP-5 Ind. & Eng. Chem., Easton, Pa.

PHARMACEUTICAL RESEARCH chemist to conduct development and research on pharmaceuticals and allied products. Give details of education, training, present and expected salary and personal data.
Box 24-NP-5, Ind. & Eng. Chem., Easton, Pa.

GRADUATE ASSISTANTSHIPS available for next year. Salary $540 for nine months' service. Part time laboratory teaching. Write for application blanks. H. D. Newton, Head, Department of Chemistry, University of Connecticut, Storrs, Connecticut.

CHEMIST WANTED: Recent graduate or graduate with a few years of experience, development work. Draft deferred. Chicago area.
Box 32-NP-5, Ind. & Eng. Chem., Easton, Pa.

TWO RECENT graduate chemists for analytical analysis in control laboratory of large Philadelphia chemical plant. Salary $2,150, per year.
Box 59-NP-5, Ind. & Eng. Chem., Easton, Pa.

Metallurgical Research

Engineer graduated in metallurgy preferably with some experience in research work alloy steels and steel specialties.

Box 48-NP-5, Ind. & Eng. Chem., Easton, Pa.

Processing Engineer

with metallurgical training wanted for improving existing steel mill practices; development of new production methods with view of increasing production and decreasing costs.

Box 49-NP-5, Ind. & Eng. Chem., Easton, Pa.

PATENT CHEMIST. Man with chemical or chemical engineering training for patent work as member of patent group of large chemical manufacturer. Previous patent experience not essential. Good technical training, ability to write clearly, and interest in specialization in patent work are important qualifications. Deferred draft status necessary. Please provide photograph and record of training and experience in first letter
Box 62-NP-5, Ind & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Man or woman, widely experienced. Background in analyses of raw materials and intermediates. Large concern, Northern New Jersey. State full qualifications and salary expected. Include recent photograph. Our employees are aware of this advertisement.
Box 63-N-5, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER—Must have several years experience preferably industrial equipment, to design, estimate and cooperate with field staff in sale of equipment used in power, municipal, process and manufacturing fields. Permanent job, not war time only. State detailed experience, present earnings. Confidential.
Box 64-N-5, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER with about ten years experience in research, testing and practical commercial problems related to chemical engineering equipment. Established organization pre-eminent in its field has opening with excellent future for right candidate. Apply by letter, stating qualifications and salary desired.
Box 65 NP-5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST or CHEMICAL engineer with some actual experience in preparing and prosecuting patent applications and making patent searches wanted as assistant in patent department of research organization. Man preferred, but will consider woman. Age under 30. Give training, experience, nationality, marital and draft status, age, and other pertinent educational and personal data, also recent photo. Location northeast.
Box 69-N-5, Ind. & Eng. Chem., Easton, Pa.

PHYSICIAN-SCIENTIST, "research minded" with ability to direct and inspire personnel of Biological and Pharmaceutical laboratories. Splendid opportunity. Salary $7000–$8000. *Women* graduate chemists to detail physicians country-wide. Extroverts 25–30. Expenses and salary $30–$50. Everett Brown Agency, 17 John Street, New York, N. Y.

(Continued on page 645)

Address communications to the box number indicated and Mail to Easton, Penna.

The American Chemical Society has no information concerning the position advertised, or in regard to those seeking employment.

GRAY HEADS — WISE MINDS

Leading Industrial Organization Invites Retired Men to Help Win the Battle of Production.

CHEMISTS • PHYSICISTS
CHEMICAL ENGINEERS

This message is addressed to men whose gray hair signifies years of service and experience in the field of physics and chemistry . . . men who under ordinary conditions would consider their life's work well done and be content with the ease and pleasures of retirement.

Today, many older men who are still able-bodied are anxious to leave their retirement . . . to go back to work and apply their experience and knowledge to help America build the materials of war.

To a limited number of such men, one of America's leading manufacturers, located in Eastern Pennsylvania, offers an opportunity to engage in research and development work in the fields of Chemistry, Physics, and Chemical Engineering. The men engaged will join the staff of a large and well-equipped laboratory. They will be active workers, not consultants.

IN APPLYING, PLEASE LIST THE FOLLOWING INFORMATION: 1. EXPERIENCE. 2. PRESENT LOCATION. 3. AGE AND PHYSICAL CONDITION. 4. SALARY REQUIRED.

Address

Box 78-NP-5, Ind. & Eng. Chem., Easton, Pa.

LARGE NEW YORK engineering firm requires chemical engineers age preferably 25-30 with any following experience: 1. Petroleum refinery experience in operation or design of stabilizers, absorbers and light end equipment. 2. Refinery experience in design or operation of plants for solvent dewaxing and solvent extraction of lube oils. 3. Refinery experience in design or operation thermal or catalytic cracking plants. In reply state education, qualifications and refinery experience in detail. Also salary expected and status regarding military service.
Box 80-NP-5, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST: Experience in coated fabrics. Location Midwest. State age, draft status, salary expected.
Box 81-NP-5, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST for pharmaceutical house. 3 to 5 years' experience in analytical chemistry. Able to develop analytical methods for newly synthesized organic compounds. Must be familiar with micro-analytical methods. Control on manufactured products. Competent to take charge of laboratory. Give full information. Plant located near New York City.
Box 90-NP-5, Ind & Eng. Chem., Easton, Pa.

ENGINEER

Trained and experienced in ceramics and glass, for manufacturing, engineering work on vacuum tubes. Direct war effort with large manufacturer of radio and special tubes.

Write stating age, education, experience, place of birth, attach snapshot (not returnable). Box 651, Suite 1800, Times Building, New York.

ANALYTICAL CHEMIST, BIOCHEMIST, CEREAL CHEMIST, CHEMICAL ENGINEER, FOOD TECHNOLOGIST, ORGANIC CHEMIST, PHYSICAL CHEMIST. Consideration will be given to applications from Bachelors, Masters, Ph.D.'s and those with a few years' post-doctorate experience. These openings represent opportunities for qualified persons in the Research Laboratories of a prominent food organization located in the East. Applicants should submit educational history, college record, experience, age, and other personal data, and recent photograph.
Box 100-TP-4, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(A.C.S. MEMBERS)

CHEMIST — PLANT Executive. 25 years' experience. Full responsibility for plant operation, maintenance, chemical control and pilot plant development. Experience covers wide variety of chemical processes and equipment. Developed two new products now being marketed. Expert analytical chemist. Interested in supervision of manufacture or laboratory.
Box 52-N-3, Ind. & Eng. Chem., Easton, Pa.

PROFESSORSHIP, by Ph.D. Ten years' teaching experience, chiefly general, some physical, organic, analytical. Five years' experience in industrial research laboratory where now employed. Age 36, married, four children, Protestant, honorary societies. South preferred.
Box 24-T-3, Ind. & Eng. Chem., Easton, Pa.

DEVELOPMENT and RESEARCH chemist with exceptional training and experience. Ability to initiate and direct research problems with sound judgment and resourcefulness. 17 years' highly successful record in heavy chemicals, petroleum, high pressure gases and catalytic processes. Desire responsible position here or in Latin America.
Box 50-T-3, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, M.S. Thirteen years' experience in research, development, and production on nitrogen, chlorine, and sulfur compounds, poisonous and volatile gases, and high pressure catalytic synthesis. Expert in training personnel and starting new plants.
Box 54-T-3, Ind. & Eng. Chem., Easton, Pa.

THOROUGHLY TRAINED chemist. M.S. Iowa State; B.S., Ph.D. Cornell. Research: plant pigments, vitamins, bioassays, balance studies, feed and food analyses, mineral nutrition. Experience; two years' industrial, one year head of chemistry department small college. Phi Kappa Phi. 26, married. Desires teaching with opportunity for research.
Box 66-T-3, Ind. & Eng. Chem., Easton, Pa.

SYNTHETIC ORGANIC chemist. M.S. leading University. Young, personable, responsible. Excellent organic training. Research and industrial experience. Desires organic research position in a metropolitan area, preferably New York or Chicago. Presently employed.
Box 14-N-4, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST, M.S. in Physical Chemistry. Two years' graduate work toward Ph.D. with research in Ceramics and high temperature physical chemistry. Experience in physico-chemical measurements, refractories, electrode-potentials, use of petrographic microscope, X-ray, spectroscope. Excellent record, references. Favorable draft status.
Box 35-N-4, Ind. & Eng. Chem., Easton, Pa.

SUMMER TEACHING position desired by assistant professor at accredited eastern college. Ph.D. 34 years' old. Will teach general, analytical or physical chemistry. Eastern location. Will consider permanent position with opportunity for advancement.
Box 58-N-4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.S. Available June 1. Graduate research with organometallics at leading midwest university. 3 years' teaching experience, desires to go into organic research in industry. Some experience with dyes, organic syntheses. Single, 23, Protestant, draft 2-A. Location immaterial. Now located in Iowa.
Box 66-N-4, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST Ph.D. 1942 (June). Vitamins and nutrition. Good foundation in organic and physical chemistry and physiology. Research on vitamin B complex and protein requirements. Publications. Five years' teaching biochemistry, general and physical chemistry. Desires research or teaching.
Box 69-N-4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, BIOCHEMIST, Bacteriologist. A.B., 16 years' experience in foods, biological and bacteriological products, plant management including production, maintenance, personnel, and accounting. Successful research and sales records. Patent experience. Age 39, married, Protestant. Continental U. S. preferred.
Box 83-N-4, Ind. & Eng. Chem., Easton, Pa.

RESEARCH or DEVELOPMENT position desired, preferably on the Pacific Coast or in Rocky Mountain States. Ph.D. in Physical and Inorganic Chemistry, University of Minnesota, 1930. Industrious worker. Eight years' experience in inorganic research; five years' teaching experience. Age 40.
Box 11-T-4, Ind. & Eng. Chem., Easton, Pa.

RESEARCH and DEVELOPMENT Chemist. B.S. in Chem. Fourteen years' diversified experience on plastics, synthetic resins, organic chemicals, paints, varnishes, cloth and paper coatings and process development. Excellent record and experience. East preferred. Available immediately. Draft deferred.
Box 18-T-4, Ind. & Eng. Chem., Easton, Pa.

TEACHER RESEARCH worker; Ph.D. Majors: Physical chemistry, chemical engineering. Twelve years' teaching these with inorganic, analytical chemistry, etc. Sixteen years' industrial research, consulting, testing. Numerous publications. Employed. Seeking broader field.
Box 22-T-4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC BIOCHEMIST, Ph.D., 1942. Available immediately. Research experience in organic synthesis and enzyme chemistry. Interested synthetic organic or biochemical research. Age 24, single, draft deferred. East preferred. Member Phi Beta Kappa, Phi Lambda Upsilon, Sigma Xi.
Box 34-T-4, Ind. & Eng. Chem., Easton, Pa.

ASSISTANT or ASSOCIATE professorship of organic chemistry in well established institution, beginning in September. Ph.D. prominent University, 1931. Eight years' department head in small mid-western University. Excellent record building up Department. Experience teaching undergraduate and graduate courses, directing M.S. researches, administration, placement, purchasing, glass blowing. Recent and projected publications based on M.S. theses. Sigma Xi, Phi Lambda Upsilon. Active A.C.S. section. Superior references. Protestant, age 37, married. Location immaterial.
Box 37-T-4, Ind. & Eng. Chem., Easton, Pa.

METALLURGICAL CHEMIST, M.S., June 1942. Inorganic major and physical metallurgy minor. Undergraduate research in organic; graduate research in inorganic. Summer experience in analytical chemistry. Experience with metallographic photomicroscope and X-ray diffraction equipment. Defense course in metal's inspection. Desires Southern California position.
Box 40-T-4, Ind. & Eng. Chem., Easton, Pa.

TEACHING POSITION, College, University or Technical Institute. Ph.D. from leading technical institute, experienced teacher. Research, many publications and patents covering 12 years industrial experience. Sigma Xi, Tau Beta Pi, Phi Lambda Upsilon, Pi Mu Epsilon. Age 35, married.
Box 48-T-4, Ind. & Eng. Chem., Easton, Pa.

EXECUTIVE with broad scientific training and administrative experience desires new connection with progressive and responsible organization. Ability proven through successful planning and directing technical projects. Market development a specialty. Familiar with heavy chemical manufacturing operations. Patents. Publications. Ph.D. Protestant. Married. Age 42.
Box 52-T-4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, M.S. 1941. A.C.S. accredited university. Major biochemistry and organic. Desires position with industry engaged in defense work—research preferred. Presently employed as instructor in same university. Single, 24, assurance of draft deferment. Sigma Xi. Available June 1. Location immaterial.
Box 54-T-4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S. in chemistry in liberal arts college, June 1942. Age 21. Training includes physical chemistry and organic analysis. Location immaterial. Available in June.
Box 55-T-4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST M.S. Accredited eastern university. Fellowship. Organic major, but thoroughly trained in physical, inorganic, analysis. Desires research or production position, preferably in east. Available middle of May, 1942. Single.
Box 56-T-4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, M.S. desires responsible position with financially sound and progressive company. 25 years experience in production, control, development, vacuum processing milk and food products. Knowledge of vitamin fortification and food laws.
Box 81-T-4, Ind. & Eng. Chem., Easton, Pa.

ASSISTANT PROFESSOR of organic and analytical desires position in essential industry or teaching position in a department interested in developing chemists. Ph.D., M.S. in organic physical minor, recent research in nonferrous electrochemistry. Sigma Xi, Phi Lambda Upsilon, publications. Protestant, married, age 29. Philadelphia area preferred, but will go anywhere, including South America.
Box 91-T-4, Ind. & Eng. Chem., Easton, Pa.

RESEARCH PHARMACEUTICAL organic chemist, Ph.D., 1941, large mid-western university. Research experience in organic syntheses, sulfur and nitrogen compounds, vitamins. Publication. Member Sigma Xi, Phi Lambda Upsilon, Rho Chi, age 27, married, draft 2-A. Now employed, but desires new connection where his abilities can be utilized fully. Available upon short notice.
Box 96-T-4, Ind & Eng. Chem., Easton, Pa.

BIOCHEMIST Ph.D. Broad knowledge of all branches related to biological chemistry. For many years directing biochemical and biological research in the field of hormones, enzymes and vitamins. Special experience in protein chemistry. Numerous publications, member of several scientific societies. At present employed. Desires responsible position in research laboratory.
Box 118-T-4, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 646)

(Situations Wanted Continued)

PHYSICS-ORGANIC Chemist, Ph.D., 1941 organic chemistry. Presently Research Associate in well-known Eastern university. Work for past three years has been of a general catalytic nature. Publications. Capable glass-blower. Wide experience in analytical chemistry. Age 26, single, draft deferred. Desires research position involving application of catalysis to organic problems.
Box 10-N-5, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. 1939 with minors in biochemistry and physical, now teaching in a western university desires full time research position. East preferred. Married, age 32. Available June 1942.
Box 11-N-5, Ind. & Eng. Chem., Easton, Pa.

METALLURGIST, PHYSICIST, chemist, age 37, broad experience as executive and industrial engineer. Qualify as director of research for the development of processes, layout, installations, operations, fabrication, foundry practice, ferrous and nonferrous alloys, welding, heat treating. Manufacture and use of industrial x-ray equipment as well as radium. Interested in occupational change with definite opportunity for future. West Coast preferred. Draft classification 3-A. Salary, minimum ten thousand.
Box 12-N-5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, EXCELLENT background. 8 yrs. varied chemical experience. Age 27. Research publications in physical, organic, analytical, and biochemistry. M.S. physical and organic. Phi Lambda Upsilon. Year chemistry teaching. Industrial testing and control experience. Employed. Out of town offers invited.
Box 15-N-5, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., June 1942, Eastern University. Desires organic research in any field with a progressive industrial firm. Thorough training in Organic and Physical Chemistry, and Bacteriology. Research experience in Organic Synthesis, Nitrogen Heterocycles, Medicinals, Endocrinology. Available immediately. Location immaterial.
Box 17-N-5, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, 7 years' general industrial research new products, especially synthetic resins, coatings, intermediates and plasticisers; drying oils and derivatives. Patents, publications on polymerization. Age 28. Employed. 3A.
Box 19-N-5, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL ORGANIC chemist. Degrees from recognized Universities. Young doctoral candidate. At present employed in a responsible research and supervisory position with an essential non-defense industry. Wide background includes teaching experience. Available on short notice. New York City vicinity preferred.
Box 23-N-5, Ind. & Eng. Chem., Easton, Pa.

INORGANIC CHEMIST. Ph.D. Over twenty years' college teaching experience, chiefly inorganic and analytical chemistry. Consulting, research and administrative experience. Age 42. Married. Honor societies. Publications. Interested in research, industrial or teaching position. Immediately available.
Box 26-N-5, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, B.S. from Western University May, 1942. 22, single, temporary draft deferred. Desires employment in explosives or petroleum fields. Teaching experience, location immaterial, high scholastic standing, available June.
Box 28-N-5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST: 18 years' practical experience. Desire responsible position. Prefer research or head of analytical group. Will complete work for Ph.D. 1942. Major inorganic analytical. Thorough training in organic and physical. Publications. Location immaterial but prefer East. Available June.
Box 29-N-5, Ind. & Eng. Chem., Easton, Pa.

WOMAN, Ph.D. 1938. Publication of independent research in electro-organic synthesis. Two years' experience teaching successfully general, analytical, organic, and foods chemistry in accredited college. Desires responsible teaching or industrial position. Now teaching. Excellent references. Middle-west preferred.
Box 31-N-5, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. June, Eastern University. Minor, physical chemistry. Research on isolation and synthesis of natural product. Research experience in biochemistry. Graduate assistantship, Phi Lambda Upsilon, Sigma Xi. Single, age 25, draft classification 2-A. Desires industrial research or teaching.
Box 34-N-5, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. course work and research completed. Physical chemistry minor. Publications. Four years' teaching general and organic. Eastern location preferred but not essential. Draft deferred. Available in June.
Box 35-N-5, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST. Ph.D. June 1942, eastern university. Research experience in natural products, carbohydrates, proteins, nitrogen compounds, and organic synthesis. Teaching experience. Desires position in organic or biochemical research. 25, single, draft deferred. Phi Lamba Upsilon, Sigma Xi, publications.
Box 36-N-5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST. M.S. in June from large midwestern university. Thorough knowledge of organic, inorganic, physical and chem. eng. Research in organometallics. Some experience. Single, 24. Chicago area location preferred.
Box 37-N-5, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER Univ. of Mich. '33. Available for position in war industry. Principle experience heavy chemical plant operation, construction, development.
Box 38-N-5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S. in chemistry with minor in engineering. Brooklyn Polytechnic graduate with one year industrial experience seeks job in defense plant or laboratory. Organic position preferred. Now employed but available after May. Eastern location preferred. Phi Lambda Upsilon.
Box 40-N-5, Ind. & Eng. Chem., Easton, Pa.

FOOD TECHNOLOGIST, married, 42, dependents. Seventeen years' experience canning, freezing, waste disposal, production management and research. Graduate chemical engineer.
Box 41-N-5, Ind. & Eng. Chem., Easton, Pa.

WAR PRODUCTION work wanted by unemployed chemical engineer with twenty years' experience in plant development and supervising thirty to three hundred employees, chiefly along organic synthetic, solvent, plastics, acid handling and collateral inorganic lines. Accustomed full responsibility, married, American ancestry, Protestant, patents, publications, references.
Box 42-N-5, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., desires responsible position in research and development with progressive company. Resourceful and creative, backed by large experience in varied fields, rubber included. 8 years' industrial research, development, sales promotion. Owner of chemical library.
Box 43-N-5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S. in chemistry, large midwestern university 1941. Physical, organic, analytical, and biochemistry. Knowledge of German and French. Understand engineering. Age 22, single, citizen, Protestant, A.C.S. member. Have pleasing personality, able to meet and handle people. Engaged at present in research, and have done original research in own laboratory. Desire stable position with good future in small or medium sized firm actively engaged in national defense work. Location must be in Chicago.
Box 46-N-5, Ind. & Eng. Chem., Easton, Pa.

FOOD CHEMIST, Ph.D., 1942 with research on deteriorative changes in glass-packed fruit juices. Biochemistry, organic, bacteriology, and food technology minors. Experience in vitamin determinations: animal, chemical, and microbiological. Interested in glass-packed food research problems especially. East preferred. Age 25, single. Protestant. Phi Kappa Phi, Sigma Xi. Held teaching and research fellowships. Publication.
Box 47-N-5, Ind. & Eng. Chem., Easton, Pa.

PHARMACIST-CHEMIST, Phm.B. (pharmacy), B.Sc. and M.Sc. (chemistry); interested in pharmaceutical research, analysis, and new product development; training in mfg. pharmacy, ampuls, tablets, organic chemistry, bacteriology, bio-assay, pharmaceutical analysis; twenty months' experience as chief chemist of small pharmaceutical house; keen student of scientific literature pertinent to medical sciences. Seeking responsible position offering greater opportunity. Age 30, single, 2A deferment, Canadian, first papers for U. S. citizenship.
Box 52-N-5, Ind. & Eng. Chem., Easton, Pa.

SUMMER EMPLOYMENT wanted. Now instructor on permanent basis in General Chemistry at state university. Ph.D. 1938. Major, Biochemistry; Minor, Organic Chemistry. Phi Beta Kappa, Phi Lambda Upsilon, Sigma Xi. Research experience. Draft classification 2B. Single, Age 28. Location immaterial. Available June 8.
Box 53-N-5, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL RESEARCH Chemist, M.Sc., 38, married, 15 years exp. whereof 10 in coal, gas, coke and by-products in charge of analytical and research laboratory and research pilot plant and as supervisor of producing plant of big Gas Works. Also Fats and Oils. Process development. Publications. Now in organic research. Location immaterial.
Box 54-N-5, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.A. 1940. Diketones, pyrans, olefins. Publication, teaching. Year's successful research with vegetable processor. Year as Government Analyst. Draft 3-A. Prefer research and development in Southern California, but consider anywhere.
Box 55-N-5, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, M.S. Interested in research or development position with progressive company in war industry. Graduate A. C. S. accredited college. 2½ years' industrial experience physical and special analytical techniques. Married, 26. Draft status 3A.
Box 56-N-5, Ind. & Eng. Chem., Easton, Pa.

WANTED: CHEMICAL research work in Rocky Mt. region. B.S., M.S. (1915), 2 yrs. toward Ph.D. Now employed. Twenty yrs. research experience in coal tar field. Would accept nominal salary for position offering advancement.
Box 58-N-5, Ind. & Eng. Chem., Easton, Pa.

RESEARCH and DEVELOPMENT, Ph.D. Organic major, Physical minor. Excellent scholastic record, Phi Beta Kappa, etc. Four yrs. varied industrial research with large organization including organic synthesis, high polymers, plastics and process development. Now employed. Desire position in research and/or development. Married. Protestant.
Box 60-N-5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S. in Chemistry, June, 1942. Will have also completed some graduate work at this date. Excellent basic training in organic, analytical and rubber chemistry, math. and physics. Prefer position as organic research assistant or work connected with rubber compounding. Available by mid-June. Location immaterial.
Box 61-N-5, Ind. & Eng. Chem., Easton, Pa.

RESEARCH DIRECTOR desires new location. 8 years experience developing inorganic pigments, heavy chemicals, metal recovery processes, and analytical research. Numerous publications, patents, book. Location immaterial. American. Draft deferred. Married. Presently employed by nationally known concern, available on short notice. Desire $5000 minimum.
Box 67-N-5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, WISHES research position. B.S. large mid-western university, 1940. Academic and industrial research experience: inorganic, synthetic resins. Chicago vicinity preferred. Draft exempt. 24, Gentile.
Box 68-N-5, Ind. & Eng. Chem., Easton, Pa.

KNOWN INDUSTRIAL Chemist, D.Sc., Ch.E., specialist in mustard-gas proof materials for textiles, leather, pharmaceutical; 20 years experience in research and development of own and other patents; various plastics introduced in main industries, for instance aircraft industry, wants position in a progressive company, preferably as consultant, also willing to bring in own patent rights.
Box 73-N-5, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST; B.S.; Two years' experience in industrial laboratory and pilot plant research and product development. Have developed new product and unit process technique. Interested in position in industrial organic research laboratory. Presently employed. Draft Deferred.
Box 75-N-5, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER; Two years' experience in distilling industry. Advanced training in unit operations and organic chemistry. Have performed work of a responsible nature. Age 24. Presently employed.
Box 76-N-5, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER: M.I.T. graduate with twenty years' diversified experience directing (often as consultant) research and development on products, processes and equipment; developing design and initial operation of million dollar plants; solving unusual production problems; increasing morale and efficiency of men. Recently in pulp and paper; earlier in rubber chemicals, coal gasification, coatings.
Box 82-N-5, Ind. & Eng. Chem., Easton, Pa.

ELECTRO-CHEMIST, M.S. with further graduate work equivalent to Ph.D. (Electrochemistry major). B.S. in Chem. Eng. Six years' successful research and development work in electroplating and metal finishing, including bright nickel, high speed tin, copper and nickel, noble metals, alloy plating including brass and silver alloys, etc. Plant experience. Proven ability. Possesses initiative and ability to work with people. Publications and patent. Age 32, employed, 3A.
Box 86-N-5, Ind. & Eng. Chem., Easton, Pa.

AGRICULTURAL and BIOLOGICAL Chemist, B.S. 1938, Pennsylvania State College. Research in Agr. Exp. Sta. Industrial experience in food and dairy chemistry and bacteriology. Draft deferred, age 24, married.
Box 87-N-5, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, B.S. 1937. Seven years' experience laboratory and plant research and development, plant yield studies, development of control chemistry, experimental equipment design, pilot plant supervision and maintenance, and trouble shooting in organic chemical field. Patent pending. Employed, but desire opportunity and more responsibility. Age 28, Protestant, native American, married, 3-A.
Box 89-N-5, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 647)

(Situations Wanted Continued)

COLLOID CHEMIST M.S. engineering '41. 5 years' experience in inorganic colloids, plastics, wetting agents, corrosion, and rubber. Age 28, married, draft 3-A. Employed. Desire research and development position.
Box 91-N-5, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.S., desires position in industrial research. Experience: Development of pharmaceuticals, research on phenols, sterols, amino-acids, vitamins. Organic synthesis and analysis. Familiar with organic micro-technique, spectrophotometric and micro-biological work. Publications. Draft deferred, dependency.
Box 96-N-5, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(NONMEMBERS)

CHEMICAL ENGINEER, degree. Four years' food technology and development, mostly prepared cereals. Now production manager for food company with large national business. Two years' research and control of electrotyping solutions. Receptive to offers from other fields Married, 3 children, age 27.
Box 12-T-4, Ind. & Eng. Chem., Easton, Pa.

PLANT SUPERINTENDENT, experienced in design, erection, operation and technical direction of vegetable oil plant manufacturing refined and hydrogenated oils, Oleomargine, Mayonnaise, Distilled Fatty Acids and Crude Glycerine.
Box 44-T-4, Ind. & Eng. Chem., Easton, Pa.

LIBRARIAN for industrial or commercial research department. Young woman. Phi Beta Kappa. University graduate; library school trained. Science major, including chemistry, bacteriology, biology. Literary ability. Knows German, French, Spanish, typing. Location immaterial.
Box 50-T-4, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST, age 45. Thoroughly experienced, practical analysis of metals, ores, silicates, gas, water, chemicals, commercial organic materials. Now employed near Philadelphia. Seeks new connection offering permanency of employment at moderate pay.
Box 57-T-4, Ind. & Eng. Chem., Easton, Pa.

EMPLOYMENT in BRAZIL wanted either as chemist or in management. A.B. 1934 Stanford, chemistry major. No experience. Seven years manager wholesale oil distribution. Consistent money making record. Speak Spanish. Read Spanish, German, some French. Studying Portuguese. Alpha Chi Sigma. Age 29. Draft 1-B. Married. Excellent references. Salary immaterial.
Box 25-N-5, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST: American born, graduates with B.S. degree, May 26, 1942. Desires analytical chemistry position in industry. 36 semester hours in chemistry, including quantitative, organic, organic qualitative, and physical. Location immaterial.
Box 30-N-5, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST (Organic) M.S. from midwestern university. One year toward Ph.D. Experience college teaching and bibliographic research. Graduate assistant and fellow in chemistry three years. Stenographic experience. Read Spanish, French, German. Thorough training in physical chemistry, physics, mathematics. Sigma Xi. References. Desired industrial position, location immaterial. Available June.
Box 33-N-5, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL and RESEARCH chemist, Checkoslovakian college graduate, 4 years in U.S.A., first citizenship papers, 2 years assistant at college, 20 years broad experience, age 44, married. Presently employed, change due to priorities, restrictions. Very capable worker, excellent references.
Box 39-N-5, Ind. & Eng. Chem., Easton, Pa.

RESEARCH and INDUSTRIAL chemist, Ph.D. organic, university Vienna, excellent experience, many patents, seeks position.
Box 45-N-5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S. June, 1942. Suitably trained for position in rubber industry. 8 years' factory experience. Formal university training in chemistry of rubber—natural and synthetic. Single, 2A.
Box 51-N-5, Ind. & Eng. Chem., Easton, Pa.

Industrial News

CONTINUED FROM PAGE 640

Abraser Vacuum Pickup



THE Taber Instrument Corp., North Tonawanda, N. Y., has announced its improved Abraser Vacuum Pickup, Model HV-42, an accessory to the Taber Abraser standard method for measuring resistance to abrasion of surface finishes.

Its primary function is to prevent accumulation of abradings from interfering with the normal wear action of the Calibrase wheels. Its principal application is for the removal of abradings that may become imbedded in the weave of textile fabrics, or the fine powder from certain types of organic coatings that tend to cling to and build up on the face of the wheels.

The pickup is of tubular design for standing on the table alongside the Abraser and has a nozzle rotatively mounted on the suction end of the housing. The contaminated air is drawn through the nozzle and connecting tube into the high-speed centrifugal pump, then through a special filter bag which passes only clean air back into the room.

THE Moore Products Co. has moved into its own building at H and Lycoming Streets, Philadelphia, Penna., which offers larger manufacturing facilities.

Deaeration of Boiler Feed Water

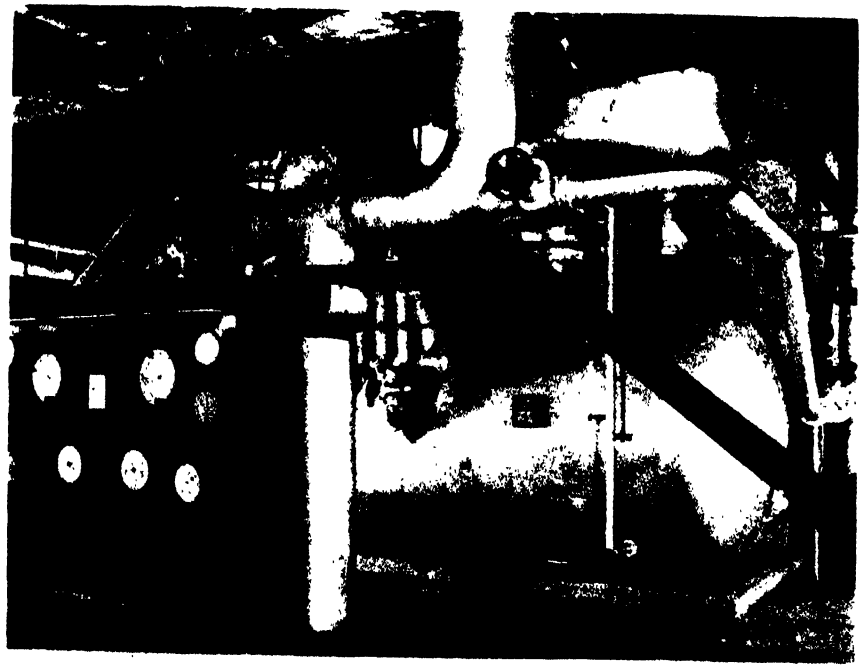
ATOMIZING deaerators spray the water and then atomize it by means of a steam jet to remove any remnant trace of oxygen. Trays, which may be fouled by high carbonate hardness, are eliminated in the deaerator design of the Cochrane Corp., 17th & Allegheny Avenue, Philadelphia, Penna.

The atomizing deaerator for stationary work is recommended where the water is turbid and contains carbonate hardness that might readily foul tray type deaerators and where the water to be deaerated is high in carbon dioxide (i. e., low in pH value), which might cause rapid deterioration of the cast-iron trays.

No differentiation is made between the atomizing deaerator and the tray type from the standpoint of performance.

A 400,000-pound-per-hour vertical unit was purchased by Michigan industrial plant instead of a tray type of heater on the basis of test results. With the installation of the atomizing type of unit the internal structures have been notably free of corrosion and deterioration, at the same time delivering zero oxygen water. Two 500,000-pound-per-hour atomizing deaerators are now operating in Texas and another 400,000-pound-per-hour unit has been installed in the Michigan industrial plant.

The Union Electric Light Co. of Missouri installation illustrated was recommended to deaerate 100 per cent make-up water previously treated through a cold process softener.



Storage tank for deaerated boiler feed is behind panel board; two atomizer units above. Four Cochrane flowmeters on panel board measure heating steam and feedwater flow.

MISCELLANEOUS

BUSINESS OPPORTUNITIES • FOR SALE • WANTED • ETC.

Five cents a word, minimum charge $2.00; display available at $7.50 per inch; in advance.

No discounts or allowances

MICRO-ELEMENTARY ANALYSES: C, H, N, S, P, Halogens, Methoxyl, Mol. wt., etc., U.S.P. and other official tests, Purity tests, Microinorganic assays, Spot tests, Micro-distillations, Toxicological investigations, and typical micro-chemical research work. Dr. Carl Tiedcke, 666 Fifth Avenue, New York, N. Y.

TRANSLATIONS FROM almost any language. A. A. Boehtlingk and Staff, 2022 Cedar Street, Berkeley, California. Specialty Synthetic Rubber (Russian) and Petroleum.

PRIVATE LABORATORY, advisory and research service in enzyme chemistry. General analytical work by competent staff. Box 685, New Brunswick, N. J.

FOR SALE: Chemical Abstracts Vol. 6 to 35 inclusive; first and second decennial index; J.A.C.S. Vol. 45 to 63; Ind. Eng. Chem. Vol. 12 to 33; Anal. Ed. Vol. 1 to 13; News Ed. Vol. 10 to 19; J. Chem. Educ. Vol. 1 to 18; School Science Review numbers 67 to 76. All unbound in good condition. Location Washington, D. C. Any reasonable offer for all or part will be accepted. Box 64-T-4, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Beilstein fourth edition complete with Suppl. Volumes to 1936. Chemisches Zentralblatt 1890 1936 complete.
Box 44-N-5, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: "Journals of the American Chemical Society" Vol. 50-61 inclusive. "Industrial and Engineering Chemistry" Vol. 20-31, inclusive. "Chemical Abstracts" Vol. 22-33, inclusive.
Box 57-N-5, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: 17 grams glutathione.
Box 66-N-5, Ind. & Eng. Chem., Easton, Pa.

FOR SALE, Gallium, Indium, Germanium, Tantalum, Thorium, Manganese, Uranium, Vanadium, Zirconium metals and salts in quantity. Also Barium, Columbium, Cerium, Beryllium, Boron, Caesium, Lanthanum, Potassium, Samarium, Tungsten, Titanium, Yttrium metals.
Box 70-N-5, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Large binocular Zeiss research microscope, Model 1936 with attachments.
Box 72-N-5, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Pure Block tin coil, flat spiral. 90 lineal feet, 1" I.D. × .295" wall. Outer turn 5' diameter, inner turn 1' Braced between turns. The Mearl Corp., 153 Waverly Place, N. Y. C.

FOR SALE: Two, 100 gallon, Hy-speed glass lined tanks. Manhole tops. Mounted on stands. One U. S. Bottler's multiple disc filter. Also fitted as transfer pump. All in A-1 condition. Raymond C. Seat, 932 Maple Ave., Zanesville, Ohio.

FOR SALE: "American Ceramic Society, Transactions": Vols. 1-19 (1900-1917); "American Ceramic Society, Journal (with Bulletin)": Vols. 1-22 (1918-1941); "Annals of Applied Biology": Vols. 1-21; "Journal, Institute of Petroleum Technologists": Vols. 1-26; "Physical Review": Vols. 1-58; "Die Naturwissenschaften": Vols. 1-26; "Handbuch der Physik" by Geiger & Scheel, 2nd edition: Vols. 1-24; "Zeitschrift fuer Physik": Vols. 1-100; "Zeitschrift fuer technische Physik": Vols. 1-20. A. Calvert, 221 Seaman Ave., New York, N. Y.

WANTED: Nachweis und Bestimmung Organischen Verbindungen, Professor Hans Meyer, Prag, Publisher Julius Springer, Wien, 1933; Die Arbeitsmethoden der Organische Chemie, Houben-Weyl, 4 vols.; Synthese der Kohlenstoffverbindungen, Professor Hans Meyer, Prag, Publisher Julius Springer, 1933, 3 vols.; Journal of Biological Chemistry, vols. 100-118; Die Praxis des Organische Chemikers, Gottermann-Wieland, Publisher Walter de Gruyter, Berlin. State price, condition, edition.
Box 18-NP-5, Ind. & Eng. Chem., Easton, Pa.

MACHINERY WANTED: Autoclave, steel, 5 gallon, 2000 lb. work pressure.
Box 22-N-5, Ind. & Eng. Chem., Easton, Pa.

WE WILL place orders for special organics with chemist who has access to equipped laboratory. Wanted now Asparagine, Histidine, Hydrochloride, Aesculin, Acrylic acid, Tryptophane, Malic acid, Digitonin, Methionine, Lysine, Threonine, Lyxose, Levulose, Xylose.
Box 71-N-5, Ind. & Eng. Chem., Easton, Pa.

WANTED TO PURCHASE: General and Special equipment for steel-work analytical laboratory. State detailed inventory and cash prices.
Box 77-N-5, Ind. & Eng. Chem., Easton, Pa.

WANTED: Glass lined tank approximately 7 ft. diameter by 3 ft. deep with top, and dished bottom, with outlet.
Box 83-N-5, Ind. & Eng. Chem., Easton, Pa.

WANTED: "Chemical and Metallurgical Engineering": Vols. 4, 6, 7, 9, 10-16, paying $3, per volume; "Electrochemical and Metallurgical Industry": Vols. 4 (1906), 6 (1908), 7 (1909), 9 (1911), 10 (1912), paying $3, per volume; "Transactions (American) Electrochemical Society": Vols. 45-70, 74-79, or any; "Journal of Bacteriology" Vols. 1-30; "Journal of Research (Bureau of Standards)": Vols. 1-23; "Electronics": Vols. 1-12; "Chemical Abstracts": Vols. 4, 5. Dr. G. H. Franzius, 201 East 82nd Street, New York, N. Y.

WANTED IDEAS: Interested preferably in patents: realization of some wastes. Write offer with full details.
Box 95-N-5, Ind. & Eng. Chem., Easton, Pa.

Protection against Flying Glass

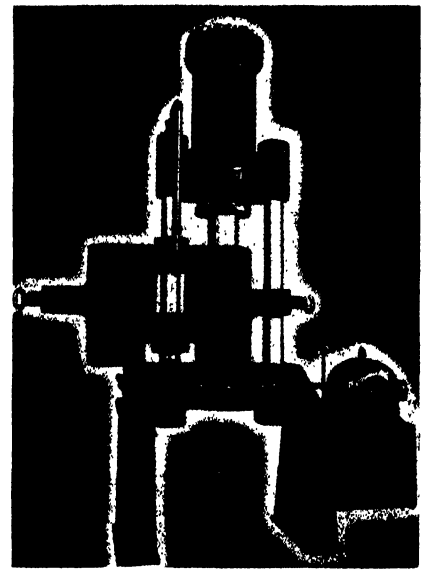


AS PROTECTION against flying glass during air raids, a coating for windows is offered by Douglas Distributors, Inc., New York, N. Y. The new coating, known as Protex shatterproof blackout coating No. 4, is applied with a brush to the inside of windows and makes them opaque for a year or more under normal conditions.

An outside blackout coating also being offered is sprayed or brushed on the outside of windows, forming a dense, flat black finish which is impervious to weather conditions. Investigation in England showed that fully 90 per cent of civilian casualties caused by Nazi bombs were attributable to flying debris, particularly glass.

Hydraulic Straining Press

A 200-ton-capacity hydraulic straining press, manufactured by The Watson-Stillman Co., Roselle, N. J., strains or filters fluids under a pressure of 2,000 pounds per square inch. The machine has two cylindrical containers, each 10 inches in diameter and 33 inches deep, mounted on a swinging arm so that one may be filled while the press strains material from the other.



The press is completely self-contained, including 20-h. p. motor, 18-g. p. m. pump, and oil tank. The entire unit stands 14 feet high and weighs 15,000 pounds.

Heating Equipment for Dryers

AN ESTIMATED 46,500 pounds of scrap metal has been released for war uses by the installation of new heating equipment for dryers in the plant of the John R. Evans & Co., Camden, N. J. In addition, this new equipment installed by the Carrier Corp., Syracuse, N. Y., has resulted in a considerable saving in motor horsepower, a slight decrease in the time required to dry hides, and an approximate saving of 5 per cent in steam consumption. Formerly the hides were moved through a 110-foot tunnel in which drying equipment consisted of fifteen 9-foot turbulence fans, driven by a 60-hp. motor from a shafting which ran the entire length of the dryer. This equipment was replaced by five Carrier heat-diffusing units, requiring only 25 hp. to circulate a large quantity of air.

Heat Transfer Calculator

THE Alco Products Division of American Locomotive Co., New York, has made available, at cost (25 cents), a limited number of mean temperature difference calculators devised to aid in the approximation of heat-transfer surfaces when preparing estimates or specifications for heat exchange equipment. The Alco calculator includes scales for the calculation of the logarithmic m. t. d., as well as the m. t. d. correction factors for one, two, three, four, and six shell passes, and also "C" and "D" scales which permit multiplication and division operations.

CHEMICAL AND ENGINEERING NEWS
HARRISON E. HOWE, Editor
PUBLISHED BY THE AMERICAN CHEMICAL SOCIETY
VOLUME 20 MAY 25, 1942 NUMBER 10

Substitute Fuels as a War Economy[1]

GUSTAV EGLOFF AND P. M. VAN ARSDELL
Universal Oil Products Co., Research Laboratories, Chicago, Ill.

With the advent of total war throughout the world, the problem of securing sufficient motor fuel of high quality has become vitally important. When the United States entered the war the oil supplies of the Axis group were a severe contrast to the United Nations, who control more than 90 per cent of the world's petroleum resources.

The world's oil consumers present a different aspect since the European continent was the second largest user of petroleum and its products before the war began. With the exception of Rumania, Poland, and Hungary, none of the nations under Axis domination have a petroleum industry sufficient to supply their needs, nor do they have motor fuel of as high quality as the United Nations. The European volume of the world's 2,250,736,000 barrels (*25*) of petroleum production in 1941 was less than 3 per cent. Consequently the major portion of the petroleum in those countries was previously imported.

The crude oil production of the world during 1941 is shown in Table I.

When the Axis Powers established domination of the European Continent, all oil production, storage, and refinery capacity was confiscated for the German military machine. During 1940–41 practically all of the oil-burning motors remaining in civilian use in Europe were converted to the gas-, coal-, and wood-burning type. Progress in building more plants for the manufacture of synthetic motor fuels also continued. The quantity of petroleum and substitute fuels produced throughout Axis Europe amounted to a maximum estimated volume of 11,268,000 barrels monthly and consisted of gasoline from petroleum, hydrogenated coal and water gas, compressed fuel gases, producer gas from wood, lignite, coal, and coke, and alcohol, benzol, and shale oil.

Until Axis control is established in some large oil-producing country, the need for greater quantities of substitute fuels will be present.

The Russian invasion has cost Germany about 21,250,000 barrels of oil and substitutes per month, of which at least 4,250,000 barrels must be used in maintaining communications and industry behind the battle lines. Germany is using oil and its substitutes at approximately double the rate of her production capacity, which is based on the maximum estimated output of the European Continent.

An estimate of the year's military operations on all European fronts by the Axis Powers called for over 255,000,000 barrels of fuel, of which Germany, Rumania, Poland, Albania, and other occupied countries produced only 53,501,000 (*25*) barrels of petroleum and substitute fuels of

Data Published on Selective Service

BECAUSE of the wide interest in this subject and the need for obtaining trained men for our Production Army, we give below references to information we have published on occupational deferments, including those of men in training. Future developments will be brought to the attention of our readers.

Chemical and Engineering News

(NEWS EDITION previous to 1942)

Vol. 18 (1940), pages 890, 1127
Vol. 19 (1941), pages 129, 311, 457, 459, 489, 520, 587, 681, 797, 1164, 1412, 1464
Vol. 20 (1942), pages 110, 157, 472, 579–80

Industrial and Engineering Chemistry

Vol. 33 (1941), pages 1, 135, 283, 561
Vol. 34 (1942), pages 2, 131, 259

Table I. World Crude Oil Production, 1941

	1,000 Barrels	Per cent
NORTH AMERICA		
United States	1,405,830	62.46
Mexico	41,200	1.83
Canada	10,003	0.44
	1,457,033	64.73
CENTRAL AND SOUTH AMERICA		
Venezuela	222,902	9.90
Colombia	24,442	1.09
Argentina	21,641	0.96
Trinidad	21,211	0.94
Peru	12,846	0.57
Ecuador	1,561	0.07
Bolivia	121	0.01
	304,724	13.54
EUROPE		
Russia	242,150	10.76
Rumania	40,563	1.80
Germany		
Old Reich	4,438	0.19
Ostmark	692	0.03
Slovakia and Moravia	109	0.01
Poland	3,319	0.15
Hungary	2,474	0.11
Italian Empire		
Albania	1,381	0.06
Italy	46	...
France	479	0.02
	295,651	13.13
ASIA		
Iran	78,035	3.47
Iraq	12,650	0.56
Burma	7,762	0.34
Bahrein	6,846	0.30
Saudi Arabia	5,871	0.26
British India	2,270	0.11
	113,434	5.04
OCEANIA		
Netherlands East Indies		
Sumatra	40,827	1.81
Borneo	13,848	0.62
Java	6,735	0.30
Molucca	721	0.03
British Borneo		
Brunei	5,552	0.25
Sarawak	1,312	0.06
Japan	2,659	0.12
	71,654	3.19
AFRICA		
Egypt	7,659	0.34
OTHER COUNTRIES	581	0.03
WORLD TOTAL	2,250,736	100.00

[1] Presented before the Division of Petroleum Chemistry at the 103rd Meeting of the AMERICAN CHEMICAL SOCIETY, Memphis, Tenn., April 20 to 23, 1942.



Above. **Compressed propane-butanes as motor fuels named Ruhrgasol.**
Below. **Compressed methane in steel cylinders under truck floor.**

all kinds equivalent to 81,720,630 barrels of fuel, or a total of 135,221,630 barrels. From a fuel production standpoint Axis Europe is short at about the rate of 120,000,000 barrels of oil per year, based on the Russian campaign.

From time to time the question arises as to the Axis defeat because of oil shortage. The European Continent is low in oil production, and to maintain a campaign based on the strategy of World War I would have depleted its oil resources. However, with modern blitz warfare the Western European campaign lasted but 45 days from invasion to capitulation. This 45-day war used about 12,500,000 barrels of oil and oil products, and the captured stores in the defeated countries were estimated at about 20,000,000 barrels (*13*). The remaining European campaigns lasted less than a year—about 284 days of actual fighting until the Russian invasion on June 22, 1941. Up to that date the actual expenditure of oil was less than had been expected, based on previous calculations of strategy. In contrast to the Western European campaign, the Russian campaign has cost about 32,000,000 barrels of oil in a similar 45-day period with no oil stores or production gained.

It has been reported that oil stocks in Germany were 59,500,000 barrels (*57*). But it is not clear what the German losses in actual capacity have been from aerial bombardment over Europe by the R. A. F and the Russian air force. From increasing frequency of bombing raids, the damage to Axis oil production should be relatively large.

A further indication of the prevailing European motor fuel situation is reflected in a news item in the *New York Times* on April 28, 1942, which points out that a system of gasoline barter for Italian prisoners was set up by the Yugoslav General Mikhailovitch. According to the dispatch, the system is one Italian soldier or noncommissioned officer for one can of gasoline, one Italian officer up to rank of colonel for four cans of gasoline, one Italian colonel for 50 cans of gasoline. These equivalents were considered unreasonable by the Italian Government but were finally accepted, thus allowing the General to fuel the tanks captured at the same time as the soldiers.

At the beginning of the war, September 1939, Europe had immense stores of crude oil and refined products, and a relatively large synthetic fuel production. The extent to which substitute fuels have been necessary is shown when acetylene, garbage, artichokes, ammonia, and hydrogen are considered suitable for motor fuels, and in the great increase in the number of gas generator (gasogene) and compressed gas vehicles during the past two years. It is naturally difficult during wartime censorship and propaganda activities to obtain reliable figures on Axis production and consumption of fuels and fuel substitutes. Data are presented in Tables II and III for maximum and minimum amounts reported by different esti-



ACME PHOTO

One of the halls of "the heart of Germany's war fuel industry", says the German censor-passed caption on this picture. The Leuna synthetic oil plants, greatest in Germany, have been bombed time and again by the British.

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Table II. Maximum Estimates Axis Oil and Substitutes Production

	Crude Oil Production (25) Barrels	Hydrogenation Bergius and Fischer-Tropsch Barrels	Compressed Gases Barrels	Shale Oils Barrels	Benzene Barrels	Alcohol Barrels	Wood and Coal Gas Generators Barrels	Refining Capacity Barrels	Total Crude Oil and Substitutes Barrels
Germany	5,239,000	42,500,000 (51, 68)	1,785,700 (11)	6,375,000 (51) (pit coal tar motor fuel) + 1,500,000 (gas oil) (45)	5,355,000 (51)	4,000,000 (51)	6,000,000 (35)	24,757,000 (54) (incl. Austria and Czechoslovakia)	72,754,700
France	479,000	3,498,000 (45)	238,000 (6)	85,000 (12)	600,000 (45) (1939)	1,600,000 (45) (1939)	1,190,000 (62)	54,558,000 (54)	7,690,000
Hungary	2,474,000	...	...	...	.	80,000 (45) (1939)	.	4,201,000 (54)	2,554,000
Poland	3,319,000	....	...	...	..	100,000 (45) (1939)	.	8,298,000 (54)	3,419,000
Rumania	40,563,000	...	.	....		.		80,712,000 (54)	40,563,000
Baltic States	....	...	...	1,500,000 (13) (1940)	....	..	....	....	1,500,000
Norway	..	..	.	...	..	..	183,000 (64)	....	183,000
Denmark	...	...	8,500 (12)	..	..	..	277,530 (12)	....	286,030
Holland	...	..	..	...	..	..	42,000 (59)	..	42,000
Finland	...	..	..	..	....	..	238,000 (17)	..	238,000
Belgium	...	...	.	..	300,000 (45) (1939)	..	143,400 (26)	..	443,400
Italy	1,427,000	3,025,500 (37) (1940)	255,000 (47)	..	..	340,000 (47) (1939)	255,000 (47)	20,628,000 (54)	5,302,500
Lithuania	....	..		...	..	50,000 (45)	..	.	50,000
Total	53,501,000	49,023,500	2,287,200	9,460,000	6,255,000	6,170,000	8,328,930	193,154,000	135,025,630

Table III. Minimum Estimates Axis Oil and Substitutes Production

	Crude Oil Production Barrels	Hydrogenation Bergius and Fischer-Tropsch Barrels	Compressed Gases Barrels	Shale Oils Barrels	Benzene Barrels	Alcohol Barrels	Wood and Coal Gas Generators Barrels	Total Crude Oil and Substitutes Barrels
Germany	5,239,000 (25)	19,125,000 (43)	1,429,000 (59)	6,375,000 (51) (pit coal tar) + 1,500,000 (45) (gas oil)	5,355,000 (51)	4,000,000 (51)	1,190,000 (37)	44,213,000
France	479,000 (25)	297,500 (26)	137,700 (26)	85,000 (32)				
Hungary	2,474,000 (25)	...	..	...				999,200
All occupied countries	....	.	...	....	.	1,071,000 (51)	.	2,474,000
Poland	3,319,000 (25)	....	.	.		.	.	1,071,000
Rumania	40,563,000 (25)	...	.	....		.	.	3,319,000
Baltic States	....	...	...	1,300,000 (45) (1939)	. .	.	.	40,563,000
Norway	....	....	....	....		.	....	1,300,000
Denmark	....	....	8,500 (40)	....	. .	. .	183,000 (64)	183,000
Holland	....	....	...	....	.	.	277,530 (12)	286,030
Finland	....	....	....	....	. .		143,000 (60)	143,000
Belgium	....	....	....	..	....	.	42,000 (59)	42,000
Italy	1,427,000 (25)	631,000 (45)	476,000 (28)	.	300,000 (45)	....	143,400 (26)	443,400
Lithuania	....	....	....	.	.	350,000 (45)	23,800 (37)	2,907,800
Total	53,501,000	20,053,500	2,051,200	9,260,000	5,655,000	50,000 (45) 5,471,000	 2,002,730	50,000 97,994,430

Table IV. Heat Content of Gasoline Substitutes

One Barrel	Equiv. Bbl. Gasoline, 60° A. P. I.
Benzene	1.07
Natural gasoline	0.941 assuming 75° A. P. I. nat. gasoline
Butane	0.823
Propane	0 730
Ethyl alcohol	0.671
Methyl alcohol	0.507
1000 Cubic Feet	
Natural gas	0.219 assuming 1150 B. t. u./cu. ft.
Methane	0 196 assuming 1009 B. t. u./cu. ft.
Manufactured gas (city gas)	0.103 assuming 537 B. t. u./cu. ft.
Producer gas	0 019 assuming 100 B. t. u./cu. ft.

mators of fuel substitutes produced. Probably both sets of figures are tinged with propaganda. The truth lies most likely somewhere between the two sets of data.

Tables II and III show the maximum and minimum fuel production statistics. Some figures are available only as late as 1939, while others are given for as late as December 1941. For either table, the data presented are estimates.

Composition Motor Fuel Efficiencies

On the technical side, the efficiency of the fuels produced as substitutes for the more desirable petroleum products has enforced some limitations on their general adaptability. While it is perfectly feasible to use the various substitutes, there are a number of drawbacks. In compressed gas, the weight of the tanks is a decided drain on efficiency. In alcohol fuels, separation occurs if water is present, and in the producer gas vehicle the fuel and the added weight on account of the retorts, coolers, etc., are a detriment to efficiency. In addition, an entire new driving and mechanical technique must be learned. Taking into account these major items, the heating quality of the gas is also a considerable item in its use. Table IV shows the heat content of the various fuel substitutes used in the countries without oil (*44*). The equivalents are based on one barrel of gasoline as a standard.

Coal Hydrogenation

Hydrogenation of coal by the Bergius, and carbon monoxide by the Fischer-Tropsch processes has formed the major source of substitute fuels in Germany. At the present time, in spite of the relatively large installations necessary for fuel

Table V. Hydrogenation (Bergius) Plants in Germany (28)

Plant	Date Placed in Operation	Place	Process	Production in Barrels 1938	1939	1940
Leuna, I. G.	1927 or 1933(?)	Merseburg	Hydrogenation of lignite	3,410,000	3,612,500	4,250,000
Oppau, I. G.	1934	Ludwigshafen	....	1,275,000	1,275,000	1,275,000
Wesseling	1939	Cologne	Hydrogenation of lignite	...	425,000	1,700,000
Mines of Geiseltal	1938 (end)	Near Merseburg	Carbonization and synthesis of lignite		637,500	637,000
Mines of Geiseltal	1940 (end)	...	Hydrogenation of mineral oils	...	...	637,500
Pölitz	1940-41	Stettin	Hydrogenation	...	...	2,975,000
Brüx	1940-41	Sudetenland	...	...	...	3,400,000
Bleichhammer	1941	Upper Silesia	Hydrogenation of Polish coals	...	...	...
Magdeburg (Brabag)	1934	Saxe	I. G. hydrogenation			
Böhlen (Brabag)	1937	Saxe	I. G. hydrogenation	3,782,500 with Schwarzheide	5,100,000	5,100,000
Zeitz (Brabag)	1938 (finished)	Saxe	I. G. hydrogenation			
Gelsenkirchen	1939	Ruhr	I. G. hydrogenation			
Bottrop	1938	Ruhr	I. G. hydrogenation	...	637,500	2,550,000
				8,467,500	12,112,000	24,225,000

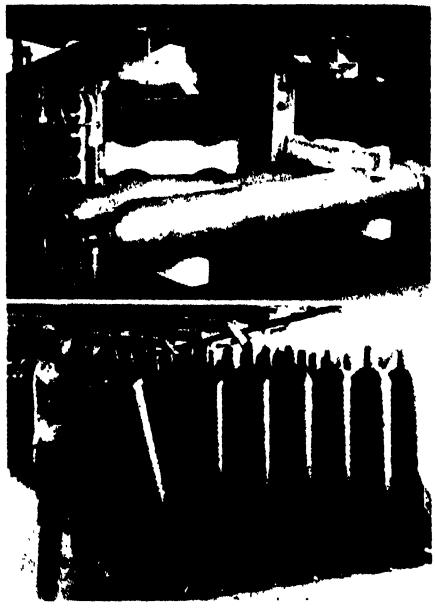
Table VI. Fischer-Tropsch Plants in Germany (28)

Plant	Date Placed in Operation	Place	Process	Production in Barrels 1938	1939	1940
Schwarzheide	1937	Saxe	Fischer-Tropsch	(See Brabag group in Table III)		
Wanne Eickel	1939	Ruhr	Fischer-Tropsch	...	425,000	1,700,000
Bochum	1939	Ruhr	Fischer-Tropsch	...	425,000	1,700,000
Rauxel	1938	Ruhr	Fischer-Tropsch	340,000	425,000	1,700,000
Sterkrade-Holten	1938	Ruhr	Fischer-Tropsch	255,000	637,500	850,000
Moers-Moerbeck	1936 & 1939	Lower Rhine	Fischer-Tropsch	255,000	765,000	765,000
Köln Neussen	1938	Cologne	Fischer-Tropsch	255,000	425,000	425,000
Dortmund	1939	Ruhr	Fischer-Tropsch	...	....	....
Deschowitz	1939	Upper Silesia	Fischer-Tropsch	...	212,500	425,000
Essen	1938-39	Ruhr	Carbonization and Fischer-Tropsch	212,500	425,000	1,870,000
Essen	1939	Ruhr	I. H. P. process	255,000	425,000	425,000
Recklinghausen	1936	Ruhr	I. H. P. process	850,000	1,062,500	1,275,000
Total				2,422,500	5,227,500	11,135,000
Total by I G. Farbenindustrie				8,467,500	12,112,000	24,225,000
Total of both I. G. Farbenindustrie and Fischer-Tropsch				10,890,000	17,339,500	35,360,000

production, the Bergius process has the largest production of synthetic oils.

During the years preceding the present war, considerable research was done on various hydrogenation processes, and a number of processes for production of oil from coal came into being. The data in Tables V and VI show the development (*28*) of 1939 through 1940 of Bergius and Fischer-Tropsch processes for the production of oil from coal, their location, capacities, and year production started. The data are incomplete as to the actual number of plants operating.

The total 1940 figures presented for the hydrogenation processes show that approximately two thirds of the synthetic oil is manufactured by the Bergius method. Table VI shows the same data for the Fischer-Tropsch process.



***Above.* Compressed gas cylinder racks. *Below.* The compressed steel cylinders**

An advantage of the Fischer-Tropsch plants (*68*) is that they may be operated efficiently on a much smaller scale than the direct coal hydrogenation plants operating on the Bergius process. Because of the possibility of decentralization of these plants, there is less danger from bombing, and even if a direct hit is scored there is less loss of capacity.

In spite of the abundant potential supply of coal in Germany, Holland, Belgium, northern France, Alsace, Lorraine, Poland, and Czechoslovakia, the aggregate production of which was of the order of 510,000,000 tons per year (1938 figures), factors limiting the maximum production capacity for war are doubtless man power and alloy steels. In addition to furnishing the coal required for hydrogenation purposes, a further limitation imposed on extension of the coal-oil synthesis plants lies in the vastly increased coal requirements of the other war production industries. According to previous data (*41*), the coal needed to manufacture 1 ton of gasoline amounts to 5 tons, and upon this assumption synthetic oil from coal will reach its approximate limits at around 42,000,000 barrels (reached in 1941), although according to Lisle (*52*) the goal set for oil from this source has been placed at about 62,000,000 barrels for 1942.

France has some small coal hydrogenation units producing motor fuel at the rate of about 2,800,000 barrels a year—a top estimate—whereas Italy hydrogenates heavy high-sulfur Albanian crude oil to motor fuel at the yearly rate of about 3,260,000 barrels. The data are shown in Table VII.

Table VII. Synthetic Fuel Plants in Axis-Dominated Countries

	Synthetic Fuels (*37*) *Barrels*
France	
Bethune	425,000
Lievin	425,000
Harnes (Pas de Calais) (Fischer-Tropsch)	85,000
Projected building (1939)[a] 4 plants	1,955,000
Italy	
Bari	1,520,000
Leghorn	1,520,000
Valdarno, Tuscany	165,500
Total Oil Output by Hydrogenation Outside Germany	6,095,500

[a] It is not known whether these plans were carried through because no information has been available on their status since June 1940.

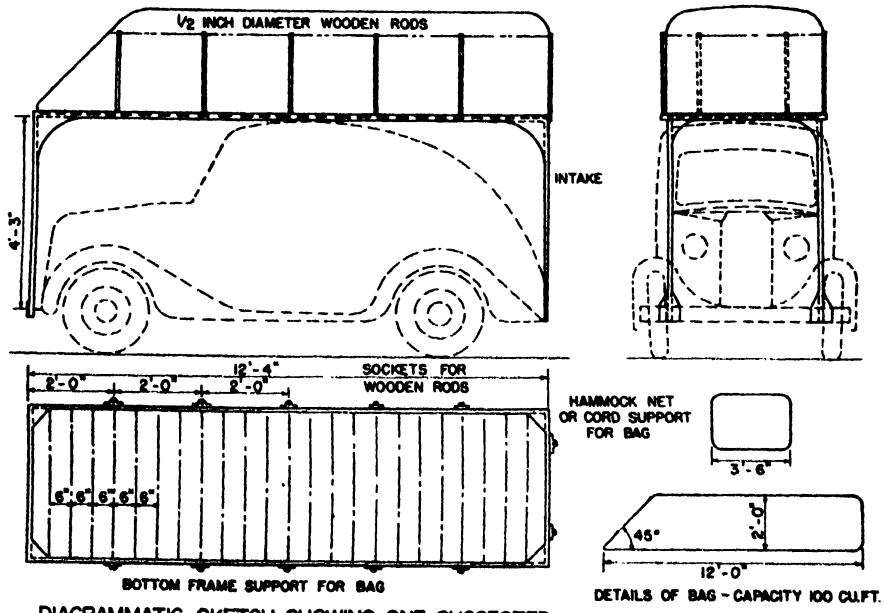
Compressed Gases

With the severe rationing of gasoline from petroleum and synthetic oils from coal sources, the use of alternate fuels has become necessary in many nations. Compressed fuel gases were developed for some years before the Second World War. Low-pressure combustible gas for gasoline engine propulsion started during the last war.

The low-pressure installation developed during the First World War is definitely a makeshift appliance, since the container for the gas is approximately as large as the vehicle on which it is installed. These containers (*34*) shown in the diagram, vary from 100 to 720 cubic feet and provide for a range of from 15 to 25 miles per filling. The life of the fabric containers is about one year. Provisions are made for refueling the gas bags at regular gasoline filling stations where the gas connection is made from the city gas mains. Two hundred and fifty cubic feet of this gas are equivalent to one gallon of gasoline.

Some of the chief drawbacks to the system have been: first, the size of the balloon necessary to be effective in driving; second, the wind resistance of the fuel bag, which is considerable at regular automobile speeds; third, the tendency of the bag to leak after two or three weeks with dilution of the gas with air; fourth, collection of snow in the winter time and, because of this added weight, the pressure is great enough to force gas into the engine too quickly and cause backfiring with subsequent stalling; a fifth difficulty is the inadequate height of the bridges and underpasses to accommodate trucks with gas bags, although bridges 13 feet high or more give no difficulty even for trucks. In July 1940, despite all drawbacks, there were 80 gas filling stations in London, and a survey made by the British Commercial Gas Association has listed the gas filling stations in each county.

Compressed gases under pressures varying from 75 to 5,000 pounds, depending on the type of gas, are more efficient in utili-



DIAGRAMMATIC SKETCH SHOWING ONE SUGGESTED METHOD OF ATTACHING GAS BAG TO A SMALL CAR AS USED IN ENGLAND

FOR AUSTRALIAN CONDITIONS IT IS SUGGESTED THAT THE WIDTH OF THE FRAME SHOULD BE EQUAL TO THE OVERALL WIDTH OF THE MUDGUARDS - ABOUT 5'-0"

Table VIII. Compressed Gases in Relation to Gasoline

Gas	Cylinder, Weight, *Lb.*	Pressure *Lb. per sq. in.*	Gas *Lb.*	Gasoline Equivalent *U. S. Gal.*
Propane-Butane	117	75–150	100	18.0
Methane	115	3000–5000	28	4.56
City gas	155	3000	12.6	1.8

zation than the low-pressure gases just discussed. However, here, too, there are drawbacks which cut their efficiency for automobile use; the factor of greatest importance is the extra weight which must be carried as the steel cylinder. Table VIII shows the weights of the compressed gases and values in relation to gasoline (*20*).

In this field, as well as in the manufacture of synthetic fuel from coal, Germany has gone the farthest in its development. In 1939 Germany had six types of bottled gas on the market—city gas, coke oven gas, methane, propane, butane, and Ruhrgasol. The facilities for the utilization of these gases include more than 50 filling stations and about 75,000 vehicles using compressed gases of the various types (*11*). The propane and butane are derived from the hydrogenation and Fischer-Tropsch plants.

Methane and city gas are more widely available than propane and butane. Natural gas fields, sewage disposal plants, and coal hydrogenation, coal carbonization, and oil refineries provide a considerable source of methane. Italy (*11*) has a small gas field near Milan which has been developed for providing methane. Probably the most outstanding development of a fuel gas source has been the utilization of methane derived from fermentation of city sewage. In Sweden, as well as in other countries, there has been development in this line. The sewage gas (*14*) as it comes from the disposal plant is 64 per cent methane and 35 per cent carbon dioxide. This product is considered richer in caloric content than city gas. Purification of sewage gas takes place before it is used in motor cars, although there are 40 cars belonging to the road and street commission in Stockholm which use the unpurified gas. This unpurified gas is about 58 to 78 per cent as efficient as benzene.

The cylinders for the use of sewage gas are about 1.4 cubic feet capacity, and 2 to 4 cylinders are necessary for each car. Each cylinder contains 212 cubic feet of gas compressed to about 2,000 pounds per square inch. The installations are the same as for city gas and methane. At the compressed gas filling station the filling time is the same as for gasoline.

In utilizing the gases, the changes in the car involve a spark advance and a change in the carburetor and a system of valves for stepping down the gas pressure before entering the carburetor. Many cars are arranged so that a change from benzene to the gas may take place at the instrument board. The cost of conversion to the gas-burning vehicles ranges between $150 and $175, and the steel cylinders from $20 to $22.50 per cylinder. Very few cities have the type of sewage systems necessary to obtain the methane for fuel.

England has had some development of sewage gases for fuel but no extensive application has been made. According to same reports (*36*) many of the larger cities throughout Europe have utilized the gases from sewage for power purposes for some time. Table IX shows the number of vehicles in various European countries that have been converted to the use of compressed gas.

Table IX. Compressed Gas Vehicles in 1941

Country	Number of Vehicles
Germany (*11*)	75,000
Britain (*6*)	10,000
France (*42*)	500
Sweden (*30*)	1,367
Denmark (*40*)	358
Italy (*23*)	20,000
Total Vehicles	107,225

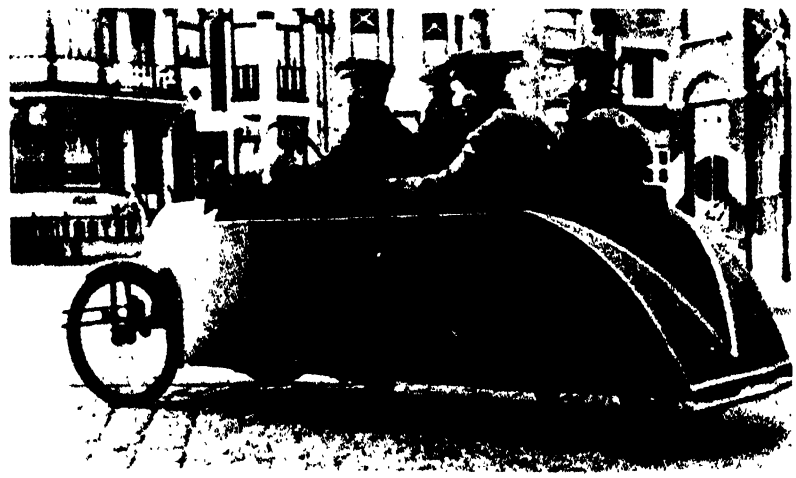
The Soviet Union, France, and Denmark have developed compressed gaseous fuels also, and in general the type of apparatus used has been much the same as in other countries. A study (*16*) made in Russia in 1940 has shown that while preference was given the development of gaseous fuels, little utilization has been made. Authorities in Russia (*16*) have claimed that yearly utilization of coal gases in the Don River Basin alone would be equivalent to approximately 8,500,000 barrels of gasoline. The Soviet Union also has rich deposits of natural gas in the Caucasus, Central Asia, the Far East, and other localities. Liquid gases are further available in large quantities as by-products from the petroleum industry.

According to latest news from Italy, methane gas, compressed to 300 atmospheres overpressure, has been used to run a gas-fed railway engine of 120 horsepower between Rovigo and Venice. It is planned to place more of these locomotives in service (*5*).

Gas Producer Development

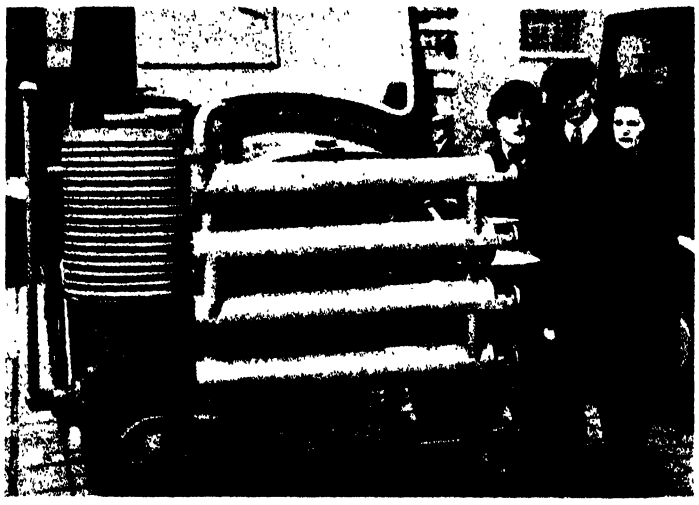
Wood, coal, and other solid combustible materials have been used for some years as motor fuel in countries lacking in oil resources. A number of factors must be considered in the widespread adaptation of gasogene (gas producer) vehicles, although the present war has left no choice. The use of gasogene-propelled motor vehicles has increased greatly in the past few years. In 1938 the European Continent had about 9,000 trucks and busses in operation, whereas 1941 indicated about 450,000, a fiftyfold increase. The tonnage of producer fuel substituted for about 8,329,000 barrels of gasoline. There are, generally speaking, three types of fuels used in the gasogene vehicles—wood, charcoal, and coal or their mixtures. In many countries, wood and charcoal are the main types of fuel used; in others coal has become as widespread as wood.

Four countries, Germany, France, Sweden, and Italy, have been mostly responsible for the use and improvement of the gasogene vehicle. For a number of years only hard woods, well dried, were



ACME PHOTO

Even German soldiers in occupied France cannot get gasoline for their sightseeing tours. German ingenuity, says the German censor-passed caption on this picture, solves the problem with vehicles like this one—a treadmobile in which the legs of the soldiers provide the "horsepower". A soldier in the rear seat puts out his hand to signal for a left turn.



ACME PHOTO

Fastened to the front of the lorry is one of the devices expected to prove the most effective substitute for gas engines in London. Another type is mounted on a trailer behind the vehicle it propels. Either apparatus produces fuel from coke or volatile coal.

importance in all countries utilizing the gas generator is to invent an engine that will run on all types of solid fuel.

Sweden, another country in which development of the gas generator has made much progress, has used the generator vehicle for a number of years. At the outbreak of the war there was little difficulty in turning from gasoline to gas generator vehicles. As in most countries, the majority of Sweden's gas generator vehicles are trucks, but other vehicles have been adapted as well. In January 1941 there were 20 different types of solid fuel burning motor vehicles on the roads in Sweden. Birch wood appears to be the most desirable fuel for them. A series of tests was run on coal and wood in comparison with gasoline, and it was found that use of coal producer gas resulted in less lubricating oil contamination than with wood gas. Since lubricants are strictly rationed in Sweden, coal gas was considered more economical than wood gas for the generator vehicles. More trouble was encountered in winter driving with wood gas because of its higher water content (*39*) and subsequent freezing.

In France a somewhat different note is being sounded. Although France for a number of years encouraged the building and use of gas generators, many of her experts had predicted

suitable for this engine; however, Germany (*60*) developed technical improvements in the engine, so that wet and soft woods may also be used. Filters made of glass wool remove the dust from the soft woods, and special heat exchangers have been installed to compensate for the heat loss due to utilizing wet woods. These and other improvements have brought the efficiency of wood gas vehicles close to that of the Diesel engine. A light-weight bus has been adapted for the use of wood gas from these sources.

That fuel may be available for the 231,000 gas generator vehicles in Germany, the German Motor Roads Fuel Co. (*22*) has arranged for more service stations to supply "chipped wood". Twenty-two wood stations were to be opened between Berlin and Dresden in May 1941 in connection with the gasoline filling stations. Germany required 2,891,000 tons of wood to propel the producer gas vehicles during 1941, although the distribution arising from such extensive use of wood places considerable burden on an already overtaxed transportation system in Germany (*65*).

With the widespread use of the wood gas generator the difficulty of increasing the supply of wood has become apparent and more attention has been given to the utilization of coal and peat. A problem which is still of great



ACME PHOTO

Paris busses are being converted to run on illuminating gas. The gas is contained in an envelope enclosed in a wooden case on top of the bus, and one filling drives the vehicles about 15 miles. Here a bus refuels at a gas station. The gas flows through the tube to the bag on top of the bus and into the cylinders of the motor, exploding in the same fashion as does vaporized gasoline.



ACME PHOTO

Motor vehicles in the Nottingham district, England, that normally run on gasoline are now being converted to coal gas because of the restrictions on oil consumption. Here are a sedan and a bus under way, their engines powered by a supply of coal gas carried in the containers on their roofs.

that too wide a use would cause a wood shortage. In June 1941 an order was issued forbidding the use of charcoal (*62*); the reason stated was that wood supplies had fallen far below expectation. A report from Vichy, February 13, 1942 (*31*) stated that the wooden paving blocks in the Place de la Concorde in Paris were ripped out to be used for fuel in wood-burning trucks, and that trees in the Bois de Boulogne had been cut down owing to a timber shortage. The gas generators that were being built at that time were expected to be modified in order to burn other solid fuels.

Holland is another country canceling permits for the use of the wood gas burner motor cars (*59*). There are approximately 1,770 trucks in service using wood gas, but in the future the manufacturers will be compelled to design the machine for burning peat since it is available in Holland.

Italy in 1938 had 2,200 wood-burning motor busses and trucks, whereas in 1941 there were 5,000 in operation. Italy is a country possessing very small forest reserves and less coal, hence the producer gas type motor vehicle has not alleviated the fuel shortage.

Denmark operated 11,656 wood-burning vehicles, according to *Foreign Commerce Weekly;* Norway, Belgium, and Finland with 5,563, 6,023, and 10,000 gas generator vehicles, respectively (see Table X) were also solving their fuel situation by this means since they had sufficient forests to provide the gas generator type of fuel.

Throughout the occupied countries in Europe and those affected by the blockade, the effect of the oil shortage has been to force the use of substitutes and in many instances that substitute has been wood or coal producer gas vehicles. Switzerland and Sweden, two of the four neutrals left on the continent of Europe, have felt the pinch of fuel scarcity to practically the same degree as the occupied countries. Switzerland licenses only the gasogene vehicles considered vitally necessary.

Embattled Russia, in spite of her vast oil resources, has also turned to the gas generator vehicle for motive power (*60*). Tractors and trucks in the Soviet Union (*15*) have had considerable development since many of the agricultural centers are far from liquid fuel supplies, but in or near the forests and peat beds. The design of the vehicles has been in some instances for charcoal and anthracite, and in others, especially the heavy trucks, for peat and bituminous coal. Tractors with producer gas units have been tried on straw briquets, but with no practicable results.

In France and Denmark a number of boats have been adapted to the use of charcoal or wood. Germany is reported to be operating 1,000 boats with 1,400 to be in use early in 1942.

Table X shows the number of vehicles in use in the various countries that have had to adopt solid producer gas fuels rather than liquids.

Table X. Producer Gas (Gasogene) Vehicles

Country	Number of Vehicles
Germany	231,000 (*35*)
France	57,000 (*66*)
Denmark	11,656 (*12*)
Finland	10,000 (1940) (*17*)
Belgium	6,023 (*27*)
Norway	5,563 (*61*)
Italy	5,000 (*47*)
Holland	1,770 (*59*)
Sweden	75,000 (*19*)
Russia	40,000 (1940) (*10*)
Total	443,012

The fiftyfold increase in producer gas propelled motor vehicles during the past three years has been confined to land vehicles and boats. It is interesting to note to what extremities some countries are being driven in the use of substitute fuels, as an Associated Press dispatch out of Rome, December 16, 1940, said:

Italian Plane Makes Flight on Charcoal Gas

Rome, Dec. 16 (AP). A flight by a charcoal-burning airplane, said to have been the first ever made, was reported today by the newspaper *Il Messaggero.*

The newspaper said the flight was made by Constantino Mazza in a Breda plane powered by a "gasogene" motor yesterday over Taliedo Airfield, near Milan. A test flight from Milan to Rome is planned next.

A special apparatus said to have supplanted the plane's gasoline tanks was described as weighing 176 pounds, 99 pounds of charcoal, and a low temperature furnace to convert the charcoal into gas.

Power Alcohol

Power alcohol consisting of both methyl and ethyl alcohol was fostered by a number of countries short of petroleum in an endeavor to make themselves self-sufficient by utilization of their own natural resources, not alone for peacetime but for war. Methyl or wood alcohol is derived from distillation of wood or sulfite pulp from papermaking and hydrogenation of carbon monoxide. Raw materials used for ethyl alcohol production are mainly foodstuffs, such as sugar, beets, and potatoes. It became a question of balance as to whether power alcohol is more important than food in the war economy.

It has been generally conceded that the alcohol industries were kept going in peacetime for the primary purpose of furnishing sufficient ethyl alcohol for the munitions industries in case of war. The events of the past three years or so have borne out this idea. It was reported in 1939 that Germany reduced the ethyl alcohol content of motor fuel from 8.2 to 2.3 per cent and discouraged the use of methyl alcohol entirely (*58*), and it appears as if ethyl alcohol will also be eliminated due to food shortage. The occupied countries of Europe are using alcohol as a motor fuel, although a general curtailment has been evident since 1936 because of technical reasons and food shortages (*1, 41*).

In 1941 France was utilising grape alcohol (*7*) as one of the substitutes for gasoline. The alcohol was distilled from the pulp after the wine was pressed, and oil was obtained from the grape seed. Grapes have also been the source of much of Spain's (*61*) motor fuel. The government instituted the use of alcohol to utilize the great surplus of grapes.

The Swiss Government (*21*) has designed a plant for the purpose of distilling wood which will produce 16,000 tons yearly of methyl alcohol and 10,000 tons of "alkaeton", a motor fuel substitute. Sweden also utilizes (*63*) wood alcohol and some turpentine. These products are derivatives of wood pulp by special processes. It has been estimated that wood alcohol could be produced to the extent of 290,000 barrels per year in existing plants.

Table XI shows alcohol production in the principal European countries.

Table XI. Power Alcohol Production in 1939 (*44*)

Country	Barrels
France	1,600,000 (*51*)
Germany	4,000,000 (*51*)
Italy	340,000 (*47*)
Poland	100,000
Hungary	80,000
Lithuania	50,000
Total for Axis Europe	6,170,000
Sweden (*21*)	290,000 (1941)
Switzerland (*61*)	195,000 (1941)

Many sources of power alcohol have been exploited, but perhaps the most unique of all is the one reported in Sweden where a baker adapted his ovens so that the alcohol produced during baking was condensed and used as a motor fuel. His fleet of 30 trucks are fueled by means of this alcohol (*29*).

The Electrically Propelled Vehicle

As a substitute for gasoline, the electrical vehicle in Europe has had some



ACME PHOTO

This Stockholm boat, too, feels the fuel shortage spreading all over Europe. It has been equipped with a generator which produces gas from charcoal.

further development and application in various countries due to wartime stringencies in the use of motor fuels. Germany again in the interest of attaining self-sufficiency in motor propulsion increased the number of electric vehicles from 3,434 in 1932 (*56*) to about 27,000 in 1940 (*9*). As an added incentive to their development, the electric vehicle was tax-free.

A government-sponsored project promoting the use of electricity for farm vehicles is reported to be saving 70,000 to 85,000 barrels of liquid fuel per year in this type of equipment alone (*69*). An estimated 100,000 electric motors have been installed on German farms since the beginning of the war (*67*).

In April 1940 M. Gasquet (*46*) estimated that about 900 electric vehicles were in operation in France, and the number was said to be increasing, a fact borne out in a recent publication of *Petroleum Times* in which the number of electric vehicles in France was estimated (*33*) at 2,000. Extensive propaganda fostering the use of the electrically driven motor car emphasized its utility (*33*), but the principal drawback for a widespread utilization of this vehicle lies in the fact that France is extremely deficient in lead, nickel, and copper, as well as in cadmium-nickel and ferronickel alloys for the production of electric motor vehicles and their batteries.

In 1933 the number of battery-driven vehicles in Britain numbered about 1,400 and at the end of 1940 the estimate (*38*) was about 6,500.

In Switzerland 6,000 to 8,000 electric vehicles (*55*) are in use ranging from light cars to 5-ton trucks. Milk dealers, bakeries, commercial houses, factories, postal authorities, officials of administration, and garbage collectors are the main users. One of the principal problems in Switzerland has been the installation of a sufficient number of recharging stations to care for the increasing number of electrical vehicles.

The chief drawbacks to the use of the electric motor car lie in the comparatively short time that is possible to run the vehicle before recharging. In addition to high battery replacement costs, the efficiency and speed decrease as the mileage increases before recharging. Their primary use is in short distance travel.

Japan

The Asiatic part of the Axis, Japan, has through the years endeavored to increase her fuel supplies by discovery, research, and conquest. Japan's primary sources are petroleum, coal hydrogenation, coal carbonization, and oil shale. Fuel substitutes include alcohol, wood, and compressed gas, and other miscellaneous fuels such as sardine oil and garbage. Japan's status in oil and its substitutes prior to the outbreak of the war with the United States, Britain, and Holland and the conquest of the Netherlands East Indies, British Borneo, and Burma is indicated in Table XII.



ACME PHOTO

In Japan where fuel is hard to find and automobiles expensive, this bicycle with a sidecar seating two is handy. The gadget will make 13 miles an hour easily, according to its inventor.

Table XII. Oil Economy of Japan

Source of Oil	Barrels
Japan	
Crude petroleum (*18*), including Formosa and part of Sakhalin (1941)	3,800,000
Synthetic oils (*49*), coal and carbon monoxide hydrogenation (1940)	4,000,000
Manchurian shale oils (*49*), (1940)	3,000,000
Motor alcohol (*44*), (1939)	2,396,000
Total oil indigenous to Japan	13,196,000
Foreign oil imports to Japan	*1940*
United States (*53*)	24,889,000
Netherlands East Indies (*49*)	7,000,000
Anglo-Iranian Oil Co. (*49*)	1,000,000
Mexico (*49*)	1,600,000
Total imports	34,489,000

Various authors have given the synthetic fuel production expected under Japan's 5- and 7-year plans. B. O. Lisle (*52*) has estimated 22,180,000 barrels, H. S. Norman (*53*) reports 16,000,000 to 18,000,000 barrels for this production, and *Business Week* (*4*) quoted 7,000,000 to 9,000,000 barrels. Owing to the immediately preceding estimates being based on plans for substitute fuel production in Japan, the improbability of their having been carried out (it requires about 5 tons of coal for each ton of oil) and the inability to obtain the necessary special alloys and equipment from Germany to hydrogenate coal and oil up to 12,000 pounds pressure and temperature of 950° F., it was thought advisable in Table XII to use the lower figure of 4,000,000 barrels of synthetic oils, as reported in *World Petroleum* of January 1942.

The foreign crude oil and products therefrom given in Table XII are direct shipments to Japan. To give an estimate of the volume transshipped through neutral ports was not possible. Just how much oil Japan had in storage December 7, 1941, is not clear, although considered "large". The oil-refining capacity of Japan in 1941 was reported to be about 64,000 barrels a day in 28 refineries. In comparison, the U. S. A. has a daily refining capacity of over 4,000,000 barrels of crude oil.

The consumption rate of petroleum and products for civilian use in Japan during 1940 was about 26,000,000 barrels, and for military and Navy needs about 14,000,000 barrels, or a total of 40,000,000 barrels peacetime needs. At the present war rate of oil consumption, Japan is probably using more than twice the latter volume despite drastic civilian curtailment.

The Netherlands East Indies in 1941 produced about 62,000,000 barrels of crude oil, while British Borneo yielded 9,500,000 barrels. The oil fields and refineries (in a highly damaged state) are in the hands of the Japanese.

According to Kessler (*70*) oil installations in the Dutch East Indies valued at $500,000,000 were developed over a period of 50 years and thoroughly destroyed before Japanese occupation. Many of the oil wells were plugged with cement so that a reopening of the well could not be accomplished without redrilling completely. In the destruction of Tarakan, Balik Papan, and Palembang alone, 88 per cent of the total oil available in the East Indies was cut off by the Dutch. Only at Tarakan, where the crude needs no special refining, could redrilling give the Japanese oil they need. According to the most authoritative statements from Batavia, the time required to obtain the necessary drilling equipment, pipe lines,

pumps, tanks, special refinery fabricated materials, fine instruments, etc., and actual drilling to production again would require from 18 to 24 months (*24*).

Burma Oil Production

Burma in 1941 produced 7,762,000 barrels of crude oil with several operating refineries. A thorough "scorched earth" policy was carried out by the British, which is borne out by a Calcutta, May 7 dispatch (*8*), as follows:

It will take the Japanese 10 years to restore the blasted Burma oil fields to capacity production, American drillers said today on arrival here from Yenangyaung and Chauk, where they helped demolish more than 4,000 wells in 8 days.

"We left behind nothing the Japanese could use," said G. Whitley, of Batson, Tex., an employe of Burmah Oil Co., who helped with the Yenangyaung destruction. "We destroyed 3,021 wells with explosives which dropped the pipes to the bottom and by firing the free flowing wells."

He said they also fired thousands of barrels of oil stored in tanks, then tore down tank and derrick superstructures, and cut up the machinery with torches.

The demolition was carried out between April 10 and 18, but most of the work was packed into the last two days after British authorities ordered total scorched-earth destruction.

Mr. Whitley said it would take at least 10 years to get the fields going to capacity and G. W. Akers, Long Beach, Calif., another Burmah employe, said it would take the invaders months to realize any flow even if they got equipment promptly.

The 1941 production of the areas now in Japanese hands is shown in Table XIII.

Table XIII

Area	Production Barrels (*50*)
Dutch East Indies	62,130,000
British Borneo	6,864,000
Burma	7,762,000
	76,756,000

These oil-producing areas in the hands of the Japanese have been subjected to a scorched earth program, and oil there will be unavailable for some time to come. On this basis the substitute fuel production assumes a more important place in Japan's fuel economy than the outputs shown in Table XIII would warrant, since this production is indigenous to Japan.

The substitutes in use in Japan (*48*) at the present time are: gas generated from charcoal, wood, coalite, and acetylene from calcium carbide; and natural gas, petroleum gas, and methane from garbage, etc. Natural and compressed gas is used only in the area of its production because of a lack of steel containers for further distribution. The oil synthesis program (*53*) (Fischer-Tropsch and Bergius) has been slowed down considerably by the lack of steel and alloys both in Germany and Japan, and the absence of suitable coals for hydrogenation purposes in Japan. Charcoal and wood are the only substitutes that have received particular encouragement from the government, and even the charcoal substitutes are limited for motor fuel use since industrial and domestic demands far exceed production. The manufacture of the gas generators has also been curtailed owing to a steel and labor shortage.

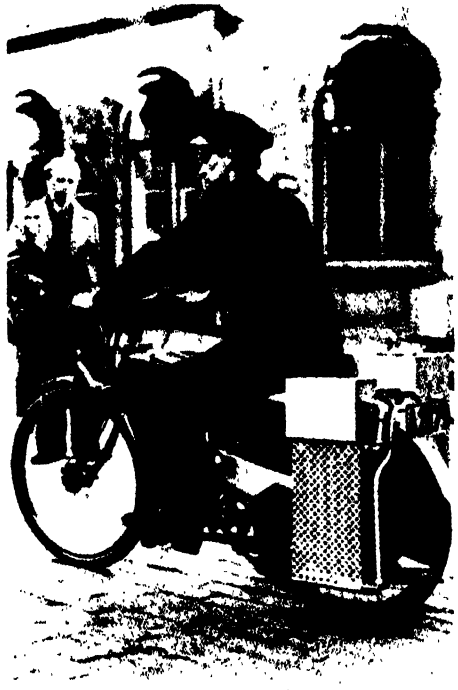
Alcohol still remains a source of motor fuel, and according to laws reported enacted in Japan (*21*) all oil companies were required to maintain emergency reserves of alcohol equivalent to at least 20 per cent of the gasoline on hand for 6 months' sales.

The tanker fleet in Japan, which is of utmost importance in fuel transport to the war theater in the Far East, is reported to have consisted of 47 vessels (in 1940), the majority of which were the largest and fastest type (19 knots per hour in contrast to 10 to 12 knots) with a gross tonnage of over 440,000 tons, and was probably augmented during the past year (*66*). The Japanese law (*2*), required that all companies operating in the Japanese market carry a 6 months' supply of petroleum products. The government provided storage tanks for lease to the companies and covered any losses that might occur from evaporation or catastrophe (*3*). In addition to the commercial petroleum stocks on hand, the army and navy were known to have accumulated "large" inventories which were stored underground for protection (*53*).

Conclusion

Many types of motor fuels and substitutes are being used by the Axis powers. There is a decided stringency in the allowable use of even substitute fuels on account of lack of raw materials, manufacturing facilities, and man power for their preparation. The relatively poor quality of the Axis fuels has curtailed the maneuverability of their automotive transportation, including airplanes.

The successful conclusion of this war will be based largely on the superior quality and quantity of the motor fuels available to the United Nations in unlimited volume.



WIDE WORLD PHOTOS, INC.

One of the first charcoal-powered motorcycles in Stockholm. Many autos are driven by charcoal because of the restriction of gasoline to governmental use. The tank by the back wheel generates gas from charcoal.

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Plastics Planning Board Advocated

PRODUCTION of smokeless powder in the United States on March 31, less than four months after we entered the war, surpassed the peak output of the first World War, Charles A. Higgins, president of Hercules Powder Co., Wilmington, Del., disclosed before the Society of the Plastics Industry at Hot Springs, Va.

Expansion in the manufacture of smokeless powder and other explosives has been responsible for a decrease in plastics production this year, Mr. Higgins said in his address entitled "Plastics and Powder". The mounting demand for plastics for the Army and Navy has been intensified by the crude rubber shortage, since some plastics are replacing rubber in hundreds of military and essential civilian uses.

Mr. Higgins suggested creation of a Plastics Planning Board to solve the difficulties created by the severe competition for raw materials and to increase plastics production in the United States. He predicted a shortage of plastics unless the plastics industry and the Government build new plastic chemical plants soon. Chemicals used by the plastics industry which now have been allocated to explosives production are nitric and sulfuric acids, ammonia, alcohol, formaldehyde, cellulose, and others.

Memphis Employment Clearing House

AT THE Employment Clearing House conducted as part of the national meeting of the SOCIETY in Memphis, April 20 to 23, 1942, 421 chemists and chemical engineers registered as candidates for employment. Only 17 were unemployed. Of this small group, 11 severed former connections in April, immediately prior to the meeting. Almost 55 per cent of the registrants, 230 in number, were employed but looking for opportunities to render increased service in the war effort or for personal advancement. The balance, 174, were students to be graduated in June—76 with the B.S. degree, 27 with the M.S., and 71 with the Ph.D.

Three hundred and eight employers' representatives, the largest number ever to use the facilities of the Clearing House, inspected the records. These included officers from the Chemical Warfare Service, Signal Corps, and Surgeon General's Office and representatives of the Ordnance Department, National Defense Research Committee, War Production Board, Civil Service Commission, United States Department of Agriculture, National Bureau of Standards, and the Tennessee Valley Authority. Many academic institutions also were represented. By far the largest number of users were from chemical industry, seeking trained men to operate the many new plants that are supplying important materials to the combat army. About one third of the employers' representatives could find the record of no one qualified for the vacancies to be filled; the other 191 requested 1,701 appointments for interviews during three and one half days.

It is not yet known how many of those interviewed were offered positions or how many accepted the offers made. As indicative of the keen competition, 16 applicants visited the Clearing House early in the week and asked to have their records withdrawn because so many positions had been offered each of them that further contacts were not desired; such requests have never been made at previous Clearing Houses. Reports of positions accepted by the registrants are being received daily.

Science Clubs Offer Prize Scholarships

FORTY all-expense trips to Washington, D. C., for a final examination and prizes of $12,000 in scholarships are offered high school students by Science Clubs of America. Preliminary examinations began May 15. This first annual science talent search, made by Westinghouse Electric & Manufacturing Co., offers to winners 18 scholarships of $200 each and two grand scholarships of $2,400 each.

New York Section Elects Officers



GLOBE PRESS PHOTO SERVICE

Charles N. Frey

CHARLES N. FREY, director of research of the Fleischmann Laboratory of Standard Brands, Inc., New York, was elected chairman of the New York Section of the AMERICAN CHEMICAL SOCIETY at the annual meeting of the section on May 8. Dr. Frey succeeds Ralph H. Müller.

Vincent du Vigneaud, head of the department of biochemistry of the Cornell University Medical School, New York, was named chairman-elect to take office in 1943. William W. Winship, manager of the New York Office of Thermal Syndicate, Ltd., of England was re-elected treasurer. Cornelia T. Snell, consulting chemist, continues as secretary.

New directors chosen include Charles O. Brown, Roland P. Soule, and Dr. du Vigneaud. Drs. Frey, Snell, Müller and Mr. Winship also will serve on the board.

The following were elected Councilors: M. Irene Bailey, R. A. Baker, B. L. Clarke, W. P. Cohoe, C. R. Dawson, E. J. Durham, R. L. Evans, A. S. Elsenbast, Louis Freedman, Carl Iddings, W. R. Johnston, D. H. Killeffer, L. G. Longsworth, H. B. McClure, S. P. Miller, J. M. Nelson, W. F. O'Connor, F. W. Power, Donald Price, W. M. Ralph, C. J. Rolle, P. W. Schutz, F. D. Snell, C. C. Steffens, F. W. Sullivan, C. S. Teitsworth, J. F. Walsh, W. J. Youden, and V. du Vigneaud.

The 1943 William H. Nichols Medal Jury of Award will be composed of Mr. Winship, chairman; Robert Calvert, L. P. Hammett, Drs. Frey and Müller, and Dr. Snell, secretary.

Memphis Meeting Abstracts

A FEW sets of planographed books of abstracts of papers presented at the recent Memphis meeting are still available from the A. C. S. News Service, 1155 Sixteenth St., N. W., Washington, D. C. The price is 50 cents per copy if order is accompanied by remittance and divisional receipt card, $1.00 per copy if order is accompanied by remittance but without receipt card; and $1.50 if bill must be rendered.

Chemical Engineers Meet in Boston









Top to bottom. D. P. Morgan of WPB; J. H. Rushton, University of Virginia; J. C. Elgin, Princeton; and M. C. Molstad, University of Pennsylvania

BOSTON, convention city for the third time to the American Institute of Chemical Engineers, was host to more than 500 institute members at the 34th semiannual meeting held May 11 to 13. Key events were the presentation of the Walker Award to E. C. Williams and an all-day Symposium on Heat Transfer held jointly with the American Society of Mechanical Engineers.

Dr. Williams, director of research of General Mills, is the recipient of the seventh William H. Walker Award. It was granted to him for his work on the production of synthetic glycerol and reported by him in the 1939 *Transactions* of the institute. Dr. Williams at the banquet Wednesday evening accepted the medal on behalf of his co-workers at the Shell Development Corp. where the work was done when he was director of research of that company. James G. Vail, former vice president of the institute and vice president and chemical director of the Philadelphia Quartz Co., made the presentation. Other speakers at the banquet, at which Gustavus J. Esselen, Boston consultant, was toastmaster, were Kenneth E. Bell, chairman of the Boston section and technical director of the A. C. Lawrence Leather Co.; Sidney D. Kirkpatrick, president of the American Institute of Chemical Engineers and editor of *Chemical & Metallurgical Engineering;* Stephen E. Simpson, professor of chemistry at the Massachusetts Institute of Technology; and James W. Parker, vice president of the Detroit Edison Co. and president of the American Society of Mechanical Engineers.

The joint Symposium on Heat Transfer was held on Wednesday with W. H. McAdams, professor of chemical engineering of Massachusetts Institute of Technology, presiding. Nine papers were presented during the day and abstracts appear below.

At the business meeting on Monday the A. McLaren White award to the winner of the institute's National Student Chemical Engineering Contest was presented to Charles C. Neas, a senior at the University of Illinois. Second and third prizes, respectively, went to Gilbert R. Shockley, Missouri School of Mines and Metallurgy, and Karl H. Rothe, Cooper Union Institute of Technology. Honorable mentions went to Harold R. Frisbie, Oregon State College, Robert E. Deatz, Kansas State College, and Herbert Kress, Pratt Institute. The contest problem this year was prepared by a committee from the technical staff of Monsanto Chemical Co. and was under guidance of the committee chairman, B. E. Thomas.

The Monday afternoon meeting was devoted to a closed discussion on War Problems of the Chemical Industry and









Top to bottom. S. L. Tyler, secretary of the A. I. Ch. E.; H. S. Lukens, of the University of Pennsylvania; J. R. Minevitch, E. B. Badger & Sons; and E. W. Comings, University of Illinois



Left to right. J. R. Huffman, New York University; J. L. Bennett, Hercules Powder Co.; James G. Vail, Philadelphia Quartz Co.

Walter G. Whitman of the WPB presided. The discussion was, at the request of the institute, considered confidential and no report can be made of the information presented.

The technical sessions were opened with an address by W. M. Rand, vice president of the Merrimac Division of the Monsanto Chemical Co., whose general subject was "New England Serves Again". Mr. Rand traced the rise of chemical industry in the New England area up to the present time, stating that:

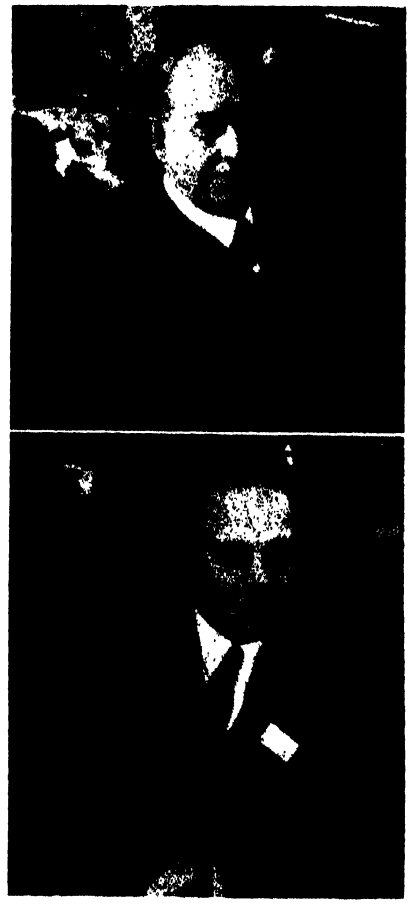
Although some of the roots of the chemical industry were firmly set in the sparse soil of New England, the main stem, the foliage, and the fruits have developed elsewhere. But this does not mean abandonment of New England by the chemical industry. There are some materials which may be found useful—some kaolins, some excellent sands, forests of spruce and hard wood.

The contributions of New England to the war effort are not insignificant. It is truly an important part of the arsenal of democracy. In its borders are two large shipyards and many smaller ones turning out battleships, destroyers, cargo ships, mine layers, and smaller craft so badly needed today; two arsenals, two large Army training camps, and an important air base. In addition, its countryside is dotted with hundreds of war plants, ranging from a huge aircraft plant to hundreds of small machine shops. The Nation looks to New England to supply destroyers rather than smokeless powder, airplane engines rather than toluene, the Garand rifle rather than magnesium, uniform cloth rather than aluminum, machine tools rather than tanks.

The technical papers were presented as previously reported in the program and brief abstracts are here included with the exception of three papers, all of which appeared in the April 25 *Transactions* of the institute. They are "Chemical Engineering Aspects of Centrifugal Fan Design", by Carl V. Herrmann, of E. I. du Pont de Nemours & Co., Inc.; "Compressed Air for Ammonia Oxidation", by Donald G. Morrow, Hercules Powder Co.; and "Performance of Drip-Point Grid Tower Packings", by M. C. Molstad, A. R. Thompson, J. F. McKinney of the University of Pennsylvania and R. G. Abbey, of the General Refractories Co.

Abstracts of Scientific Papers

A. H. Maude, chemical engineer of the Hooker Electrochemical Co., Niagara Falls, N. Y., opened the technical sessions with a paper on "Anhydrous Hydrogen Chloride Gas". The history of the commercial production of hydrogen chloride was traced, and the technical problems in plant construction and equipment design were given. The method described most fully by Maude is the synthetic production of hydrogen chloride by burning of chlorine and hydrogen. Materials of construction depend upon the physical conditions. Early plants utilized silica and brick construction but today metals are used, provided certain precautions are taken such as correct metal temperature to prevent hydrogen chloride corrosion and dew formation. Thus iron may be used safely at 30° C. and copper at 5° C. above the dew point. If the gas is cooled to a temperature below the dew point, however, nonmetallic surfaces, such as glass, stoneware, impregnated graphite, and silica are necessary, though tantalum may also be used. Ignition of the gases is yet a problem, the best solution today being a retractable air-hydrogen blow torch. Alternate methods of HCl production were also given. The principal commercial method of concentrating hydrogen chloride is absorption in water to form a concentrated solution and subsequent distillation and condensation of water from the vapors and drying of the hydrogen chloride gas by sulfuric acid. An alternative method consists in absorbing the hydrogen chloride with a metallic salt in a manner analogous to the addition of water of crystallization by some anhydrous salts. The compound when saturated with hydrogen chloride gas is heated to remove the pure hydrogen chloride from the nonvolatile salt and the latter re-used to repeat the cycle. Among the salts considered are lead and copper sulfates which are thought to form $PbSO_4.2HCl$ and $CuSO_4.2HCl$, respectively. At 83° C., 1.5 moles of hydrogen chloride are removed from the copper salt, but 0.75 mole of hydrogen chloride is still retained at 100° C. In the case of the lead compound 1.5 moles of hydrogen chloride are removed at 32° C. but the balance is not removed even at 100° C.



Above. G. J. Esselen, consultant of Boston. *Below.* G. G. Brown, University of Michigan

Moisture must be absent in such an absorption process, and this system is said to work satisfactorily with gases containing 50 per cent hydrogen chloride or more. All the gas cannot be absorbed, however, and from 1 to 5 per cent may pass through to water scrubbers. Through the use of carriers for the absorbing salt, equipment now exists which can extract from the gas stream 14 pounds of hydrogen chloride per cubic foot.

J. G. McGiffin, Standard Oil Co. of Ohio, gave considerable data pertaining to the performance of a commercial crude naphtha stabilizer. His investigation covered six different engineering performance tests run on a stabilizer, 42 inches in diameter, 61 feet high, and a total of 30 trays spaced at 18 inches except that the 3 bottom trays were 3 feet apart. Each tray had 18 bell caps, $4^{7}/_{16}$ inches outside diameter, and the feed to the tower entered on tray 16.

Four runs were made attempting to cut between isopentane and normal pentane and two tests were made to cut normal butane and isopentane. Operation was such as to produce nearly flooding conditions in the tower. For the particular tower and problem involved, McGiffin concluded that fractionation suffers from flooding, and downcomer liquid velocities in the lower portion of the tower become excessive when the rates are 1.5 feet per second when reboiler weight vaporization to bottoms ratio is above 3/1, or 1 foot per second when reboiler-bottoms ratio is above 1.5/1. He also found that fractionation is satisfactory when downcomer liquid velocities, in lower portion of tower, are maintained below 0.9 foot per second when reboiler-bottoms ratio is at a minimum of 1.4/1. Fractionating suffers somewhat when actual vapor velocities exceed the critical velocity as calculated by formula $V_c = 4.04\sqrt{\frac{TS}{MP}}$ where T = vapor temperature $R°$; S = liquid specific gravity at temperature T; M = vapor molecular weight; P = operating pressure in pounds per square inch absolute.

A summary of experimental and development work conducted during the last five years to bring a grain distillery up to date from the engineering standpoint was given by A. Herman, E. M. Stallings, and H. F. Willkie, of Joseph E. Seagram & Sons, Inc., Louisville, Ky.

In grinding experiments, a subject of great controversy in the distilling industry, it was claimed that no difference was found between corn ground in roller mills or in hammer mills. This refutes the former belief that roller mills produce flat particles and hammer mills irregular shaped particles. Experiments indicated that roller mills required one third to one half less horsepower per bushel than hammer mills to produce similar fineness, but maintenance on the roller mill was double the cost for the hammer mill. The cooking process, formerly requiring 2 to 3 hours, is now accomplished on a continuous basis taking only 30 seconds. The slurry of



W. M. Rand of Monsanto's Merrimac Division

water and grain, about 25 per cent by weight of grain, is preheated to 165° C. and then passed through a steam mixing jet into a holding vessel. During its passage it is cooked as thoroughly as in the old operation. Flow charts of the new low-temperature system for distillation of fermented mash were given. The particular advantage of this new system is the production of spirits that are more neutral. The lower the temperature in distillation, the more neutral, relatively, are the spirits obtained.

Stillage is recovered by screening to remove solids, and the liquid from the screening is evaporated in a five body, quadruple effect evaporator. Through experimentation, forced circulation, long tube evaporators were found to have the best qualities for the problem of evaporating the highly viscous stillage. Three effects, however, have natural circulation, while the last two effects are forced circulation as they evaporate the most viscous material. Vitamin assays showed that the sirup concentrated in the evaporators was high in riboflavin and other members of the B complex. Cattle feed of recovered solids and sirup is made by mixing these two products and drying in drum dryers.

"Pumps in the Chemical Industry" was the subject discussed by W. W. Mellen and A. P. Smith, of the E. I. du Pont de Nemours & Co., Inc., plant at Penns Grove, N. J. Classified into three groups by the authors, centrifugal, positive displacement, and lift types, pump selection is based on five factors—corrosive action, erosive action, head and specific gravity, temperature, and viscosity.

In selecting pumps for corrosive services the authors made the following observations: for pumping hydrochloric acid, centrifugal pumps of durochlor are used extensively up to 30 per cent acid and from 30° to 40° C.

High chrome nickel iron alloys are used for sulfuric acid of 72 to 98 per cent concentration, whereas acid of 100 per cent and over can be handled by cast steel. For lower concentrations hard lead or high silicon iron may be used.

No satisfactory practice exists for hydrofluoric acid. For acid above 60 per cent a small inexpensive cast iron gear type pump with direct motor drive, having a capacity of 20 gallons per minute, is used. Pumps are replaced frequently and no repairs attempted since cost of the unit is low. Carbon may prove to be a good material for this acid in the lower concentrations.

Mixtures of nitric acid and sulfuric acid of varying compositions are pumped with horizontal externally mounted pumps, the materials of construction being high chrome nickel alloy.

Dowtherm and diphenyl at temperatures up to 200° C. are pumped with a centrifugal internal bearing type pump, of Ni-resist casings, carbon steel rotors, bronze bushings, and Nitraloy shaft sleeves.

For pumping lead at 450° C. a special pump was designed having enlarged steel shafts of precision finished steel and high tensile strength. The pump column was fabricated from steel pipe having welded steel stiffening ribs, bearing surfaces were Stellited, and discharge lines were 18-8 steel.

It was found that a system of regular inspection and maintenance repair by a crew of trained pump specialists played an important part in minimizing breakdown. For an increase in production of 100 per cent, the increase in pump maintenance costs in locations where pump inspections were not provided was four times as great as in comparable locations where pump inspections were systematic.

The fundamental factors influencing the performance of rotary dryers was the contribution of C. O. Miller, Case School of Applied Science, B. A. Smith, Bartlett and Snow Co., and W. H. Schuette, Dow Chemical Co. Direct heat rotary dryers were investigated for heat transfer relationships representative of a system removing surface moisture from nonhygroscopic materials. Data were collected on the effects of temperature difference, air velocity, number of flights, flight size, and retention time.

The rate of heat transfer (for similar operating conditions) was found to be directly proportional to the temperature difference. Increased air velocity results in

a more efficient removal of moisture, since too low a velocity leads to the air becoming saturated before traveling the length of the dryer. The effect of the number of flights was expressed as a slope of 0.69. This appeared as a power for the number of flights in the final equation indicating an increase of heat transfer rate for increased flights. The heat transfer was independent of the retention time. After comparing the experimental results with several large-scale installations the authors obtained the following expression for predicting capacity for rate of heat transfer in a rotary dryer.

$$Q/\theta = 0.85\, LDn_f^{0.69}G^{0.55}\Delta t_m$$

where Q/θ = rate of heat transfer
L = length of dryer cylinder
D = cylinder diameter
n_f = number of flights
G = air velocity
Δt_m = log mean temperature difference

Henry T. Ward, Drexel Institute of Technology, discussed the use of dimethylformamide as a solvent for the extraction of Pennsylvania type lubricating oils. Extractions with this material were carried out on steam-refined lubricating stock, both waxy and dewaxed, and a 180 neutral stock in single-batch and countercurrent procedures. Solvent ratios of 1/1 to 3/1 were used.

Compared with other solvents, dimethylformamide was thought to be a reasonably good solvent. Chlorex, furfural, and nitrobenzene produced better improvements in viscosity index, carbon residue, and per cent yield, but the difference was slight. Though gravity difference between the new solvent and the heavy oils is small, it is considered possible to make effective and rapid separations of extract and raffinate layers to meet large-scale operations. Flash, fire points, and filter yields were satisfactory. Loss in recovery from raffinates and extracts was less than 0.2 per cent. A solvent ratio of 2/1 seemed to be the best range of operation.

D. F. Boucher, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., and J. C. Brier, University of Michigan, reported on the solvent extraction of oil from a porous mass. The authors, in simulating the extraction of oil from soybeans, prepared porous clay plates or slabs, which after being air-dried at 900° C. to give a porosity of 41 per cent, were saturated with a phosphatide-free soybean oil. Solvents used in the runs were tetrachloroethylene and an azeotropic mixture of 79 per cent carbon tetrachloride and 21 per cent ethylene dichloride.

To differentiate between the two resistances to diffusion of oil from the plate to the solvent—namely, resistance due to the capillary structure of the plate and the liquid-film or resistance to diffusion into the main body of the solvent—extractions were run in which the solvent velocities were varied, causing changes in Reynolds numbers from 14.7 to 20,400, and when residual oil content of the plates was plotted against Reynolds numbers it was found that the two were independent, indicating that liquid-film resistance was inconsequential as compared to the resistance within the plate.

The extraction period may be divided into two stages. The initial extraction stage, which accounts for only a small fraction of the total time, is characterized by a substantially constant center-line concentration within the plate. The extraction rate during this period corresponded to the equation

$$\frac{dW}{Ad\theta} = \frac{25.15 \times 10^{-4}}{(\mu_0\mu_S)^{0.515}} \frac{(X_1 - X_E)}{(X_1 - X)} (C_S - C_L)$$

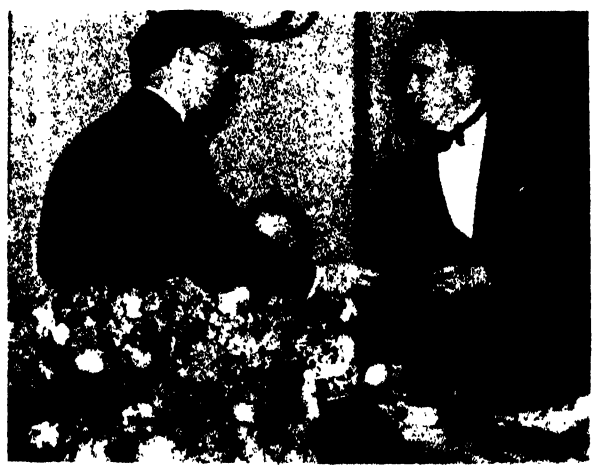
where W = solute weight, lb.
A = exposed surface area, sq. ft.
θ = time, hours
μ_0, μ_S = viscosity solute and solvent
X_1 = initial solute content solid, lb. solute/lb. solid
X_E = equilibrium solute content of solid or concentration in solvent, lb. solute/lb. solid
X = solute content of solid, lb. solute/lb. solid
C_S = concentration of liquid within plate, lb. solute/cu. ft. solution
C_L = solvent concentration, lb. solute/cu. ft. solution

The final extraction stage is characterized by a falling concentration at the center-line plate and corresponds to the equation

$$\frac{dW}{Ad\theta} = \frac{36.15 \times 10^{-4}}{(\mu_0\mu_S)^{0.348}} (C_S - C_L)$$

The effect of plate thickness and porosity was not evaluated since in these trials only one plate thickness and porosity were used.

The adsorption of chloroform from air by beds of activated carbon was the basis of a study by H. C. Engel and J. Coull of the University of Pittsburgh, and J. Miller, Mellon Institute. A relation for adsorption efficiency was reported which was related to time, and the authors investigated the method of Bohart and Adams and Furnas in an attempt to predict the influence of the variables.



J. G. Vail presents Walker Award to E. C. Williams.

J. F. White, Merrimac Division, Monsanto Chemical Co., spoke on the "Manufacture of Silica Aerogel", the heat transfer method when autoclaving the gel, and over-all heat balances and transfer coefficients.

The manufacturing operations were, first, the addition of sodium silicate to a solution of sulfuric acid, concentrations being controlled to give a gel having 8 per cent silicon oxide. The gel is aged to give firming due to syneresis, and then passed through roll crushers into one of four wash tanks. Water is circulated through to remove any sodium sulfate formed in the gel reaction and when washed sufficiently, the water is drained and alcohol added. After suitable soaking, a fresh alcohol portion is substituted and the gel is washed as one of a unit in a four-stage countercurrent system. Weak alcohol taken from the system is fractionated in a recovery column. The gel is transferred to an autoclave and heated to 550° F. at 1,150 pounds gage. Pressure is then reduced to atmospheric pressure, and the gel is finally evacuated at 20 inches of mercury for 10 minutes. The resultant aerogel is removed by an airveyor system. The substitution of alcohol for the water before autoclaving gives a system capable of being removed at the critical point, thereby preventing the collapse of the gel due to surface tension and at the same time obviating the increase in size of the colloidal particles which is characteristic of silicon oxide in the presence of water.

It was found that the general over-all heat transfer coefficient for the particular autoclave charged with 450 pounds aerogel was 26 B. t. u./(hr.)(sq. ft.)(° F.). Radiation was found to play a relatively unimportant part in the transfer of heat as particles of silicon dispersed through the gel did not appreciably change the over-all heat transfer coefficient.

Cooling organic liquids before discharging into storage tanks often prevents excessive loss in the displaced air, and in an attempt to encourage the practice of using vapor condensers to do this cooling, A. P. Colburn, L. L. Millar, and J. W. Westwater, University of Delaware, conducted basic research on the use of vertical vapor-in-tube condensers, with the tubes long enough

to accomplish the desired degree of subcooling.

The work was done on a single condensing tube, as this was the best means of obtaining the fundamental data for design purposes. A $^7/_8$-inch outside diameter condensing tube, surrounded by a 1-inch inside diameter tube for the water coolant, was used. Spiral flow was assured by winding a 10-gage wire around the inside tube and forcing the outside tube over the filed down wire.

Results indicated that vapor temperatures of the organic materials condensed—acetone, isobutanol, and trichloroethylene—were steady down to a certain point where they varied widely for about 6 inches of tube length, and then dropped steadily to the exit port. Interpretation is that the gases condensed in a very sharp zone.

The authors were able to suggest a design procedure on the basis of the data obtained. They recommended: estimation of the average condensate temperature at the end of the condensing section to break down the heat load to condensing and subcooling requirements; prediction of the separate film coefficients; selection of the proper mean temperature differences; and calculation of the tube length for each duty.

Heat transfer coefficients for liquid flow which is neither fully laminar nor fully turbulent, titled semiturbulent flow and occurring between Reynolds numbers of 1,500 to 11,000, were given by R. N. Norris and M. W. Sims of the General Electric Co. Used for these tests was an Admiralty-metal tube, 0.527 inch in diameter and 11 feet long. The fluids tested were a light mineral insulating oil and askarel, a chlorinated hydrocarbon. Coolant was water. Results of the authors' tests indicate that one equation will predict the heat transfer to within ±5 per cent for flow in the semiturbulent region.

$$\left(\frac{h}{cG}\right) = 0.0067 \left(\frac{c\mu}{k}\right)_a^{-0.8} \left(\frac{\mu_a}{\mu_w}\right)^{0.14}$$

where h = surface heat transfer coefficient, B. t. u./(hr.) (sq. ft.) (° F.)
c = specific heat of liquid, B. t. u./(lb.) (° F.)
G = weight velocity of liquid, lb./hr./sq. ft.
μ = absolute viscosity, lb./hr./ft.
k = thermal conductivity of liquid, B. t. u./(hr.) (sq. ft.) per (° F./ft.)

Subscript a indicates the values are based on the average inlet and outlet temperature of the liquid being cooled and w on the temperature at inner tube wall surface.

Using this correlation, test results show much less scatter than older forms of equations. Simplicity of use is also a factor for curved lines, for which no equation existed before and which are now shown to be part of a straight line.

New conclusions, obscured by the complexity of previously available correlations, are found justified, provided the effect of variation of fluid properties is excluded. They are:

1. Surface heat transfer coefficient is directly proportional to velocity.
2. Temperature drop of the fluid while passing through the tube is independent of velocity for a fixed inlet temperature and a fixed uniform tube temperature.
3. Heat transfer coefficient is independent of tube diameter, at least for the large length to diameter ratio tested.



President Kirkpatrick recites Kipling's "Sons of Martha" at the banquet Tuesday.

A voluminous study on heat transfer and pressure drop for a fluid flowing in the viscous region through a vertical pipe was given: the work of L. M. K. Boelter, University of California, and six associates.

New data were presented for oil and water moving in streamline flow up a steam-heated vertical pipe and reported in several mathematical equations of a complexity which prevents reporting in this abstract. In general, however, the results are fairly close to predictions by theoretical methods based on vertical pipes. The measured pressure drop was found to be in fair agreement with previously published material also.

J. H. Wiegand, E. I. du Pont de Nemours & Co., Inc., and E. M. Baker, University of Michigan, collaborated in a report on transfer processes in annuli, basing their study on the premise that the rate of transfer of energy as friction and heat and the rate of transfer of material are closely related to the measurements of turbulence in flowing streams and, for flow in around pipes, these rates have been correlated by the Reynolds numbers. It is of interest to study corresponding relationships for annuli. Several relationships were derived and compared to published data, basis being the J factor of Chilton and Colburn[1].

For laminar flow where the ratio of inner to outer diameter of annulus is between 0.85 and 1.0, the annulus is satisfactorily regarded as two parallel plates. With turbulent flow, if transfer occurs at one wall only, J varies with the ratios of inner and outer wall diameter.

The Jordan equivalent diameter, equal to four times the ratio of the cross-sectional area divided by the heated perimeter, did not seem to be a proper measure of the general turbulence in the stream. As turbulence is a controlling factor with transfer it was felt that an equivalent diameter, $d_2 - d_1$ or the ratio of the cross-sectional area of flow to the wetted perimeter, would be a better measure of turbulence.

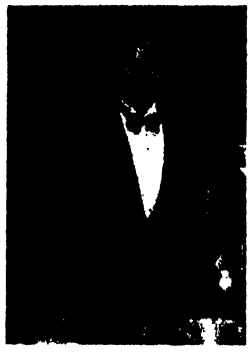
C. C. Monrad, Carnegie Institute of Technology, and J. F. Pelton, Linde Air Products Co., were joint authors of an article on the heat transfer by convection in annular spaces. Heat transfer coefficients were obtained experimentally for fluids and air flowing turbulently in annuli. Heat transfer was from the inner tube of the annulus and a variation of ratio of outer to inner diameters of 1.65, 2.45, and 17 was used. Temperatures varied from 80° F. to 180° F., Reynolds numbers from 12,000 to 220,000. Heat transfer from the outer tube to the inner was studied for tube ratios of 1.85.

Results indicate that the Dittus-Boelter or the Colburn equations were satisfactory, provided an equivalent diameter, equal to four times the hydraulic radius, was used.

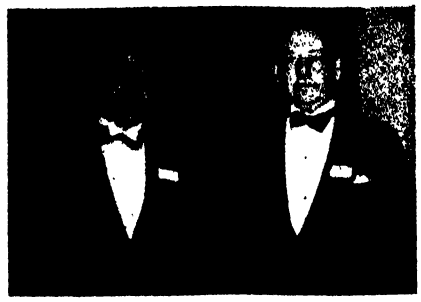
Utilization of hydrolyzed lignocellulose as a semiplastic filler for standard resins was found, by Raphael Katzen and Donald F. Othmer of the Polytechnic Institute of Brooklyn, and A. O. Reynolds, Northwood Chemical Co., to give several advantages over conventional fillers, among them an accelerated molding cycle and a conservation of resin used. Hydrolyzed lignocellulose is made by a continuous process at the Northwood Chemical Co., and it has been found that with standard phenol-formaldehyde resin products, proportions of 3 parts of lignocellulose filler and 1 part of resin yield acceptable results.

J. W. Merrill and J. E. C. Valentin of the Bakelite Corp. reported on the problem of dust control in the plastic industry. Dust explosions have resulted in the destruction of $51,000,000 of plant investment, 1,080 persons injured, and 487 killed. The proper design and selection

[1] *Ind. Eng. Chem.*, 26, 1183 (1934).



E. C. Williams, General Mills, accepts the award.



K. E. Bell, chairman, Boston Section, and G. J. Esselen, general chairman of meeting



J. W. Parker of Detroit Edison, president and representative of A. S. M. E.

of equipment and the analysis of the particular dust and problem involved are some of the necessary steps in the prevention of these losses, the authors concluded.

The use of liquid solvents, normally gaseous, in the region of their critical temperatures as solvents for long-chain fatty acids and related substances was the subject of a paper by A. W. Hixson, Columbia University, and J. B. Bockelmann, Colgate-Palmolive-Peet Co. The data obtained, the authors state, are indicative that this new system may be the basis of a new liquid-liquid extraction process.

H. C. Hottel, Massachusetts Institute of Technology, and R. B. Egbert, Carbide and Carbon Chemicals Corp., reported on experiments and an analysis they made of the data of other investigators in the field of radiant heat transmission in the hope of resolving, into one acceptable method, the various techniques now used in calculating the radiant heat transmission due to water vapor. The results were given in two charts presenting the emissivity as a function of gas temperature and the product term in an ideal state of zero partial pressure of water vapor. A second chart enabled corrections to be made in terms of a finite pressure.

A. C. Mueller, E. I. du Pont de Nemours & Co., Inc., reported on the heat transfer from wires to air in parallel flow.

Melvin Avrami and Victor Paschkis reported on the results of a study with their experimental electric analogy, originally devised by C. L. Beukin of Holland[1], in studying the diffusion of heat through a long rectangular bar.

[1] News Ed., 19, 740 (July 10, 1941).

Charles E. Reed, formerly assistant professor of chemical engineering at the Massachusetts Institute of Technology, has joined the staff of the General Electric Co.'s Research Laboratory, Schenectady, N. Y., as consulting chemical engineer.

Profits of the Chemical Industry

In an analysis of the profits of the chemical industry during 1941, the *New York Times* of April 27, 1942, gives statistics for various periods by different classifications in the industry, based on a study of 40 companies. While topping results in 1929, for the most part in 1941 net profits of the chemical industry made only slight headway over 1940 because of increased taxes and other charges. Forty companies had combined profits of $197,418,345 in 1941, compared with $184,402,604 in 1940. Federal income and excess profits taxes of the 16 principal companies were $215,077,000 or 56 per cent of earnings before taxes, compared with $92,487,000 or 36.7 per cent in 1940.

What Civilian Commodities Mean to the Army

Peace-to-war commodity shifts tell the wherefore of civilian shortages, according to the *Wall Street Journal.*

Cotton in two mattress covers makes an Army shelter tent. Aluminum in 60,000 quart sauce pans makes a Flying Fortress. Material in a home radio makes two paratrooper radios.

Jute of a living room rug makes 46 sandbags. Metal in 8 electric toasters makes a 75-mm. shell case. Wool in 15 blankets equips a soldier for a year. Wool in a woman's sport suit makes 13 Army overseas caps.

Rubber in 3,400 girdles makes one jeep tire. Silk in 185 pairs of women's hose makes one Army parachute.

Hans Wolff has accepted a position as research chemist with the A. E. Staley Manufacturing Co., Decatur, Ill. He was previously research chemist for the Devoe & Raynolds Co., Inc., Louisville, Ky.

Robertson D. Ward has been elected assistant to the president of the Freeport Sulphur Co., New York, N. Y., and **Richard C. Wells** has been elected assistant treasurer.

Pure Mercury Made by General Electric

Mercury that is 99.99995 per cent pure, required for reliable operation of electronic tubes, is being made by the General Electric Co. at Schenectady, N. Y., at the rate of 0.5 ton per day. Since December 1941 more than 90,000 pounds have been prepared in a special mercury purification plant that has been set up in the Schenectady Works Laboratory.

Raw mercury, formerly obtained from Spain, Italy, and Austria, is now obtained from cinnabar mined in California, Nevada, and Oregon, and shipped to Schenectady in 70-pound capacity iron cylinders. It is treated chemically and then distilled to remove impurities. Every precaution is taken to safeguard the health of the workers, since mercury vapor is highly poisonous.

The chief use of the very pure mercury at present is in power rectifiers, particularly in plants refining magnesium and aluminum.

New Jersey Standard Expands 100-Octane Fuel Output

Sixty million dollars is being spent by the Standard Oil Co. of New Jersey to expand production of 100-octane fuel, the company's magazine *The Lamp* says. The plants should be ready for operation within 10 months. Standard's program also includes construction of several units using new catalyst processes. These plants, with those being built by other companies, will produce raw materials for Buna S and Butyl rubber and toluene for TNT.

"If plant materials can be provided without interfering with the war effort," the company says, "rubber in quantities not only for military use but sufficient to keep the country's 30,000,000 cars on the highway is attainable as a direct result of Jersey's efforts. Buna S capacity to meet these demands could be built at a cost of about $15 a car. This type of rubber was perfected as a result of the prewar Jersey–I. G. Farbenindustrie agreement."

ESMDT Courses Scheduled at Ohio State

Two classes will be trained during the summer in the ESMDT Course on Explosives at Ohio State University. The instruction will be on a full-time basis with 30 hours of instruction per week for six weeks. The first class will be trained from June 15 to July 25 and the second class from July 24 to September 3. Prerequisites for admission to either class include three years of college chemistry (general chemistry, quantitative analysis, and organic chemistry), or the equivalent in industrial experience or other special training. No tuition is charged for the training, but students are responsible for living expenses, a $5 textbook charge, and a $10 laboratory deposit. Since each class will be limited to about 75 students and more than 50 applications are already on hand for the first class, interested applicants are advised to write soon for reservations.

The explosives course is under direction of Herrick L. Johnston with the assistance of George E. MacWood and Henry E. Wirth. Inquiries or requests for application blanks should be addressed to Professor Harry E. Nold, Director, Engineering, Science, and Management Defense Training, Lord Hall, Ohio State University, Columbus, Ohio, or direct to Professor Johnston, Department of Chemistry.

Some Defense Problems

A number of problems, the solutions to which will materially aid in winning the war, have been put out by the Associated Defense Committees of Chicago Technical Societies, of which the Defense Committee of the Chicago Section of the American Chemical Society is a member. That more widespread consideration might be given these problems, a list of them is printed below. Any solutions, or ideas concerning possible solutions, should be sent to Robert C. Brown, Jr., Chairman, Associated Defense Committees, 53 West Jackson Blvd., Chicago, Ill. All communications will be held strictly confidential and will be transmitted to the proper Government authorities.

Problem 1. Materials, composite, etc., for use as armor.

Problem 2. A directable land torpedo, utilizing a new means for obtaining traction or propulsion with a range in the neighborhood of 3 miles.

Problem 3. Methods for constructing high muzzle velocity guns of reasonable fire.

Problem 4. Easily erected and dismantled portable water or fuel storage tanks.

Problem 5. Amphibian armored fighting vehicles, capable of good speed in water.

Problem 6. Methods for the destruction of antitank obstacles and wire barricades.

Problem 7. Methods for the detection of chemical agents such as toxic gases.

Problem 8. New methods for absorbing the recoil of guns.

Problem 9. Plastic material uses for war purposes.

Problem 10. Means for easily laying or constructing a track or road for vehicles over otherwise unsuitable country, such as sandy desert, swamps, etc.

Problem 11. Booby traps.

Problem 12. Antitank devices.

Problem 13. Flame-thrower designs.

Problem 14. Fuels and ignition devices for flame-throwers.

Problem 15. Revolving turret designs.

Problem 16. Portable bridge designs, easy to dismantle and assemble and capable of bearing heavy loads.

Problem 17. Light steam engines for vehicles.

Problem 18. Directionally and remotely controlled projectiles.

Problem 19. Projectile-throwers of explosive compressed air or manual-operated types.

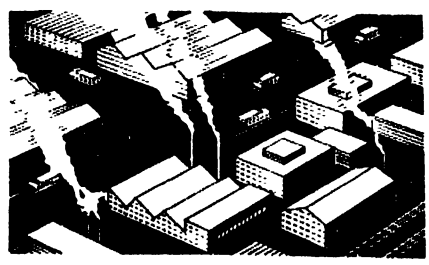
Problem 20. New types of variable speed gears.

Problem 21. Antiskid devices for wheels which may be operated conveniently from the vehicle driver's seat.

Problem 22. Means for the propulsion of armored fighting vehicles supported in the water by flotation devices and the design of new types of flotation devices.

Problem 23. Methods of camouflage.

Problem 24. Special electrical, acoustic, optical, magnetic, and mechanical devices or instruments having application in warfare.



Problem 25. Means for protection of industrial areas against an enemy.

Problem 26. Methods of sabotage within those areas in case of invasion.

Problem 27. Provision of means in a tank for preventing the entrance of flammable liquids or gases, such as gasoline, thrown onto the tank by the so-called flame-throwers.

Problem 28. Portable means suitable for use by land troops for detecting the presence of explosive buried at depths not in excess of two feet below ground and non-magnetic in character.

Problem 29. A time delay mechanism for bombs which will have time factors up to thirty days but which do not involve clock work because of noise and which are more accurate than the present known chemical time delays.

Problem 30. Means for detecting and rendering impotent, mines ordinarily placed near shipping or port facilities and actuated by various types of trigger mechanism.

Problem 31. Lightweight means adapted for use in connection with high-speed steam turbines for transmitting the turbine energy to the propeller of a ship without sacrificing the inherent flexibility of the present turbo-electric drive.

Problem 32. A thin coating, preferably transparent, which cannot be wet by water to overcome the problem of ice formation on an airfoil surface.

Problem 33. An aircraft fuel system controlled in such manner as to prevent completely vapor lock over a wide range of barometric pressures.

Problem 34. Means suitable for use by land troops permitting the use of liquid hydrocarbons having high potential energy as explosives providing the propelling force in lightweight large calibre weapons.

Problem 35. A lightweight and highly accurate hydraulic pump capable of rapid and infinite discharge volume regulation for use as gasoline injecting means on aircraft engines, the pump to be specifically designed for construction with a minimum of close machine work.

Problem 36. A welding unit adapted to form a satisfactory high strength weld of relatively thin sheet or thin membered structural aluminum alloy.

Problem 37. The development of a harmless compound to prevent, or at least partially neutralize, the effects of seasickness without adversely affecting the capacity of the user to perform his duties.

Problem 38. Portable means for projecting an inflammable liquid to a point at least 100 yards distant, coupled with means for lighting such liquid upon contact with the target.

Problem 39. Development of a lubricant to be used in place of copper in deep drawing of steel.

WORLD-WIDE CHEMISTRY



Standards issued by the Department of National Health permit the manufacture and sale of vitamin B white flour (Canada approved) as from April 1942. The new flour has a natural thiamin content of 2.64 micrograms per gram (400 I. U. per pound). Bread from the new flour appeared on the market shortly after the permissive regulations went into effect.

Discussion in the press as to merits of the new flour has been animated, with frequent reference to the United States vitamin enrichment plan and the long-extraction flour bread now on the market in Great Britain. Nutritionists and chemists have debated the subject quite fully, and it is fair to say that the general public has been given more than the usual amount of information.

Molasses Distribution Taken under Control

Nonedible cane molasses, high-test molasses, and sugar beet molasses have been declared "chemicals". Their distribution has been taken under control as they are regarded as essential raw materials, being largely used in industrial alcohol production. A recent announcement indicates that wheat may soon be used in Canada for alcohol production.

Gasoline Rationing in Canada Started April 1

As a measure of conservation, gasoline sales were subjected to a rationing scheme as of April 1. Coupon books issued to automobile license holders control the extent of gasoline purchases. Noncommercial motor vehicles are equated according to their gas consumption so that all may be driven approximately the same number of miles per coupon used. Special categories are provided to meet the needs of particular classes whose requirements are regarded as more than ordinarily important. The initial minimum allowance per car is 60 units or 300 gallons a year, with quarterly limits.

Tourists are allowed 20 units (100 Imperial gallons) during their first 48-hour stay in Canada, and special provision has been made to meet needs of those remaining for longer periods.

EDITOR'S NOTE. Those interested in further details should address the correspondent whose name and address appear for each country, and enclose sufficient international coupons to prepay the reply. United States stamps should not be sent.

Development of New Mineral Products Is Stimulated by War

A new development brought by the war has been the search for, discovery, and development of mineral products not formerly available from Canadian sources. The list of new products includes mercury, magnesium, tin, titanium, and tungsten. It is expected that more chromite and manganese will be produced. Cobalt production has been stimulated, and some attention has been given to output of molybdenum. During World War I Canada was an important source of molybdenum with several producing properties.

A tin concentration plant established in 1941 is working satisfactorily, and the electric furnace production of refined tin of 99+ per cent grade was commenced on a modest scale in April 1942. About two tons of tin are recovered from each 5,000 tons of tailings treated.

A new and very successful process for the manufacture of magnesium powder gives a better product than the ordinary processes at a lower cost.

Mercury is being produced for the first time in sufficient quantities to meet domestic needs with some available for export.

Medal Awarded for Magnesia Development

The medal of the Professional Institute of the Civil Service of Canada has been awarded to M. F. Goudge, Dominion Bureau of Mines, for his discovery of valuable deposits of brucitic limestone and development of a process for its concentration and the low-cost production of pure calcined magnesia in a form suitable for use in basic refractories and for making magnesium metal. His contribution has made possible the development of limestone deposits which hitherto have had little economic value.

New Plant Being Built to Produce Magnesium from Domestic Sources

The new ferrosilicon process for production of magnesium[2] worked out by L. M. Pidgeon, chemist on the staff of the Canadian National Research Council, is to be used in a large plant now under construction. Following several years of experimental work in the National Research Laboratories, a pilot plant was built by a group of leading Canadian industrialists who sponsored the development.

With full cooperation of the industry and the Department of Mines and Resources with the National Research Council, the required research and development work was done with greatest efficiency. Preparation of the raw material, domestic dolomite, was carried on in the mines laboratories while the initial experimental work and construction and operation of the pilot plant have been under direction of the National Research Laboratories. The new plant is being put up by the same group of industrial leaders with support of the Dominion Government.

National Research Council Helps Solve War Problems

In the National Research Laboratories at Ottawa, work has been expanded in several directions because of the war. In the chemistry and biology divisions especially the selection and testing of suitable materials for use of the armed forces has been a major problem. Specifications for materials normally bought in England had to be revised to conform with Canadian practice. All kinds of supplies had to be tested to determine whether they were acceptable according to required standards. Technical advice has been given as requested by the services in the specialized fields of science in which the council members are trained. Food storage and transport under war conditions presented many difficulties. Lack of refrigerated space and indeed lack of ocean shipping space made it necessary to devise new methods of handling perishable foodstuffs. The tremendous increase in volume of merchan-

[2] Killeffer, D. H., "Magnesium from Dolomite by Ferrosilicon Reduction", CHEM. ENG. NEWS, 20, 369 (1942).

dise being shipped and the limited number of cargo vessels available require that the best possible use be made of every inch of space. Refrigerated shipping space in vessels is now very limited, and serious problems have arisen in connection with the transport of the large volume of bacon to Great Britain. By use of portable refrigerating units and other devices it has been found possible to convert the ordinary uninsulated cargo hold into a refrigerated space for perishables.

Output of Industrial Minerals Is Increased

Those minerals which are used in industry in the raw or partly processed form were produced in Canada in 1941 to the value of $82,000,000, marking a gain of $13,000,000. The importance of these minerals is emphasized by the statement that the production of metals such as nickel, copper, lead, zinc, and aluminum, leading metallic minerals in Canada's long list, is directly dependent on adequate supplies of refractory materials for furnace linings, while the output of many chemical products is contingent upon the supply of such commodities as common salt, sodium carbonate, and sodium sulfate.

Some industrial minerals are not available from Canadian sources in adequate quantities for present needs. In this group are fluorspar, graphite, china clays, tungsten ores, chromium, and manganese. Iceland spar for optical instruments and quartz crystals with piezo-electric properties also are not available.

Research on Sulfite Liquors Encouraging

In Canada there are two plants making bakers' yeast from sugars present in sulfite liquor from pulp mills and one plant producing synthetic vanillin from the lignin fraction. Experimental work in the National Research Laboratories has shown that sulfite waste liquor may be readily converted into a suitable culture medium for the growth of fungi. Fungi are being used because they are among the most active of the microorganisms that break down the native lignin in plant materials in soils and composts. Many types of fungi have been tried and in general it appears that soil fungi offer more promising possibilities than do wood-destroying types. Several papers have appeared on this work recently in the *Canadian Journal of Research.*

Aluminates of Calcium Discussed by Thorvaldson

Thorbergur Thorvaldson, president of the Canadian Institute of Chemistry, recently spoke before members of the eastern Canadian branches of the institute on the structure of anhydrous and hydrated calcium aluminates and their relation to disintegration of cement. Professor Thorvaldson is head of the Department of Chemistry at the University of Saskatchewan at Saskatoon and has conducted research on cements for many years.

Canadian Chemists to Meet in Hamilton

The 1942 Canadian Chemists' Convention will be held in Hamilton, Ontario, June 1 and 2. Housing facilities will be provided for visiting chemists and guests at McMaster University.

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April 28, 1942



Little change is reported from British chemical markets, but the control system continues to grow. Latest development is the formation of a special department in the Miscellaneous Chemicals Control to deal with raw materials for the paint industry, although not all materials for the paint trade are under supervision of the new department which will have to maintain close contacts with other authorities. Self-government in industries consuming chemical products has made progress through establishment of a Rayon Council and a consulting council for the glass trade. Both these new bodies will help to rationalize production, an objective which cannot but affect the sale of chemicals. The paint industry has applied for Essential Works status, but the Ministry of Supply is preparing an alternative scheme for organization on a speciality basis. In any case production will be curtailed as far as is consistent with war needs. Rationalization in the manufacture of glass substitutes and antiscatter treatments is to be achieved by an order of the Ministry of Works which restricts their production to 36 types of glass substitutes instead of over 300 now on the market and 23 types of antiscatter treatment instead of 250. War emergency standard specifications have been issued for red lead ready-mixed paints. Production and supply of China clay have been made subject to license.

Record Highs Expected in Spring Fertilizer Consumption Statistics

When statistics are available, consumption of chemical fertilizers in British agriculture this spring will probably be the highest on record, thanks to increased acreage and official encouragement of fertilizing. As potassic and phosphatic fertilizers are in short supply and sold only for special purposes, however, the chemical balance of artificial fertilizing may be upset with detriment to the quality of the crop. To ensure that all available supplies of phosphates are used now, forward sales of potassic and phosphatic fertilizers have been prohibited until the middle of June.

A means of increasing the fertilizer effect of ammonium sulfate is the sprinkling of wetted straw with the chemical, sufficient powdered chalk being added to keep the whole slightly alkaline. The resulting material, which is called synthetic farmyard manure, must be kept moist and turned at intervals of 1 to 2 months until it is rotted down. It is an example of the growing use of chemicals in agriculture for the treatment of waste products. Another illustration is the treatment of straw with sodium hydroxide for feeding purposes.

New Type of Synthetic Plastics Made in England

Methyl silicons are new types of synthetic resins made in England. They are condensation products prepared by hydrolyzing methyl silicon chloride, bromide or iodide. The density is stated to be 1.19 grams per cc.; the refractory index 1.423. The material contains an average of 1.41 methyl groups per silicon atom. It oxidizes at 300° C. but may in a vacuum be taken to 550° C. without adverse effect. It is insoluble in water, alcohol, and glycol, and clear, colorless, and nonsticky if solid, but similar products are prepared in a solvent like ether for liquid coating compositions for use on metal wires, glass fiber, asbestos, and mica products. The solid product retains its shape at very high temperatures and in thermosetting properties is superior to all other known silicons. Applications suggested for the new materials are concerned mainly with electrical insulation, heat resistance, sealing of vacuum-tight joints, and improvement of known coating materials.

Metal of Higher Purity from Light Metal Scrap

The increased utilization of light metal scrap makes the selection of suitable chemicals for fluxes a matter of increased importance. Most fluxes in use contain an alkaline fluoride, usually sodium fluoride or cryolite, as the oxide remover and another substance to lower the melting point. For the latter purposes calcium, potassium, or sodium chloride, and calcium and sodium carbonate are employed. There is a tendency to improve and differentiate the properties of fluxes to meet

special requirements and to recover metal of a purity grade which permits its use for purposes where secondary metal would normally not be employed. Alkali borofluorides and double chlorides of titanium or vanadium are used to introduce these elements.

Lac Solutions Used with Metallic Pigments

Use of certain lac solutions in connection with metallic pigments such as bronze and aluminum, for which spirit varnish cannot be used because of its acidity, is suggested by the Shellac Research Bureau. When solutions of lac in methylated spirit are refluxed with certain metallic oxides, viscosity increases. The formation of the salt of lac is not the only reaction which occurs and the product can be dissolved in the usual organic solvents generally used for the resin, giving solutions possessing abnormally high viscosities. Solutions obtained by refluxing with metallic oxides or by adding aqueous solutions of metallic salts to alkaline solutions of lac give hard and glossy films which possess increased toleration for plasticizers. Basic pigments, such as zinc oxide and white lead, can safely be incorporated into lac varnishes treated with suitable metallic oxides.

Many Applications Found for Synthetic Magnesium Silicate

Synthetic magnesium silicate was mentioned by C. S. Garland in the presidential address to the Institution of Chemical Engineers. It is made from chemically prepared magnesia and quartz and is distinguished by having the lowest loss factor for high frequencies of any product so far known. It lends itself to sawing, grinding, drilling, and shaping, is very hard, tough, and elastic, possesses high compressive strength, and takes a high degree of polish. Synthetic magnesium silicate may be varied in its properties by application of suitable temperatures in firing. When the firing was stopped at 900° C., a product hard enough for handling and working and yet soft enough to be treated in the same way as a nonferrous metal was obtained. Synthetic magnesium silicate provides a good material for water-lubricated gears and bearings; it may take the place of mica in many connections concerning the construction of resonant circuits, and it plays an important part in short-wave transmission.

Imperial Chemical Forms Pharmaceutical Subsidiary

Imperial Chemical Industries, Ltd., has announced formation of a new subsidiary, I. C. I. (Pharmaceuticals), Ltd., with a capital of £500,000 (equivalent to $2,000,000). Together with organisation of the Therapeutical Research Corp. by Boots, British Drug Houses, Glaxo, May & Baker, and Wellcome Foundation last November, this is the most important chemical company formed in wartime. The latter company was also capitalized with £500,000, but it was to engage solely in research, whereas the new I. C. I. subsibidary is to act as manufacturers and dealers of fine chemicals, scientific apparatus and materials, oils, colors, dyeware, etc., as well as conducting research on a large scale. The British pharmaceutical industry has been faced with many problems which could not be foreseen when war broke out. Full cooperation and coordination, not only of industrial capacity but of research, has been necessary to meet requirements of the Government and armed forces. While civilian consumption of medicinal products is restricted and as far as possible directed into channels where essential goods in short supply are not affected, output of British pharmaceutical factories must be increased further.

German Manufacturer's Rights Are Acquired

The stocks, good will, and British rights of Schering, Ltd., a subsidiary of the German pharmaceutical manufacturers, were acquired in August 1941, by a British group from the Board of Trade. Three associated companies are now stated to be in active operation: British Schering Research Laboratories, Ltd.; British Schering Manufacturing Laboratories, Ltd.; and British Schering, Ltd. The latter handles distribution.

Special Grade Glauber's Salt Is Made in England

Granular, free running, desiccated Glauber's salt, technically free from iron (corresponding to the old German Duisburg standard), is now being made by a British firm.

Activated Gas-Coke Used for Gas Producers

Use of producer gas as a substitute for liquid motor fuels has made great headway in Great Britain as in Continental Europe during the past two years, although progress has necessarily been retarded by the need to conserve supplies of construction materials and engineering products for suitable equipment. For this reason the British government has abstained from encouraging extension of gas generator propulsion for road vehicles, while on the Continent all kinds of solid fuels are being used for gas producers, including soft wood, charcoal, anthracite, lignite, and turf briquets. In Great Britain the emphasis has shifted markedly toward gas coke of special quality treated with sodium carbonate to give high reactivity. Alkali-activated gas coke and specially prepared low-temperature cokes appear to be the best fuels for operating portable gas producers, and the opinion is expressed that, if the need should arise, a considerable proportion of the British road transport could be transferred from gasoline to producer gas. As for the economic side, one road transport enterprise which has up to now used producer gas vehicles over an aggregate of more than 1,000,000 miles reports that the cost of operation is higher than in the case of Diesel oil but lower than with gasoline. Provided the supply of suitable fuels at reasonable price is adequate, at least part of the British road transport system may permanently be served by producer gas vehicles on the basis of anthracite and activated coke.

No More Tartaric Acid to Be Available to Bakers

Supplies of tartaric acid and cream of tartar in Great Britain have been on a limited scale for a long time. The Ministry of Food has announced that when the present small stocks are exhausted further quantities may not be available for the baking industry. Pyro cream powder and calcium phosphate which are still available are mentioned as suitable alternatives.

Cooperation in Research on and Utilization of Fuel Urged

The growing demands for coal and other fuels, in the face of a limited output which cannot be increased unless miners are released from the armed forces, will before long compel the authorities to introduce fuel rationing. A system based on point rationing of coal, gas, and electricity is foreseen and will help conserve fuel for essential industrial purposes. The need to save coal is reflected in the fuel economy drive of the authorities and in efforts to reduce fuel demands as a whole by selection of manufactured fuels for purposes where they have a definite advantage.

These developments have an acute bearing on fuel research. E. W. Smith, director-general of gas supply, made a plea for coordination of research between the British Coal Utilisation Research Association, Gas Research Board, coke research organizations connected with the coking industry, and fuel research of the iron and steel industries. Under the direction of a first-class administrator separate directors should be responsible for each branch of the work. The actual research men ought to be able to devote their time to thinking

and directing, while the analytical work and other odds and ends should be done in the affiliated service departments.

Tin Economy Affects Welsh Tinplate Industry

Changes in the tin supply position have necessitated important economies in the use of tin for various industrial purposes, and the tinplate industry, which despite diminution of the export trade is still one of the principal tin consumers in the British Isles, has to contribute materially to the savings. The effect of these changes on the chemical trade is twofold. On the one hand, tinplate is replaced in many cases by lacquer-coated sheets for which chemicals are required. On the other hand, the need to economize in the use of tin where tinplate is essential gives an advantage to methods of production which help save tin by keeping the coating as thin as possible. The alkaline tinplating process has been used for some time and is applied widely where fabricated articles from steel, copper, bronze, etc., are to be coated with tin as light as 0.0025 mm., although thick coatings to 0.075 mm. are also possible. The constituents of the alkaline tinplating bath are sodium stannate, the tin usually obtained from scrap tinplate, caustic soda, sodium acetate, and hydrogen peroxide. Organic agents are occasionally added.

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April 22, 1942

Paper Stock Shortage Reported from Dublin

An unfavorable situation in Irish paper stocks, due to declining imports, is reported from Dublin. Prices for newsprint, among other items, have advanced to an extent that Dublin papers have been forced to increase their price per copy.

Apart from certain small shipments of newsprint paper arranged for, there is said to be little prospect of further imports of this type and the small output of domestic mills is not sufficient to help the situation. Excluding newsprint, the annual amount of paper and cardboard imported has ranged around 27,000 tons, but under current conditions imports will be only about one fifth of that.

Plans are under way at one of the largest mills of the country to use wheat straw for paper production, thus utilizing extensive accumulations of a ready material which will not affect other requirements.

All iodine imported by Guatemala is for medicinal purposes except for a small quantity used by a leading lithographer. Imports have averaged 291.5 pounds annually in 1938–41, but fluctuate from year to year.

War Stimulates Brazil's Demand for Chemicals

Active demand for chemicals in Brazil during the past year is attributed to a number of conditions partly arising from the war. Restricted shipments of goods from abroad with consequent stimulus to local production have led to industrial demand for chemicals, such as a need for refrigerants by a plant contemplated at Rio de Janeiro for refrigerating oranges. Plants, either actually operating or planned, will make airplane motors, plastics, glass, sodium hydroxide, beverages, cement, aluminum, paper, cloth sacks, and textiles from native fibers—all requiring imported chemicals of various kinds.

Sales of Insecticides to Paraguay by U. S. Slump

A great drop in United States sales of agricultural insecticides to Paraguay is indicated by latest reports. In 1939 the United States shipped 31,300 pounds valued at $5,600, compared with 800 pounds at $65 value in 1940. Meanwhile advertisements have appeared in the press of the country for lead arsenate, sulfur, sodium nitrate, potassium sulfate, and carbon disulfide.

Bulk of Chile's Potassium Chlorate Comes from U. S.

The United States in 1940 supplied 60 per cent of Chile's requirements of imported potassium chlorate. The total incoming shipments amounted to 133,600 kg. While this compares with 137,000 kg. the year before, there has been a decided shift of emphasis on origin of supplies. In 1937 and 1938 Germany furnished nearly all such imports by Chile, while in 1939 Finland and Sweden supplied the bulk. The commodity is used principally in manufacture of matches, and to a lesser degree by the pharmaceutical industry in preparing antiseptics, astringents, gargles, and mouth washes.

Brazil Is Important U. S. Gluestock Source

Brazil has, in the past two years, assumed an increasingly important place among sources of glue-making materials for the United States, according to recent trade figures. For the first nine months of 1941 imports of hide cuttings from Brazil into the United States amounted to 830,000 pounds valued at $18,400. In the previous year these figures were 655,150 pounds at $11,600 for the calendar year, and none at all in 1939.

The state of Rio Grande do Sul is the largest livestock raising district in Brazil, and large amounts of hide fleshings, or gluestock, are available from meat packing plants, jerked beef manufacturing plants, and tanneries. The two most important packing plants are branches of American firms which ship gluestock products regularly to their headquarters in the United States.

Numerous meat plants and tanneries scattered throughout the state and varying in size and importance produce a fairly large amount of such materials. Only a part is absorbed in the domestic glue industry. Packing plants probably purchase a good percentage for eventual export, and it is believed that practically all hide fleshings suitable for glue manufacture are shipped dry to other points either abroad or in Brazil.

El Salvador Ceases to Import Potassium Chlorate

No imports during 1941 of potassium chlorate were reported from El Salvador, where formerly the chemical was required in match manufacture and for locally hand-made rockets and bombs used in public celebrations of holidays and other occasions, as well as for pharmaceuticals. In 1940 imports were nearly 10 short tons and in 1939, 14 short tons.

Brazil Produces 400 to 500 Tons Carnauba Wax Yearly

Brazil is estimated to have an annual production of carnauba wax in Bahia state of between 400 and 500 metric tons annually. Production in 1941 was indicated at 450 tons, compared with 350 for the previous year. The only grade produced in Bahia is a fatty grease type. The entire output is exported, the latest figure amounting to 439,766 kg., of which 96 per cent was destined for the United States.

Demand in Peru for Sodium Hydroxide Gains

Peru reports an expanding demand for sodium hydroxide incident to increased activity of the soap, lard, and oil industries which use this product, in addition, to sugar factories, textile and paper mills, and mining concerns. The upward trend has been noted particularly for 1939, 1940, and 1941, with the United States and United Kingdom supplying the bulk of Peruvian requirements over the past 10 years.

Canada to Pipe Petroleum for Synthetic Rubber from U. S.

Canada is formulating plans to manufacture synthetic rubber from petroleum piped from the midcontinent fields of the United States, according to the U. S. Department of Commerce. Work on a plant to be erected in Sarnia, Ontario, the terminus of Imperial Oil's pipe line, will be started "as soon as possible" and is expected to be completed in 15 months.

Supreme Court Decides Ethylene Oxide Suit

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On March 30, 1942, the Supreme Court of the United States handed down a decision holding that Reissue Patent No. 20,370 is not for the same invention described and claimed and intended to be secured by the original patent and, therefore, is void.

By way of background, the suit in the District Court was based upon claims 8 and 9 of Reissue Patent No. 20,370, dated May 18, 1937, which the plaintiff, the Carbide & Carbon Chemicals Corp., acquired by assignment from one Theodore Emile Lefort, of Paris, France, to whom the original United States Patent No. 1,998,878 was issued on April 23, 1935, upon application dated March 22, 1932. This original patent was based upon a process developed by Lefort in France, and patented there March 27, 1931.

The process for preparing ethylene oxide, as described and claimed in the original patent, consisted substantially in the passage of a mixture of ethylene gas and air through a tube containing a silver catalyst heated to a controlled temperature between approximately 150° C. and 400° C. The direct combination of the oxygen in the air with the ethylene produces ethylene oxide.

In carrying out the process, a side reaction also occurs in which there is a destructive oxidation of some of the ethylene, producing carbon dioxide and water. It is pointed out in the original patent that the efficiency of the ethylene oxide-forming reaction is increased by diminishing the carbon dioxide formed in this side reaction, as by introducing water or carbon dioxide into the reacting gases. The effect probably is caused by the partial pressure of the water or carbon dioxide gases introduced.

Several examples are mentioned in the specification of the original patent illustrative of the operation of the process, but nowhere in them, or in the original claims, is the introduction of water treated as optional or permissive.

Carbide and Carbon Chemicals Corp. after acquiring the title to the original patent, applied for a reissue patent realizing that ethylene oxide could be produced by passing ethylene and air over a catalyst at the temperature described in the original patent without the voluntary introduction of water into the reaction zone. A reissue patent was allowed with additional claims 8 and 9 which were broader than the original claims by the omission of the step of positively introducing water in one form or another into the reaction mixture. The argument advanced for the allowance of reissue claims 8 and 9 was bottomed upon the fact that a certain amount of water was necessarily present in the reaction chamber, owing to the side reaction which gives carbon dioxide and water, and that the introduction of additional water or carbon dioxide was merely permissive in order to augment the quantities already formed by that side reaction.

The suit was initiated in the U. S. District Court for Maryland by the Carbide and Carbon Chemicals Corp. against U. S. Industrial Chemicals, Inc. The District Court held the reissue patent valid and infringed (34 F. Supp. 813.). The Circuit Court of Appeals affirmed the decision (121 F. 2d. 665.).

The Supreme Court, in reversing the decisions of the lower courts, took the position that the original patent included a step of introducing water into the reaction, which step originally was not designated as optional or desirable but described and claimed as an integral part of the whole operation in preparing ethylene oxide. In contrast, the reissue patent treats this step of introducing water as immaterial or optional and for the mere purpose of controlling the temperature in the reaction zone, a thought not even suggested by the specification of the original patent.

In effect, the reissue patent omitted the step of positively introducing water in the process of preparing ethylene oxide, which step was described, claimed, and considered as essential in the original patent when viewed in the light of its context. The Supreme Court has uniformly held that the omission from a reissue patent of one of the steps in a process, which step was considered essential as described in the original patent, thus to broaden the claims of the reissue to cover a new and different combination of process steps, renders the reissue patent void, even though the result attained is the same as that brought about by following the process claimed in the original patent.

Process for Nonfogging Materials Patented

The nonfogging properties of such military items as gas masks, respirator eye and face pieces, and observation panels of aircraft would be increased by processes described in four United States patents granted to Celanese Corp. of America, New York, N. Y. All four patents, 2,280,055, 2,280,097, 2,280,098, and 2,280,452, relate to nonfogging sheet material made of cellulose acetate or similar material.

The material may be made by superficially saponifying one side only of cellulose acetate sheet material so that one side is more capable of absorbing moisture than the other. The nonfogging material can also be made by laminating a sheet of cellulose acetate resistant to moisture with another sheet of cellulose acetate material capable of absorbing moisture readily.

Patents on Stretching Artificial Cellulose Acetate Yarns

The Celanese Corp. of America, New York, N. Y., has been granted United States patents 2,279,478 and 2,279,479 relating to a process and apparatus for the stretching of artificial cellulose acetate yarns, foils, and similar materials.

Staple-Fibers of Cellulose Acetate

A refinement in the process of making staple fibers of cellulose acetate for the manufacture of fluffy or napped fabrics, either woven or knitted, which do not readily shed the individual fibers is indicated in U. S. Patent 2,281,647 granted to the Celanese Corp. of America, New York, N. Y. As a result of this discovery it is possible to use cellulose acetate staple fibers for the manufacture of fabrics suitable for making blankets, ski suits, lumber jackets, and other similar materials.

Monsanto's President Advocates Suspension of 40-Hour Week

Suspension for the duration of the war of the 40-hour week, patent laws, antitrust laws, and adoption of a firm attitude by the Administration on such controversial issues as the closed shop and the check off to permit unhindered pursuit of the war production program were advocated by Edgar M. Queeny, president of Monsanto Chemical Co., at the recent annual meeting of Monsanto stockholders in St. Louis. His comments were in answer to a question put by a stockholder from the floor.

He stressed that the 40-hour week has not as yet hampered Monsanto construction or operation, even though the company's plants have operated around the clock seven days a week for years. He said, however, that the limitation on hours had increased the cost of construction and in some cases the cost of operation. But these additional costs, he stated, have been borne largely by the Government, either because the Government is paying for plants or because the extra production costs caused by overtime payment have reduced profits which, in turn, have reduced the company's federal tax contribution to the extent of 72 per cent.



POTOMAC POSTSCRIPTS

WPB Activities

Alcohol. Beverage alcohol from 100 to 189 proof, known in industry as "high wine", is placed under complete allocation control in Amendment 1 to Order M-69. Distillers must deliver specified quantities to rectifying plants for redistillation into 190 proof alcohol to augment the Nation's industrial alcohol supply. Each producer also is required to report to the Chemicals Branch, WPB, the quantity of high wine his distillery is capable of producing and his entire storage facilities.

Diversion of beverage alcohol is not expected to curtail seriously the supply of whisky in the country as only a few days' run from each distillery will be required. Use of high wines to make industrial alcohol is being carried on voluntarily by 25 distilleries at the request of WPB, and the new order will make possible extension of this program throughout the country.

Aluminum and Magnesium Plants. Suppliers of materials used in construction of vital aluminum and magnesium plants have been advised by WPB that deliveries should be made on schedule even though subsequent orders assigned under Preference Rating Order P-19-i carry higher preference ratings. The ruling was made in Interpretation 1 of P-19-i which covers materials used in essential civilian construction. It was necessary, WPB said, to prevent any delay in delivery which might result from a misunderstanding of the original order.

Antifreeze. Production of antifreeze is placed upon a quota basis by Order L-51. Quotas have not yet been set, but they are expected to approximate 50 per cent of the amount of antifreeze sold by each producer in 1941. Antifreeze manufactured for the Army, Navy, other governmental agencies, Lend-Lease, or for the governments of the British Empire, Belgium, China, Greece, the Netherlands, Norway, Poland, Russia, and Yugoslavia may be made in addition to quotas.

Buna S Synthetic Rubber. WPB has authorized the Reconstruction Finance Corporation to provide facilities for an annual productive capacity of 700,000 tons of Buna S synthetic rubber to be in operation not later than the end of 1943. This represents an increase of 100,000 tons in the Buna S program previously authorized by the War Production Board, and is in addition to the planned capacity for butyl synthetic rubber and neoprene totaling 100,000 tons.

The 700,000-ton Buna S program is to be given all the priority and allocation assistance needed to assure the production of not less than 350,000 tons during 1943. All the synthetic rubber to be produced for many months must be reserved for military uses, and none will be available for civilian uses.

Cellophane. Charging willful violation of the cellophane limitation order, WPB has withdrawn all priority assistance from the Everett Sales and Equipment Corp., New York, for one month and at the same time prohibited the firm from accepting or delivering any cellophane or similar transparent material derived from cellulose. After May 10, 10 days after the effective date of Suspension Order S-44, the Everett company was also enjoined from cutting or processing any cellophane.

Chlorinated Solvents. Changed preference ratings for all permitted uses of chlorinated hydrocarbon solvents have been announced with amendment of Order M-41. The order extends A-10 ratings for such solvents to be used in the fumigation of stored products, including grain; for charging and recharging fire extinguishers; for laboratories, hospitals, and public institutions; for processing and manufacturing food, chemicals, rubber, petroleum, and plywood; for cleaning metal parts of electrical equipment; for manufacture of refrigerants; and for degreasing machines used in manufacture of war materials.

B-2 ratings are assigned for degreasing machines other than those used on Army and Navy contracts; for packaged spotting and cleaning preparations; for dry cleaning establishments; and for manual cleaning of other than metal parts of electrical equipment. No other uses of chlorinated hydrocarbon solvents are permitted, with the exception that quantities up to 1 gallon may be purchased without a preference certificate or a rating. B-2 ratings are restricted to 50 per cent of average monthly consumption in the base period set up in the order. The previous order was due to expire on May 15.

Chlorine. Because the wording of Order M-19 relating to chlorine would have required the filing of monthly reports by thousands of retail stores, it has been amended to remove that provision. The reports never have been required because the effective date of the order was postponed to permit the changes announced.

Electric Power. When WPB issued Order L-94 recently, it set up machinery to handle power shortages wherever and whenever they occur in this country. Two main lines of action against power shortages are set out in the order. The first, which went into operation at once, requires each utility to operate its facilities and interchange power with other utilities in a manner that will "achieve the maximum coordination of power supply for war production and essential civilian uses, and for relief of power shortages". Such operations include making available the maximum amount of power at peak periods, using water power as much as possible to save fuel, and maintaining as much reservoir storage as possible. No utility is permitted to abandon any of its generating facilities except upon authorization by the WPB.

The second part of the program, which will be put into operation when and where a shortage occurs, establishes machinery for mandatory curtailment of power from commercial, industrial, and residential consumers. Consumers exempt from the curtailment consist of governmental and community services, such as street lights and power for hospitals and schools; transportation services; communications services; military establishments; and plants engaged exclusively in war production.

Indian Kyanite, including andalusite and sillimanite, a super-duty refractory used in furnaces where extremely high temperatures are necessary, has gone under complete allocation control. The order, M-143, provides that delivery, consumption, and processing of Indian kyanite, both future imports and present stocks in the United States, are subject to specific authorization. Consumption is restricted to necessary uses. Suppliers and consumers using kyanite in the manufacture of a refractory must file with WPB monthly reports on Form PD-466.

Metallic Coatings. Schedule V to Order L-42 prohibiting the use of metallic coatings for finishing purposes has been revised to bar the use of chromium, nickel, cadmium, copper, and copper-base alloy only. This action was taken after the Lead and Zinc Branches of the Materials Division advised that at present quantities of lead and zinc are sufficient to supply the small amount needed for finishing purposes. The amendment also removes all restrictions on the use of materials in fitting and trim made for chemical plants, research laboratories, hospitals, vessels other than pleasure craft, and airplanes, where use of noncritical materials is impractical.

Naphthalene. Distribution of naphthalene will be under rigid allocation control, commencing June 1, by terms of Conservation Order M-105. After that date, except for certain exempted types of delivery, all naphthalene shipped by a producer or distributor must be delivered in accordance with schedules issued by the Director of Industry Operations at the

beginning of each calendar month. Intracompany or intraplant deliveries of naphthalene are subject to the restrictions if the deliveries are made for further processing or manufacturing into another product. Users of naphthalene desiring allocations of the chemical should make application on forms PD-434 and PD-435.

Naphthenates and naphthenic acid will also go under strict use and allocation control June 1. Use of driers containing more than 40 per cent of naphthenates by weight in the manufacture of paints and varnishes is restricted to orders rated A-2 or higher, and use of naphthenates is restricted to orders rated A-10 or higher. Inventory allocation and other restrictions do not apply to imported naphthenic acid. Form PD-439 is provided for applications for naphthenic acid and Form PD-438 for monthly reports from producers.

Phosphate Rock. Order M-149 removes the minimum working inventory restrictions of Priorities Regulation 1 and any other inventory restrictions, in so far as they apply to phosphate rock, to permit consumers to take advantage of transportation facilities when they are available. Approximately 75 per cent of phosphate rock is used in production of fertilizers. The remainder is used in chemical warfare, manufacture of baking powder, and soaps, water-softening compounds, and boiler cleansers.

Rubber Substitutes of the general type of Koroseal and Vinylite have been made subject to direct allocation by an amendment to General Preference Order M-10. The order as originally issued in June 1941 and amended last December included only polymerized vinyl chloride and its copolymer with vinyl acetate, containing 92 per cent or more of vinyl chloride. The new amendment brings under the restriction all copolymers of polyvinyl chloride and all copolymers and polymers of vinyl chloride.

Totaquine. Distribution and use of totaquine, except as an antimalaria agent, has been prohibited to prevent an evasion of the intent of Conservation Order M-131 on quinine. After issuance of the original quinine order on April 4, some drug manufacturers began to use totaquine, which was not covered by the order, for the same purposes for which quinine had been prohibited.

Totaquine is a substance made up of several of the alkaloids extracted from cinchona bark, and containing some quinine. The substance had never before been produced commercially in this country. The amended order requires that the primary use of cinchona bark must be for the extraction of quinine or totaquine, and limits the use of the latter substance to antimalaria purposes. Quinine may be used for two additional minor medical purposes.

Zinc Sulfide Pigments. A monthly producer's pool in zinc sulfide pigments, of which lithopone is the principal product, has been established. Order M-128 provides that the Director of Industry Operations will set up by the 15th of each month a percentage of all classes of lithopone manufactured, to be set aside for the following month. Mandatory orders will be filled from this pool, after which other production may be sold without restriction. Exports of lithopone other than Lend-Lease cannot be made except upon application to the War Production Board on Form PD-464.

Prices on Machines and Parts Set

A COMPREHENSIVE regulation establishes maximum prices for machines and parts not covered by other price schedules. All outstanding "freeze" letters and informal agreements covering machinery are superseded by the new measure, Maximum Price Regulation 136, part of OPA's overall formal price stabilization program.

Effective May 18, the regulation specifies October 1, 1941, prices for the machines and parts it covers at all levels of distribution except retail. October 1 rentals for machines are also established as maximum rentals. Specifically excluded are certain subcontracted parts and subassemblies manufactured for incorporation into another machine by the buyer. This will exclude many specially-designed parts for munitions. Informal price action is expected in this field in the near future. The arms production expansion program is still in a transitional phase through farming out of parts orders by prime war goods contractors, and OPA deemed it impractical to draw up maximum regulations for such items until the production cost picture had further jelled.

The regulation also states formulas for maximum prices for rebuilt used machines and parts and other second-hand units.

Commodities Allocated to American Republics

ADDITIONAL commodities have been allocated to the other American Republics for the second quarter of 1942. The list, announced jointly by the Department of State, Board of Economic Warfare, and War Production Board, supplements allocations announced on April 4 and comprises the following materials: iron and steel, lead, natural amorphous graphite, fluorspar, uranium salts and compounds, ascorbic acid, thiamine hydrochloride, sulfanilimide, sulfaguanidine, cranes, hoists, and derricks, and mechanical household refrigerators.

Pennsylvania Salt Plans War Plant

CONSTRUCTION and operation of a new plant in the Philadelphia area for manufacture of materials used in war production have been arranged between the Government and the Pennsylvania Salt Manufacturing Co. Financing of the plant, expected to be in operation within six months, will be provided by the Defense Plant Corporation and is expected to involve $1,750,000.

Priorities Listing Revised

PRIORITIES in Force", issued by WPB's Division of Information, has been revised to include the original booklet and weekly supplements in one complete alphabetical listing through March 31, 1942. Copies may be obtained from Room 1501, Social Security Building, Washington, D. C.

Hearing on Canned Shrimp

A PUBLIC hearing to gather evidence for standards of fill of container for canned wet pack shrimp and canned dry pack shrimp, in nontransparent containers, will be held at 10:00 A. M., June 3, in Room 1039, South Building, Independence Avenue between 12th and 14th Streets, S. W., Washington, D. C. The full notice is published in the *Federal Register* for May 2, obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C.

1942 Fertilizer Sales Rise

MARCH fertilizer sales, as indicated by the sale of tax tags and reported by the National Fertilizer Association, amounted to 1,156,000 tons in the 17 reporting states. This represented a decrease of 22 per cent from March 1941. However, total sales for the first quarter of the year were 24 per cent greater than for the corresponding period of 1941. The picture is abnormal this year due to early buying of fertilizer by the farmers, as the seasonal peak normally occurs in March.

New Synthetic Ammonia Plant Planned

PLANS for the immediate erection of a plant that will substantially increase our supply of ammonia and its derivatives have been announced by Mathieson Alkali Works, Inc., New York, N. Y.

In accordance with the terms of the contract the new plant will be financed by the Defense Plant Corporation and will be erected and operated under lease by the Mathieson organization. The ammonia will be produced synthetically through the use of a modification of existing methods.

Swift Sponsors University Nutritional Studies

The University of Rochester has received from Swift & Co., Chicago, a grant to be used under direction of John R. Murlin in a study of meat protein intake and efficiency. This work will involve a study of meats as compared with other high-protein foods as sources of muscular energy and a study of the influence of high-protein diets on muscular efficiency and muscular endurance at different rates of work. Dr. Murlin is professor of physiology and director of the Department of Vital Economics at the university and is chairman of the Committee on Research, Food and Nutrition Board, National Research Council.

A Swift grant at Pennsylvania State College for 1942 will be used under direction of R. Adams Dutcher in the study of factors influencing the value of pork as a source of the vitamin B complex in the human diet. R. C. Miller, Department of Agricultural and Biological Chemistry, and P. T. Ziegler, meat expert in the Department of Animal Husbandry, will also participate in the work. Professor Dutcher proposes to study the vitamin B complex content of pork from the standpoint of feeding of the hogs from which the pork originated, handling and storage of the meat before reaching the consumer, various commercial processing methods, and various cooking methods.

At Cornell University a Swift fellowship has as its main purpose work on the riboflavin content of foodstuffs. Included in the investigation will be the determination of the effect of manufacturing processes and cooking upon this vitamin in ordinary foods. This award has been made jointly to L. A. Maynard and L. C. Norris.

The University of Chicago also has received from Swift & Co. a grant to be used under the direction of Alexander Brunschwig for research in parenteral alimentation with fat. Knowledge gained from this study will be of particular value in the nutrition of patients undergoing major surgical operations and patients suffering from certain diseases. Dr. Brunschwig is professor of surgery at the University of Chicago.

A Swift grant at Kansas State College of Agriculture and Applied Science for 1942 is to be used to support work on the nutritive properties of dried eggs. R. M. Conrad, assistant professor of poultry chemistry, will direct the investigation. The effect of spray drying procedure on the nutritive value of eggs, and the effect of the diet of the hen on the stability and the food value of the dried product are important factors that will be considered. The need for stable and concentrated food products that will keep until consumed and that require the least amount of shipping space is of pressing importance.

In a talk entitled "Industrial Efficiency from the Point of View of Industry and the Manufacturer", delivered by James F. Lincoln, of the Lincoln Electric Co., Cleveland, before the convention of the Associated Business Papers on May 7 at Seaview Country Club, Absecon, N. J., the point was made that the most critical material shortage facing our war effort is manufacturing brains and skill.



Top. Audience during talks by A. C. S. Student Affiliates at the recent regional meeting at St. Thomas. *Center.* Recreation period. *Bottom.* Supper in Ireland Hall.



College of St. Thomas Student Affiliate Chapter of the AMERICAN CHEMICAL SOCIETY

Student Affiliate Chapters Hold Regional Meeting

READING of student chemical papers highlighted the regional meeting of 65 A. C. S. Student Affiliates from Hamline University, College of St. Thomas, and the University of Minnesota and their guests from other Minnesota institutions on the St. Thomas campus, St. Paul, May 3.

Eugene McMullen, Chairman of the St. Thomas Chapter, opened the afternoon session with a welcoming address answered by Robert Frericks, Chairman of the Hamline Chapter, and Allen Matthews, Chairman of the University of Minnesota Chapter. Speakers were Alfred Stepan, a senior at St. Thomas, on "The Life and Work of Father Nieuwland"; Sherman Johnsen, of the University of Minnesota, on "Dithizones"; and Leonard Brown, of Hamline University, on "Hydroponics". In the evening Lee Irvin Smith, chief of the division of organic chemistry at the University of Minnesota, addressed the affiliates on "Use of Chemicals in Warfare".

The idea of a joint meeting of the affiliate groups in the vicinity originated with James J. Carney, professor of organic chemistry and faculty adviser for the St. Thomas Student Affiliate Chapter. As general chairman of the meeting, Eugene McMullen was assisted by James B. Gergen, chairman of the Program Committee, and John F. Nobis, chairman of the Arrangements Committee.



Left to right. John Nobis, chairman of Arrangements Committee for the Student Affiliate meeting; James J. Carney, faculty adviser; Lee Irvin Smith, principal speaker; William J. Tomsicek, chairman of the St. Thomas Department of Chemistry; James Gergen, chairman of Program Committee; Eugene McMullen, general chairman.

Summer Conference on Spectroscopy

A SUMMER Conference on Spectroscopy and Its Applications, to be sponsored jointly by the Optical Society of America and the Massachusetts Institute of Technology, will be held in Cambridge at M. I. T. on July 20, 21, and 22.

A Symposium on Fluorescence and Phosphorescence is planned in connection with the conference. Admittance to the conference will be by reservation. Further information and tickets can be obtained from George R. Harrison, Massachusetts Institute of Technology, Cambridge, Mass.

The usual courses in spectroscopy will not be given at the Massachusetts Institute of Technology this summer.

M. I. T. to Give Industrial Statistics Course

THE fourth summer course in industrial statistics will be given by Massachusetts Institute of Technology from June 15 to 27. The course is intended for workers in industrial plants and scientific laboratories who would like to acquire the rudiments of modern statistical technique as applied to inspections, design and analysis of factory and laboratory experiments, and control of the quality of industrial output.

Tuition fee is $40, and registrations will be limited to 20 persons. Dormitory accommodations will be open on the campus at $1.00 per day per occupant. Application should be made to the Director of Admissions at the institute, Cambridge, Mass., and direct inquiries to the instructors of the course to George P. Wadsworth, Department of Mathematics, and Harold A. Freeman, Department of Economics and Social Science.

NEWS-MAKERS

C. E. Bergamini has been appointed chief chemist of E. F. Timme & Son, Woonsocket, R. I.

M. R. Bhagwat, formerly closely associated with welfare activities among chemists and chemical engineers in New York, first secretary and later secretary and manager of the Chemists Advisory Council, is now chemical engineer in the Research Division, Mathieson Alkali Works (Inc.), Niagara Falls, N. Y.



F. E. Bibbins

F. E. Bibbins, chief pharmacist of Eli Lilly and Company, Indianapolis, Ind., has received the honorary degree of doctor of science from Purdue University for his contributions to the science and art of pharmacy through original investigations that have resulted in new and improved medicinal products.



Johannes H. Bruun

Johannes H. Bruun has resigned his position as manager of the Experimental Division of the Sun Oil Co. to become chief, Process Development Department, General Aniline Works Division, General Aniline & Film Corp., 435 Hudson St., New York, N. Y.

William T. Caldwell, professor of chemistry and chairman of the Department of Chemistry, has been named dean of the College of Liberal Arts, Temple University, Philadelphia, Penna., succeeding **James H. Dunham,** retired.

Walter R. Carmody, formerly assistant professor of chemistry at Reed College, Portland, Ore., is now associate professor of chemistry in charge of the Physical Chemistry Division at Boston College, Chestnut Hill, Mass.

Jean F. Caul, who received his Ph.D. in physiological chemistry at the Ohio State University in March, has accepted a position as research chemist in the research division of the Biological and Chemical Laboratories of The Borden Co., Bainbridge, N. Y.

Charles M. Craighead has been named a research metallurgist at Battelle Memorial Institute, Columbus, Ohio. He was formerly associated with the Aluminum Co. of America, the Reynolds Metals Co., and the Braeburn Alloy Steel Corp.

D. Eolkin has joined the staff of the Chemical Engineering Section of the Armour Research Foundation. Mr. Eolkin was previously engaged in consulting work for a number of organizations in Minneapolis.

Walter M. Fenton, for the past three years manager of the Baker & Adamson Division of General Chemical Co., has resigned to become a member of the executive staff of S. B. Penick & Co., 50 Church St., NewYork, N. Y.

W. D. Fisher has been appointed sales representative and tool engineer for the McKenna Metals Co., in the Detroit district.

William Stanley Herbert has joined the staff of the Metallurgical Section of the Armour Research Foundation. Dr. Herbert was previously connected with the New Jersey Zinc Co. of Pennsylvania.

Howard Hopkins is now dean of the College of Pharmacy, Ferris Institute, Big Rapids, Mich.

Captain Arthur E. Huff, research scientist in the laboratories of the Organic Chemicals Division of the Monsanto Chemical Co., St. Louis, Mo., was cited May 3 in dispatches from the Philippines for bravery under vicious fire of Japanese



A. E. Huff

batteries and dive bombers in the restoration of the American flag to the top of the flagstaff at Corregidor.

Clyde W. Leaf, formerly connected with Girandau-Delawanna, Inc., has been appointed organic chemist in the Chemical Engineering Section of the Armour Research Foundation.

Arthur Linz succeeded Alan Kissock on May 1 as vice president of Climax Molybdenum Co. He will be in charge of converting operations at the company's plant at Langeloth, Penna., but will have his headquarters in New York.

C. D. Lowry, Jr., Universal Oil Products Co., addressed the University of Wisconsin Chapter of the American Institute of Chemical Engineers at Madison, Wis., May 13, on "Petroleum's War Assignments in Aviation, Rubber, and Explosives".

Randolph T. Major, director of research of Merck & Co., Inc., Rahway, N. J., has been appointed to the Graduate Council of Princeton University.

J. W. McCutcheon is serving as technical officer in the Explosives Division of the British Purchasing Commission, Washington, D. C.

Personnel changes in the Solvent and Chlorine Products Divisions of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., include the transfer of **Edward W. McGovern** from the Chlorine Products Division to be manager of the Solvents Division, of **Nelson C. Cooper** from the Solvents Division to the Chlorine Products Division, and of **M. Marean,** formerly manager of the Solvents Division, to be assistant to the director of sales.

Noah J. Menard, member of the executive staff of the Rumford Chemical Works, Rumford, R. I., has passed the examinations and been admitted to practice before the bar of the District of Columbia.

Lewis B. Miller has joined the consulting staff of W. H. & L. D. Betz, Philadelphia, Penna.

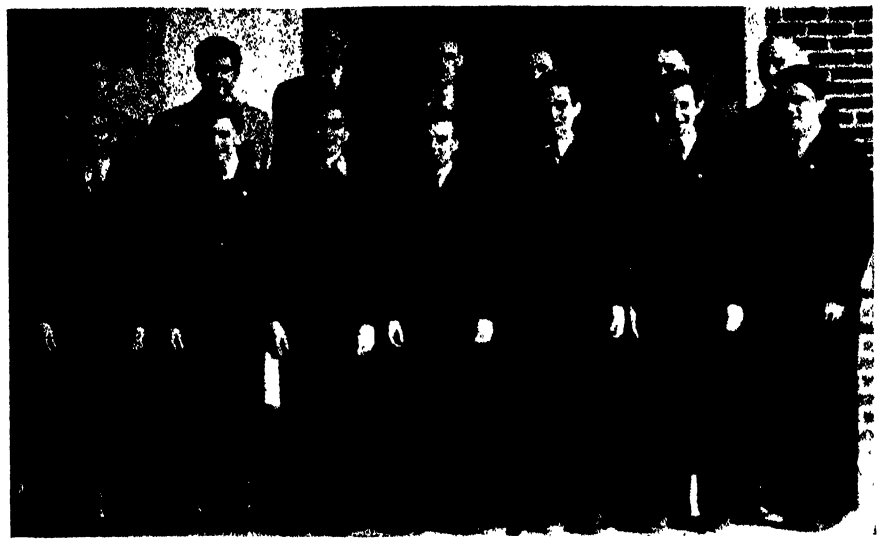
Major Albert J. Mottern, Chemical Warfare Service, formerly chief chemist of the U. S. Internal Revenue Laboratory at Philadelphia, has been transferred from Edgewood Arsenal, Md., to the Dugway Proving Ground, Clover, Utah, where he will serve as operations officer. Major Mottern served for nearly a year as commanding officer of the First Chemical Laboratory Company, the Army's first mobile chemical laboratory.

Kenneth W. Nelson has been on active duty as an ensign in the U. S. Naval Reserve since February 27, and at present is taking a special navy course in industrial hygiene at the Harvard University School of Public Health, Cambridge, Mass.

At the annual board of directors' meeting **Charles J. O'Connor** was elected to the presidency of Reichhold Chemicals, Inc., succeeding **H. Reichhold,** who becomes chairman of the board and general manager of the company's plants. **C. A. Knauss** has been elected as vice president in charge of eastern defense service.

Elsa Orent-Keiles, formerly of the Biochemistry Department, School of Hygiene and Public Health, Johns Hopkins University, is now in charge of the Nutrition Research Laboratories and assistant chief of the Foods and Nutrition Division of the Bureau of Home Economics, U. S. Department of Agriculture, Beltsville Research Center, Beltsville, Md.

Ruth L. Payne has joined the staff of the Connecticut Telephone & Electric Corp., Meriden, Conn., as chemist.



Jamestown College A. C. S. Student Affiliate Chapter in front of the new Science Hall

She is to organize a chemical and general testing laboratory, develop methods for controlling plant processes, and work on pertinent research problems.

R. G. Phelps, formerly vice president of Meenan Oil Co., Inc., New York, will serve as price executive of the Chemical Section of OPA. Mr. Phelps, a chemical engineer who built explosive plants in the first World War, was previously associate price executive and succeeds **Clarence W. Farrier** who becomes technical director of the National Housing Agency.

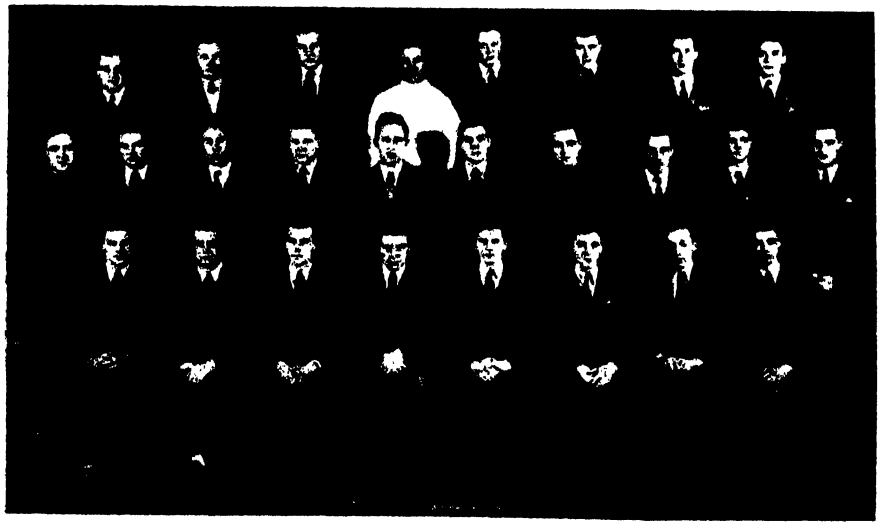
David J. Price, chemical engineer of the Bureau of Agricultural Chemistry and Engineering, Washington, D. C., has been elected president of the National Fire Protection Association.

Hillary Robinette, of the Commercial Solvents Research Department, has been called for active duty with the Chemical Warfare Service, U. S. Army.

Adolph G. Rosengarten, Jr., has resigned as director of Merck & Co., Inc., Rahway, N. J., because of duties with the Army and is succeeded by his uncle, **J. G. Rosengarten, Jr.**

David B. Sabine has been appointed plant superintendent and general manager of the Arlington Chemical Co., Yonkers, N. Y. Mr. Sabine has been with the company 17 years and has been chief chemist since 1936.

Harold H. Zeiss has resigned his position with the research staff of the Sunbeam Electric Mfg. Co., Evansville, Ind., and is now employed as research chemist in the Ridbo Laboratories, Inc., Paterson, N. J.



A. C. S. Student Affiliates at St. Norbert College, West DePere, Wis.

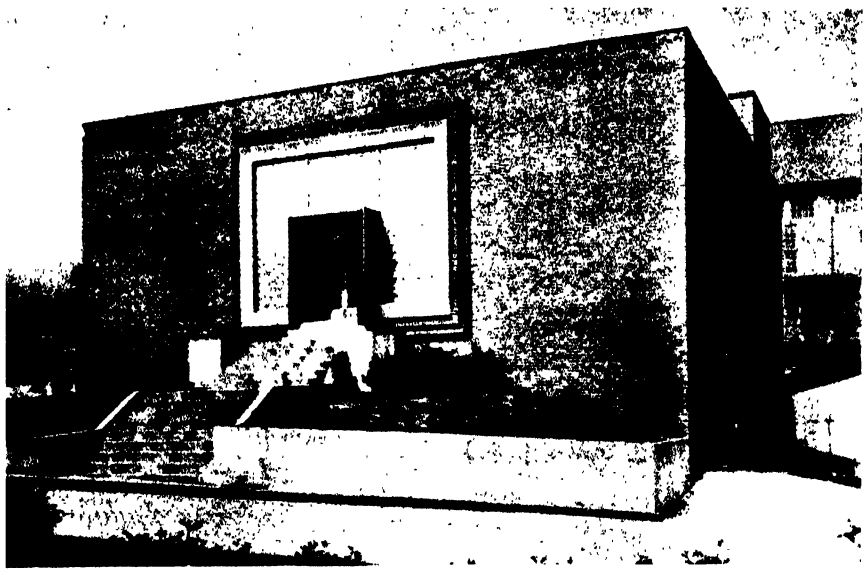
Kober Medal Awarded to Van Slyke

THE George M. Kober Medal, one of the highest honors in the medical profession, was awarded on May 6 to Donald D. Van Slyke, Rockefeller Institute for Medical Research, New York, N. Y., by the Association of American Physicians. Dr. Van Slyke was cited for his contributions to the treatment of diabetes and Bright's disease, and his work toward oxygen treatment of pneumonia.

Evans Chemetics Increases Staff

RALPH L. EVANS ASSOCIATES, the research division of Evans Chemetics, Inc., has added six chemists to its staff: **Walter W. Edman,** from the M. W. Kellogg Co.; **Evelyn Klibaner,** from the General Dyestuff Corp.; **Fred Linsker,** University of Vienna; **Mildred Mellor,** formerly with the Cheney Bros. Silk Co.; **Carl Seybold,** formerly with the Trojan Powder Co.; and **John Ross,** recently with the Ponds Extract Co.

Chemical Laboratory of Vanadium Corp.



New chemical laboratory building of Vanadium Corp. of America

THE new chemical laboratory building at the Bridgeville, Penna., plant of Vanadium Corp. of America combines a high degree of visibility and noise-proofing with a ventilating control of atmospheric dust and gases, to which the tasks performed in an alloy laboratory are extremely sensitive. The laboratory was designed and built under direct supervision of O. M. Svensson, chief engineer for Vanadium Corp., by The Rust Engineering Co., Pittsburgh, Penna.

Air and temperature control of the laboratory rooms is facilitated by sealed walls of glass brick and glazed tile, acoustical-panel ceilings, and unusually large insulating air spaces in the walls and roof.

A perpetual positive pressure is maintained within the building, 8 per cent more air being delivered by the heating system into the rooms than is drawn off by the hoods. This produces a flow of air outward from the analytical rooms, through doorways, stairshafts, and the storeroom and basement windows, preventing entry of dust or gases from without. Of the large amount of air which the hoods must handle to evacuate gases, 75 per cent is supplied by forced air introduced around the upper periphery of the hoods.

The hood design incorporates a double roof and double side aprons, within which adjustable baffles control both the discharge from the hood and the characteristics of the air curtain around the sides. Exhaust piping is held to a minimum to reduce maintenance due to corrosive gases and resistance in removing heavy gases. The heating system is located in the basement, while all other air-handling equipment is housed in a penthouse.

The emphasis on atmospheric control arises from the sensitivity to contamination during difficult alloy analyses—for example, the determination of gases in steels and other alloys.

Another item specifically designed for alloy-laboratory use is the chemical drains of cast iron pipe, which are mounted exposed under the basement ceiling where they are easily accessible for repairs. These drains join the sanitary sewers in a manhole outside the building, eliminating numerous troublesome traps.

The building is fireproof, the only exposed combustible being the wood bead securing the acoustical ceiling panels.

W. M. Lehmkuhl has been appointed plant manager of the New Orleans plant of The Flintkote Co.

A. P. I. and S. A. E. Organize Research Council

THE Cooperative Research Council, a new organization sponsored jointly by the Society of Automotive Engineers and the American Petroleum Institute, has been created to centralize, correlate, and promote cooperative research activities of the automotive, aeronautic, and petroleum industries. The council formally began operation from its new headquarters in Room 1618, 30 Rockefeller Plaza, New York on May 1.

B. B. Bachman, Autocar Co., has been elected chairman, and T. G. Delbridge, Atlantic Refining Co., vice chairman. C. B. Veal, for 16 years S. A. E. research manager and secretary of the Cooperative Fuel Research Committee, is secretary of the council, and R. P. Anderson, secretary of the General Committee, Division of Refining of the A. P. I., is treasurer. The 12 council members, appointed to serve one year, are Mr. Bachman, Mr. Delbridge, J. M. Crawford, William Littlewood, J. B. Macauley, Jr., Arthur Nutt, C. G. A. Rosen, D. P. Barnard, A. L. Clayden, R. A. Halloran, K. G. Mackenzie, and G. G. Oberfell.

Summer Graduate Courses at New York University

THE Department of Chemistry, New York University, announces that a limited program of graduate studies will be offered at the Washington Square center during the coming summer. Courses in qualitative organic analysis and organic synthesis will be conducted and also research leading to the master's and doctor's degree. Information circular may be obtained on application from the graduate school secretary.



One of the large rooms in the Vanadium chemical laboratory

NECROLOGY

Mendel Donchi

MENDEL DONCHI, retired consulting chemist, died April 25 in Newark, N. J., at the age of 69. Dr. Donchi was born in Russia, received his doctorate in chemistry at the University of Berlin, and then went to Puerto Rico, where he grew and processed sugar cane as the representative of a German concern. He later became chief chemist and general manager of Central Aguirre, largest sugar enterprise of Puerto Rico. In 1917 he went to New York and became consulting chemist for several concerns. In the same year he made a survey of sugar cane possibilities in Palestine. He retired several years ago.

Carl O. Johns

CARL O. JOHNS, consulting chemist and former director of research and member of the board of directors of the Standard Oil Development Co., died April 17.

Dr. Johns, who was 71 years old, was born in Sweden and came to this country with his parents as a 9 year old. He enrolled at Upsala College, Brooklyn, in 1894. He received an A.B. degree from Bethany College, Kansas, in 1899 and took an A.M. there in 1902. He received a Ph.B. from Yale in 1904 and a Ph.D. from the same university in 1906. In 1922 Dr. Johns returned to Bethany for a doctor of science degree.

In 1899 he was named an instructor in natural history at Bethany and served that college as professor and treasurer. In 1904 as assistant in chemistry he went to Yale where he served as instructor and assistant professor until 1914. Dr. Johns was an organic chemist with the Bureau of Chemistry, U. S. Department of Agriculture, and later had charge of the Protein Investigation Laboratory, a post he held through 1920. He served on the Joint Commission on Reclassification of Government Salaries in 1919-20 and was chairman of the Intersectional Petroleum Symposium, New York, in 1924. He returned to Yale as a lecturer in chemistry in 1920 and also became associated with the Development Department of the Standard Oil Co. of New Jersey. He was director of research in that department through 1927 and a director and member of the board and executive committee of the company through 1930. Since 1930 he had been a consulting chemist.

Dr. Johns, a member of the AMERICAN CHEMICAL SOCIETY since 1907, had served as Councilor. He was a director of the New Jersey Chemical Society, former chairman of the A. C. S. Washington Section, and had headed the Yale Chemical Society since 1930. He also belonged to the American Association for the Advancement of Science, Society of Chemical Industry, Society of Biological Chemists, American Petroleum Institute, and Sigma Xi. Dr. Johns was the author of 80 scientific articles.

Karl Pomeroy McElroy



KARL POMEROY MCELROY, a long-time resident of Washington, D. C., died at his home, 1412 Sixteenth Street, N. W., the morning of April 18.

Mr. McElroy was born in Sidney, Ohio, 75 years ago and graduated from Columbia University, Washington, D. C. (now George Washington University). He served with the *Toledo Blade*, of which his father, Colonel John McElroy, was editor. Afterwards he became a prospector in the West and later served as a consulting chemist and metallurgist. He was appointed to a position in the U. S. Department of Agriculture and served directly under the late Harvey W. Wiley.

His skill as a chemist led him to join the Patent Office force in the United States Patent Office, where he served as an assistant examiner for a number of years. In 1905 he resigned and opened an office as chemical consultant and patent attorney. His ability along these lines brought him many clients, and he himself was an inventor of a number of important chemical products including diethylene glycol.

Mr. McElroy was a man of exceptional ability, and it is not too much to say that his advice and experience influenced a number of chemical industries. At one time Mr. McElroy was nonresident vice president of The Chemists' Club, New York. His affability and good humor, as well as his knowledge bordering on genius, helped to make him many friends, who share with his immediate associates in their loss.

Mr. McElroy is survived by his wife, Moree Buckles McElroy, of Washington, D. C.; a sister, Mrs. Elsie McElroy Slater of El Paso, Tex., and a nephew, John McElroy Slater of Washington, D. C.

Jean Perrin

JEAN PERRIN, Nobel Prize winner in 1926, and former president of the French Academy of Science, died in New York April 17 at the age of 71. Dr. Perrin became professor of sciences at the University of Paris in 1910 and served on the faculty for many years, but retired before the war. After the German invasion he came to this country and had been very active in the affairs of the Free French movement, becoming dean of the faculty of sciences of the recently established Franco-Belgian Free School of Higher Studies. He was also guest scholar at Wilson College, as occupant of the chair created by faculty members through a fund for distinguished foreign scholars.

Dr. Perrin's chief fame was won through research in the field of nuclear movements. He received the Nobel Prize in Physics in 1926 for work on the Brownian movement, and was also honored for work on the role of radiation in chemical reactions. In 1938 he informed the French Academy of Science, of which he was president, that there existed a 93rd element, "transuranium", heavier than uranium, previously believed the heaviest atom. He was founder of the Department of Physico-Chemistry at the Sorbonne and was the author of many scientific publications.

Gustave Whyte Thompson



GUSTAVE WHYTE THOMPSON, for many years chief chemist of the National Lead Co., died April 22 in Brooklyn, N. Y. He was 76 years old. Until his retirement four years ago, Dr. Thompson had direct charge of the company's laboratories, and its research laboratory was organized entirely under his guidance.

Dr. Thompson was born in Brooklyn in 1865. He joined the National Lead Co. as chief chemist when it was organized in 1892. During the World War he directed the establishment in the United States of a smelting plant to produce pig tin from South American ore. Dr. Thompson became a director of the company in 1916, and before his retirement had served as an officer or director of the Williams-Harvey

Corp., Titanium Pigment Co., United Lead Co., and Metallurgical and Chemical Corp. He was also a director of the Patino Mines and Enterprises, Inc., a Bolivian firm.

Technical processes with which his name is associated are the Thompson method for the analysis of white metal alloys, the Thompson laboratory classifier dealing with classification of particles according to fineness, the Harris process, and the commercial separation of elements in white metal alloys in the secondary metal field.

Dr. Thompson had been a member of the AMERICAN CHEMICAL SOCIETY since 1901, and was a former president of the American Institute of Chemical Engineers. In 1909-11 he was in charge of extensive work developing reliable data and adequate specifications for linseed oil, and from 1910 to 1920 was secretary of a committee of the American Society for Testing Materials which dealt with preservative coatings for structural materials. He was also active on the Committee on Nomenclature and Definitions. He was vice president of the A. S. T. M. in 1926 and 1927, and president in 1928. Mr. Thompson also belonged to the American Association for the Advancement of Science and the Society of Chemical Industry. He received the degree of doctor of science from Armour Institute of Technology in 1927.

WE ANNOUNCE with regret the death of the following A. C. S. members:

Charles Blanc, consultant, New York, N. Y. Member since 1931.

George Everett Flanigan, assistant director of laboratory, Borden Co., Bainbridge, N. Y. Member since 1935.

Lawrence J. Henderson, Abbott & James Lawrence Professor of Chemistry, Harvard University, Cambridge, Mass. Member since 1922.

Arthur Michael, emeritus professor of chemistry, Harvard University, Cambridge, Mass. Member since 1914.

Charles W. Morse, chemist, Bull & Roberts, New York, N. Y. Member since 1924.

W. L. Shively, chemical engineer, Boston Consolidated Gas Co., Boston, Mass. Member since 1940.

Leonard C. Surprenant, research chemist, plastics division, Monsanto Chemical Co., Springfield, Mass. Member since 1940.

David Warmbrunn, plant chemist, Tin Processing Corp., Texas City, Tex. Member since 1941.

Edgar Whedbee, sanitary engineer, State Board of Health, Dallas, Tex. Member since 1928.

Renee V. E. Wiener, Tomkins Cove, N. Y. Member since 1920.

Victor Yngve, chemical engineer, National Carbon Co., Highland Park, N. J. Member since 1911.

Chicago Chemical Exposition Expands

THE 1942 National Chemical Exposition at the Stevens Hotel, Chicago, November 17 to 22, the second sponsored by the Chicago Section of the AMERICAN CHEMICAL SOCIETY, will be twice as large in floor area as the first show. More than 40,000 square feet have been made available. The National Industrial Chemical Conference will be held in conjunction with the exposition.

Victor Conquest, chairman of the show committee, points out that the first show and conference in December 1940 proved most effective for the wide and quick distribution of new products, machines, and methods, as well as new uses for standard products, machines, and instruments. Such a result from this exposition would be a vital contribution to the war effort.

Serving on the committee with Mr. Conquest are: A. Guillaudeu, Swift & Co.; W. M. Hinman, Frederick Post Co.; W. C. Johnson, University of Chicago; L. E. May, Sherwin-Williams Co.; R. C. Newton and H. E. Robinson of Swift & Co.

The 1942 exposition will be the second sponsored by the Chicago Section of the AMERICAN CHEMICAL SOCIETY. Mr. Conquest points out that the first show and conference held in December 1940 proved most effective for the wide and quick distribution of new products, new machines and new methods, as well as new uses for standard products and standard machines and instruments. He stresses the fact that the chemical industry in this country really had its birth during World War I and the current emergency will probably make America the leading industrial chemical nation of the two hemispheres.

The show will be twice as large in floor area as the first exposition. More than 40,000 square feet have been made available in the exposition hall and adjoining ballrooms at the Stevens Hotel for the exhibition. The Grand Ballroom, with adequate seating capacity, has been reserved for the conference programs.

The Advisory Committee, working closely with the sponsors, is composed of Bruce K. Brown, J. V. N. Dorr, Willard H. Dow, Gustav Egloff, Otto Eisenschiml, Harry N. Holmes, Harrison E. Howe, Ward V. Evans, William Lloyd Evans, S. D. Kirkpatrick, H. R. Kraybill, A. H. Mellinger, George W. Merck, Thomas Midgley, Jr., Carl S. Miner, Walter J. Murphy, Harry McCormack, Charles L. Parsons, H. I. Schlesinger, N. A. Shepard, C. R. Wagner, E. R. Weidlein, Frank C. Whitmore, and E. C. Williams.

Marcus W. Hinson is show manager, with headquarters at 110 North Franklin St., Chicago.



Crude Oil, Natural Gas Gain as Energy Sources

COAL remains the dominant source of energy in the United States but is rapidly losing ground to petroleum and natural gas, a report of the U. S. Bureau of Mines reveals. Total available fuel and power energy in 1940 almost equaled the amount available in 1929, the peak year. In terms of coal, fuel and power production of all fuels was 884,224,000 net tons in 1929, compared with 879,324,000 net tons in 1940.

Coal accounted for 66 per cent of the total in 1929, only 54 per cent in 1940, while crude petroleum and natural gas energy rose from 31 per cent to 42 per cent of the total. Hydroelectric power increased from 3 to 4 per cent in the same period.

The bureau's report cautions that no attempt is made to equate these fuel and power sources on any basis except B. t. u. content and that for many uses they are not competitive. Less than one half of the output of petroleum and about one half of natural gas production are strictly competitive with coal.

Neil Kershaw, Chairman of the A. C. S. Indiana Section, has been called to active service with the War Department as sanitary engineer with headquarters at Atlanta, Ga.

Alan Kissock, vice president of the Climax Molybdenum Co., who has been in charge of its conversion plant at Langeloth, Penna., has resigned and been succeeded by **Arthur Linz.**

L. G. MacDowell, formerly employed as research chemist for the Carbide and Carbon Chemicals Corp., is now research director for the Florida Citrus Commission, Lakeland, Fla.

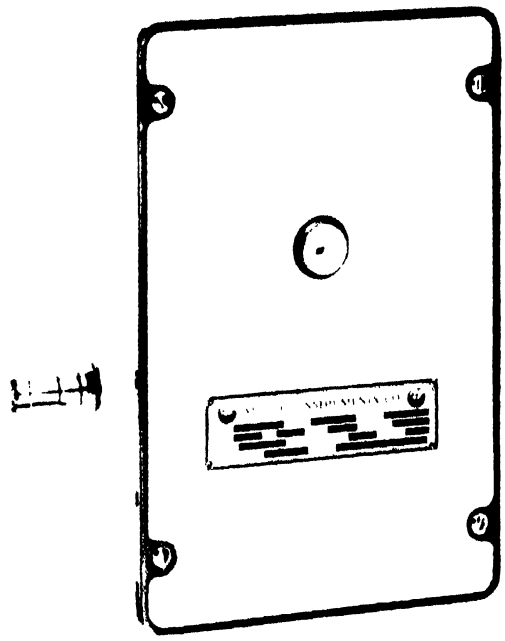
Edward V. Osberg has been named vice president of the Wilmington Chemical Corp., 10 East 40th St., New York, N. Y., and will be in charge of all sales and technical service. For five years he has been a member of the editorial staff of the *India Rubber World,* more recently as executive editor.

Walther H. Ott has completed his work for the Ph.D. degree in biological chemistry at the Pennsylvania State College and has joined the research staff of Merck and Co., Rahway, N. J.

Raymond Reuter is on leave of absence from the Atlantic Refining Co. to help in the war effort in the Office of Petroleum Coordinator, U. S. Department of the Interior, Washington, D. C., where he is working in the Equipment Procurement Section of the Refining Division.

CONTROL LIQUID LEVELS

without floats or contacts



WHEELCO REMOTE CONTROLS

These *new* Remote Controls effect control action without any contact with the liquid to be controlled

They operate on a differential of .001 to .125 inches change in liquid level

They may be used with electrolytic liquids as well as dielectric liquids having dielectric constants as low as 1.8

They are capable of controlling the INTERFACE between 2 liquids—as described below

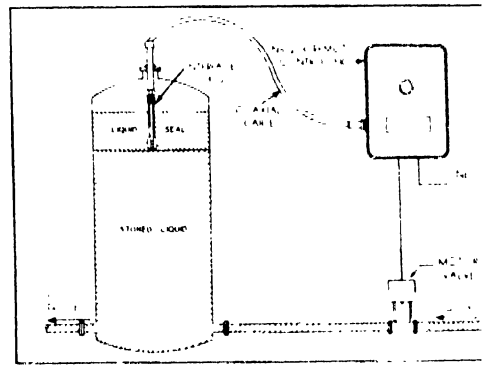
DESCRIPTION OF OPERATION

Remote Controllers employ Wheelco's famous "Radio Principle." A "Radio Principle" Control System consists, essentially, of an electronic tube and a relay assembly. The electronic tube is maintained in an oscillating condition and thereby generates a high frequency alternating current. This current is conducted to a Pick-up Unit by means of a special cable. Any material entering the field of the Pick-up detunes the oscillator. The resulting change in current through the relay operates its contacts.

REMOTE CONTROLLERS ARE AVAILABLE FOR A LARGE VARIETY OF APPLICATIONS

Wheelco Remote Controllers can be utilized for almost any application where control is essential. Various Pick-up Units, other than the one shown, are available for special control applications.

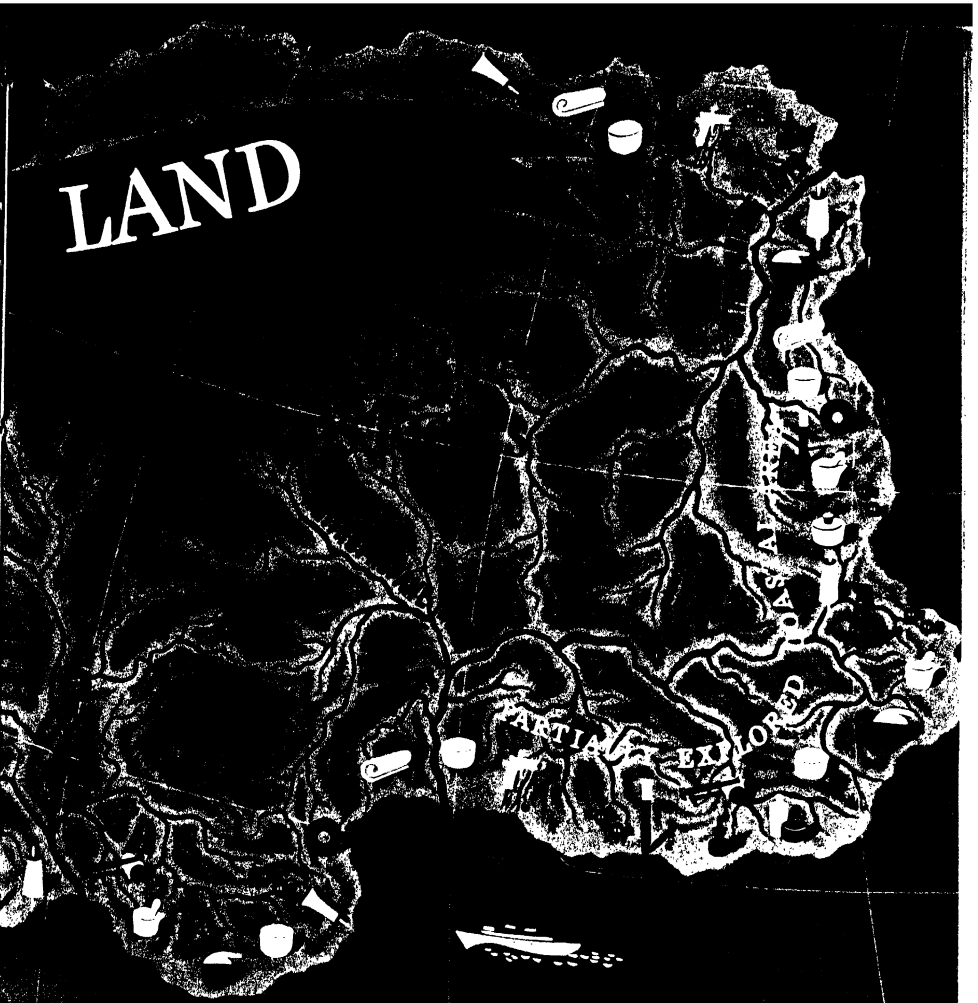
INTERFACE CONTROL—An Interface Pick-up Unit is placed in the vessel with the tip at the point where the interface is to be maintained. A movement of the interface between the two liquids—which, for example, may be an aqueous solution and an organic material—causes control action. The Model 263 Remote Controller energizes the throttling valve motor to open or close the valve, according to the position of the interface with respect to the Pick-up Unit. At an intermediate interface position it will permit the motor to stop, thus "floating" the valve in the correct position to maintain the level desired.



For Complete Data on Wheelco Remote Controllers Write for Free Bulletin No. J2.

NITROPARAFFIN LAND



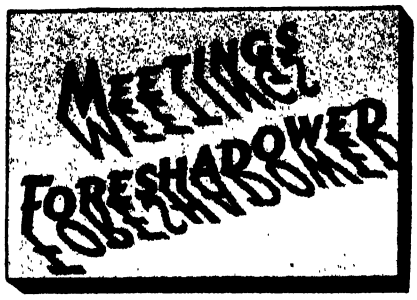


This vast new chemical continent of the Nitroparaffins offers rich rewards in scientific and industrial achievement to research chemists who will develop its tremendous resources. For only the coastal areas have been explored, and they but partially. The fertile interior, made accessible by the main Nitroparaffin rivers and the thousands of derivatives that form their tributaries, is still virgin territory, awaiting the coming of the resolute chemical voyageur.

Write for 40-page data book—"The Nitroparaffins—New Worlds for Chemical Exploration."



COMMERCIAL SOLVENTS
Corporation



American Chemical Society[1]

104TH MEETING. Buffalo, N. Y., September 7 to 11, 1942.

105TH MEETING. Indianapolis, Ind., April 12 to 16, 1943.

106TH MEETING. Minneapolis, Minn., fall of 1943.

NATIONAL CHEMICAL EXPOSITION. Stevens Hotel, Chicago, Ill., November 17 to 22, 1942.

NINETEENTH NATIONAL COLLOID SYMPOSIUM, Division of Colloid Chemistry. University of Colorado, Boulder, Colo., June 18 to 20, 1942.

Other Scientific Societies

AMERICAN ASSOCIATION OF PHYSICS TEACHERS. State College, Penna., June 25 to 27.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Chicago, Ill., June 22 to 26.

AMERICAN LEATHER CHEMISTS ASSOCIATION. Deshler-Walleck Hotel, Columbus, Ohio, June 1 and 2.

AMERICAN PHYSICAL SOCIETY. State College, Penna.. June 25 to 27; Berkeley, Calif., July 11.

AMERICAN SOCIETY OF BREWING CHEMISTS. Hotel Netherland-Plaza, Cincinnati, Ohio, May 25 to 27.

AMERICAN SOCIETY OF REFRIGERATING ENGINEERS. Skytop Club, Skytop, Penna., June 7 to 9.

AMERICAN SOCIETY FOR TESTING MATERIALS. Atlantic City, N. J.. June 22 to 26.

EASTERN PHOTOELASTICITY CONFERENCE. University Club, Boston, Mass., June 20 Semiannual meeting.

INSTITUTE OF FOOD TECHNOLOGISTS. Hotel Nicollet, Minneapolis, Minn., June 15 to 17. Annual meeting.

SCIENTIFIC APPARATUS MAKERS OF AMERICA. Hotel Hershey, Hershey, Penna., June 1 to 3.

SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION. Columbia University, New York, June 27 and 28.

[1] The list of the SOCIETY's National Officers and Directors, Editors, members of Council, Divisional and Local Section Officers, Committees, and Chapters of Student Affiliates appears in CHEMICAL AND ENGINEERING NEWS three times a year—usually February 10, May 10, and October 10. The latest list is printed on page 601 of the May 10 issue.

Nineteenth Colloid Symposium

Boulder, Colo., June 18 to 20, 1942

PERSONS planning on attending the Boulder, Colo., Colloid Symposium, held under auspices of the Committee of Colloid Science of the National Research Council and the Colloid Symposium Committee of the Division of Colloid Chemistry of the AMERICAN CHEMICAL SOCIETY, will be interested in knowing of housing facilities in and near Boulder. Early reservations are advised since Colorado is a popular vacation center, although no one knows what to expect in the way of travel this summer. The University of Colorado summer session, usually enrolling over 4,000, promises to be large and numerous conventions are scheduled for Boulder during the summer months.

For room reservations, write to the respective hotels, mentioning that you are planning to attend the Colloid Symposium at the university.

Blanchard's Lodge is situated three and one-half miles up Boulder Canyon and has both rooms and cottages available at prices ranging from $1.25 single to $3.00 double.

Estes Park and Estes Park Village are 31 miles to the northwest of Boulder on a beautiful, paved, easy ascent mountain highway, and Denver is 32 miles southeast on a paved, plains highway. Good hotels are available at both places. The Boulder, Estes Park, or Denver Chambers of Commerce will be pleased to send descriptive literature, and lists of hotels and cottage camps on request.

For information regarding the symposium, address Frank E. E. Germann, Department of Chemistry, University of Colorado, Boulder, Colo.

Program

I. Apparatus and Techniques

June 18, 11:00 A. M.

1. FRANK E. E. GERMANN AND C. W. MCLANATHEN. A Method of Capillary Fluorescence Analysis Employing a Balanced Photoelectric Circuit.

2. HERMAN BENIAMS AND R. G. GUSTAVSON. The Theory and Applications of a Two-Path Rectangular Micro-Electrophoresis Cell.

3. LADISLAUS MARTON. Applications of the Electron Microscope in Colloid Chemistry.

II. Inorganic Colloid Chemistry

June 18, 2:00 P. M.

4. BYRON T. SHAW. The Nature of Colloidal Clay as Revealed by the Electron Microscope.

5. JOHN H. BLOMQUIST AND WESLEY G. FRANCE. Adsorption at Crystal-Solution Interfaces: An Electron Diffraction Study of Crystal Faces of Sodium Bromate with and without Adsorbed Dyes.

6. HARRY B. WEISER, W. O. MILLIGAN, AND W. C. SIMPSON. The Elimination of Sorption-Desorption Hysteresis.

7. L. H. REYERSON AND MARTIN CINES. Adsorption of Propane and Propylene by Silica Gel and Metallized Silica Gel.

8. T. H. JAMES. Influence of Age and Surface Conditions on the Reactivity of Certain Precipitates.

III. Colloidal Electrolytes

June 19, 9:30 A. M.

9. C. E. MARSHALL. The Clays as Colloidal Electrolytes.

10. E. L. MCBAIN. Migration Data in Solutions of a Colloidal Electrolyte, Lauryl Sulfonic Acid.

11. JAMES W. MCBAIN. Osmotic Properties of Solutions of Typical Colloidal Electrolytes.

12. HANS M. CASSEL. Surface Tension of Micelle-Forming Solutions.

IV. Protein Chemistry

13. E. A. HAUSER AND J. Y. KAO. The Mechanism of Rubber Latex Vulcanization at Low Temperatures.

June 19, 2:00 P. M.

14. G. E. BOYD AND W. D. HARKINS. Protein Films.

15. R. B. DEAN AND J. R. VINOGRAD. The Diffusion of Solubilized Dye in Water and through Membranes.

16. CHARLES H. NORRIS. Physical Properties of Living Matter.

17. ROBERT M. HILL AND VIRGINIA TREVORROW. Normal Variation in the Concentration of Fibrinogen, Albumin, and Globulin in Blood Plasma.

June 20, 9:30 A. M.

18. H. A. ABRAMSON, D. H. MOORE, AND H. H. GETTNER. A General Electrophoretic Pattern in Extracts of Pollens Causing Hay Fever.

19. HAROLD H. STRAIN. Problems in Chromatography and in Colloid Chemistry Illustrated by Leaf Pigments.

	Without Bath		With Bath	
	Single	Double	Single	Double
Boulderado Hotel	$1.25	$1.50	$2.50	$3.50–$4.50
Albany Hotel	$1.00–$2.00	$2.00–$3.00	$1.50–$2.00	$3.00
Monticello	$1.00	$1.50	$1.50	$2.50

New England Chemistry Teachers to Meet

THE Fourth Summer Conference of the New England Association of Chemistry Teachers will meet at the University of New Hampshire, Durham, N. H., August 11 to 14.

Durham is on the Western Division, *via* Dover, of the Boston and Maine Railroad. Frequent service is available all day. Reasonable taxi service is available from Dover for those trains which do not stop at Durham. The Durham railroad station is a two-minute walk from the registration desk of the dormitory. Bus service from Boston is also available. Telephone connections are available at James Hall (registration) and Congreve North (dormitory).

All teachers of chemistry in attendance at the conference are required to register. The charge for members, if paid before August 1, 1942, is $2.00; if paid after August 1, 1942, $3.00. Nonmembers will pay $5.00. At the option of the registrant, $3.00 of this fee may be used in payment of dues for membership for one year in the association. Nonprofessional guests of members or registrants will be charged $1.00 per family.

Rates for rooms, $1.00 per night, $3.00 for four nights. Meals will cost about $1.25 per day. The committee will attempt to make any special rooming arrangements that are desired, if it is notified in advance of the conference. All inquiries concerning the Fourth Summer Conference should be addressed to the conference chairman, Millard W. Bosworth, Saxtons River, Vt.

Program

Tuesday Evening, August 11

7:30—Motion picture program.
8:15—OFFICE OF THE PRESIDENT, University of New Hampshire. Welcome.
8:30—ARTHUR R. DAVIS. Fire and the Control of Fire.

Wednesday Morning, August 12

9:00—FRANK G. LANKFORD. Experimental Evidence on the Relative Value of Individual Laboratory Work and the Demonstration Methods in Teaching Science.
10:00—GORDON P. PERCIVAL. Modern Methods of Soil Testing.
11:00—CARLE R. HAYWARD. Chemistry and Physics Applied to Extracting Metals from Ores.

Wednesday Afternoon, August 12

2:00—[illegible] B. CLAPP. Sulfamic Acid and Its Uses.
3:00—JOHN E. CAVELTI, *Chairman*. Symposium—Atomic Structure.
4:00—Round Table Discussion. Laboratory or Demonstration.

Wednesday Evening, August 12

7:30—Motion picture program.
8:15—RALPH W. GERARD. Science Education and the Contemporary World.

Thursday Morning, August 13

9:00—CHARLES H. STONE. Guide Posts to Successful Teaching. Oxidation and Reduction.
10:00—ALBERT F. DAGGETT. Spectrochemical Analysis.
11:00—WILLIAM O. BROOKS. What the Chemical Warfare Service Is Doing.

Thursday Afternoon, August 13

2:00—FRANK SCHNEIDER. Microchemical Demonstrations as a Teaching Tool.
3:00—Symposium—Atomic Structure.
4:30—Round Table Discussions. I. The Fused Course. II. The Teaching of Elementary Organic Chemistry.

Thursday Evening, August 13

7:30—Motion picture program.
8:15—ROBLEY D. EVANS. Atom Smashing and the Structure of Atomic Nuclei.

Friday Morning, August 14

9:00—ERNEST G. RITZMAN. Calories in Wartime.
10:00—KATHARINE B. BLODGETT. Interference Colors Reflected by Thin Films.
11:00—C. HAWLEY CARTWRIGHT. Invisible Glass.

Friday Afternoon, August 14

2:00—JOSEPH J. SULLIVAN, S.J. Glass Blowing.
3:00—Symposium—Atomic Structure.
4:30—Round Table Discussion. The Effect of the War on Chemistry.

Friday Evening, August 14

7:30—Motion picture program.
8:15—ALEXANDER SILVERMAN. Glass Today and Tomorrow.

Chicago Spectroscopy Conference Scheduled

UNDER auspices of the Chemistry, Physics, and Astronomy Departments of the University of Chicago, a Spectroscopy Conference will be held at the University of Chicago, June 22 to June 25. The program comprises a series of more or less interconnected symposia, designed to promote the sharing of experience by workers in various pure science fields in which spectroscopy is important. Everyone is invited to attend, but because of probable space limitations should write at once to the conference chairman, Robert S. Mulliken, Ryerson Physical Laboratory, University of Chicago, Chicago, Ill., who will be glad to supply further information and a copy of the final program.

Registration and information headquarters for the first day will be in Eckhart Hall on the Quadrangles, University Avenue near 58th Street, beginning June 22 at 8:30 A. M. Headquarters hotel will be the Windermere East, 1642 East 56th St., near the 53rd Street station of the Illinois Central Railroad. This hotel offers special rates of $3.00 single, $5.00 double (twin beds), all rooms with private baths, to those attending the conference. Room reservations should be made in advance with the hotel direct.

The general conference committee consists of Professor Mulliken, O. Struve, J. Franck, and W. G. Brown.

Preliminary Program

Monday, June 22

9:30 A. M.

R. S. MULLIKEN. Introduction to the Conference.

SPECTROSCOPIC METHODS

H. G. GALE, *Chairman*

1. W. F. MEGGERS. Primary Standard of Wave Length.
2. W. E. WILLIAMS. Measurement of Standard Wave Lengths by the Reflection Echelon Method.
3. H. G. BEUTLER. Generalised Theory of the Concave Grating.

Monday, June 22

2:00 P. M.

THE SPECTRA OF COMETS

N. T. BOBROVNIKOFF, *Chairman*

1. A. MCKELLAR. Molecular Bands in Cometary Spectra: Intensity Measurements.
2. P. SWINGS. Molecular Bands in Cometary Spectra: Identifications.

Monday, June 22

8:00 P. M.

SPECTROSCOPIC APPLICATIONS OF ATOMIC BEAMS

R. A. Fisher, *Chairman*
K. W. Meissner
R. A. Fisher
J. Mack
W. E. Williams

Tuesday, June 23

9:30 A. M.

THE STRUCTURE OF THE EARTH'S ATMOSPHERE

O. R. Wulf, *Chairman*
1. F. L. Whipple. Meteors and the Earth's Upper Atmosphere.
2. C. T. Elvey. The Light of the Night Sky.
3. R. Wildt. Geochemistry of the Atmosphere in Relation to the Constitution of Terrestrial Planets.

Tuesday, June 23

2:00 P. M.

ATOMIC SPECTRA

G. S. Monk, *Chairman*
1. W. F. Meggers. Atomic Spectra of the Rare Earth Elements.

Tuesday, June 23

6:00 P. M.

Conference dinner.

Wednesday, June 24

9:30 A. M.

TRIATOMIC SPECTRA

H. H. Nielsen, *Chairman*
1. E. F. Barker. Infrared Spectra of Triatomic Molecules.
2. R. S. Mulliken. Electronic Structures and Spectra of AO_2 Molecules.
3. S. Mrozowski. Emission Spectrum of the Ion CO_2^+.

Wednesday, June 24

2:00 P. M.

ELECTRONIC SPECTRA OF ORGANIC MOLECULES

K. F. Herzfeld, *Chairman*
1. H. Sponer. Ultraviolet Spectra of Substituted Benzenes.
2. W. H. Rodebush. Interpretation of Ultraviolet Absorption Spectra in Terms of Resonance Structures.
3. A. L. Sklar. Theoretical Studies on Electronic Spectra.

Wednesday, June 24

8:00 P. M.

SPECTRA OF DYE MOLECULES

W. G. Brown, *Chairman*
1. W. G. Brown. Historical Introduction.
2. L. G. S. Brooker. Absorption and Structure-Degeneracy in Dyes.
3. A. L. Sklar. Quantum Theory of Dye Spectra.

Thursday, June 25

9:30 A. M.

ELECTRONIC SPECTRA OF ORGANIC MOLECULES

G. W. Wheland, *Chairman*
1. E. P. Carr and L. W. Pickett. Absorption Spectra of a Series of Dienes.
2. R. S. Mulliken and C. A. Rieke. Theoretical Studies on Electronic Spectra.
3. M. Goeppert-Mayer. Electronic Spectra of Wurster's Salts.

Thursday, June 25

2:00 P. M.

COOPERATIVE SPECTRA

J. Franck, *Chairman*
1. S. E. Sheppard. Influence of Environment and Aggregation upon the Absorption Spectra of Dyes.
2. G. N. Lewis. Absorption and Emission of Light as a Function of Molecular Orientation.

Thursday, June 25

8:00 P. M.

SPECTRA OF ION COMPLEXES

P. Pringsheim, *Chairman*
1. E. Rabinowitch. Spectra of Ion Complexes.
2. S. Freed. Spectra of Rare Earth Complex Ions.

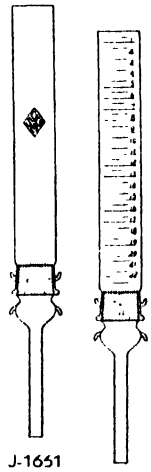
CHROMATOGRAPHIC APPARATUS

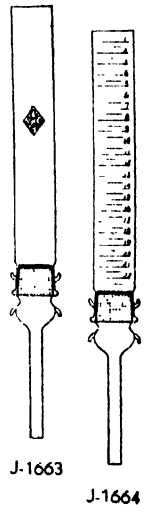
DESIGNED BY PROF. ZECHMEISTER AND DR. CHOLNOKY

"Chromatography," a new and extremely effective method invented by the Russian botanist Tswett, is for the separation and for the accumulation of natural products in extracts. The basic idea is that if a solution is sucked through a vertical column composed of a suitable adsorbent, the different solutes will be fixed in different sections of the column, according to their respective adsorption affinities. This separation becomes still more effective, if finally a pure solvent is sucked through the system. Each fraction so obtained can be used for any analytical or preparative operation, after having been eluted from the adsorbent by a suitable solvent.

Complete methods of analysis have been thoroughly described by Drs. Zechmeister and Cholnoky in "Principles and Practice of Chromatography" (New York: John Wiley & Sons, Inc.), 1941.

Four styles of tubes are available. J-1661 has a perforated plate sealed on the male connection, tube is not graduated; J-1662 has a perforated plate and column is graduated in 1/2 cm. divisions; J-1663 has a sealed in fritted disc, tube is not graduated; J-1664 has a fritted disc sealed in and column is graduated in 1/2 cm. divisions.





SIZES OF CHROMATOGRAPHIC TUBES

SIZE No.	Cylindrical Part MM. Diam.	Length	Connection
I	11	130	10/18
II	19	200	19/22
III	38	230	34/28
IV	48	270	45/35
V	58	300	55/35
VI	80	330	71/40

PRICES OF CHROMATOGRAPHIC TUBES

Size No.	J-1661 EACH	J-1662 EACH	J-1663 EACH	J-1664 EACH
I	2.50	3.50	3.50	4.50
II	3.25	4.25	4.25	5.25
III	4.00	5.00	5.00	6.00
IV	6.25	7.25	7.60	8.60
V	7.60	8.75	9.00	10.25
VI	12.00	13.50	14.00	15.50

SCIENTIFIC GLASS APPARATUS COMPANY



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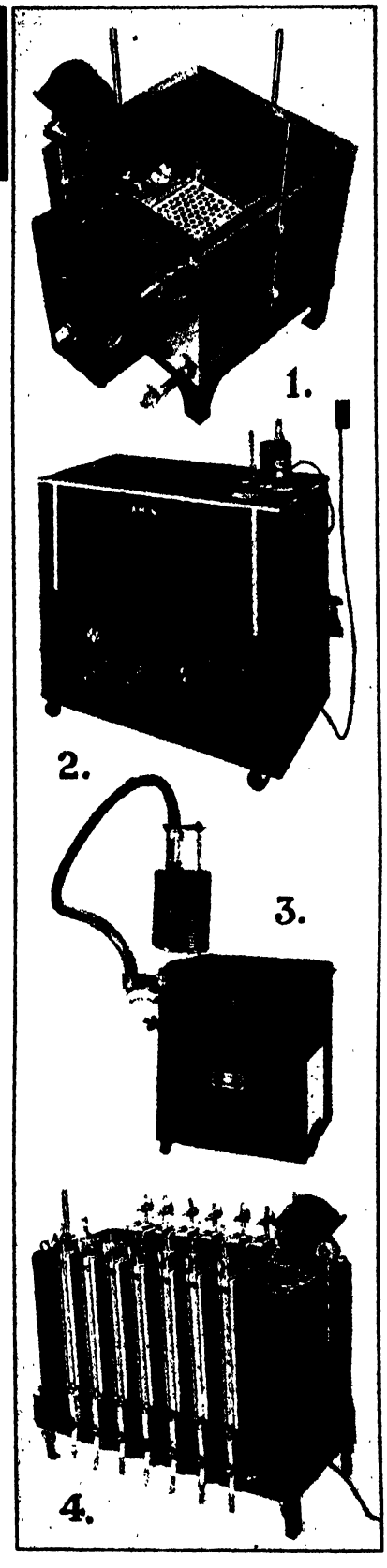
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American Electroplaters' Society

THE 30th national convention of the American Electroplaters' Society is to be held in Grand Rapids, Mich., June 8 to 10, 1942. The program will include a Victory Session on June 8, at which Wm. Blum, of the National Bureau of Standards, will discuss "Military Applications of Electroplating" and Wm. McCord, of the War Production Board, will speak on the "Present Situation in the Electroplating Industry Regarding Government Restrictions and Government Business". Technical sessions on plating, organic finishes, electroplating, and oxide coatings are included, as well as entertainment for the ladies, plant trips, and a photographic display.

The general chairman of the convention is Chester W. Smith, 600 Prospect S. E., Grand Rapids, Mich.

The Chemists' Club Elects

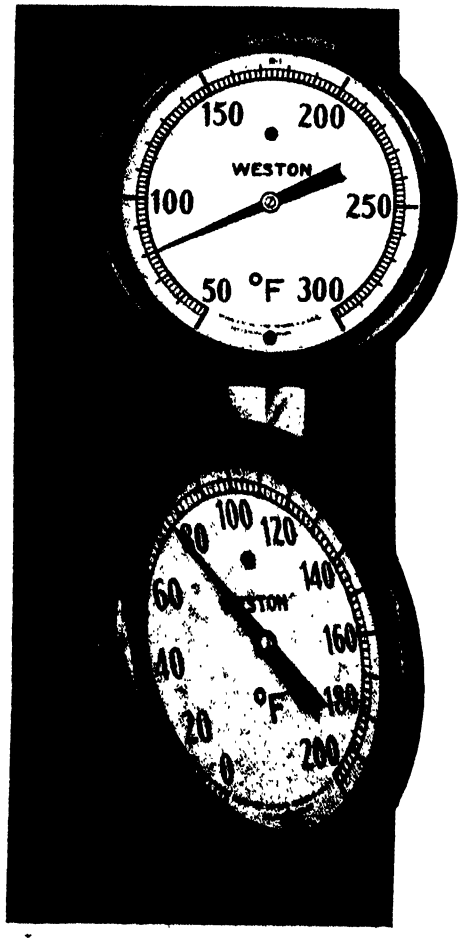
AT THE annual meeting of The Chemists' Club (N. Y.) held on May 6, the following named officers were elected for the club year 1942–43: president, Walter S. Landis[1], American Cyanamid Co.; resident vice president, Ralph E. Dorland[1], Dow Chemical Co.; nonresident vice president, Jasper E. Crane, E. I. du Pont de Nemours & Co., Inc.; suburban vice president, William J. Orchard, Wallace & Tiernan Products, Inc.; secretary, Robert T. Baldwin[1]; treasurer, Ira Vandewater[1], R. W. Greeff & Co.; trustees, 3-year term, Charles L. Gabriel, Commercial Solvents Corp., James G. Detwiler, The Texas Co. Reports of officers and committees indicated the affairs of the club to be in excellent condition.

Announcement of the retirement of Emily J. Fell, after serving 24 years as the club's librarian, was received by members with regret.

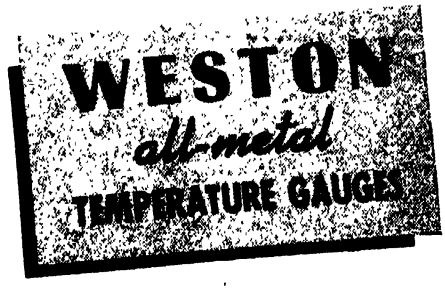
Membership in the club now stands at 1,692 as compared with 1,539 on May 1, 1940, and 1,632 on the same date in 1941.

[1] Re-elected.





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Officers of Chicago Section

NEWLY elected officers of the Chicago Section of the AMERICAN CHEMICAL SOCIETY, who will assume office July 1, are: Roy C. Newton, chairman, Swift & Co.; L. M. Henderson, first vice chairman, Pure Oil Co.; T. H. Rogers, second vice chairman, Standard Oil Co. (Indiana); L. E. May, treasurer, Sherwin-Williams Co.; J. J. Doheny, secretary, Chicago Public Schools. Directors: M. H. Arveson, Malcolm Dole, W. V. Evans, W. F. Henderson, and A. W. Ralston.

Quebec Rubber & Plastics Group Meets

THE Quebec Rubber & Plastics Group held its final meeting of the season, May 8 at the Ritz Carleton Hotel, Montreal. After the dinner the annual meeting was held and the following officers were elected: chairman, Peter Gunter, Mack Moulding Co.; vice chairman, A. B. Lewis, British Rubber Co.; secretary-treasurer, R. V. V. Nicholls, McGill University; executive committee, J. T. Dunn, J. H. McCready, N. C. Smith, H. L. Blachford, L. C. McLeaod and W. P. B. Gedye.

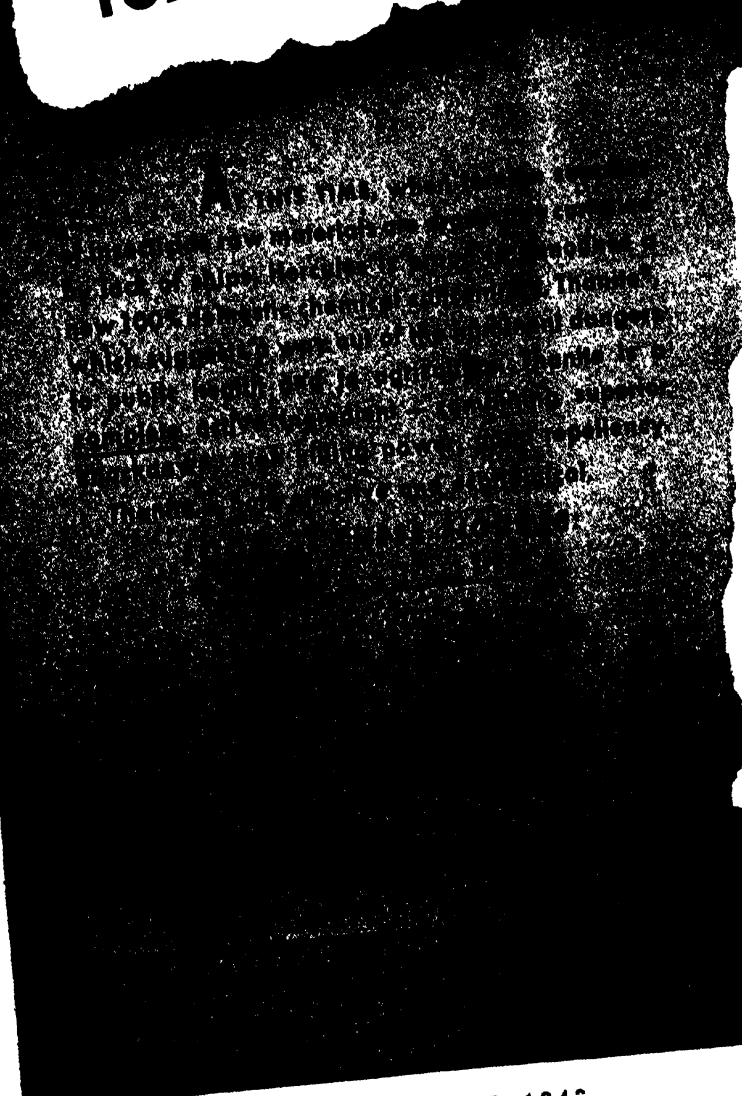
The secretary-treasurer announced that next year the group will become The Rubber & Plastics Division of the Society of Chemical Industry. The Montreal branch extended the invitation to the Quebec Rubber & Plastics Group to affiliate with it and the parent English society has approved the necessary changes in constitution.

A.S.T.M. to Hold 45th Meeting

MORE than 100 technical papers and reports are scheduled for the 45th annual meeting of the American Society for Testing Materials at Haddon Hall, Atlantic City, June 22 to 26. There will be more than 150 meetings of technical committees. Featured will be the Symposium on Radiography and a Discussion on Solvent Action of Water Vapor at High Temperature and Pressure.

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Edited by A. A. Ashdown, Ed. F. Degering, J. E. Hawkins, and S. L. Redman

Send items to Ed. F. Degering, Department of Chemistry, Purdue University, Lafayette, Ind.

PREPARATION of a program is an outstanding problem of most local sections. Finances, rather than inability to find suitable speakers, are the usual difficulty. This problem was solved by the Rochester Section when it was founded, 29 years ago. At that time it was agreed that local section dues of $2.00 a year would be charged to all, whether national members or local associates. Of course, local section meetings are open to national members, whether or not they pay local dues; but social functions can be arranged by the section, admission to which is limited to paid local members. The Rochester Section has never taken advantage of this excluding clause, but the officers have pointed out, when dues are payable, some of the advantages this section enjoys which are not enjoyed by members of other sections. The result is that a large percentage of the national members pay local dues.

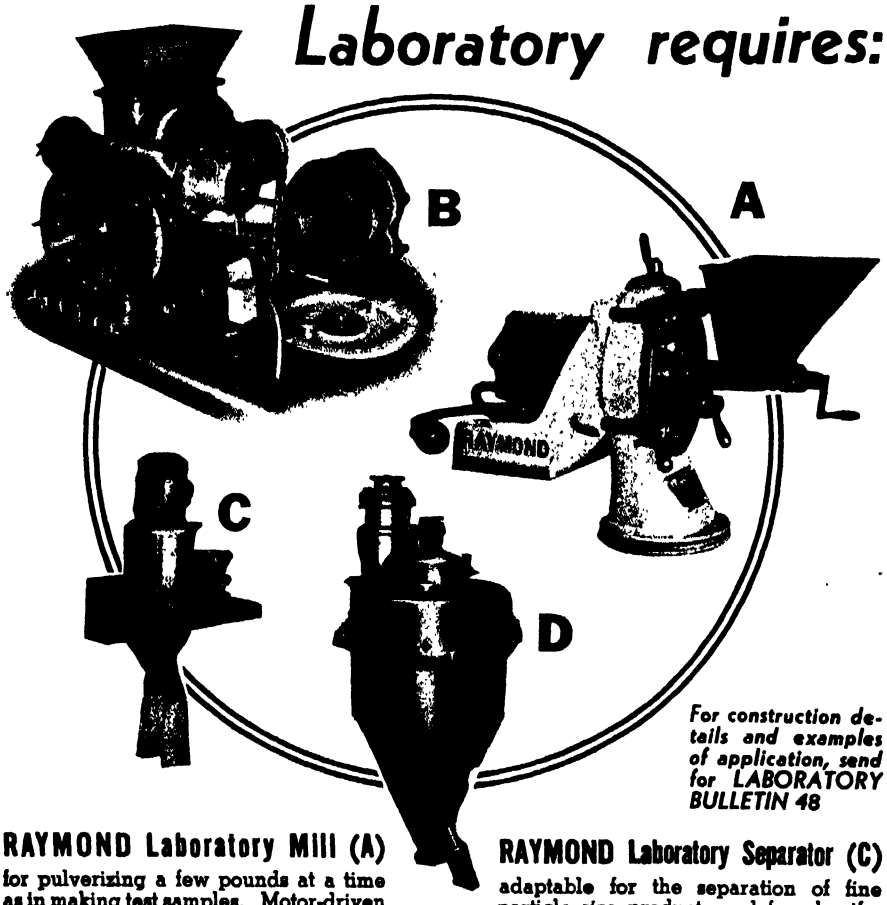
The section also encourages interested persons in becoming associate members. These consist principally of people working in allied fields such as physicists, photographers, physicians, high school science teachers, and plant workers in chemical industry. A large number of young men who are not chemists but who are working under chemical supervision and studying chemistry in night schools or university extension courses also become associate members. Many of these eventually join the SOCIETY. The Rochester Section also encourages college and university students to join the local section, and to these a special rate of $1.00 a year is charged.

The Rochester Section holds 16 meetings a year, on the first and third Mondays of each month from October through May. At 12 of these, speakers from outside the section present papers. The remaining four are addressed by local chemists.

The first meeting in the fall is moved ahead to a previous Saturday, on the afternoon of which an outing is held in cooperation with the Syracuse and Cornell Sections. An annual golf game between the Rochester and Syracuse Sections is a feature of this outing. In the evening there is a dinner followed by the scheduled talk. Following one of the November meetings, cider and doughnuts are served by courtesy of the section; and the third Monday in April is always reserved as "Ladies' Nite" at which time an attempt is made to present a scientific program which will appeal especially to the ladies. Refreshments are served with the compliments of the section.

The plan outlined has proved successful at Rochester. Even at the bottom of the depression the section was able to add a few dollars to its reserve. With a little money in the bank officers can, with confidence, plan an ambitious, interesting, and valuable program for the succeeding year.—THOS. J. MURRAY, JR., *Rochester Section.*

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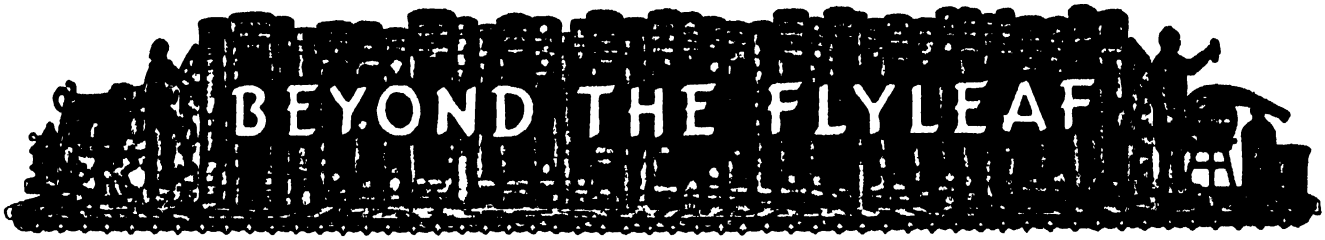
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Scientists Face the World of 1942. Three essays by *Karl T. Compton, Vannevar Bush,* and *Robert W. Trullinger.* Followed by comments by *Harvey N. Davis, Detlev Bronk,* and *S. W. Fletcher,* respectively. Part III of a symposium at the 175th anniversary of Rutgers University. 80 pages. Rutgers University Press, New Brunswick, N. J. Price, $1.25.

PRESIDENT COMPTON'S essay is divided into two parts, one sketching skillfully the state of progress in the natural sciences up to the end of 1941, the other outlining and commenting on the organization of science for the prosecution of the war. As one would expect, the author's treatment is clear and concise, in fact the first part is too concise. Some detail of the second part could well have been omitted for a corresponding space expansion of the first part. President Davis' comments on President Compton's essay deliberately pass over the text and intentionally exploit some of the speaker's own preoccupations.

Dr. Bush deals with the need for and conditions precedent to the development of biological engineering as a distinct profession. Dr. Bronk in commenting does a commendable job of expanding Dr. Bush's thesis.

Mr. Trullinger deals similarly with the profession of agricultural engineer and does it entertainingly. Dr. Fletcher in commenting points out the shortcomings in existing curricular attempts to train for a profession of agricultural engineer, a discussion which is poignantly reminiscent of the birth pains of the chemical engineer three decades ago.

Just why these papers are put together in one book is not clear. All of them are general in their treatment as the necessary brevity of symposium papers requires. They are not, however, tied together by subject matter. President Compton had a chore to do and with his characteristic thoroughness and tender conscience did it well. Dr. Bush appears in a prophetic role and is convincing. Mr. Trullinger entertainingly records the efforts to bring all the science disciplines to the practical service of agriculture. But why all between two covers?

The printing is good, making it easy to read. Internal evidence indicates that President Davis' comments were printed from stenographic report of an extemporaneous speech and were not edited by the author. Similar evidence indicates that Dr. Bronk's comments were communicated in writing.

F. W. WILLARD

The Condensed Chemical Dictionary. *Thomas C. Gregory,* Editor. 3rd ed. 756 pages. Reinhold Publishing Corp., 330 West 42nd St., New York, N. Y., 1942. Price, $12.

THE third edition of the Condensed Chemical Dictionary appears now some 12 years after its well-known predecessor. Extensive revision is one of the features of the new volume and a vast amount of new and additional information has been added. The general arrangement remains largely the same as that of the second edition, but in content it is vastly improved and far more valuable.

The dictionary is not intended as a universal compendium of information on chemistry. Rather, it confines itself to definitions of substances and descriptions of processes. Chemical specialties, sold under trade names, are included and in addition to information as to what the product is, typical specifications, color, odor, uses, containers, and shipping regulations are given. The data, supplied by the manufacturers, are to be considered typical of the commercial product.

As to chemicals, the dictionary becomes encyclopedic in many cases, giving synonyms, properties, constants, impurities, manufacturing procedures, literature references, grades, uses, and various other bits of information which the editor deemed important adjuncts to a definition.

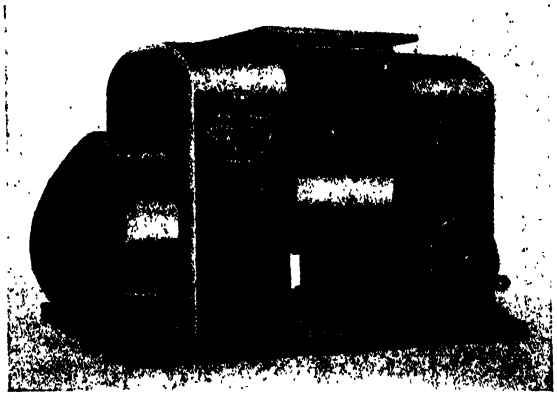
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THE SHARPLES CORPORATION

CONTINUED FROM PAGE 692

and Pronunciation Committee of the AMERICAN CHEMICAL SOCIETY on the pronunciation of chemical words, a study on the wartime effect on chemical prices, and a section of tables giving various physical and conversion data of interest in the chemical field.

The dictionary has a pleasing format and is easily read. Page size is approximately 6 × 9 and the paper is heavy enough to carry the print without showing through to the next page.

It is an important undertaking which should meet with continued success. We hope, however, to see the next edition before the passing of another 12 years.

Introduction to Chemical Thermodynamics. *Luke E. Steiner.* 1st ed. 516 pages. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York, N. Y., 1941. Price, $4.00.

THIS book presents the fundamentals of thermodynamics and provides ample opportunity for the student to practice application on well-selected problems. The usual individual topics are considered, including chapters on partial molal quantities, nonideal solutions, galvanic cells, solutions of electrolytes, and some applications of thermodynamics. One chapter on general equilibrium conditions well might have been included in preceding chapters dealing with free energy and equilibrium.

A straightforward and rather complete mathematical treatment of thermodynamics is given. As the author states, derivations of formulas are given somewhat fully to free the class time for more important discussions. The nomenclature is that of Lewis and Randall; a complete table of symbols is provided.

Discussions of the various thermodynamic laws and functions are in general quite clear and understandable. It is felt, however, that some of the derivations could have been simplified. For example, the section dealing with the change in heat of reaction with temperature by Kirchhoff's law would have been improved by the more usual choice of system. Also, the second law development could have been more direct; it extends through two chapters and is likely to confuse the beginner.

The tables of thermal and other thermodynamic data are not adequate for problem work. Consequently, the problem statements at the end of each chapter contain the data, or reference is made to preceding problems; in some cases the student is referred to the literature for necessary information.

The book may be recommended as a text in elementary thermodynamics. The mathematical development is excellent and orderly; the student should appreciate properly the course if he has a background of the usual year of calculus. The book is well constructed, with large clear type, substantial binding, and a very complete index.

CHARLES D. LUKE

Diffusion in and through Solids. *Richard M. Barrer.* 1st ed. 464 pages + xiii. Cambridge University Press, England; The Macmillan Co., 60 Fifth Ave., New York, N. Y., 1941. Price, $6.50.

THE scholarly monograph by Dr. Barrer must be highly recommended, both for its theoretical interest and for its practical usefulness in a remarkable variety of applied fields.

The author first assembles for convenient reference mathematical solutions of the diffusion equation for many typical cases. Then he distinguishes types of flow, such as streamline, molecular, orifice, and activated diffusion, both specific and nonspecific, through lattices and along grain boundaries. The cases considered range from capillary tubes and miscellaneous porous systems to crystals, glasses, metals, and such organic solids as waxes, fats, rubbers, proteins, cellulose, resins, paint and varnish films, and textiles.

The text includes 119 tables of experimental data and 158 diagrams and graphs. In every case a theoretical analysis of the phenomena is given in so far as the data permit. Likewise, many applications are suggested for theoretical and practical purposes. Copious references are given in each chapter.

Barrer has a clear and interesting style which enables him to keep his subject matter in simple perspective while illustrating it with intriguing items of information. Workers in almost all fields of applied science will find materials and suggestions of value in this excellent monograph.

JAMES W. MCBAIN

Thermodynamics. *Joseph H. Keenan.* ix + 499 pages, 221 illustrations. 15 × 23 cm. John Wiley & Sons, Inc., New York, N. Y., 1941. Price, $4.50 cloth.

THIS new treatise on thermodynamics shows the continuing tendency for the chemist and the engineer to meet on common ground. At the outset the author maintains the traditional approach

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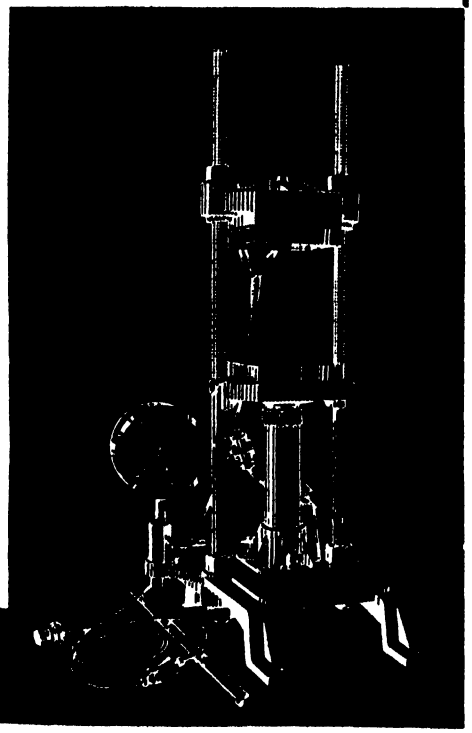
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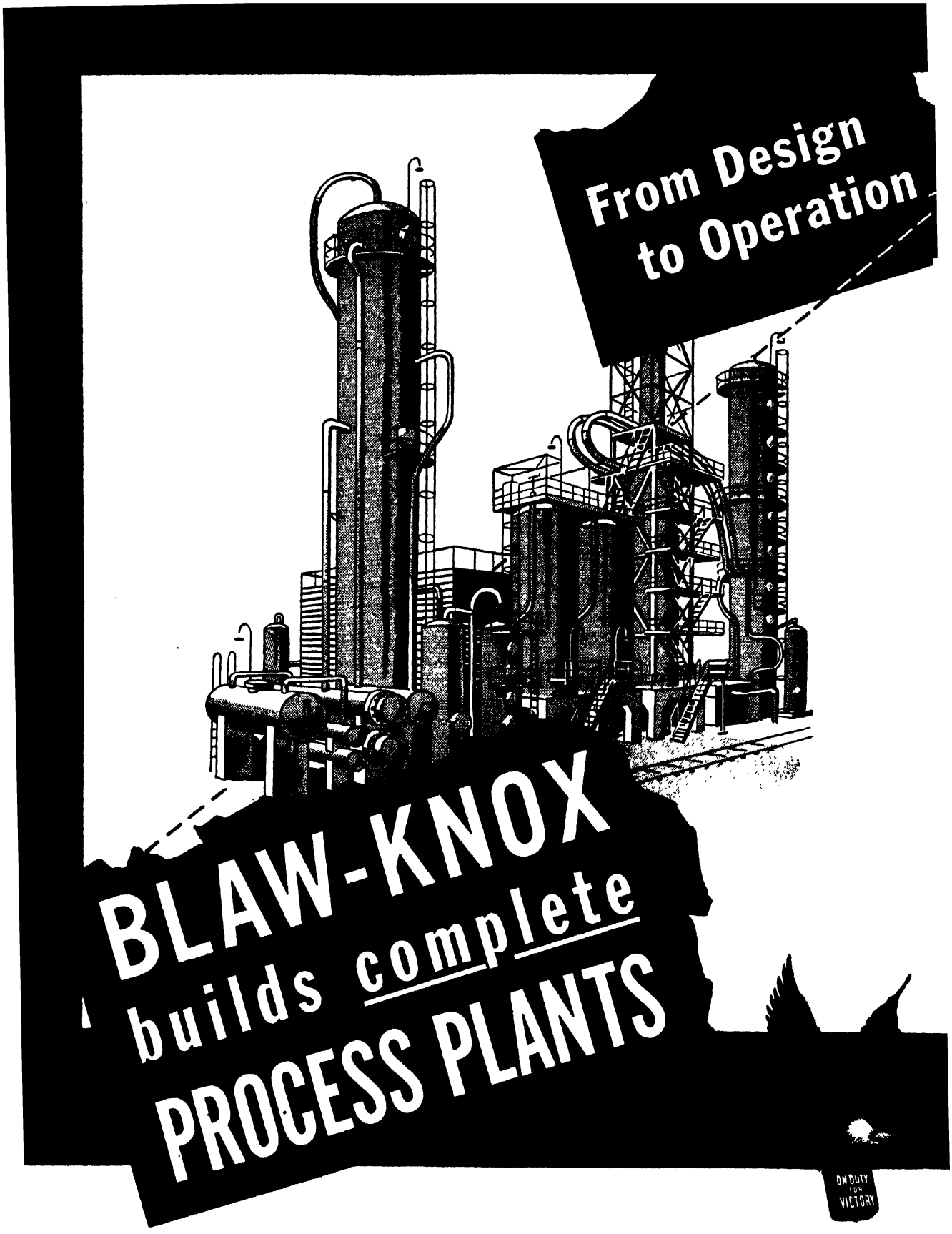
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Beyond the Flyleaf

CONTINUED FROM PAGE 694

through the Carnot cycle and draws his illustrative material from things and processes familiar to the mechanical engineer. Much attention is given to flow processes and to the various cycles of heat engines including internal combustion engines, steam turbines, and refrigeration. The treatment of the relations between pressure, volume, and temperature and on binary mixtures follows more the methods of the chemist than those of the mechanical engineer.

In the last few chapters the emphasis is on equilibrium. It presents that part of the work of Willard Gibbs which seems to bear most directly on problems in engineering. Moreover, it provides a broad and sound foundation for the discussion of equilibrium in the field of mechanics.

There are 26 chapters, 16 of which are evidently intended for undergraduate instruction. The last 10 chapters are indicated as being suited for graduate study. The notation is not far different from that of the chemist. A table of symbols, many problems, and a list of references are appended to each chapter. Most of the equations are developed in the differential form. Fugacity is briefly treated. The chemical potential is preferred over the molal free energy.

This is a scholarly and important contribution to the science and application of thermodynamics by an author who has had much experience in research and teaching in the field. The reviewer liked the work.

MERLE RANDALL

TechniData Handbook. *Edward Lupton Page.* 1st ed. 64 pages. The Norman W. Henley Publishing Co., 17–19 West 45th St., New York, N. Y., 1942. Price, spiral binding, $1.00; cloth binding, $1.50.

THIS is a small handbook which the author states in his preface was compiled when he was a student to enable him to find in one book the necessary data and formulas for his studies.

The book contains, in order, sections on mathematics, physics, chemistry, engineering mechanics, how to use a slide rule, and various tables giving properties of metals, standard pipe sizes, wire gages, and tap drill diameters.

The book is printed by a reproduction process and unfortunately some of the table headings, mathematical equations, and footnotes are practically illegible. This also holds for the lettering of the various figures. The section on chemistry is weak although probably suited to the needs of those not trained in chemistry. Eight pages are given over to most elementary chemical definitions. Its value as an addition to the library of chemical engineers and chemists is uncertain and this reviewer is not inclined to recommend it.

A Treatise on Physical Chemistry. A Co-operative Effort by a Group of Physical Chemists. In Five Volumes. Volume 1. Atomistics and Thermodynamics. 3rd ed. Edited by *Hugh S. Taylor, David B. Jones,* and *Samuel Glasstone.* vii + 679 pages. 15 × 23 cm. D. Van Nostrand Co., Inc., New York, N. Y. Price, $7.50.

THE appearance of this volume marks the renewal of the ambitious effort of 1924, the expansion of that most useful work to five volumes. It also brings Professor Glasstone to the assistance of Professor Taylor as co-editor. The first chapter, 119 pages, Atomic Concept of Matter by Professor Taylor himself, features a discussion of the mass spectrograph, radioactivity, isotopic research, the cyclotron, nuclear fission, and an elaborate table of induced radioactivity. Chapter II by Saul Dushman, assistant director of the General Electric Research Laboratory, 318 pages, Quantum Theory, brings Dushman's admirable previous treatment up to date. Chapter III, 74 pages, The First and Second Laws of Thermodynamics by Professor Taylor uses the notation of Lewis and Randall's "Thermodynamics". In addition to a summary of the important thermodynamic equations this chapter contains an excellent treatment of statistics and the partition function. The fourth chapter, 160 pages, by John G. Aston of Pennsylvania State College, The Third Law of Thermodynamics and Statistical Mechanics, is an excellent treatment including references to the latest work. Aston's notation is uniform with that of Taylor. Seventeen pages of important tables of functions are included. Finally, a table of Raymond T. Birge's 1941 "Values of Physical Constants" is included.

This treatise is a most welcome and timely addition to our American scientific literature. It should be on the shelves of every research library and on the desk of every serious worker in the fields of physics, chemistry, biology, or engineering. The mechanical appearance of the book is outstanding.

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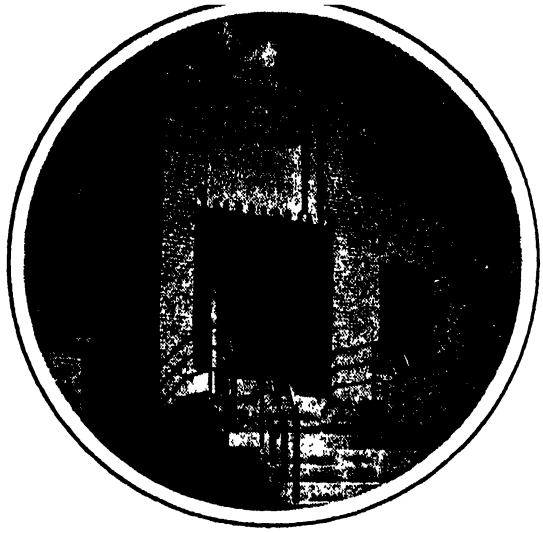
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CONTINUED ON PAGE 698



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Witco Yellow, a replacement for French Ochre; Witco Blancal, an alternate for Blanc Fixe; Witcarb, an improved calcium carbonate—these three new products of Wishnick-Tumpeer research are not only relieving current raw material shortages in many applications, but are finding a permanent place in manufacturing techniques. For these products are not merely "substitutes" born of an emergency; they are definitely superior in many respects to the materials they replace.

These three developments offer convincing demonstrations of the skill and resourcefulness of Wishnick-Tumpeer's staff in dealing with raw material problems. The Research Laboratories of Wishnick-Tumpeer are thoroughly equipped to undertake such problems, particularly in the fields of chemicals, oil, pigments, asphalts, and allied products.

If you are faced with a shortage of raw materials essential to your production—or if new manufacturing conditions require modification in the properties of other materials—perhaps you, too, can benefit by Wishnick-Tumpeer's technical cooperation. Write, wire, or phone us an outline of your problem—what materials you need, what properties they must have, how they are to be used. Let our experienced research workers assist you in the effort to develop alternate or improved materials that may provide a satisfactory solution to your problem.



WITCO YELLOW

A new synthetic pigment, Witco Yellow offers interesting possibilities for replacing French Ochres in rubber and paint manufacture. While practically the same in analysis as French Ochre, it provides these outstanding advantages:

Greater strength
Higher tinctorial value
Cleaner final tint



WITCO BLANCAL

This precipitated barium-calcium compound is available in both low and high oil grades as an alternate to Blanc Fixe. In most cases, it gives better results than Blanc Fixe, since it offers you these desirable characteristics:

Extremely fine division
Excellent color, in dry state as well as under oil
Higher bulking value



WITCARB

This new inert offers special advantages as a white reinforcing filler in rubber formulas requiring high tensile and modulus. In paint formulas, it provides such features as:

Lower cost per pigment pound
More gallons per pound
Added texture in flats
Better stability in finished product
Improvements in Lithopone and Titanated Lithopone paints, and in some cases gloss paints and enamels

Samples and complete information on any of these new products will be sent on request.

WISHNICK-TUMPEER, INC.

MANUFACTURERS AND EXPORTERS

New York, 295 Madison Avenue • Boston, 141 Milk Street • Chicago, Tribune Tower
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The Pioneer Asphalt Co. • Panhandle Carbon Co. • Foreign Office, London, England

Beyond the Flyleaf

CONTINUED FROM PAGE 696

tive text and large modernly arranged photographs in a recently published brochure. One of the many points mentioned is the personnel-training program inaugurated in 1933. The institute employs selected high school graduates and assists them in obtaining college degrees while gaining practical training. Three of the young men who joined the Merck Institute in 1933 and 1934 after graduation from high school are now engaged in research toward their doctorates. The institute expects that a substantial part of the research staff in years to come will consist of men who grew up with the organization in this way.

Tenth Anniversary of U. S. I. Chemical News

U. S. I. Chemical News, a news type of advertisement used by U. S. Industrial Chemicals, Inc., New York, N. Y., celebrates its tenth birthday in May. As one sheet, printed on both sides of a blue stock, the insert has appeared regularly since 1932 in publications reaching the chemical, paint, varnish and lacquer, textile, artificial leather, explosives, and other fields. Its policy has been to stress informative news rather than attempt direct selling. Until two years ago it was known as *Solvent News*.

Since 1933 a companion advertisement, *U. S. I. Alcohol News*, has also been published, in publications going to the drug, cosmetic, and pharmaceutical fields.

Oil-Reservoir Behavior

A NEW method of evaluating the producing capacities of oil wells by comparing the amount of recovered petroleum with the decline of pressure in the reservoir has been suggested by U. S. Bureau of Mines engineers. Detailed descriptions of the fields studied together with tables, charts, and other pertinent information are included in R. I. 3634, "Oil Reservoir Behavior Based on Pressure-Production Data", by H. C. Miller. Copies may be obtained without charge by writing the Bureau of Mines, Department of the Interior, South Building, Washington, D. C.

May Issue of Journal of Physical Chemistry

THE *Journal of Physical Chemistry* for May contains the following articles and reviews of new books:

H. H. ROWLEY AND W. B. INNES. Equilibria of Two-Dimensional Systems. I.

W. B. INNES AND H. H. ROWLEY. Surface Fugacity and the Heat of Free Expansion on a Surface for a Single-Component Insoluble Film.

W. G. EVERSOLE AND T. F. HART. The Use of the *h* and *h'* Functions in Calculating the Activity Coefficients of Strong Electrolytes; Dependence of the Activity and Activity Coefficient on the Concentration Units.

I. M. KOLTHOFF, R. W. PERLICH, AND D. WEIBLEN. The Solubility of Lead Sulfate and of Lead Oxalate in Various Media.

E. S. FETCHER, JR. A Criticism of the Teorell-Meyer-Sievers Theory of Membrane Permeability.

A. M. BUSWELL AND R. C. GORE. Quantitative Spectroscopic Analysis of Proteins.

MONA SPIEGEL-ADOLF AND GEORGE C. HENNY. X-Ray Diffraction Analysis of Protein Denaturation.

HARRY B. WEISER, W. O. MILLIGAN, AND JAMES HOLMES. The Elimination of Sorption-Desorption Hysteresis in Hydrous Oxide Systems. I. Silica.

TERRELL L. HILL. Theory of the Isoelectric Point. II.

April Issue of Chemical Reviews

THE April issue of *Chemical Reviews* contains the following articles:

MARTIN KILPATRICK. Effect of Dielectric Constant on Acid-Base Equilibria.

O. REDLICH AND J. BIGELEISEN. Molal Volumes. V. Thermodynamic Properties of Electrolytes at Infinite Dilution.

FRANK T. GUCKER, JR., IRVING M. KLOTZ, AND THEODORE W. ALLEN. Apparent Molal Heat Capacities and Volumes of the Amino Acids and Their Uncharged Isomers.

A. L. ROBINSON AND W. E. WALLACE. Some Heats of Dilution and Related Thermal Quantities of Aqueous Cadmium Chloride, Bromide, and Iodide Solutions.

GEORGE SCATCHARD AND LEO F. EPSTEIN. Calculation of the Thermodynamic Properties and the Association of Electrolyte Solutions.

M. J. COPLEY, LAURENCE S. FOSTER, AND JOHN C. BAILAR, JR. Stabilization of Valences by Coördination.

W. H. BESSEY AND O. C. SIMPSON. Recent Work in Molecular Beams.

HENRY GILMAN AND HARRY L. YALE. Organobismuth Compounds.

Vitamin Deficiencies of the Filamentous Fungi

THE July issue of *The Botanical Review* will contain an extensive review by W. J. Robbins and V. Kavanagh of the New York Botanical Garden and Columbia University, on "Vitamin Deficiencies of the Filamentous Fungi". This will be a tabulated summary of growth substance requirements of 375 species. Authors' reprints will not be distributed, but separate copies may be purchased for 50 cents each by prepublication orders to *The Botanical Review*, New York Botanical Garden, Bronx Park, New York, N. Y.

Revised Carboy Manual Issued

MCA Manual Sheet C-1, the shippers' manual covering service requirements of the ICC Specification 1A boxed carboy, has been completely revised. Originally issued in 1935, the rewritten manual is comprehensive in scope and comprises 15 pages of text with 19 illustrations and drawings. New subjects include closures, box-car loading, and reconditioning of porous closures. Illustrations and sketches are new and show modern equipment. Copies of the manual at 25 cents each postpaid are available from the Manufacturing Chemists' Association, 608 Woodward Bldg., Washington, D. C.

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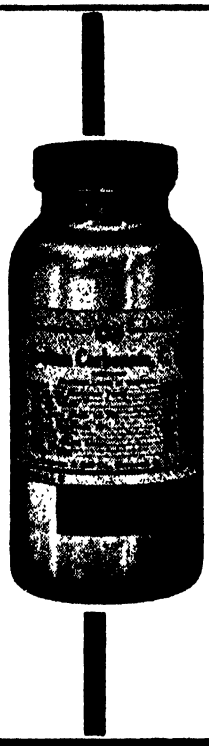
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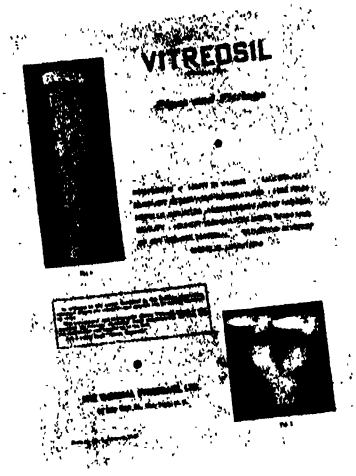
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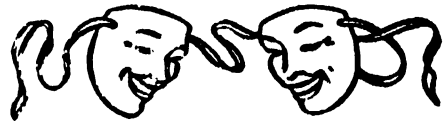
THE WALL STREET OF CHEMISTRY

	March Quarter Earnings		Per Common Share	
	1941	*1942*	*1941*	*1942*
American Commercial Alcohol Corp.	$ 65,018	$ 240,160	$0.25	$0.92
American Cyanamid Co.	1,120,505	1,127,927	0.39	0.38
American Rolling Mill Co.	3,599,241	1,731,000	1.08	0.43
American Viscose Corp.	1,548,692	1,445,475	0.72	0.66
Atlas Powder Co.	440,282	322,973	1.41	0.93
Barber Asphalt Co. (loss)	234,689	21,379	..	..
Bohn Aluminum & Brass Corp.	473,083	441,270	1.34	1.25
Bristol-Myers Co.	861,491	688,113	1.29	1.03
A. M. Byers Co.	290,561	368,263	..	..
Celanese Corp.	1,587,755	1,953,882	0.84	0.98
Climax Molybdenum Co.	1,844,925	2,048,892	0.73	0.81
Commercial Solvents Corp.	556,992	547,181	0.21	0.21
Copperweld Steel Co.	331,818	199,119	0.59	0.33
Duval Texas Sulphur Co.	...	226,953	..	0.45
Hazel-Atlas Glass Co.	472,473	729,966	1.09	1.68
Industrial Rayon Corp.	683,351	652,284	0.90	0.86
Interchemical Corp.	286,301	260,505	0.68	0.56
Lambert Co.	504,012	450,411	0.67	0.60
Link-Belt Co.	566,335	580,268	0.75	0.77
Liquid Carbonic Corp.	257,399	175,495	0.35	0.20
Monsanto Chemical Co.	1,342,707	778,910	0.98	0.45
National Oil Products Co.	139,707	187,350	0.65	0.87
New Jersey Zinc Co.	2,813,509	2,291,334	1.43	1.17
Newport Industries	110,959	174,498	..	0.28
Norwich Pharmacal Co.	158,830	156,742	0.20	0.20
Oliver United Filters, Inc.	80,803	70,138	0.26	0.21
Paraffine Companies	350,295	498,864	0.69	0.99
Parke, Davis & Co.	1,841,304	1,449,234	0.38	0.30
Penick & Ford	334,693	299,428	0.91	0.81
Pennsylvania Glass Sand Corp.	181,829	189,036	0.44	0.46
Procter & Gamble Co.	7,166,041	6,037,308	1.09	0.92
Revere Copper & Brass	1,053,747	995,658	0.68	0.64
Sharp & Dohme	351,701	443,941	0.19	0.31
Sterling Products	3,250,194	2,667,810	1.86	1.54
Texas Gulf Sulphur Co.	2,147,381	1,829,485	0.56	0.48
Tubize Chatillon Corp.	459,638	408,633	0.58	0.41
Union Carbide & Carbide Corp.	10,545,636	9,416,304	1.14	1.01
United Chemicals, Inc.	56,593	78,005	..	..
U. S. Gypsum Co.	1,266,773	1,141,894	0.94	0.84
Victor Chemical Works	245,461	263,404	0.35	0.35
Westinghouse Electric & Manufacturing Co.	5,627,264	4,124,654	2.10	1.28
Westvaco Chlorine Products Corp.	372,620	351,887	0.86	0.81

1942 Cooperative General Chemistry Test

THE Committee on Examination and Tests of the A. C. S. Division of Chemical Education adds to its recent announcement that the editors of the 1942 Cooperative General Chemistry Test are Theodore Ashford, University of Chicago; Alexander Calandra, Brooklyn College; F. D. Martin, Purdue University; B. C. Hendricks, University of Nebraska; and W. J. E. Crissy, Cooperative Test Service.

The committee also reports that the Cooperative Organic Chemistry Test, Form S, has been made available through the efforts of Ed. F. Degering, Purdue University, with collaboration of a large group of other teachers. Information concerning these examinations may be obtained from the Cooperative Test Service, 15 Amsterdam Ave., New York, N. Y.



EMANATIONS

WITH red face CHEMICAL AND ENGINEERING NEWS bows to a gentle but deserved drubbing from Austin M. Patterson:

I note in the March 10 issue, page 346, that a condensate return system made by Cochrane Corp. assures "complete elimination of entrailed air". To be used in the vicinity of packing plants, I presume.

FROM a civilian defense examination for prospective air raid wardens we learn:

An incendiary bomb consists of a 2½-pound hollow filled with termites.

The RECOVERY of VAPORS

with SPECIAL REFERENCE to VOLATILE SOLVENTS

By CLARK SHOVE ROBINSON

Department of Chemical Engineering
Massachusetts Institute of Technology

MODERN LIBRARY OF CHEMICAL ENGINEERING SERIES

RECENT years have seen greatly increased interest in the problem of recovering solvent vapors from various industrial processes, such as the recovery of gasoline from natural gas, of alcohol vapor from the gases liberated in the fermentation of sugars, of carbon disulfide in viscose rayon production, and the removal of water vapor from air. This reclamation of valuable materials is especially important under war conditions, and a study of its possibilities by plant executives and engineers in all solvent-using industries will be well repaid.

The aim of this book is to state briefly and clearly the engineering principles involved and to describe the most successful methods and equipment now in use. The laws governing gases, vaporization, condensation and adsorption are discussed, with copious diagrams and many typical calculations. This feature makes the book extremely useful to students of chemical engineering as well as to engineers whose chief activities lie in other fields. Diagrams and designs of equipment, both old and new, accompany the text, together with numerous photographs of recent installations. Complete vaporization data of gases is included in the appendix.

The only book describing this phase of the process industries, it will be welcomed by all who need to understand the principles and applications of vapor recovery.

CONTENTS: Introduction. Gases and Vapors. Vaporization. Liquid Mixtures. Distillation of Liquid Mixtures. Condensation of Mixed Vapors. Rate and Capacity. Adsorption. Adsorption of Mixed Gases. Rate of Adsorption. Recovery of Adsorbed Vapors. Adsorption Apparatus for Solvent Recovery. Commercial Activated Carbon Systems. Solvent Recovery by Condensation at Constant Pressure. Condensation with Cooling Water. Cooling with Refrigeration. Heat of Vaporization in the Absence of Gases. Vaporization in the Presence of Inert Gases. The Gas under Natural Circulation. The Gas under Forced Circulation. Apparatus Used in Forced Circulation of Gases. Solvent Recovery by Compression and Cooling. Solvent Recovery by Scrubbing. Scrubbing Apparatus. Special Absorbents. Extraction by Solvents. Appendix. Indexes.

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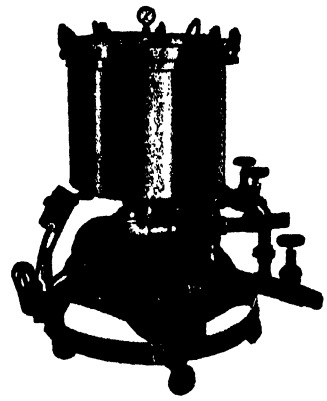
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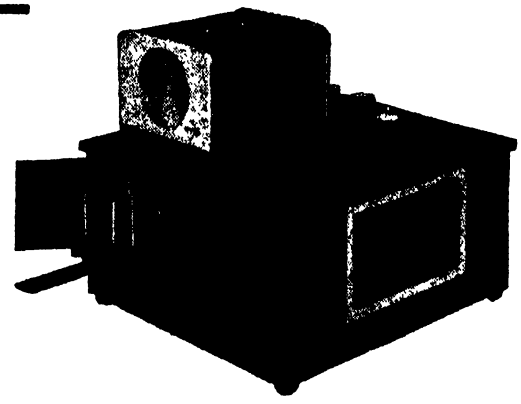
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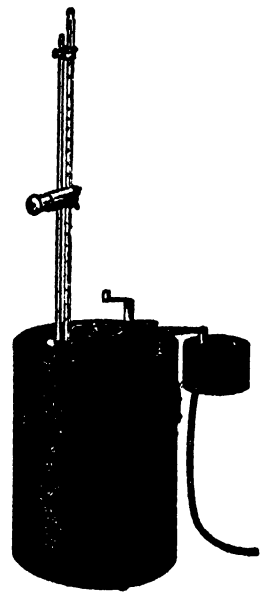
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CONTINUED ON PAGE 706

RESEARCH'S CONTRIBUTION TO THE WAR EFFORT

62 of a series of timely suggestions for solving war-time problems

You may find the answer to your problems in the following list:

ADV.

Protect aluminum with new chemical against corrosion at low temperatures where condensation is possible. (111)

Metal castings, smooth and non-brittle, are now produced by a new foundry core application. (115)

Seal for joints and seams which is flexible, leak-proof, non-cracking and resistant to benzol, gasoline, diesel oil, butane, propane, pentane and similar liquids and gases. (119)

Lubricating compound for drawing aluminum. (139)

Lubricating compound for tin stamping which permits the stamping of lacquered metal without fracturing the coating. (140)

Rust prevention, lubrication and bright annealing of nickel alloy stampings are obtained by the application of a solution of a synthetic wax which gives a water resistant finish. On subsequently annealing the stamping, the wax has a reducing action on the oxides and gives a very bright anneal. (157)

Both ferrous and non-ferrous surfaces can be protected from tarnish and corrosion by means of a special emulsion which is sprayed cold on to the desired parts to give a thin, transparent adhesive film. (159)

Nickel alloys are now being drawn, stamped or formed and then annealed without cleaning by means of a special water dispersible wax-like synthetic. (177)

Sintered bearings made with metallic powders have a tendency to stick in the molds. A newly developed lubricant enables the bearings to be very readily released from the molds. (179)

A water soluble material that gives a soft, flexible, transparent film on paper, textiles, wood, etc. (112)

Waterproof cloth or paper in one operation. A new waterproofing liquid does it. (133)

Flameproofing agent cuts fire risks for textiles, paper, wood and composition board. (143)

Paper coated with paraffin wax is rendered much more translucent by a pre-treatment with an aqueous solution of a new synthetic chemical. (145)

Non-stick wrapper for packaging sticky candies and other products made possible by new wax coating of white, odorless, synthetic wax in conjunction with paraffin wax. (156)

Olive Oil substitute for textile and other technical lubrication. (128)

Textile lubricant which is water soluble. (137)

Cotton and rayon braid, shoe laces, etc., are treated with a combination of waxes to give increased flexibility and high lustre. (148)

Dye Solvent for water insoluble dyes which makes them "soluble" in water. (149)

Textile emulsions of oils and waxes stable in the presence of sulphuric acid, aluminum sulfate and other electrolytes, can readily be made by use of a new type of emulsifying agent. (152)

"Nylon" and "Vinyon" lubricant can readily be made in the cold by use of synthetic emulsifying agent. The finished oil is readily removed by water, is non-oxidizing, stainless and will not carbonize. (167)

Textile oils used as worsted lubricants, spun rayon stock lubricants, finish and lustre oils for cotton, rayon and other natural and synthetic yarns can economically be made by means of a new synthetic oil, produced from domestic raw materials. (170)

A temporary binder for clays for ceramic insulation prior to firing, enabling the clays to be molded without crumbling. (113)

Porcelain, vitreous china, plated metal parts are protected against mechanical abuse and corrosion by a new type of protective coating. (123)

Binder for vitreous enamel to replace gum arabic for vitreous enamel designs, enabling identifications or trade-marks to be applied with a rubber stamp. (131)

Abrasive wheels. A temporary binder for abrasive wheels which completely volatilizes on firing. (141)

Porcelain enamel frit binder giving a firmer and more lustrous enamel coating than is obtained with gums. (142)

Adhesive for "cellophane", cellulose acetate and other synthetic materials of a similar nature. (118)

Adhesive for holding tissue paper to aluminum in special map and display work. (124)

The adhesion of rubber to cloth on vulcanization can be increased by the addition of a chemical material to the raw rubber mix. (151)

Thermosetting cements for lamp and radio tube bases of the alcoholic phenol formaldehyde type containing a synthetic product, made domestically, have greater thermoplastic effects before heat setting than when shellac is used. (164)

Pulp color and pigment dispersing agent for aqueous products that prevents caking. (120)

Flatting agent for paints and varnishes that eliminates grinding and produces a smooth, uniform product. (125)

Semi-gloss water emulsion paints and varnishes that are water resistant on drying are made with a protein base. (127)

Lacquer, varnish and enamel plasticizer which is light in color and which will increase the gloss of the dry film. Also has good wetting and dispersing properties for pigments. (144)

Lake colors which permit soft grinding, giving better length and dispersion, are obtained by the application of a glyceryl compound before coupling bases. (163)

Pigment lakes incorporated in the usual vehicles exhibit greater length and absence of "buttering" by the use of a special soaplike material applied in the acid phase in the manufacture of the lakes after coupling. (166)

Non-mar enamels are easily made by the incorporation of a solution of a special wax which gives increased "slip" effects. (169)

Lacquers giving excellent water and ink resistance are obtained by the incorporation of a solution of a new type of wax. (171)

Rubber goods finish of high lustre and flexibility resistant to gasoline. (129)

Raw rubber sheets can be prevented from sticking together by means of a water dispersion of a synthetic wax-like material. This dispersion can also be used as a lubricant in the cutting of rubber gaskets. (150)

Plastic and hard rubber articles can be polished by the tumbler barrel method by means of a hard, white, synthetic wax which effectively replaces carnauba wax at a much lower cost. (168)

Synthetic rubber can now be made flexible by means of a new plasticizer which is now available. (184)

Cork preservative to prevent mould formation. (132)

Cement, concrete and stucco waterproofing agent. (138)

Warpage of wood can be prevented by the use of a special wax which increases acid and alkali resistance as well as decreasing time of impregnation. (146)

Wood, fibreboard, etc., can be flameproofed effectively without loss of other properties. (176)

Sulphonated oils in the treatment of furs and leather can be replaced by the use of a new synthetic oil which eliminates rancidity and stickiness. (158)

Printing ink vehicles giving better spread, slip and anti-blocking effects are obtained by substituting for ozokerite a new synthetic wax made from domestic raw materials. (162)

Urea formaldehyde resins are plasticized and lubricated by new water dispersible waxes which are incorporated in the aqueous phase. (165)

Carnauba wax can be replaced as a lubricant for molding thermosetting plastics by a synthetic wax now available in powdered form. (172)

Wax which will not melt in boiling water. (110)

Substitutes for imported waxes such as Montan wax, Ozokerite, Japan wax, etc., now available. (114)

Synthetic oils dispersible in water that do not contain soap, or added emulsifiers. (121)

Emulsifying agent for emulsions stable to strong acids, salts and other electrolytes. (122)

Photographic offset plates are improved, giving increased water solubility, spread and wearability by the use of a new type of binder. (126)

Defoaming agent for casein, glue, gelatine, shellac and similar products. (130)

Wax which "dissolves" in hot water. (135)

Oil which remains fluid at -50° C. without freezing. (136)

Glycerin substitutes meeting specific requirements are now commercially available. (175)

Lanolin for industrial purposes can be replaced by a new compound made from domestic raw materials. (178)

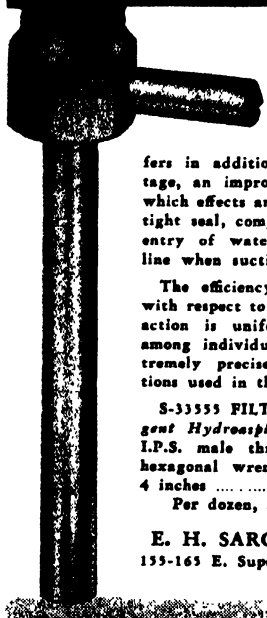
A liquid foam producer to replace Saponin for industrial purposes, is now being offered. (181)

A hygroscopic, water soluble liquid which is an excellent dye solvent and which replaces glycerin in many instances. (182)

See number in parenthesis after each subject. Jot down and mail to us any number that interests you. We will send you data sheets about the chemicals and their uses. Answers to many other problems in your industry are given in our 112 page manual "Chemicals by Glyco"—which is yours for the asking.

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[1] Junior member.

THE Neuberg Chemical Corp., established over 30 years ago as a chemical importing business, will henceforward be known as the Enco Chemical Corp., with headquarters at 441 Lexington Ave., New York, N. Y. Officers and personnel have not been changed.

Sulfur Stocks in U. S. A.

THE American sulfur industry finds itself well able to cooperate with industrial users of sulfur who recently were advised by the War Production Board to build up stocks of sulfur at their plants so that possible future transportation tie-ups would not halt their operations. All sulfur production and shipment records were broken in 1941 and stocks at the mines decreased about 7 per cent. The sulfur industry, however, during the first three months of this year, was able to exceed by about 8 per cent the 1941 rate of production and increase by about 20 per cent the rate established during the first quarter of 1941. As a result, stocks of sulfur at the mines on March 31 of this year were slightly in excess of the stocks at the end of 1941, in spite of the present accelerated demand and shipments. Producers of sulfur, therefore, have available ample stocks from which consumers may build up their reserves during the summer and so relieve the strain on the railroads during the fall and winter.

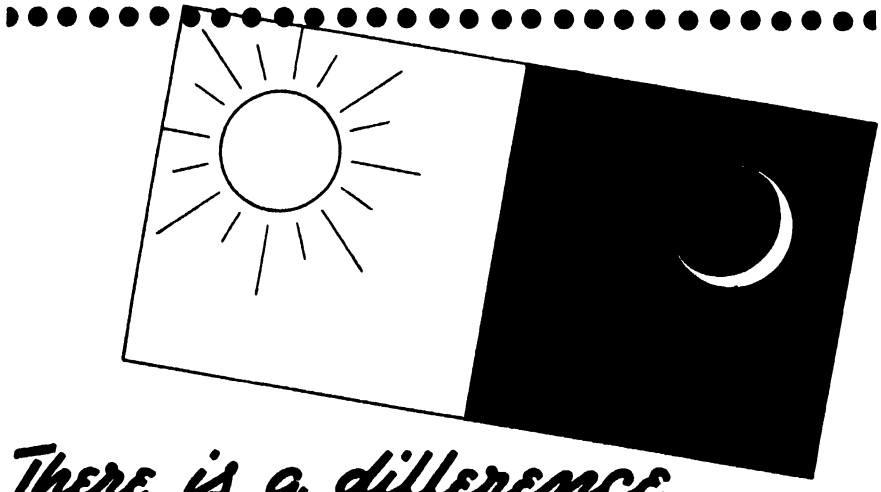
Wood Trusses Instead of Steel

ON THE new storage depot program alone, we expect to employ around 35,000 wood trusses, thereby releasing more than 200,000 tons of steel. That much steel, it is estimated, will build 7,500 medium tanks," said Raymond F. Fowler, Chief, Supply Division, Corps of Engineers, in discussing conservation of materials at a symposium sponsored by the Producers' Council.

United States army engineers have demonstrated during the last few months that it is possible to build, yet not use critical materials. They use wood extensively in construction of hangars, ports cantonments, munitions factories, dams, and many other structures for war purposes.

Colombia Plans Conversion of Bones to Fertilizer Material

THE Colombian Congress at the end of 1941 laid out an extensive program of chemical development for the country in the coming year. Provisions enacted include establishment of a fertilizer plant and setting up of soil conservation and soil analysis services. Chemists have not found satisfactory mineral deposits for the proposed fertilizer plant, however, and it is now planned to establish one or two plants to convert animal bones into the product. Pilot plants already are operating at Bogotá and Medellin with an estimated production of 20 metric tons possible from the 1,000 head of cattle slaughtered daily in the entire country. Imports by Colombia amounted to 13,120 metric tons of fertilizer between 1936 and 1940.



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Laucks Test Dust Explosibility

ALTHOUGH fire protection associations have warned against the explosiveness of dust, life and property in the United States continue to be lost, oftentimes by lack of simple precautions. Nearly all finely divided organic or metallic substances are likely to explode when mixed with air and ignited—whether by spontaneous combustion, generation or application of flame, spark or excessive heat, or flint stones, nails, or bits of metal striking sparks.

In Laucks Laboratories, Inc., Seattle, Wash., an apparatus has been built according to specifications of the U. S. Bureau of Mines, Washington, D. C., to determine the explosibility of various dusts, so that preventive measures may be intelligently carried out in any plant. The apparatus consists of an explosion chamber of heavy glass that has a light cover to afford a vent for the explosive gases. Suspended in this chamber is a nichrome or a platinum filament. The filament is heated almost to its melting point by electricity to ignite the dust. The dust is weighed, placed in a small filter funnel, and thrown into the combustion chamber by a sudden gust of oxygen or air emanating from a pressure bottle sealed with mercury. If the dust is explosive, a small explosion results. If no explosion occurs, further tests are sometimes carried out with higher and higher concentrations of oxygen until even such substances as diamond dust can be exploded. Materials requiring extremely high oxygen concentration to be explosive are, of course, not considered hazardous. Such dusts can contribute to the severity of explosions caused by other dusts, however.

Indiana Standard Systematizes Scrap Campaign

ONE cruiser, 450 tanks, 13,000 cannons, 536,500 machine guns, or 5,500,000 rifles could be made from the 15,000 tons of steel and iron scrap which Standard Oil Co. of Indiana has set as the goal for the "Get in the Scrap" campaign at its six refineries in 1942. More than 2,000 tons of steel and iron scrap have already been saved by the Whiting, Ind., refinery alone in the first three months of this year.

Much old refinery equipment is being dismantled that would not normally be torn down until other times, the company declared. The scrap is sorted and plate, pipe, fittings, valves, etc., which are usable are set aside and reclaimed for reuse in the refineries. The Whiting refinery has also saved much other material in the first three months of this year, such as 90 tons of lead and 25 tons of baled paper.





Photos courtesy,
Cherry-Burrell Corp., Chicago, Ill.

Here is an effective illustration of how one manufacturer found the answer to his material shortage problem. This conveyor belt for moving milk bottles from washer to filler was formerly made of brass. Brass is not available now and a substitution was necessary.

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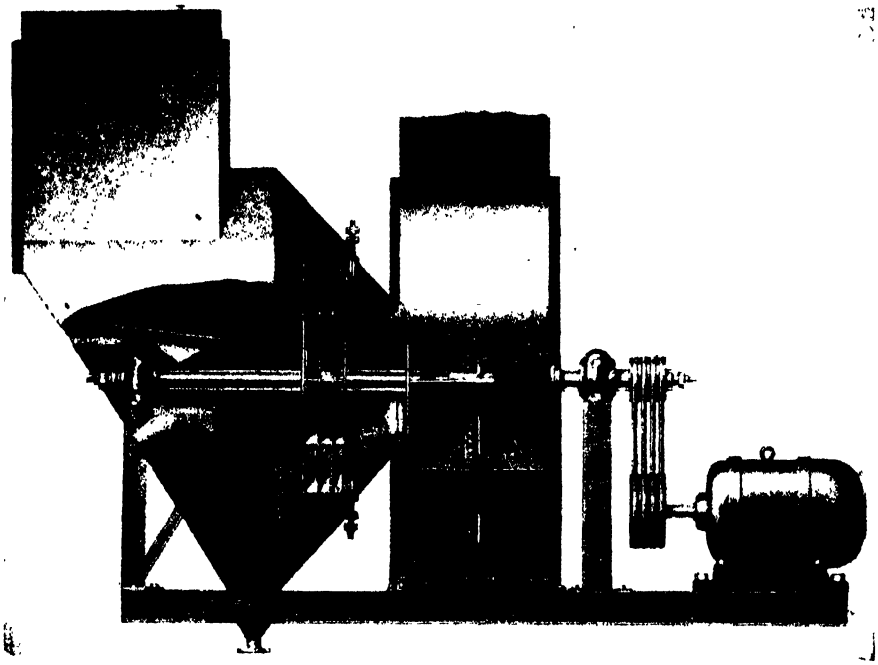
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STAMFORD, CONN.

Dust Elimination



THE Schneible Filtre Fan is a collector unit to remove dust and fly ash from flues, kilns and furnaces, smelter stacks, and cupolas. It consists of a combination housing on which are mounted a rejector wheel and fan wheel, on a single motor-driven shaft. Solids are removed from the gas stream by means of this rejector wheel which throws the particles into a dead zone and hopper by centrifugal force. The dust particles do not come into contact with the wheel, thus eliminating wear on wheel blades. It is made by the Claude B. Schneible Co., Chicago, Ill.

Mineral Wool Board Insulation

A MINERAL wool board type of insulation for cold storage rooms and equipment has been introduced by the Building Materials Division, Armstrong Cork Co., Lancaster, Penna. It is a nonpriority material and is available for all kinds of installations. Developed and proved in more than 200 installations within the past six months, the mineral wool board equals or exceeds Federal Specification HHM-371 for board or block form insulation, having a thermal conductivity as determined by tests of average material produced ranging from 0.31 to 0.33 at 90° F. The material has good moisture resistance, is self-supporting, and will stay permanently in place without sagging, settling, shrinking, swelling, or warping.

Manufactured in board size of 12 × 36 inches and in thicknesses of 1, 1½, 2, 3, and 4 inches, Armstrong's mineral wool board is applied essentially the same as corkboard. Erection in hot asphalt with multiple layer construction is recommended. The material may be finished with asphalt plastic or portland cement plaster.

High-Speed Steel

THE Jessop Steel Co., 534 Green St., Washington, Penna., announces a low tungsten-molybdenum steel, TCM high-speed steel.

The steel is heat-treated in the same furnaces and the same atmosphere as 18-4-1 high-speed steel. It has a slightly lower hardening temperature which contributes to a lower cost in heat treating and is lighter in weight than 18-4-1.

Ammonia
Argon
Boron Trifluoride
Butadiene
Butane
Butene 1
Butene 2
Carbon Dioxide
Carbon Monoxide
Chlorine
Dimethylamine
Dimethyl Ether
Ethane
Ethyl Chloride
Ethylene
Ethylene Oxide
Freon (12)
Helium
Hydrogen

The Matheson Co.

38 Rare & Common
GASES
in six different sizes of cylinders from ½ pound to 150 pounds.

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East Rutherford, N. J.

Hydrogen Chloride
Hydrogen Fluoride
Hydrogen Sulphide
Isobutane
Isobutylene
Methane
Methyl Bromide
Methyl Chloride
Monoethylamine
Monomethylamine
Nickel Carbonyl
Nitrogen
Nitrous Oxide
Oxygen
Phosgene
Propane
Propylene
Sulphur Dioxide
Trimethylamine



No metal contacts pulp or liquid

Pinch VALVES
for Abrasive or Corrosive Pulps and Liquids

Made with rubber or synthetics, the Masseo-Grigsby Pinch Valve is more resistant to wear than metal valves. Shuts tight even on solid particles... withstands freezing. Useful for solutions which are highly corrosive or which crystallize at normal temperatures and must be handled hot; for solutions or solids which are both corrosive and abrasive. Sizes from 1" to 12". *When writing please state your problem.*

The MINE AND SMELTER SUPPLY CO., Denver, Colo.

Prizes Doubled in Compressed Air Idea Contest

INCREASED war production, by broadcasting new and unique industrial uses for compressed air, is the goal of Blast the Axis Program conducted under Compressed Air Institute sponsorship. Opened as a compressed air idea contest before Pearl Harbor, it was intended to speed defense. Recognizing the contest's value in meeting the new urgency, the institute has inaugurated two new steps. The value of each cash prize has been doubled, bringing the total to $1,000, and the duration of the program has been extended one month, to terminate July 1.

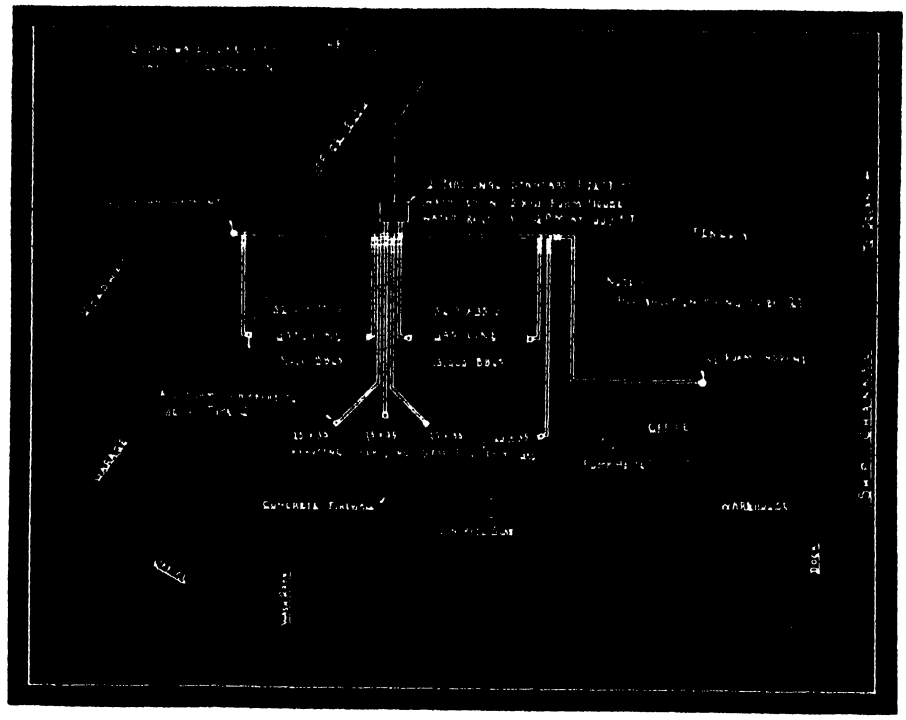
Nation wide in scope and open to virtually any one in industry, the contest is not restricted to employees of companies comprising the Compressed Air Institute. Skill in writing and grammatical construction will have little weight in awarding prizes. The idea and its value to industrial production is the important thing. Entries which have a bearing on some particular aspect of war production, whether or not the idea wins a prize, will be made available to appropriate federal authorities with full recognition to the contributor. Inquiries on the idea program should be addressed to the Educational Director's Office, East Orange, N. J.

Monsanto Opens Phosphate Plant

WITHOUT ceremony or slowing work Monsanto Chemical Co.'s Trenton, Mich., plant went into production recently. The new plant, situated on a 138-acre tract, will eventually turn out a group of industrial chemicals derived from phosphorus. Among products to be made are phosphoric acid, used for treating metal to replace tin plate in many uses, and sodium phosphates, used for cleaning metal parts and in boiler water conditioning, the textile industry, soap manufacture, and oil-well drilling. The principal raw material is pure elemental phosphorus manufactured at Monsanto's huge electric furnace plant in Monsanto, Tenn.

Synthetic Rubber Production

THE first synthetic rubber to be produced in any of the new synthetic rubber plants being erected for the Government's defense plant corps has been produced by the Firestone Tire and Rubber Co., Akron, Ohio, as a test run of several thousand pounds, according to announcement made May 14. Regular production is expected to get under way in a few days and will increase to plant capacity as raw materials become available. The first batch of synthetic rubber was used in making the latest combat tire for military vehicles.



These are National's recommendations for the protection of a large industrial plant. One man controls the entire system.

PLANS FOR A BULWARK AGAINST FIRE!

THIS plan is not for sale! It was designed for specific fire-hazards in a particular plant. And while you can't buy the plan, you *can* use the knowledge and experience responsible for its creation!

In other words, National engineers and laboratory men ask for the opportunity to study your fire-protection requirements . . . the type of fire that threatens your production . . . how and where it will go into action . . . and how you can launch a counter-attack with the least delay, least expense, and greatest efficiency!

Regardless of your hazard, National has achieved a fire-fighting record with it! We shall gladly make recommendations without obligation to you.

Bulletin A-3.

NATIONAL FOAM SYSTEM, INC.

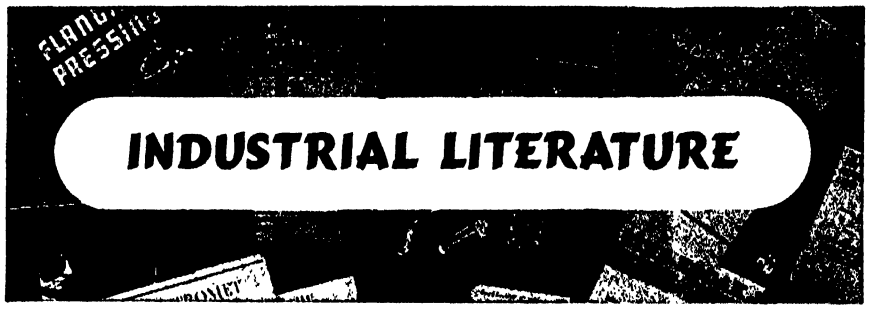
Fire-Protection Specialists in the Chemical and Metallurgical Industries

PHILADELPHIA NEW YORK CHICAGO

The Only Chemical Foam That Can Extinguish Polar Organic-Solvent Fires!

Alcohol, ether, ketones, esters and mixed polar solvents immediately break down ordinary foam bubbles. *Yet they can't touch National "99".* Every test has shown that! Listed by the Underwriters' and Factory Mutual Laboratories, National "99" is an exclusive National development!





Listed publications should be requested directly from the company concerned. Use business stationery, mention bulletin numbers, and refer to this journal. Publications will be sent free unless otherwise noted.

Band-Sawing Operations. This 48-page booklet describes 40 types of machining operations that can be performed with band saws. *40 Different Ways to Cut Machining Costs CEN.* CONTINENTAL MACHINES, INC., Minneapolis, Minn.

Care of Conveyor and Elevator Belting is covered in a 24-page catalog section. Included are instructions on preventing wear at loading points; making belts run straight; and wear due to defective idlers, excessive tension, or excessive exposure to light, heat, and moisture. Other subjects are the proper selection of new belts, installation, splicing, and various repairs. *Catalog Section 2,800 CEN.* B. F. GOODRICH CO., Akron, Ohio.

Centrifugal Pumps. Described in these two bulletins are two-stage volute centrifugal pumps available in capacity ranges of 30 to 650 gallons per minute, operating against heads of from 100 to 300 pounds per square inch. *Bulletins 228-1, 229-1 CEN.* WARREN STEAM PUMP CO., INC., Warren, Mass.

Dust Control. Why industrial control is necessary is discussed in a 2-page release. *Release 95-CEA.* AMERICAN FOUNDRY EQUIPMENT CO., Mishawaka, Ind.

Electrical Wiring Joints. This 4-page folder gives data on a device which joins the ends of electric lines by the simple operation of inserting the ends of the lines and twisting. These wire joints are small enough to be used in knock-out boxes and are said to be approved by the Underwriters' Laboratories. *Form WDB-342 CEN.* IDEAL COMMUTATOR DRESSER CO., 1279 Park Ave., Sycamore, Ill.

Horizontal Pumps. This 8-page bulletin describes high-pressure motor-driven horizontal pumps and two-plunger steam pumps. The motor driven pumps are available in pressure ranges from 380 to 12,000 pounds per square inch and displacements from 0.5 to 186 gallons per minute. The steam pumps range from 900 to 13,200 pounds per square inch and 1.25 to 45 gallons per minute displacement. *Bulletin 270-A CEN.* WATSON-STILLMAN CO., Roselle, N. J.

Liquid Handling Equipment. This 40-page catalog features the manufacturer's line of lubrication, filtration, metering, pumping, storage, and dispensing equipment. Used extensively in the solvents, lubricating oil, fuel oil, and gasoline fields, this equipment also finds application with many other liquids. *Industrial Equipment Catalog CEN.* S. F. BOWSER & CO., INC., Fort Wayne, Ind.

Load-Center Power Distribution System. An 8-page illustrated publication helps in the selection of the proper arrangement of load-center distribution system to fit individual requirements. *Bulletin GEA-3759-CEN.* GENERAL ELECTRIC CO., Schenectady, N. Y.

Machine Maintenance. A 16-page bulletin describes the metallizing process and equipment for its application. *Bulletin 42 A-CEN.* METALLIZING ENGINEERING CO., INC., 21-07 41st Ave., Long Island City, N. Y.

Machine Tool Accessories. A 4-page folder lists such items as live centers, electric etchers, balancing ways and other equipment for the machine shop. *Form MSB-142 CEN.* IDEAL COMMUTATOR DRESSER CO., 1277 Park Ave., Sycamore, Ill.

Manufacturer's Line of Equipment. This 11-page illustrated booklet contains a classified listing of all products made by this manufacturer. *How Worthington Serves Industry Booklet CEN.* WORTHINGTON PUMP AND MACHINERY CORP., Harrison, N. J.

Micromax Speed Recorders. This 11-page illustrated bulletin tells about instruments which measure and automatically record speed of rotating machinery. *Catalog N-27 CEN.* LEEDS & NORTHRUP CO., 4934 Stenton Ave., Philadelphia, Penna.

News from Production Front. A 4-page leaflet tells how General Motors went at the war production job and what has been accomplished. *News Letter 1-CEN.* GENERAL MOTORS CORP., Detroit, Mich.

Oil-Burning Equipment. A 4-page folder describes equipment said to be capable of an unusually wide range of capacity. This is attained by a burner designed to provide efficient atomization throughout the capacity range and a control system which balances the mixture of air and fuel through this range. *Bulletin 107 CEN.* PEABODY ENGINEERING CORP., 580 Fifth Ave., New York, N. Y.

Overhead Cranes. A 28-page catalog describes overhead cranes of many types for a wide variety of services. *Bulletin H-13 CEN.* HARNISCHFEGER CORP., Milwaukee, Wis.

Petroleum Refining. This 80-page booklet is a treatise on refinery processing equipment. Each separate section, devoted to each process described, includes a discussion of the process, an illustration of a typical plant installation, and a flow sheet. Also given are a large number of illustrations of refining units, a general section on petroleum processing, and a table of physical constants. *Bulletin 0-42-1 CEN.* FOSTER WHEELER CORP., 165 Broadway, New York, N. Y.

Plating Conveyors. An illustrated bulletin gives detailed descriptions of the construction of the semiautomatic heavy-duty plating conveyor, describing the types of drives, methods of agitation, and operation. *Bulletin SA-101-CEN.* HANSON-VAN WINKLE-MUNNING CO., Matawan, N. J.

Pressure Instruments. A 24-page catalog covers pressure indicating, recording, and controlling instruments of the bourdon spring, bellows, and manometer type. *Catalog 76JF CEN.* TAYLOR INSTRUMENT CO., Rochester, N. Y.

Production Facilities. A new catalog presents a complete list of machines that comprise the company's facilities for fabrication of sheet metal, sheet steel, and light plate, with name and size of each piece of equipment. *Catalog CEN.* THE S. C. BAER CO., 500 Times-Star Tower, Cincinnati, Ohio.

Rheostats and Resistors. A new 16-page catalog lists over 1,000 stock items in rheostats, resistors, tap switches, chokes, and attenuators. It gives illustrations, descriptions, ratings, and prices. *Catalog 18-CEN.* OHMITE MANUFACTURING CO., Department 9B, 4835 Flournoy St., Chicago, Ill.

Rubber-Lined Barrels and Drums. This catalog leaflet describes barrels and drums lined with rubber by the Vulcalock process. These drums may be used for the shipment of certain dilute inorganic acids, salts, and alkalies, and certain organic chemicals such as formic acid, acetic acid, and formaldehyde. *Catalog Section 9,030 CEN.* B. F. GOODRICH CO., Akron, Ohio.

Sand Pumps. Described in this 4-page folder are centrifugal sand pumps which have no stuffing boxes. These pumps are suitable for the pumping of sands, sludges, slurries, slimes, and many abrasive solutions. *Bulletin E-1400 CEN.* A. R. WILFLEY AND SONS, INC., P. O. Box 2330, Denver, Colo.

Steel Stamps. A 16-page catalog gives information on a complete line of steel stamps, type holders, and accessory equipment. *Supplement A to Catalog 146 CEN.* JAS. H. MATTHEWS & CO., Pittsburgh, Penna.

Temperature Regulators. Described in this 16-page catalog section are liquid-expansion type regulators. These regulators are self-contained, entirely automatic, and require no outside source of power. *Bulletin 600 CEN.* SARCO CO., INC., 475 Fifth Ave., New York, N. Y.

Vulgum resins as crude, reclaim, synthetic rubber extenders.

INVESTIGATE *Resin and Lacquer Emulsions* as LATEX SUBSTITUTES

—Extenders and Modifiers

Resin and Lacquer Emulsions have been finding an ever-widening use in many industries. They have proved invaluable in replacing other materials in adhesives, modifiers, binders and fillers, grease proofing, waterproofing, sizing, impregnating, coating, color dispersions and innumerable other uses.

In the Rubber Industry these emulsions are being used today as *Latex Modifiers* and *Complete Latex Replacements* to extend, thicken, stabilize, increase penetration, improve resistance to acids, oils and solvents; *in Coatings* to produce adherent pigmented or clear coatings on paper, fabric and rubber and as intermediate coats for lacquer on rubberized cloth; in *Rubberizing* textiles; in *Latex Treated Papers* to increase strength and improve ageing; in *Adhesives*, for paper, for leather to cloth, and cloth to cloth.

These are just a few of the known applications in the rubber field. Undoubtedly in your own plant you will find many uses for these emulsions to improve your products and extend the supply of the vital materials, LATEX and RECLAIMS.

Our Technical Staff will be glad to make recommendations to meet your specific problems. Write today for additional information.

AMERICAN RESINOUS CHEMICALS CORPORATION

Coatings • Pigment Dispersions • Resin, Wax, Lacquer Emulsions

MAIN OFFICE and LABORATORIES, PEABODY, MASS.

Factory Branches: Newark, N. J. and Chicago, Ill.

A Few of Our Products of Interest to the Rubber Industry

ALKYD 17-B A permanently tacky, alkyd type resin emulsion containing 40% solids. When mixed in equal proportions with normal latex, the mixture for all practical adhesive purposes is indistinguishable from latex.

ALKYD 18 An alkyd type resin emulsion which is non-yellowing and non-oxidizing. Film is water-white and non-tacky. Preferred where slight oxidizing action may be considered harmful to rubber. Extender for latex in coating, combining and impregnating processes.

EMULSION 58-B A series of emulsified elastometers containing up to 65% solids. Recommended for use as full latex replacements in impregnation and combining.

PIGMENT BASES Concentrated aqueous dispersions of pigments in resin bases, available in all shades and viscosities, suitable for spreading, spraying, etc.

Also Acrylic, Vinyl, Maleic, Phenolic, Hydrocarbon, Ethyl Cellulose, Cellulose Acetate and Nitrate emulsions and solutions for various applications.

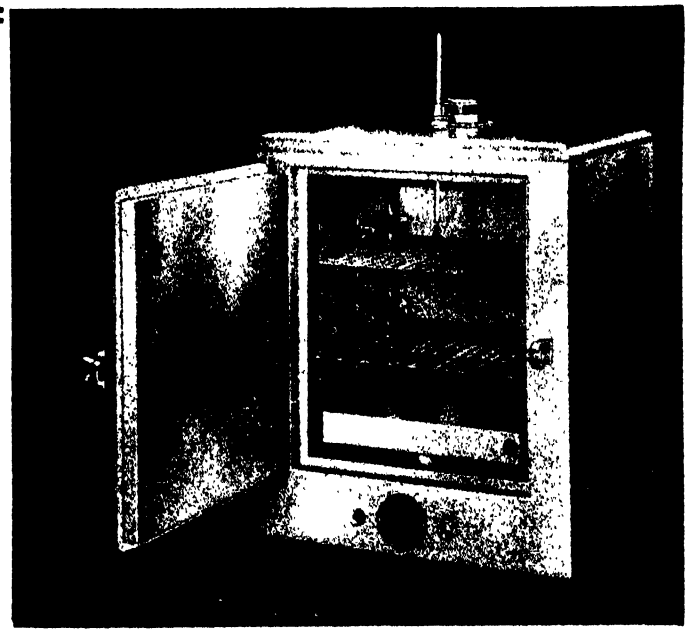
Brand New No. 16

LABORATORY OVEN

Ask for new Bulletin 42-48

$85.

Working chamber 11" x 11" x 11". Sensitivity Plus or Minus ½° C. Overall dimensions 16½" wide, 16" deep, 25" high. Includes 2 latticed metal shelves adjustable for height on 3 sets of brackets to permit pulling half-way out; thermometer holder; ventilating shutter, hazard-safe door latch, Neon pilot lamp, cord and plug. For A. C. single phase, or D. C. Wattage, 300. Specify voltage.



A 64-741 — for 110 Volts *A 64-742 — for 220 Volts*

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BURRELL TECH. SUPPLY CO.
1936-42 Fifth Ave., Pittsburgh, Pa.

EBERBACH & SON CO.
200 E. Liberty St., Ann Arbor, Mich.

GREENE BROS., INC.
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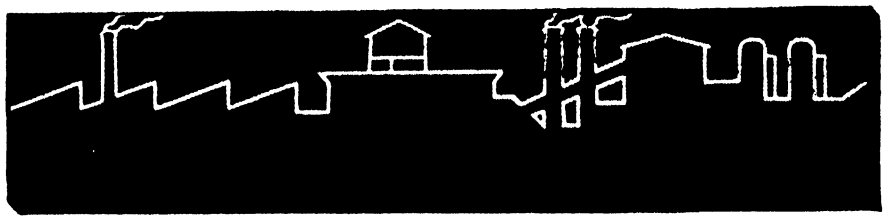
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417 E. 13 St., Kansas City, Mo.

HOWE & FRENCH, INC.
99 Broad St., Boston, Mass.

E. MACHLETT & SON
220 E. 23 St., New York, N. Y.

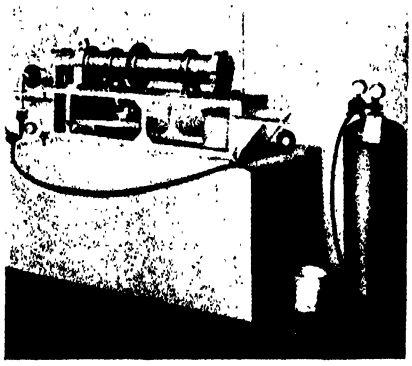
PHIPPS & BIRD, INC.
915 E. Cary St., Richmond, Va.

GEO. T. WALKER & CO.
324 Fifth Ave., So., Minneapolis, Minn.



Experimental Rotary Dryer

THE C. O. Bartlett & Snow Co., Cleveland, Ohio, has introduced a small rotary dryer which is being used for experimental and research work in laboratories, and for student instruction in technical schools and colleges.



This unit has a cylinder 6 inches in diameter by 36 inches long, fitted with internal feed and lifting flights, is carried on a pair of steel riding rings, supported on trunnion rolls, and rotated with a girt gear and sprocket drive. Different size driving sprockets permit four variations of rotating speeds from 2.06 to 4.92 r. p. m. The cylinder ends have machined seal rings, which engage split breechings. The feed breeching is equipped with a feed chute. The discharge breeching has a hoppered bottom and discharge chute arranged to connect to a covered receptacle.

Stabilog Controller

THE new Model 30 Stabilog controller, introduced by Foxboro Co., Foxboro, Mass., incorporates refinements for better appearance and closer control but does not depart from proved Stabilog control principles. When panel-mounted, the instrument extends only 3/4 inch from the panel surface. A dual pressure indicator, replacing the customary two small gages, is easily seen through a rectangular opening in the recessed door. Interior illumination can be readily provided.

All operating adjustments are made from the front of the case, but the entire operating mechanism is protected and concealed behind a removable plate. Unit construction simplifies replacement of the measuring system, changing the type of control, or any other major servicing. The instrument has three functions. The first is its proportional function, providing uniform pneumatic proportional action, adjusted to the smallest value that will result in stabilization following a disturbance of process conditions. The reset function acts simultaneously with the proportional function, establishing stabilization at the desired point of control. The third function provides a temporary additional correction, determined by the rate of change in any disturbance of conditions. If the rate of change is fast, the additional correction is large; if the rate of change is slow, the additional correction is negligible. The operation of this third function is entirely automatic, being governed by the proportional and reset adjustments.

Corrosion-Inhibiting Additive for Lacquers

A CORROSION-INHIBITING additive for clear lacquers, nitrocellulose solutions, and alcoholic shellacs, which eliminates the need for shipping these materials in tin-lined drums, has been announced by the Merrimac Division of Monsanto Chemical Co., Everett, Mass.

The additive is a solution of an organophosphorus compound and is known as D. P. Solution. Used in lacquers in proportions of 0.1 to 1.0 per cent, it has been found to give effective protection against corrosion of iron or steel under conditions met in the handling of lacquer shipments.

Its action is ascribed to the fact that it reacts with iron to form an insoluble film.

In addition to inhibiting corrosion, the solution has demonstrated interesting properties as a flocculating agent for maintaining good suspensions of the flatting agent in flat lacquers.

Thin Slot Insulation



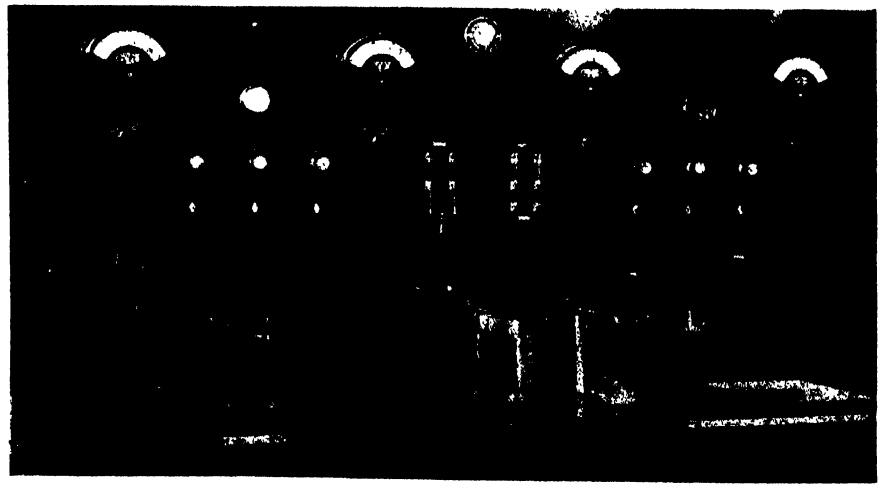
NEW thin types of Irv-o-slot insulations have been developed by the Irvington Varnish & Insulator Co., Irvington, N. J., to provide nonbulking slot insulation for use in confined or limited space.

Plating Laboratories Expanded

TO PROVIDE facilities for the greatly increased volume of research and experimental work, the plating laboratories of the Hanson–Van Winkle–Munning Co., Matawan, N. J., have been reconditioned and expanded. All laboratory rooms are now accessible from a central hallway. Three new offices have been constructed, as well as a library.

A new solution preparation room has been provided. Between it and the analytical laboratory, an experimental electroplating room has been built and a modern and complete electroplating control board installed. This board is used for making bent cathode tests on plating solutions, for experimental electroplating tests, and for the examination of raw materials and supplies used in electroplating processes. The board has six places for work with coded plugs and jacks to facilitate rapid setting up and tearing down of experimental plating units. It is divided into two parts, each served by one ammeter and one voltmeter, with selector switches. A field rheostat is available for control of the voltage at the generator. In addition, carbon pile rheostats have been placed in series with each set of outlets for close control of the current.

Special glass, laboratory-size, plating bath containers are provided of shape and proportions to simulate commercial conditions. A built-in timing device is included for timed experiments. The thermostatic bath is electrically heated and agitated. Compressed air is available at the panel, fitted with air filter and air regulator. Where mechanical agitation is required, air and electric motors with proper speed control are used. Research facilities have been expanded by providing more space and installing new equipment. The instrument room is used for both research and routine control. The installation includes an optical bench, special photographic equipment, and a stereoscope for microscopic examinations. A dark room is available for processing plates and films. Adjoining the instrument room, a research laboratory has been provided for the study of alkalies, inhibitors, fluxes, and related products. A large room for semicommercial plating tests has been provided on the second floor. New pumps, tanks, heating devices, and controls have been installed.



Electroplating control board

EMPLOYMENT INFORMATION

RATES to be paid in advance. Standard setting 5c a word, minimum charge $2.00 each; include 8 words for box address. Exceptions see ⟶ Display, $10.00 per column inch. 2 inches maximum, larger units at regular display unit rates. No discounts or allowances.
SEND advertisements with remittance to INDUSTRIAL AND ENGINEERING CHEMISTRY, 332 West 42nd St., New York, N. Y., to reach there not later than 10:00 A.M. on the 10th and 25th, closing dates for editions of CHEMICAL and ENGINEERING NEWS of the 25th and 10th, respectively. Insertions made in order of receipt provided necessary remittances are complete.
EMPLOYERS are requested to mention in their announcements the section of the country in which the open position is located to ensure replies only from those who are geographically available.
In printing these advertisements the SOCIETY assumes no obligations as to qualifications of prospective employees or responsibility of employers.

UNEMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking employment for themselves are allowed in one calendar year 3 announcements free (one per issue) set in standard style and limited to 50 words each, including 8-word box address, and 3 additional standard announcements at 50% of regular rate. Further announcements and excess words at full rate.

EMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking new positions are permitted 3 standard announcements during the calendar year at 50% of the regular rate—include 8 words for box address.

EMPLOYERS seeking chemists and chemical engineers are permitted 3 standard announcements, not to exceed 50 words each including box address and not more than one per issue, during the calendar year without charge, provided they agree in writing to acknowledge all replies (excess words 5c each), otherwise full rate applies.

The AMERICAN CHEMICAL SOCIETY is vitally interested in the welfare of its members and in seeing that the chemical industry is manned with competent chemists and chemical engineers. These pages are part of our service in that connection. In addition most of the larger sections of the AMERICAN CHEMICAL SOCIETY and several of the smaller ones have active employment committees. Local section secretaries in your area will inform you as to any employment aids that may be available locally.

An Employment Clearinghouse is operated at each national meeting of the SOCIETY for the purpose of bringing together representatives of industry looking for chemists and members and student affiliates in attendance wishing to make such contacts. For further details, consult the preliminary and final programs as printed in the NEWS EDITION prior to each meeting.

In the New York area, special employment facilities are offered by the Employment Bureau of the Chemists' Club, 52 East 41st St., New York, N. Y. In the Chicago area, the Chicago Section maintains an employment service at 413 Stevens Hotel, Chicago, Ill.

Those replying to announcements should be careful to send copies and not original documents. Advertising circulars will not be forwarded and to that end all letters will be opened at the forwarding office.

SITUATIONS OPEN

Those announcements in which the letter "P" is part of the address key have paid in full and are not committed to acknowledge replies. The Society regards acknowledgment by employers of all applications as an act of common courtesy but can assume no responsibility for their failure to do so.

CHEMICAL ENGINEER, American citizen, wanted for sales training in highly specialized technical field. Location, New York City. State age, draft status, education, experience and salary record. Enclose photo. Replies considered confidential.
Box 30-T-4, Ind. & Eng. Chem., Easton, Pa.

Chemical Engineer
Physical Chemist
Cereal Chemist
Biochemist
Organic Chemist
Food Technologist
Analytical Chemist

Consideration will be given to applications from Bachelors, Masters, Ph.D.s and those with a few years post-doctorate experience. These openings represent opportunities for qualified persons in the Research Laboratories of a food organization located in the East. Applicants should submit educational history, college record, experience, age, and other personal data, with recent photograph.

Box 110-TP-4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST or CHEMICAL Engineer having knowledge of and preferably experience in the production of synthetic rubber, particularly in the use of alcohol and waste agricultural materials therefore. Give complete information on education, experience and personal qualifications.
Box 16-N-5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST or CHEMICAL Engineer; preferably recent graduate with some experience in vegetable oil and soap analytical work wanted as assistant to Superintendent of an edible oil and soap factory in Honduras. Good climate and living accommodations. Single man preferred but no objection to married man. Applicant should have some knowledge of Spanish. Send recent snapshot, personal information and salary required.
Box 20-NP-5 Ind. & Eng. Chem., Easton, Pa.

GRADUATE ASSISTANTSHIPS available for next year. Salary $540 for nine months' service. Part time laboratory teaching. Write for application blanks. H. D. Newton, Head, Department of Chemistry, University of Connecticut, Storrs, Connecticut.

CHEMIST WANTED: Recent graduate or graduate with a few years of experience, development work. Draft deferred. Chicago area.
Box 32-NP-5, Ind. & Eng. Chem., Easton, Pa.

TWO RECENT graduate chemists for analytical analysis in control laboratory of large Philadelphia chemical plant. Salary $2,150, per year.
Box 59-NP-5, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Man or woman, widely experienced. Background in analyses of raw materials and intermediates. Large concern. Northern New Jersey. State full qualifications and salary expected. Include recent photograph. Our employees are aware of this advertisement.
Box 63-N-5, Ind. & Eng. Chem., Easton, Pa.

LARGE NEW YORK engineering firm requires chemical engineers age preferably 25-30 with any following experience: 1. Petroleum refinery experience in operation or design of stabilizers, absorbers and light end equipment. 2. Refinery experience in design or operation of plants for solvent dewaxing and solvent extraction of lube oils. 3. Refinery experience in design or operation thermal or catalytic cracking plants. In reply state education, qualifications and refinery experience in detail. Also salary expected and status regarding military service.
Box 80-NP-5, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST. Summer teaching, eastern college. Man or woman regularly employed in college teaching in winter term preferred. Term, June 15-September 3.
Box 10-TP-5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST for LABORATORY research. Rubber adhesive experience essential. State qualifications, other pertinent data, fully.
Box 14-T-5, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEERS. Old established company requires men familiar with personnel and requirements of Industrial and Scientific Laboratories, as exclusive district representatives. Several key industrial areas open. Unusual opportunity. Diversified lines insure stable future. Full particulars required and will be kept confidential. Our men know of this ad.
Box 15-T-5, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST. Middle Atlantic college needs teacher for twelve week summer session, beginning June 12. Experienced teachers, preferably now employed in college teaching, desired.
Box 16-TP-5, Ind. & Eng. Chem., Easton, Pa.

WANTED: COMPETENT chemist, Ph.D. or D.Sc. Must be graduate of acknowledged school. Must possess sound scientific background, some industrial experience desirable. Wanted for research work with nationally known manufacturer of photographic material. Photographic hobbyist preferred. Adequate compensation and excellent future opportunities assured.
Box 33-TP-5, Ind. & Eng. Chem., Easton, Pa.

Chemist Wanted

Preferably experienced in shoe cements, finishes, etc. Write stating age, experience, technical education, salary wanted.

Box 14-NP-5 Ind. & Eng. Chem.
Easton, Pa.

DESIGNERS and DRAFTSMEN

For vital war plant work carrying high priority ratings of A-1-A to A-1-C.

Working 50 hours per week with remuneration on basis of a 40-hour week with time and one-half for work in excess of 40 hours per week. Program covers 1½ years.

Must have experience in design of:

Oil Refinery Process Piping
Concrete and Structural Steel
Heat Exchangers, Pressure Vessels
Electrical Control, Light and Power
Conduit Systems

Instrument Engineers able to select and specify proper control instruments for oil refinery units.

Application should be made by letter giving age, nationality, concise outline of previous experience and educational background, present salary, salary desired and references. Include recent photograph.

BLAW-KNOX COMPANY
Process Industries Dept.
P. O. Box 5087
East Liberty Station, Pittsburgh, Pa.

WHOLESALE DRUG house in deep south has an opening for a chemist. Experienced in Analytical Laboratory and capable of manufacturing test solutions and microscopic stains. P. O. Box 1680, New Orleans, Louisiana.

ENGINEER, familiar with design of process equipment such as tube mills, ball mills, dryers, mixers, etc. State experience, details of education, salary desired and when available. Middle Atlantic District.
Box 44-TP-5, Ind. & Eng. Chem., Easton, Pa.

WANTED: INSTRUCTOR in inorganic and Analytical chemistry, instructor in organic chemistry, assistant professor in organic chemistry. Ph.D. required. Write Department of Chemistry, University of Pittsburgh, for application blank.

BIOCHEMIST for the duration, draft exempt and experienced in the production of bacteria for commercial use. Must have at least B.S. in chemistry and the equivalent of a major in biology including bacteriology.
Box 49-T-5, Ind. & Eng. Chem., Easton, Pa.

RUBBER CHEMIST, experienced in compounding rubber, wanted for research on sealing materials used for hermetic closures. Good opportunity for young, aggressive, well qualified chemist. Middlewestern location. In reply give full particulars of training and experience, draft status, and salary desired.
Box 50-T-5, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 714)

Address communications to the box number indicated and Mail to Easton, Penna.

The American Chemical Society has no information concerning the position advertised, or in regard to those seeking employment.

(Situations Open Continued)

PHYSICAL CHEMIST and petroleum chemist wanted by long established petroleum processing concern in Los Angeles area. Some post-graduate work, or experience in fields allied to petroleum desirable but not essential. Give details including draft status and photo. All replies confidential. Our employees have been notified of this advertisement.
Box 51-T-5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST or CHEMICAL engineer age 27-30 experienced in development and field application of cutting oils, and compounds also wax products by large oil company; location Milwaukee, Wisconsin. Permanent position. Give complete details, education, experience, salary expected, and photograph.
Box 52-T-5, Ind. & Eng. Chem., Easton, Pa.

Specialized chemist, very well connected with industrial dyers, tanning. Would like to **represent in Argentina** a North American producer of chemical products, auxiliaries and pigments applying to these industries.

Eventually would import direct.
First class references

Apply by letter to A.B., Av. R.S. Peña 616, Buenos Aires, Argentina

CHEMIST—EXPERIENCE in manufacture of colors helpful, but not essential. A background of research and plant control advantageous. Excellent opportunity for person qualified to hold executive position. In reply, please state education, previous experience, age, and other personal data. Replies will be treated in strictest confidence.
Box 65-T 5, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, young, M.S. preferred, with basic training in analytical and biochemistry; $1500, research position in New York City. Submit details on courses, practical experience, references, personal data, photograph.
Box 68-T-5, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST—Ph.D. degree with good background in organic chemistry to conduct and organize literature researches in an Industrial Research Laboratory in New York area. Include full particulars and recent picture in first letter.
Box 73-TP-5, Ind. & Eng. Chem., Easton, Pa.

PACIFIC COAST college has an instructorship or assistant professorship for a man with physical and analytical training. Ph.D. preferred. Genuine interest in teaching, and in the aims of Christian education in a liberal arts college demanded. Give full details of training and experience, and state minimum acceptable salary.
Box 80-T-5, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(A.C.S. MEMBERS)

SPECIAL LIBRARIES ASSOCIATION will recommend trained chemical and technical men and women librarians at no cost to employer or member. Competent persons are now available. Write to the Executive Office, 31 East Tenth Street, New York, New York, for additional information.

DEVELOPMENT and RESEARCH chemist with exceptional training and experience. Ability to initiate and direct research problems with sound judgment and resourcefulness. 17 years' highly successful record in heavy chemicals, petroleum, high pressure gases and catalytic processes. Desire responsible position here or in Latin America.
Box 50-T-3, Ind & Eng. Chem., Easton, Pa.

RESEARCH and DEVELOPMENT Chemist. B.S. in Chem. Fourteen years' diversified experience on plastics, synthetic resins, organic chemicals, paints, varnishes, cloth and paper coatings and process development. Excellent record and experience. East preferred. Available immediately. Draft deferred.
Box 18-T-4, Ind. & Eng. Chem., Easton, Pa.

TEACHER RESEARCH worker; Ph.D. Majors: Physical chemistry, chemical engineering. Twelve years' teaching these with inorganic, analytical chemistry, etc. Sixteen years' industrial research, consulting, testing. Numerous publications. Employed. Seeking broader field.
Box 22-T-4, Ind. & Eng. Chem., Easton, Pa.

ASSISTANT or ASSOCIATE professorship of organic chemistry in well established institution, beginning in September. Ph.D. prominent University, 1931. Eight years' department head in small mid-western University. Excellent record building up Department. Experience teaching undergraduate and graduate courses, directing M.S. researches, administration, placement, purchasing, glass blowing. Recent and projected publications based on M.S. theses. Sigma Xi, Phi Lambda Upsilon. Active A.C.S. section. Superior references. Protestant, age 37, married. Location immaterial
Box 37-T-4, Ind. & Eng. Chem., Easton, Pa.

METALLURGICAL CHEMIST, M.S., June 1942. Inorganic major and physical metallurgy minor. Undergraduate research in organic; graduate research in inorganic. Summer experience in analytical chemistry. Experience with metallographic photomicroscope and X-ray diffraction equipment. Defense course in metal's inspection. Desires Southern California position.
Box 40-T-4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST M.S. Accredited eastern university. Fellowship. Organic major, but thoroughly trained in physical, inorganic, analysis. Desires research or production position, preferably in east. Available middle of May, 1942. Single.
Box 56-T-4, Ind. & Eng. Chem., Easton, Pa

RESEARCH PHARMACEUTICAL organic chemist, Ph.D., 1941, large mid-western university. Research experience in organic syntheses, sulfur and nitrogen compounds, vitamins. Publication. Member Sigma Xi, Phi Lambda Upsilon, Rho Chi, age 27, married, draft 2-A Now employed, but desires new connection where his abilities can be utilized fully. Available upon short notice.
Box 96-T-4, Ind. & Eng. Chem., Easton, Pa

ORGANIC CHEMIST, Ph.D. 1939 with minors in biochemistry and physical, now teaching in a western university desires full time research position. East preferred. Married, age 32. Available June 1942.
Box 11-N-5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST: 18 years' practical experience. Desire responsible position. Prefer research or head of analytical group. Will complete work for Ph.D. 1942. Major inorganic analytical. Thorough training in organic and physical. Publications. Location immaterial but prefer East. Available June.
Box 29-N-5, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. course work and research completed. Physical chemistry minor. Publications. Four years' teaching general and organic. Eastern location preferred but not essential. Draft deferred. Available in June.
Box 35-N-5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S. in chemistry with minor in engineering. Brooklyn Polytechnic graduate with one year industrial experience seeks job in defense plant or laboratory. Organic position preferred. Now employed but available after May. Eastern location preferred. Phi Lambda Upsilon.
Box 40-N-5, Ind & Eng Chem., Easton, Pa.

FOOD TECHNOLOGIST, married, 42, dependents. Seventeen years' experience canning, freezing, waste disposal, production management and research. Graduate chemical engineer.
Box 41-N-5, Ind. & Eng. Chem., Easton, Pa.

SUMMER EMPLOYMENT wanted Now instructor on permanent basis in General Chemistry at state university. Ph.D. 1938. Major, Biochemistry; Minor, Organic Chemistry. Phi Beta Kappa, Phi Lambda Upsilon, Sigma Xi. Research experience. Draft classification 2B. Single, Age 28. Location immaterial. Available June 8.
Box 53-N-5, Ind. & Eng. Chem., Easton, Pa

CHEMIST, B.S. in Chemistry, June, 1942. Will have also completed some graduate work at this date. Excellent basic training in organic, analytical and rubber chemistry, math. and physics. Prefer position as organic research assistant or work connected with rubber compounding. Available by mid-June. Location immaterial.
Box 61-N-5, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER: M.I.T. graduate with twenty years' diversified experience directing (often as consultant) research and development on products, processes and equipment; developing design and initial operation of million dollar plants; solving unusual production problems; increasing morale and efficiency of men. Recently in pulp and paper; earlier in rubber chemicals, coal gasification, coatings.
Box 82-N-5, Ind. & Eng. Chem., Easton, Pa.

ELECTRO-CHEMIST, M.S. with further graduate work equivalent to Ph.D. (Electrochemistry major). B.S. in Chem. Eng. Six years' successful research and development work in electroplating and metal finishing, including bright nickel, high speed tin, copper and nickel, noble metals, alloy plating including brass and silver alloys, etc. Plant experience. Proven ability. Possesses initiative and ability to work with people. Publications and patent. Age 32, employed, 3A.
Box 86-N 5, Ind. & Eng. Chem., Easton, Pa.

AGRICULTURAL and BIOLOGICAL Chemist, B.S. 1938, Pennsylvania State College. Research in Agr. Exp. Sta. Industrial experience in food and dairy chemistry and bacteriology. Draft deferred, age 24, married.
Box 87-N 5, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, 8 years' design and development experience in petroleum refining, solvents, and organic syntheses. Diversified experience in all unit processes and operations. Doctor's degree in chemical engineering, M.I.T. graduate. Age 31, single, Protestant. Now employed in essential industry in minor job; desire more responsibility and permanent position with major essential chemical industry. Will work anywhere.
Box 11-T-5, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER. Well balanced, experienced development, research, administration and production supervision. Present position assistant to plant superintendent and in charge of development and research. Wide knowledge purchasing and sources of supply paint, varnish and printing ink industries. Diversified experience includes inventory control, production planning and scheduling, technical service and consultation ink, textile and paper problems. Broad knowledge machinery and plant operating techniques. Designed several unusual types of apparatus for testing laboratory. Prefer production supervision, technical service work or administration to strictly laboratory research. Desire opportunity for advancement with company offering reasonably permanent connection. Special interests: technical writing; photography. Single. Aged 31. Draft 3. Protestant. Available reasonable notice.
Box 12-T-5, Ind. & Eng. Chem., Easton, Pa.

ECONOMIC CHEMIST, M.S., 1940, Gamma Sigma Epsilon. Single. One year teaching. One year industrial experience. Employed. Interested in teaching general, physical, and economic chemistry; economic chemical research; sales. Business ability. Publications.
Box 13-T-5, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST M.S. 12 years' experience Agricultural Experiment Station work. Publications. Research in chemistry of foods, plants and animals. Training in physics, bacteriology, sology and mathematics through calculus. Teaching experience. Member of Sigma Xi. Age 45, married. Desire change.
Box 20-T-5, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, B.S. Univ. of Mich. '32. Married, Protestant. Ten years' experience research, development, design, operation various chemicals. Special design of equipment processes, synthetics. Continuously employed, desires position of greater usefulness and responsibility in major defense industry. Possesses initiative and capability for hard work. New York area preferred but not essential.
Box 21-T-5, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Ph.D. 1935. Six years' industrial experience in enzyme production and application. Academic experience in fermentation and organic research. Married. Publications. Sigma Xi.
Box 22-T 5, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, Ph.D., 1941, leading midwestern university, mathematical physics minor. Now employed but seeking more interesting work, academic or industrial. Experience in electrical measurements. Single, age 26, draft 3A, good health. Phi Beta Kappa, Sigma Xi.
Box 23-T-5, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, Ph.D. 1941. Outstanding Middle Western university. Now employed but desires responsible research and development position with progressive company. Experience, petroleum, metallurgical, teaching. Publication, patent. Single, 25, draft deferred. Available on reasonable notice.
Box 24-T-5, Ind. & Eng. Chem., Easton, Pa.

WANTED: OPPORTUNITY to enter and make specialty of field of organic synthesis. A.B., M.A., degrees. Experience limited to over one year analytical. Now employed. Draft exempt. Will go anywhere, but prefer N. Y. C. or vicinity.
Box 25-T-5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST PHARMACEUTICAL Organic, training in Pathology and Physiology. Graduate work 4 years, Research assistant 3 years, now operating own successful organic synthetic lab. 2 yrs. Wide experience in analysis, research, production, and sales. Honor societies, publications.
Box 26-T-5, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER and research chemist: Ph.D. physical chemist. 12 years' industrial experience, research, development, pilot plant; pharmaceuticals, cotton finishing, cellulose research, spectrophotometry. Academic experience also. New England and New York area preferred.
Box 27-T-5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, M.S. Fifteen years' varied experience in research, manufacturing, and sales service. Seeks position in oils, paints, resins, pigments, fillers, or related field.
Box 28-T-5, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL and INDUSTRIAL engineer with unusual training and affility. B Ch.E., M.A. (Ind.E.) leading universities. Candidate for M.Ch.E. (evening college). Successful experience in research and development on cellulose, lignin, extraction, engineering economics, waste utilization; prefers production. N. Y. area preferable. Single, 24, immediately available.
Box 29-T-5, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, B.Ch.E. cum laude, M.S., work toward Ph.D., honor societies. Excellent organic training—synthetic, micro-analytic. Food Analysis, vitamins. Studies, plastics, synthetic rubber. Executive, teaching, experiences. Resourceful, co-operative. Age 35, married, draft 4-C. Desires teaching, research, development, production position.
Box 34-T-5, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 715)

(Situations Wanted Continued)

CHEMIST B.S. leading eastern college 1932. Nine years' experience in research and production. Rubber, synthetic rubber and lacquers. Wishes to associate himself with top notch chemist in synthetic rubber, lacquers, resins or plastics. Development or research.
Box 36-T-5, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. Fourteen years' diversified experience, mostly synthesis in fields of carbohydrates, pharmaceuticals, olefins. Knowledge of biochemistry, bacteriology, languages; skilled abstractor. Reasonable salary.
Box 38-T-5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST and BIOCHEMIST, Ph.D., Major Organic. Fifteen years' of research in synthetic organic, enzymes, proteins, carbohydrates, chemistry and physiology of bacteria, mechanism of drug action, immunochemistry. Forty publications, patents. Also several years' research in Europe. Now engaged in biochemical research in a large Eastern University. Desires a change to a responsible position with a progressive group. Imaginative, resourceful. Age 45. Gentile. Please give details in first letter.
Box 41-T-5, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER—Synthetic Rubber. Ch.E. 1927, M.S. 1928. Age 40, Draft 3A, 15 years' varied experience in research and development, process engineering, manufacturing and plant design. Expert in latex, rubber, dispersion and emulsions. Thoroughly familiar with the chemistry of high polymeric compounds, pilot plant operations, plant design, development, installation, operation and labor supervision. Protestant of American ancestry. Excellent record and references. Desires permanent position with responsibility in the development, design, construction or operation of synthetic rubber with a commensurate starting salary and chances for advancement. Location immaterial.
Box 42-T-5, Ind. & Eng. Chem., Easton, Pa.

ORGANIC and PHYSICAL chemist, Ph.D., Ch.E., desires research or teaching position with opportunity for research. Fifteen years' research and teaching experience at large university (Ass't Professor) and research institutes, teaching graduate courses and directing Ph.D. researches. Numerous publications in physical and organic chemistry. Research involves absorption and emission-spectra, fluorescence, Raman-spectra, polarography, optical activity, calorimetry and their applications to organic, biological or nutrition problems. Organic synthesis, especially pyrrole pigments, qualitative and quantitative organic microanalysis. Administrative ability. First citizenship papers, age 42, married. Christian. Employed, available within reasonable notice. Location immaterial.
Box 43 T-5, Ind. & Eng. Chem., Easton, Pa.

COLLEGE TEACHER desires to obtain position teaching chemistry only. Nine years' successful experience teaching general, qualitative and organic in college and engineering school. Now teaching chemistry and other sciences Present position permanent. Would be pleased to have opportunity to do research while teaching. Good recommendations. Ph.D. 1935 Major, organic; minor, general chemistry. Good background in other sciences. Publications. Membership: Sigma Xi, Phi Lambda Upsilon. Protestant, family.
Box 46-T-5, Ind. & Eng. Chem., Easton, Pa

ASSISTANT PROFESSORSHIP in chemical engineering wanted by chemical engineer, M.S., now employed in industry but who prefers teaching. Age 36, class 3A, industrial and teaching experience. East, south, or middle west.
Box 47-T-5, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL RESEARCH, development position wanted by Ph.D., physical chemistry, 1941 Doctoral research in precision calorimetry. Publications. Year experience in plastics. Phi Beta Kappa, Sigma Xi. Age 25. Married. 3-A draft classification. Willing locate anywhere.
Box 54-T-5, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER. B.S. 20 years' varied experience in research pilot plant development, design and plant control in the fields of oil refinery, gas and by-products, and production of organic chemicals.
Box 56-T-5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST: B.S. Chemistry, M.S. Biochemistry. Three years' graduate research on sulfite waste utilisation, 4 months experience in experiment station, 17 months in soil mechanics, 20 months in paper mill on research and pollution. Desires work more directly connected with war effort. Age 29. Draft 3A. Prefers West or Mid-west.
Box 57-T-5, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. in biochemistry. Experience in synthesis, isolation of vitamins, amino acids, other biochemicals, development protein and vitamin analyses. Publications, patent applications, Sigma Xi. Interested in research development for war production.
Box 58-T-5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST: Two years' of graduate work toward M.A. Desires position in production and development of organic chemicals in war production plant. Some analytical and production experience. Age 25, married. Draft deferred. Employed. Location immaterial. Available on short notice.
Box 64-T-5, Ind. & Eng. Chem., Easton, Pa.

ORGANIC RESEARCH chemist, Ph.D. 1934, age 35, married. Experienced in industrial research methods. Twelve-year background of teaching, synthetic organic research and developments in viscose, cellulose derivatives and protective coatings. Capable of directing established research activities or organising and supervising such work in pioneer fields. Interested only in a permanent connection requiring outstanding ability and application with an organization recognised for its sound achievement, business integrity and financial stability.
Box 60-T-5, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, Cornell, B.Chem. 1939, Ch.E. 1940, single 23. Two years' experience development work on organic chemicals, methanol, ammonia. Any location, available immediately. Defense work preferred; principally interested in process development, improvement of existing processes; production if defense industry.
Box 66-T-5, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. Research experience in sterols and synthetic organic. Seek industrial position in organic research or development, preferably for war effort. Sigma Xi. 29, 2-A.
Box 67-T-5, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. 1938, Age 28, single. Employed by Government, desires research position in industry. Experience includes synthetic organic chemistry, organic microanalysis, sterol research, biochemical research. Available on short notice
Box 72-T-5, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, B.S., M.S. in Biochemistry and nutrition. 2½ yrs. experience in vitamin chemistry, vitamin preparations, and fluorometric assaying of thiamin and riboflavin. Also holds N. J. Secondary Teacher's Certificate.
Box 74-T-5, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, Ph.D., desires work in research or development. Researches in kinetics, high vacuum, electrochemistry. Now working in radio tube factory, thermionic emission, production development of direct emission filaments. Good background in physics, mathematics. 29, married, English born, American citizen. Phi Lambda Upsilon, publication.
Box 76-T-5, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.S. 1940, industrial production, analytical, and investigative experience, with wide responsibilities. Desires research, development, or production in organic field, with company contributing to war effort. Twice classified 2A. Age 24 Presently employed.
Box 77-T-5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, M.S., one year industrial experience, desires position in research, production, or development, preferably organic. Eastern location, particularly New Jersey, preferred. Age 27, single, favorable draft status. Available immediately.
Box 81-T-5, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Ph.D., 1942. Excellent background in physiological chemistry, organic chemistry and physiology. Courses in toxicology, bioassays, spectroscopy and microanalysis. Research experience in fatty acids and human fat Interested in organic or biochemical research. Single, 27, draft 2-A, Sigma Xi, Phi Lambda Upsilon.
Box 82-T-5, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(NONMEMBERS)

PLANT SUPERINTENDENT, experienced in design, erection, operation and technical direction of vegetable oil plant manufacturing refined and hydrogenated oils, Oleomargine, Mayonnaise, Distilled Fatty Acids and Crude Glycerine.
Box 44-T-4, Ind. & Eng. Chem., Easton, Pa.

EMPLOYMENT in BRAZIL wanted either as chemist or in management. A.B. 1934 Stanford, chemistry major. No experience. Seven years manager wholesale oil distribution. Consistent money making record. Speak Spanish. Read Spanish, German, some French. Studying Portuguese. Alpha Chi Sigma. Age 29. Draft 1-B. Married. Excellent references. Salary immaterial.
Box 25-N-5. Ind. & Eng. Chem., Easton, Pa.

CHEMICAL LIBRARY position desired by woman-chemist. Wide experience in literature and patent searching. Good scientific and technical background. Fluent use of scientific Russian, Ukrainian, French and German. Typing.
Box 17-T-5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST B.S. May 1942. Organic, physical, analytical, micro and physiological chemistry. Background in physics and bacteriology. Undergraduate research in chrome ore analysis. Available immediately. Excellent references. Draft status unclassified.
Box 30-T-5, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST. Recent M.S., A.C.S. accredited university. Good knowledge of physical chemistry. Members Sigma Pi Sigma, Phi Lambda Upsilon, Sigma Xi. Experience in synthetic resins. Desire position in defense industry, research preferred. Now employed.
Box 35-T-5, Ind. & Eng. Chem., Easton, Pa.

LIBRARIAN, B.S. in chemistry, M.S. in Library Science, married, age 31, 3-A. Highly trained and skilled in acquiring, assembling and searching scientific and research literature. Executive ability; business experience. Present position, head librarian, University. Will consider asking leave of absence for duration if position open in vital war industry or agency.
Box 37-T-5, Ind. & Eng. Chem., Easton, Pa.

SPECTROGRAPHIC ANALYST; white, male, finishing ESMDT spectroscopy, U. S. C., no experience, Protestant, 56, married, B.S. '09, salary your schedule, location non-essential.
Box 39-T-5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST: B.S. in April 1942 University of Pittsburgh. Received "A" grades in bacteriology, inorganic, organic, Analytical (qual. and quan.) chemistry. Ordnance material testing and inspection, advanced metallurgical analysis, physics, mathematics. Had first year in medical school at Pitt. Seven months experience in hospital laboratory as medical technician. Location immaterial; single, age 27, available immediately, reclassified to 4F (poor vision 20/200) in left eye, right eye normal. Desire industrial or pharmaceutical work.
Box 48-T-5, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST. With background of physics, mathematics and radio. Age 29; A.B. 1935. At present employed but desires position with greater advancement. Four years' experience in analytical testing. West coast position preferred.
Box 59-T-5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST and ENGINEER 20 years' experience research management and sales—starches, gums, and dextrins, animal glues, colloids, foods, sizing and finishing materials, animal and mineral oils, waxes, textile chemicals, enzymes, and synthetics. M.I.T. graduate.
Box 61-T-5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST 19 years' experience oils and allied lines, sulfonations, synthetics, detergents, emulsions, bases for emulsifying mineral oils and glycerides, resins, textile chemicals, water proofing compounds, adhesives, waxes, carbohydrates, and proteins. Desires position requiring broad experience in research and production.
Box 62-T-5, Ind. & Eng. Chem., Easton, Pa.

TEACHING POSITION wanted—preferably small college in midwest or south. M.S. degree biochemistry (1940). Advanced work in organic, bacteriology. Three years' graduate school. Many hours over M.S. Two years' director small nutrition research laboratory. 29, married, draft 3A.
Box 69 T-5, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, B. of Ch.E. 1940. Experienced in Chemical Economics as preparing consolidated breakdown statements of raw materials for priorities, standard and cost analysis, power conservation, production scheduling. Employed by large organic manufacturer. Desires similar position in N.Y.C. or vicinity. Age 25, Draft 3A.
Box 75-T-5, Ind. & Eng. Chem., Easton, Pa.

Hydrion Wide-Range pH Test Paper

R. P. CARGILLE, 118 Liberty St., New York, announces a new technique for checking the pH of solutions against his Hydrion wide-range pH test paper.

A complete line of buffers, for comparison with the unknown, known as the Cargille buffer set No. 1, has been developed. Solutions of known pH, made by dissolving the tablets in this set, are applied to the test paper to bring out on the paper the color for any half unit from pH 3 to pH 11. The colors are used for reference to judge the pH of the sample being tested; comparisons made with these reference colors are more accurate than those made with color charts. Readings can be made to one-half pH unit.

The new unit is designed for control tests in the plant by unskilled workmen; and for quick, preliminary tests in laboratories where more elaborate pH apparatus is available.

The buffer set is priced at $3.00; the Hydrion unit at $1.50.

MISCELLANEOUS

BUSINESS OPPORTUNITIES • FOR SALE • WANTED • ETC.

Five cents a word, minimum charge $2.00; display available at $7.50 per inch; in advance. No discounts or allowances

MICRO-ELEMENTARY ANALYSES: C, H, N, S, P, Halogens, Methoxyl, Mol. wt., etc., U.S.P. and other official tests, Purity tests, Microinorganic assays, Spot tests, Micro-distillations, Toxicological investigations, and typical micro-chemical research work. Dr. Carl Tiedcke. 866 Fifth Avenue, New York, N. Y.

WANTED TO PURCHASE

General and Special equipment for steel-work analytical laboratory. State detailed inventory and cash prices.

Box 77-N-5, Ind. & Eng. Chem., Easton, Pa.

WANTED: Mellor's "Comprehensive Treatise on Inorganic and Theoretical Chemistry," complete set or separate volumes; "Der Aufbau der Zweistoffleigerungen."
Box 18-T-5, Ind. & Eng. Chem., Easton, Pa.

WANTED: 500 to 1000 lbs. of secondary octyl alcohol (methyl hexyl carbinol) up to 50 gals. of diethyl carbinol, 100 lbs. of diethyl ketone, up to 2000 lbs. of caprie acid, 10 grams. Thujone. Quote prices.
Box 31 T-5, Ind. & Eng. Chem., Easton, Pa.

WANTED: 10 kilos Asparagine, 100 kilos Xylos, 100 kilos Sodium cacodylate, 500 grams Tryptophane, 500 grams Rhenium metal or salts also Acrylic, Glucuronic, Glutamic, Maleic, Malonic, Sebacic acids, 50 kilos Levulose.
Box 71-T-5, Ind. & Eng. Chem., Easton, Pa.

WANTED: FILTER press. New or used plate and frame press; iron, rubber coated or wood. 1-2 cu. ft. capacity; enclosed discharge; suitable for washing cake. Reply giving description and price. Box 769, Kansas City, Mo.

WE WANT to BUY. Offer us all your surplus laboratory equipment in any quantity or complete laboratories. We are in urgent need of all types of instruments and apparatus. We are willing to pay the fairest price in many instances more than what we have sold most of the same equipment for. Please list and send promptly via air-mail to save time. Urgently needed are microscopes, Abbe refractometers, balances, polarimeters, Saccharimeters, Spectroscopes, Microscopic accessories etc. The Laboratory Exchange, 24 E. 21st St., N. Y. C.

For Sale
CRESYLIC ACID
William D. Neuberg Company
420 Lexington Ave. New York, N. Y.
Telephone LE 2-3324

FOR SALE: Industrial and Engineering Chemistry, Industrial edition, vols. 1-33 (1909-1941). Complete. Unbound. Excellent condition.
Box 19-T-5, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Berichte Deutschen Chemischen Gesellschaft years 1873-1920 bound. Zeitschrift Physikalische Chemie vols. 1-75, bound. American Journal of Physiology 1899-1937. Tigerstedt, Handbuch Physiologische Methodik 1912, 3 vols.
Box 55-T-5, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Commercial laboratory. Business principally metallurgical. Very active. Splendidly equipped. Centrally located. Long record of big earnings and accomplishments. Unusual opportunity for competent metallurgical chemist. Health forcing retirement.
Box 63-T-5, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: 5000 tons Volcanic ash, 100 tons Red Jasper large lumps, 1000 tons Olivine, 500 tons Celestite, 1000 lbs Columbite 70% Cb205, 100 lbs Wolframite specimen lumps, Luminous pigments for Blackout & display, Black light U. V. lamps $18.00.
Box 70-T-5, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Spencer Compound Microscope with four and sixteen millimeter objectives, oil emersion lense, Abbe Condensor, three Oculars, Mechanical Stage, Vertical Illuminator, and glass bell jar, like new. The Perkins Laboratories Omaha, Nebraska.

FOR SALE: Immediate delivery subject to prior sale, Spencer Binnocular Microscope, (3) B & L Microscopes, (2) B & L Dubosq Colorimeters, (3) International Centrifuges with all accessories, Schmidt & Haensch Polarimeter, Saccharimeter, (5) Horisontal Sterilising Autoclaves for gas or steam, (3) Large incubators, (3) Freas Ovens, (2) Multiple unit organic combustion Furnaces, Gaertner Micrometer Microscopes, Labtest hydraulic presses 6 × 6 self contained with or without heating plates, 12 × 12 × 10 single wall drying ovens, analytical balances, Barnstead Water stills electric, Hanovia Quarts lamps, (9) various types torsion balances, (3) vacuum ovens, De-Laval purifiers and clarifiers, vacuum pumps, Microtomes and many other offerings in standard laboratory equipment. Fully guaranteed. Write us your requirements. Immediate attention to all inquiries. The Laboratory Exchange, 24 E. 21st. St., N. Y. C.

FOR SALE: Need balances? We are offering new (never used) laboratory pulp balances in polished mahogany case with sliding cointerpoised door made by a national firm. 100 gr. capacity, 1 mg sensitivity. A splendid opportunity to purchase these fine balances while still available. Reduced to $27.50. Order promptly to assure delivery. Subject to prior sale. The Laboratory Exchange, 24 E. 21st St., N. Y. C.

Direct Blackening Process for Copper and Copper Alloys

THE Enthone Co., 442 Elm St., New Haven, Conn., has developed a new process called Ebonol "C" for direct, low-temperature, chemical blackening of copper and copper alloys. The process involves immersion in a solution of blackening salts operated near the boiling point or from 200° to 212° F., and the blackening is accomplished in from 2 to 10 minutes, depending upon the alloy being blackened.

The process is stated to be suitable for blackening copper, beryllium copper, bronze, phosphor bronze, and brasses with zinc contents of 35 per cent or less. The coating is essentially cupric oxide, and being integral with the base metal, it cannot chip or flake. It is hard enough to be buffed and does not have to be lacquered to prevent wear.

Conservation

JOBBERS are playing an important part in the planned conservation campaign being conducted by Manning, Maxwell & Moore, Inc., Bridgeport, Conn. Each month they distribute folders telling how to make the company's products and competitive products last longer.

Plastic Spacers

NEW plastic spacers are reported to save brass and steel and to speed up milling machine operations in the manufacture of airplanes, locomotives, electrical equipment, pneumatic and precision tools, and other goods.

The spacers are made in thicknesses from 0.001 to 0.020 inch with hole diameters as high as 2 inches with standard keyways. Larger sizes with outside diameters up to 10 inches may be had on order.

They are made by Industrial Products Suppliers, New York, from "Plastacele", cellulose acetate plastic of the Plastics Department of the Du Pont Company.

VINYL ACETATE
for the preparation of Poly Vinyl Acetate, Alcohol, and Acetal resins; synthesis of pharmaceutical chemicals
NIACET
CHEMICALS CORPORATION
4701 Pine Ave. Niagara Falls, N. Y.

IMPORTANT!

Publication and closing dates of Chemical and Engineering News

Issue of the 10th closes— 25th of preceding month

Issue of the 25th closes— 10th of the month

CHEMICAL AND ENGINEERING NEWS
HARRISON E. HOWE, Editor
PUBLISHED BY THE AMERICAN CHEMICAL SOCIETY
VOLUME 20 JUNE 10, 1942 NUMBER 11

PRELIMINARY PROGRAM
Buffalo Meeting, American Chemical Society

September 7 to 11, 1942

General Program

REGISTRATION and most divisional meetings will be held in the Hotel Statler, which will be convention headquarters. The general meeting will be held in the new Municipal Auditorium which is within walking distance of the convention hotels.

Sunday, September 6

2:00 to 9:00 P. M.—Registration, Mezzanine Floor, Hotel Statler.
8:00 to 10:00 P. M.—Social period.

Monday, September 7

8:00 A. M. to 6:00 P. M.—Registration.
9:30 A. M.—Council meeting.
12:15 P. M.—Group luncheons.
2:00 P. M.—General meeting, Municipal Auditorium.
6:30 P. M.—Group dinners.
8:15 P. M.—Strenuous entertainment, Municipal Auditorium.

Tuesday, September 8

7:30 A. M.—Group breakfasts.
8:00 A. M. to 6:00 P. M.—Registration.
9:00 A. M.—Divisional meetings.
12:15 P. M.—Group luncheons.
2:00 P. M.—Divisional meetings.
6:30 P. M.—Group dinners.
8:30 P. M.—Entertainment for benefit of the intellectuals.

Wednesday, September 9

7:30 A. M.—Group breakfasts.
8:00 A. M. to 6:00 P. M.—Registration.
9:00 A. M.—Divisional meetings.
12:15 P. M.—Group luncheons.
2:00 P. M.—Divisional meetings.
7:00 P. M.—Subscription dinner.
9:30 P. M.—Dance, open to all registrants.

Thursday, September 10

7:30 A. M.—Group breakfasts.
8:00 A. M. to 6:00 P. M.—Registration.
9:00 A. M.—Divisional meetings.
12:15 P. M.—Group luncheons.
2:00 P. M.—Divisional meetings.
6:30 P. M.—Group dinners.

Friday, September 11

7:30 A. M.—Group breakfasts.
8:00 A. M. to 12:00 M.—Registration.
9:00 A. M.—Divisional meetings.
12:15 P. M.—Group luncheons.
2:00 P. M.—Divisional meetings.

Local Committee Chairmen

Chairman. Nelson Allen, E. I. du Pont de Nemours & Co., Inc., Station B, Buffalo, N. Y.
Vice Chairman. Wilmer H. Koch.
Secretary. Hans O. Kauffmann.

Executive Committee. Nelson Allen, Lawrence H. Flett, Hans O. Kauffmann, Wilmer H. Koch, Howard W. Post, and J. Frederic Walker, Jr.

ENTERTAINMENT. Raymond R. Ridgway.
FINANCE. Max E. Bretschger.
GOLF. Joseph S. Reichert.
GROUP MEALS. Warren K. Eglof, Department of Chemistry, Niagara University, Niagara University, N. Y.
HOTELS AND HOUSING. Edward F. Wesp.
INFORMATION. James H. Crowdle.
LADIES ENTERTAINMENT. Margaret C. Swisher.
MEETING PLACES AND EQUIPMENT. Ralph B. Elliott, Electrochemicals Department, E. I. du Pont de Nemours & Co., Inc., Niagara Falls, N. Y.
PLANT VISITS. Robert L. Murray.
PRINTING. Walter M. Buehl.
PUBLICITY. Robert M. Fowler.
RECEPTION. Lester Francis Hoyt.
REGISTRATION. George W. Fiero.
SIGNS. G. E. Symons.
STUDENTS. Groves H. Cartledge.
SUBSCRIPTION DINNER. Albert E. Jennings, Jr.
TRANSPORTATION. Donald E. Drew.

Data Published on Selective Service

BECAUSE of the wide interest in this subject and the need for obtaining trained men for our Production Army, we give below references to information we have published on occupational deferments, including those of men in training. Future developments will be brought to the attention of our readers.

Chemical and Engineering News

(NEWS EDITION previous to 1942)

Vol. 18 (1940), pages 890, 1127
Vol. 19 (1941), pages 129, 311, 457, 459, 489, 520, 587, 681, 797, 1164, 1412, 1464
Vol. 20 (1942), pages 110, 157, 472, 579-80

Industrial and Engineering Chemistry

Vol. 33 (1941), pages 1, 135, 283, 561
Vol. 34 (1942), pages 2, 131, 259, 648

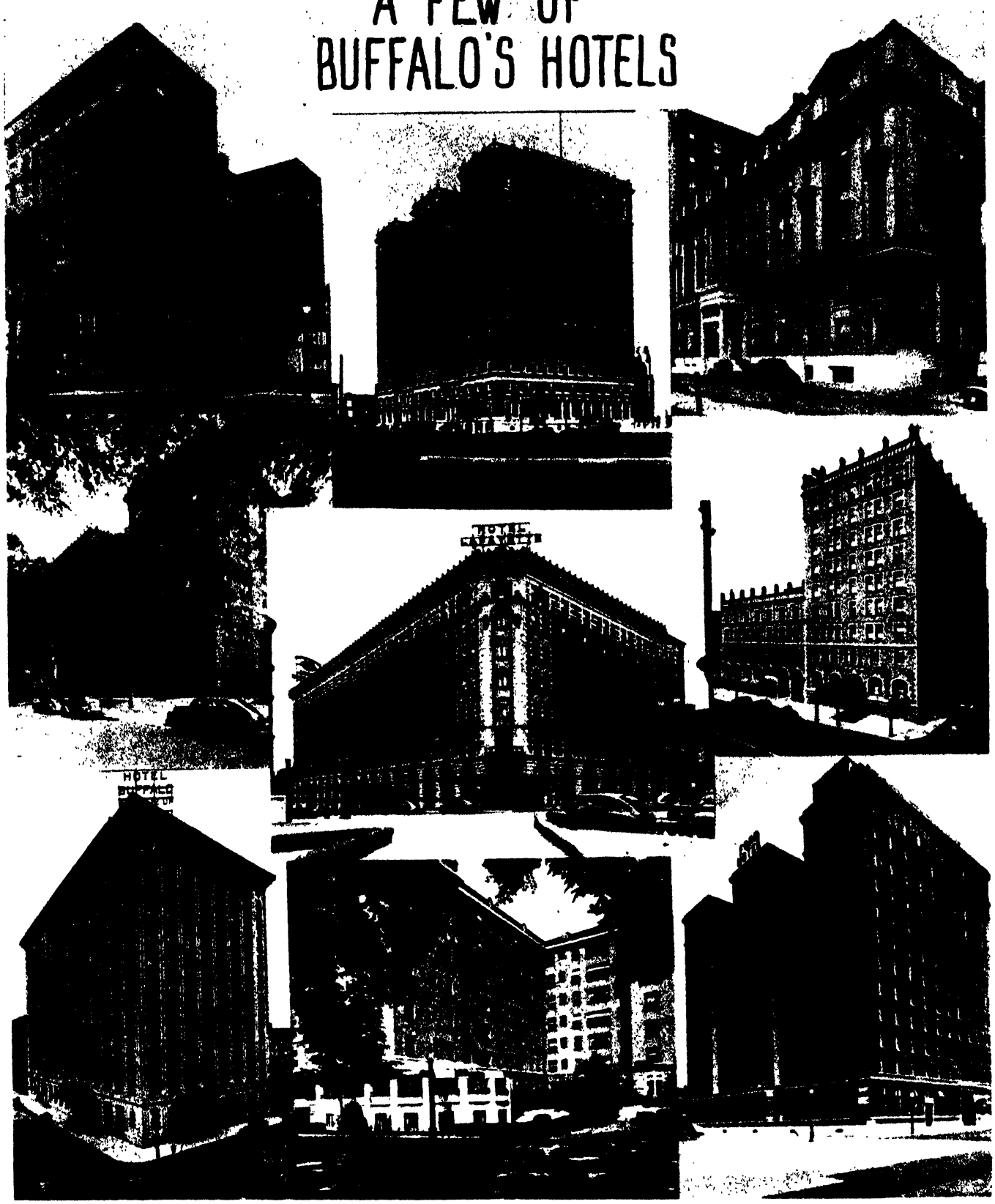
Ladies Program

Headquarters—Hotel Statler

In order to afford ladies with children more opportunity to participate in meeting activities, a nursery school will be maintained in the Hotel Statler. It will be under the direction of Mrs. Mary B. Parke, director of the Nursery School at the University of Buffalo.

Sunday, September 6

2:00 to 9:00 P. M.—Registration, Mezzanine Floor, Hotel Statler.
2:00 to 5:00 P. M.—Ladies headquarters will be open.
8:00 to 10:00 P. M.—Social period.



To members attending the A. C. S. Buffalo meeting: Make your reservations *early*.

The AMERICAN CHEMICAL SOCIETY assumes no responsibility for the statements and opinions advanced by contributors to its publications.
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Annual subscription rate, $2.00. Foreign postage to countries not in the Pan American Union, $0.60; Canadian postage, $0.20. Single copies, $0.15. Special rates to members.
No claims can be allowed for copies of journals lost in the mails unless such claims are received within 60 days of the date of issue, and no claims will be allowed for issues lost as a result of insufficient notice of change of address. (Ten days' advance notice required.) "Missing from files" cannot be accepted as the reason for honoring a claim. Charles L. Parsons, Business Manager, 1155 16th St., N. W., Washington, D. C., U. S. A.



Vice-Chairman Koch



Chairman Allen



Secretary Kauffmann



Executive Committee Member
L. Post



Executive Committee Member
Flett

Monday, September 7

8:00 A. M. to 6:00 P. M.—Registration.

3:00 to 5:00 P. M.—Tea and reception in honor of the wives of the officers of the AMERICAN CHEMICAL SOCIETY, Hotel Statler.

8:15 P. M.—Entertainment, Municipal Auditorium.

Tuesday, September 8

11:00 A. M. to 4:30 P. M.—Trip to Museum of Science via Zoo, Historical Building, Albright Art Gallery. Lunch at the Museum at 1:00 P. M.

1:00 to 4:30 P. M.—Trip to the Museum of Science. Tea at the Museum.

1:30 to 4:30 P. M.—Trip to the Albright Art Gallery and the Historical Building. Tea at the Art Gallery.

8:30 P. M.—Entertainment.

Wednesday, September 9

1:00 to 3:00 P. M.—Luncheon and entertainment at the 20th Century Club.

7:00 P. M.—Subscription dinner.

9:30 P. M.—Dance, open to all registrants.

Thursday, September 10

10:30 A. M. to 5:00 P. M.—Trip to Niagara Falls. Luncheon at Niagara Falls Country Club at 1:00 P. M.

Registration

The registration headquarters of the meeting will open at 2:00 P. M. Sunday on the Mezzanine Floor of the Hotel Statler, and will continue there throughout the meeting. The registration fee, required by vote of the Council to help carry local expenses, has been fixed at $3.00 for members and visitors other than American nonmember chemists and chemical engineers; $8.00 for American nonmember chemists and chemical engineers. All members and visitors must register. Admission to meetings will be restricted to those wearing official badges of this meeting.

Society Regulations Governing Registration

BYLAW 2. (*a*) Attendance at meetings of the SOCIETY is limited to registered persons.

(*b*) All persons in registering at meetings of the SOCIETY shall state whether or not they are members of the SOCIETY and, if not, whether they are chemists or chemical engineers.

(*c*) American chemists or chemical engineers, nonmembers of the SOCIETY, attending meetings of the SOCIETY, shall assist in the support of the facilities which they enjoy by paying a higher registration fee than members. This differential at general meetings shall be $5.00 higher than the fee charged members; while at regional and divisional meetings it shall be at least twice the regular fee adopted. They shall be furnished with a special nonmember badge to differentiate them from members of the SOCIETY and from foreign and nonchemist guests. The differential charged shall not apply to regularly matriculated students majoring in chemistry or chemical engineering at any college or university.



Executive Committee Member
Walker

(*d*) Meetings are normally open to all registrants, but any session may be closed to nonmembers of the SOCIETY by order of the President.

NOTE. Corporation members have the right to designate *one representative only* with membership privileges at each meeting. If a *corporation member* sends a substitute for the delegate of record, the Secretary's office should be informed by mail. In registering, such a representative should sign the corporation name, per his own as representative.

Associate members of local sections and of divisions are not members of the Society, and have no Society privileges; if chemists or chemical engineers, their registration fee is $8.00. All visitors, including children, regardless of age, who participate in any trips, luncheons, or other activities provided on either the men's or women's program, regardless of whether they are free or paid events, must pay the visitors' registration fee, $3.00, and wear the appropriate badge.

Official Hotels

Hotel[a]	Rates For One Person[b]	For Two Persons	Suites
Statler	$3.30 to $6.60	$5.50 to $11.00	$ 9.00 to $18.00
Lafayette	3.30 to 4.40	4.50 to 6.60	10.00 to 18.00
Ford	1.50 to 2.00	2.75 to 5.00	.....
Touraine	2.25 and 3.30	5.00 to 7.00	8.00 to 12.00

[a] Map showing location of hotels will be printed in the June 25 issue of CHEMICAL AND ENGINEERING NEWS.
[b] Limited in number. Double occupancy desirable.

Hotels

Hotel Statler, Niagara Square, has been designated as headquarters for the meeting. Hotel Lafayette, Washington and Clinton Streets, will be headquarters for the Division of Rubber Chemistry.

All official hotels are in or near the theater, shopping, and business district. They are readily accessible to all railway stations and steamer landings by taxicab, bus, or trolley.

Requests for reservations should be sent at once to Edward F. Wesp, Chairman, A. C. S. Hotels and Housing Committee, Buffalo Convention and Tourists Bureau, Genesee Building, Buffalo, N. Y. Please use the hotel reservation application on page 725, giving all the data requested.

Because of the present large demand for hotel rooms in Buffalo, it is imperative that reservations be made at the earliest possible date. For the same reason, double occupancy of rooms is desirable. Since defense activities are making a heavy call on Buffalo hotels, the convenience of a single room should be sacrificed as a patriotic contribution. It is in this spirit that the Hotels Committee asks that (1) hotel reservations be made early, giving the dates of arrival and departure, and (2) members arrange to share double rooms.

Rooms for students will be available at $1.00 per day and up.

Railroad Rates

Owing to the general reduction of railroad rates, railroads have discontinued the granting of reduced fares to conventions. However, there are substantial reductions in special round-trip fares from many cities. Consult your local ticket agent.

There is a great shortage of railroad equipment for movement of civilian traffic; *early reservation of space is essential.*

Addresses of Divisional Secretaries

Agricultural and Food Chemistry. Roger H. Lueck, Research Department, American Can Co., Maywood, Ill.

Analytical and Micro Chemistry. Francis W. Power, S. J., Fordham University, New York, N. Y.

Biological Chemistry. Erwin Brand, 630 West 168th St., New York, N. Y.

Cellulose Chemistry. Charles R. Fordyce, 275 Maplewood Drive, Rochester, N. Y.

Chemical Education. Paul H. Fall, Hiram College, Hiram, Ohio.

Colloid Chemistry. J. W. McBain, 571 Foothill, Stanford University, Calif.

Fertilizer Chemistry. Charles A. Butt, International Minerals & Chemical Corp., Box 69, East Point, Ga.

Gas and Fuel Chemistry. G. R. Yohe, State Geological Survey, Urbana, Ill.

History of Chemistry. Ralph E. Oesper, Department of Chemistry, University of Cincinnati, Cincinnati, Ohio.

Industrial and Engineering Chemistry. Whitney Weinrich, Gulf Research & Development Co., Box 2038, Pittsburgh, Penna.

Medicinal Chemistry. John H. Speer, Box 5110, Chicago, Ill.

Organic Chemistry. Arthur C. Cope, Department of Chemistry, Columbia University, New York, N. Y.

Paint, Varnish, and Plastics Chemistry. Adolf C. Elm, The New Jersey Zinc Co., Box 263, Palmerton, Penna.

Physical and Inorganic Chemistry. Oscar K. Rice, Department of Chemistry, University of North Carolina, Chapel Hill, N. C.

Rubber Chemistry. Howard I. Cramer, Sharples Chemicals, Inc., 23rd & Westmoreland Streets, Philadelphia, Penna.

Sugar Chemistry and Technology. E. Whitman Rice, National Sugar Refining Co., 129 Front St., New York, N. Y.

Water, Sewage, and Sanitation Chemistry. H. Gladys Swope, North Shore Sanitary District, Dahringer Road, Waukegan, Ill.

Papers for the Meeting

Titles for papers should be sent to the secretary of the appropriate division and *not to the Secretary of the Society. Titles to appear on the final program and abstracts, or complete papers where required, must be in the hands of the divisional secretaries no later than July 10.*

Society Regulations Governing Papers

BYLAW 3. (*a*) Papers by American chemists or chemical engineers not members of the SOCIETY shall not appear on the programs of general, divisional, or regional meetings of the SOCIETY unless they be joint papers with SOCIETY members.

(*b*) All papers presented before general, divisional, regional, group, local section, or other meetings are the property of the SOCIETY, to be published in the journals of the SOCIETY or released by the appropriate editor if not retained for such publication.

(*c*) The SOCIETY is not responsible for statements and opinions advanced by individuals in papers or discussions before its meetings.

(*d*) Any paper, although announced in the final program, may be excluded at any time prior to delivery by order of the President.

The Board of Directors has voted the following regulations (R-55) governing papers to be presented before general, divisional, regional, or group meetings, supplementing Bylaw 3:

(*a*) Authorship of papers shall be accredited only to individuals and not to companies or laboratories.

(*b*) No paper may be presented which has been offered for publication elsewhere.

(*c*) No paper, no matter how important, may be presented, the title of which does not appear on the final program.

(*d*) If a paper is declined by any division of the SOCIETY, the secretary of that division is instructed to notify the secretary of any other division to which it is likely to be offered.

Priority is based solely upon the date of receipt of the *complete* paper deposited for publication with the secretary of the division or the appropriate editor.

The Council has empowered officers of divisions to request any paper in advance, so that it may be passed upon and an indication made to the author as to whether he is to read the entire paper or to abstract it in order to give time for discussion.

No paper may be presented at the meeting, title for which is not printed in the final program.

"By title" should be placed on the announcement of any paper when the author is to be absent, so that members may understand in advance that the paper will not be read. All such papers should be placed at the end of the program.

Titles should be accompanied by information concerning desired projection equipment. Only standard lantern slide projectors will be furnished without cost.

Divisional Requirements

The Division of Agricultural and Food Chemistry requires that those wishing to present papers at the meeting submit, in duplicate, a 200-word abstract together with information regarding the time required for presentation of the paper. Abstracts should be accompanied by the name and address of the author (or authors), the name of the laboratory in which the work was done, and information regarding papers the author (or authors) plans to present before other divisions. Abstracts must be in the hands of the secretary not later than July 10. Authors should have a complete manuscript of their papers, ready for publication, to give to the secretary at the meeting. Planographed abstracts of the papers will be



Peace Bridge to Canada

sent to all members of the division about two weeks prior to the meeting.

The Division of Analytical and Micro Chemistry requires that authors who plan to present papers before the division return to the secretary not later than July 10 a form which lists the title of the paper, name and address of the author (or authors), name of the laboratory in which the work was done, time needed for informal presentation, a 200- to 250-word abstract, and one copy of the complete paper.

The Division of Biological Chemistry requires by July 10 a 200-word abstract in duplicate and information regarding the time required for presentation of the paper. If deemed necessary, the division may request a 1,000-word abstract or the complete manuscript. Abstracts will be sent to members of the division prior to the meeting.

The Division of Cellulose Chemistry requires that an abstract not to exceed 200 words and two copies of the manuscript be in the hands of the secretary on or before July 10. Two copies of the manuscript are necessary in order that the paper may be considered by the review committee within the time remaining between July 10 and the date on which the final program is submitted for publication.

The Division of Chemical Education requires by July 10 a 200-word abstract, the complete paper, and information on the time needed for presentation. Abstracts of all papers on the divisional program will be sent to members of the division in advance of the meeting.

The Division of Colloid Chemistry requires not later than July 10 three copies of an abstract of about 200 words. The complete manuscript should be handed to the secretary after the paper is presented.

The Division of Fertilizer Chemistry requires by July 10 an abstract not to exceed 250 words and information on the time needed for presentation. The manuscript should be submitted to the secretary on or before the date of presentation.

The Division of Gas and Fuel Chemistry requires not later than July 10 a 200-word abstract, the complete paper, and an estimate of the time needed for presentation.

The Division of the History of Chemistry requires that its secretary receive not later than July 10 the name of the author (or authors) with address and official connection at the time of the work reported, an abstract not to exceed 250 words, and information regarding the time required to present the paper. Earlier notification of intention to contribute will be appreciated. Membership in the division is not required. For reasons of economy, there will be no solicitation of papers. The complete manuscript should not be sent to the secretary. After the paper has been read, the manuscript, *prepared for publication*, should be submitted to the Editor of the *Journal of Chemical Education*.

The Division of Industrial and Engineering Chemistry requires the complete paper for submission to reviewers. It must be received by July 10 and accompanied by a 200-word abstract, the name of the laboratory in which the work was done, and information regarding the time requirement. The paper will be placed upon the final program only after receiving a favorable report from the reviewers. Manuscripts for the Unit Process Symposium should be sent to R. Norris Shreve, Chairman, Purdue University, West Lafayette, Ind.

The Division of Medicinal Chemistry requires that authors submit by July 10 the complete manuscript, three copies of a 200-word abstract, an estimate of the time needed for presentation, and the name of the laboratory in which the work was done. The executive committee has authority to accept or reject papers.

The Division of Organic Chemistry requires (1) a 200-word abstract, which must be typed in the space allotted on a form supplied by the secretary, and (2) a more extensive abstract of at least 1,000 words, or a copy of the manuscript in form for publication. Both must reach the secretary by July 10, after which no additions, changes, or withdrawals of papers can be made.

The Division of Paint, Varnish, and Plastics Chemistry requires that those wishing to present papers at the meeting send the title and two copies of an abstract to the secretary before July 10. Two copies of the complete paper should be



One of Buffalo's beautiful parks

sent to the secretary before July 15, and preferably not later than July 1.

The Division of Physical and Inorganic Chemistry requires that titles for papers be accompanied by an abstract of approximately 100 words for distribution to the members of the division, and the complete manuscript or another abstract of 1,000 words. The short abstracts should follow the form used in the sets of planographed abstracts for previous meetings; please refer to a recent copy. The manuscript or long abstract will be returned only upon request made at time of transmittal. All material must reach the secretary before July 10, and no alterations or additions may be made thereafter. No title will be placed upon the program unless an author expects to be present to give the paper.

The Division of Rubber Chemistry requires by July 10 three copies of an abstract of 200 to 250 words, an estimate of the time needed for presentation, and the name of the laboratory in which the work was done. Three copies of the complete manuscript must be submitted to the secretary on or prior to the date of presentation.

The Division of Sugar Chemistry and Technology requires a 100- to 200-word abstract, to be submitted not later than July 10.

The Division of Water, Sewage, and Sanitation Chemistry requires by July 10 five copies of a 250-word abstract, two copies of the complete paper, and information regarding time required for presentation and the laboratory from which the paper originates. The abstracts will be sent to members of the division prior to the meeting.

Publication of Papers

BYLAW 3 (*b*). All papers presented before general, divisional, regional, group, local section, or other meetings are the property of the SOCIETY, to be published in the journals of the SOCIETY or released by the appropriate editor if not retained for such publication.

If release is desired, address the editor of the appropriate journal—i. e., H. E. Howe, A. B. Lamb, S. C. Lind, N. W. Rakestraw, or W. Albert Noyes, Jr. When the paper is in their hands, the editors will act promptly on any release requested.

Abstracts of Papers

Abstracts should accompany all titles when sent to the secretaries of the various divisions. Many of the secretaries complain that they are caused embarrassment through the nonarrival or late arrival of titles and abstracts. Members are urged to comply with this request in order to facilitate prompt distribution of sets of abstracts by the News Service.

Sets of Abstracts

Frequently there is a considerable period between the presentation of a paper and its publication, and in such cases the abstracts are of particular value.

The A. C. S. News Service, 1155 16th St., N. W., Washington, D. C., will supply abstracts of papers presented at the

Divisional Programs

DIVISION	NUMBER OF SESSIONS	PROGRAMS
Agricultural and Food Chemistry	6	Vitamins (with Division of Biological Chemistry). Chemical Aspects of Food Preservation by Canning, Dehydration, and Refrigeration. Processing of Foods for the Military Forces and Protection of Food against War Damage. General.
Analytical and Micro Chemistry	4	Teaching and Practice of Analytical Chemistry (with Division of Chemical Education). General.
Biological Chemistry	6	Vitamins (with Division of Agricultural and Food Chemistry). Proteins. General.
Cellulose Chemistry	4	General.
Chemical Education	4	Teaching and Practice of Analytical Chemistry (with Division of Analytical and Micro Chemistry). General.
Colloid Chemistry	2	General.
Fertilizer Chemistry	4	Potash, John W. Turrentine, Chairman. General.
Gas and Fuel Chemistry	3	Uses of Coal by Various Industries, H. J. Rose, Chairman. General.
History of Chemistry	2	General: Biographical and Historical. Exhibitions: Books, Pictures, Manuscripts, Historical Apparatus.
Industrial and Engineering Chemistry	5	Unit Process, R. Norris Shreve, Chairman. Administrative Problems of the Research Laboratory. The Manufacture and Use of Solvents. General.
Medicinal Chemistry	2	General.
Organic Chemistry	6	General.
Paint, Varnish, and Plastics Chemistry	4	Recent Developments in Drying Oils. General.
Physical and Inorganic Chemistry	12	Flow under Abnormal Conditions. Kinetics Using Tracer Isotopes. Low-temperature Phenomena and Critical Phenomena. General.
Rubber Chemistry	4	General.
Sugar Chemistry and Technology	2	General.
Water, Sewage, and Sanitation Chemistry	2	General.

Buffalo meeting. Sets are not guaranteed to be complete, but contain abstracts from all divisions as submitted by authors. The abstracts will be mailed as soon as possible after receipt of order, beginning about September 1, and will also be on sale at Buffalo.

This enterprise is undertaken in a spirit of service and not for profit. Sets are offered on the following terms:

To members of divisions who forward receipt for divisional dues with remittance and order, 50 cents.
To those without receipt for divisional dues, who remit with order, $1.00.
To those who fail to enclose remittance with order, necessitating correspondence, $1.25.
To those who require bills to be rendered, $1.50.

News Service

The A. C. S. News Service will have a press room in the Hotel Statler. Members who are to present papers will confer a great service and promote the efficiency of the publicity work by sending synopses to H. E. Howe, director of the News Service, 1155 16th St., N. W., Washington, D. C., as far in advance of the meeting as possible.

Group Meals

Arrangements for group breakfasts, luncheons, and dinners should be made with the Group Meals Committee and not with the hotels. All correspondence should be addressed to Warren K. Eglof, Department of Chemistry, Niagara University, Niagara University, N. Y. Requests, indicating expected attendance and preference as to time, must be submitted by July 1 in order to facilitate the work of the committee and avoid conflicts.

Equipment for Divisional Meeting Rooms

Divisional meeting rooms will be equipped with a standard lantern slide projector, screen, blackboard, pointer, chalk, reading stand, reading light, table, and ice water. Motion picture and other *special projectors can be furnished* upon the request and *at the expense of divisions if notice of such special needs is given* the Meeting Rooms Committee *before July 10*. Each secretary should contact his local assistant and inspect the assigned meeting room before the first session of the division. All correspondence concerning meeting rooms and equipment must be sent to Ralph B. Elliott, Electrochemicals Department, E. I. du Pont de Nemours & Co., Inc., Niagara Falls, N. Y.

Plant Trips

Because of wartime regulations affecting industrial plants working on government contracts, it is doubtful that any plant trips can be arranged. If conditions change, it may be possible to visit industrial operations. Buffalo chemists regret that they are unable to continue this interesting feature of national meetings.

Travel Information

Buffalo is very accessible. It is served by good motor roads, by several railroad and bus lines, by two major airlines, and by passenger boats on the Great Lakes. Service by public conveyances is frequent. A change in the usual method of travel, such as a trip by boat, may add to the visitor's pleasure. Those who find it possible to drive, may be interested to know that Canada has a moderate gas allowance for visitors.

Public transportation services are burdened by a tremendous increase in traffic and a decrease in facilities available to civilians. It is essential that those planning to attend the meeting *make reservations early* and buy tickets well in advance of departure. Otherwise, it may be impossible to secure travel accommodations. If tickets are not used, refund will be made by the railroad.

Local trains and busses to all points of the Niagara Frontier are readily accessible from the official hotels.

Students

Students of chemistry and chemical engineering are urged to attend the Buffalo meeting. By doing so, they will find many opportunities to improve themselves and to make valuable contacts with other students and prominent chemists from a wide territory. A broad field of subjects will be covered in the papers presented in the general and divisional meetings. The educational aspects will be "spiced" with complimentary entertainment.

The Student Committee in conjunction with the Division of Chemical Education is arranging a program of distinct interest to students. Experts will discuss the use of chemical literature, the importance of chemical fundamentals, what industry expects from its newly-hired employees, etc.

As usual, a low-cost breakfast for students will be held. Fraternal, academic, and professional groups will meet for various meals.

Student members and paid student affiliates of the AMERICAN CHEMICAL SOCIETY, registered at the meeting, are eligible to utilize the facilities of the A. C. S. Employment Clearing House (see 724).

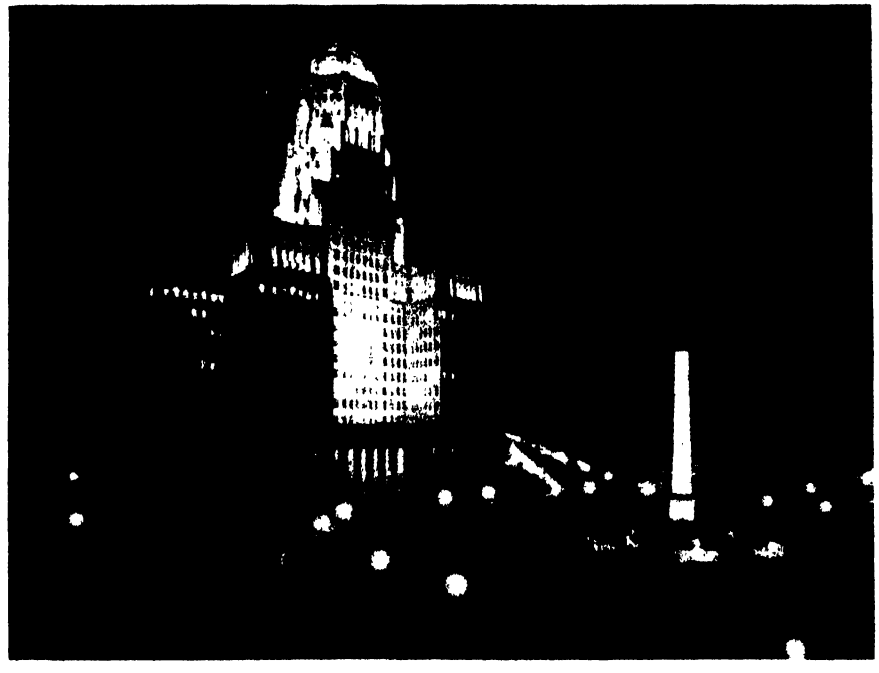
The registration fee for a regularly matriculated student of chemistry or chemical engineering is $3.00. Special low-priced hotel accommodations will be available.

For further details of the students program, please address Groves H. Cartledge, Chemistry Department, University of Buffalo, Buffalo, N. Y.

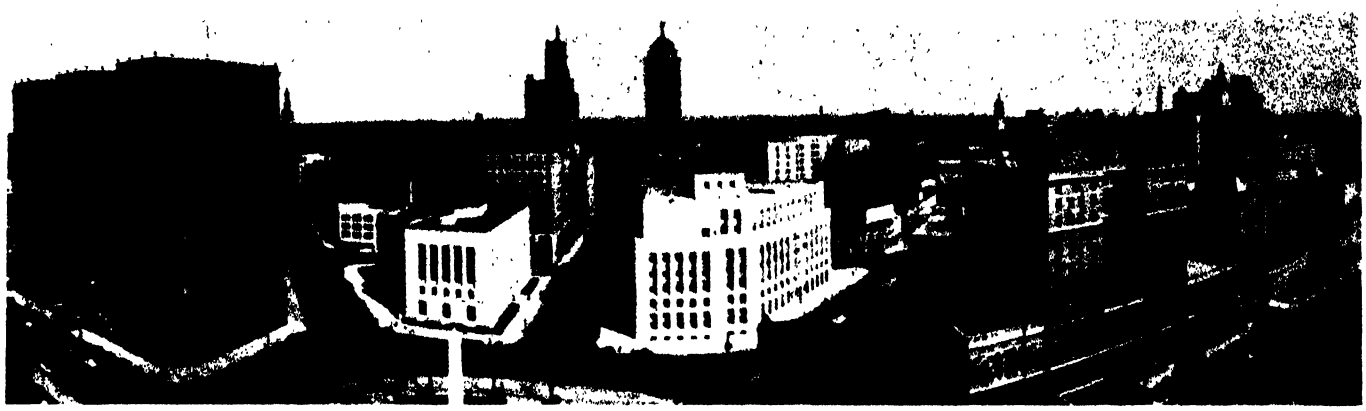
Golf Tournament

The semiannual A. C. S. Golf Tournament will be held on Thursday afternoon, September 10, at the beautiful Niagara Falls Country Club. Many suitable prizes have been provided by the committee, the chairman of which is J. S. Reichert. As usual, the Wilson cup will be awarded to that *member* of the SOCIETY who has the lowest gross score.

Busses will leave the Hotel Statler at 11:30 A. M., arriving at the club one hour later. Luncheon will be served at the



City Hall at night



clubhouse. Participants will tee off at 1:30 P. M.

Tickets, to be sold at registration headquarters in the Hotel Statler, will include cost of transportation, luncheon, and greens fee.

Two Buffalo golf courses will be open during the meeting to all registrants. Further particulars will be available at registration headquarters.

Employment Clearing House

At Buffalo the SOCIETY again will provide facilities to bring together employers looking for chemists and chemical engineers and *members and paid student affiliates registered at the meeting*, seeking employment and wishing to make such contacts.

Beginning Sunday afternoon, candidates for employment will file records in the Clearing House on forms which provide space for a photograph, personal data, and information regarding education and experience. The records are maintained in classified files and also are indexed under all fields of training and experience. This enables an employer to find quickly the records of those with the qualifications desired.

Beginning Monday morning, appointments for interviews will be made at the request of employers and at the times they specify. Private booths will be assigned for such conferences No chemist or chemical engineer looking for employment and no employer looking for trained men can afford to miss this opportunity. Many personnel representatives attend each meeting solely to take advantage of the service.

Candidates for Employment

By action of the Board of Directors (December 12, 1940), the Employment Clearing House is open only to members and paid student affiliates of the AMERICAN CHEMICAL SOCIETY registered at the meeting.

Advance registration is helpful to the registrant and to the staff of the Employment Clearing House. Please request the necessary forms from the AMERICAN CHEMICAL SOCIETY, 1155 16th St., N. W., Washington, D. C. Forms will not be available to inquirers until July 1; requests received before that date will be filled as soon as possible. Forms can be completed under more favorable circumstances at home than in Buffalo. If returned by mail well in advance of the meeting, trained Clearing House personnel will suggest, when desirable, changes that will make the record more serviceable to employers. Advance registration also enables completion of much of the clerical work in Washington, thus relieving congestion at the meeting. Records filed in advance cannot be inspected by employers until after the arrival of the registrants, since all users are assured that everyone whose vita is on file is available for interview. Those who do not file vitae by mail may fill out the forms in the Clearing House after arrival.

Since employers begin inspecting these vitae on Monday, most effective use is made of the records of those who register Sunday and Monday. Experience shows that more interviews and offers of employment are received by those who register early.

Amplification of the data on the forms and lists of publications cannot be accepted for filing in the Clearing House. No part of the record is of more importance than a good photograph; many employers will not interview an individual who does not attach a picture. Each person should bring with him *two* copies of a *good* photograph, not larger than 2.5 × 3 inches.

Employers

By action of the Board of Directors (December 6, 1941), the Employment Clearing House is not open to any employer or employer's representative "who, in offers made as a result of interviews in the Clearing House, is unwilling to meet the recommendations unanimously adopted at the Atlantic City meeting of the AMERICAN CHEMICAL SOCIETY in its resolution on employer-employee relationships". [See NEWS EDITION 19, 1442 (December 25, 1941).]

Although employment of chemists and chemical engineers is at a high level owing to the demands of rapidly expanding industry, it is our expectation that employers will find in the Buffalo Clearing House registrants whose availability might not otherwise be known. They will be primarily individuals seeking a change of employment, especially chemists and chemical engineers in nonessential industries wishing to make new connections in order to contribute directly to the war program. Many employers expected a small Clearing House registration at recent meetings. Actually 421 were available for interview in Memphis, 324 in Atlantic City, and 527 in St. Louis. At Memphis, 1701 interviews were arranged.

Employers who have never visited an A. C. S. Employment Clearing House will find this unique employment aid of distinct value. Many personnel department representatives attend each meeting solely to take advantage of this service. The number of employers regularly using the A. C. S. Employment Clearing House at national meetings of the SOCIETY indicates that the activity is meeting a real need.

The forms filed by candidates for employment provide space for a photograph, personal data, and information regarding education and experience. A classified index will be maintained so that one can find quickly those with the special training or experience desired. A private room will be available in which employers' representatives may inspect the index and vitae at any time from Monday through Friday. At the request of the employer, interviews will be arranged promptly with any whose records are on file. The space available in Buffalo will permit erection of more private interview booths than heretofore.

We know of no other place at which one can find not only the records of such a diversified group of chemists and chemical engineers, but the individuals themselves. Any employer, having a vacancy to fill or anticipating one, can ill afford to pass up this opportunity to make personal contacts.

The advantages to employers are many. They may inspect these records without

Hotels and Housing Committee, Edward F. Wesp, Chairman

Buffalo Convention and Tourists Bureau
Genesee Building, Buffalo, N. Y.

Dear Sir: Please make hotel reservations noted below: _____, 1942

Hotel_____First choice

Hotel_____Second choice

Hotel_____Third choice

If the hotel of first choice is unable to accept the reservation, the Hotels Committee will endeavor to comply with your second or third choice in the order named.

_____Double rooms for_____persons, double bed ☐ twin beds ☐ Rate desired $_____ to $_____ per day

_____Single rooms Rate desired $_____ to $_____ per day

_____Suites - parlor and_____bedroom(s) for_____persons Rate desired $_____ to $_____ per day

Arriving September....., hour.....A. M.....P. M. Leaving September .....

Print names and addresses of all occupants including person making reservation:

NAME	STREET ADDRESS	CITY	STATE

If necessary attach sheet listing additional names.

Signature_____

any of the registrants knowing they are looking for chemists. Personal interviews are always more satisfactory than correspondence; this plan makes available to each employer individuals from widely scattered localities who otherwise could be interviewed only through time-consuming and costly travel.

Plan on using the A. C. S. Employment Clearing House on the Seventeenth Floor, Hotel Statler, Buffalo, N. Y., September 7 to 11, 1942.

Final Program

The final program will be printed in the August 25 issue of CHEMICAL AND ENGINEERING NEWS.

CHARLES L. PARSONS,
Secretary

Melchett Medal Awarded to A. C. Fieldner

THE Melchett Medal, awarded annually by the Institute of Fuel, of England, for outstanding achievement in work involving the scientific preparation or use of fuel, will be presented this year to Arno C. Fieldner, chief of the Technologic Branch and the Coal Division, Bureau of Mines, Department of the Interior. Dr. Fieldner is the second American so honored since the medal was first awarded in 1930. Previous recipients include Charles M. Schwab, Sir John Cadman, Fr. Bergius, and Etienne Audibert.

The medal is ordinarily presented personally to the recipient in London in October, but under present conditions arrangements may be made for the formal presentation in the United States.

The President's Flag Day Proclamation

(Issued May 9, 1942)

"For many years it has been our American custom to set aside June 14 in honor of the flag, the emblem of our freedom, our strength, and our unity as an independent nation under God. Now we are fighting in the greatest cause the world has known. We are fighting to free the people of this earth from the most powerful, the most ruthless, the most savage enemy the world has ever seen. We are dedicating all that we have and all that we are to the combat. We will not stop this side of victory.

"We as a nation are not fighting alone. In this planetary war we are a part of a great whole: we are fighting shoulder to shoulder with the valiant peoples of the United Nations, the massed, angered forces of common humanity. Unless all triumph, all will fail.

"For these reasons it is fitting that on our traditional Flag Day we honor not only our own colors but also the flags of those who have, with us, signed the Declaration by United Nations, paying homage to those nations awaiting liberation from the tyranny we all oppose, to those whose lands have escaped the scars of battle, to those who have long been heroically fighting in the blaze and havoc of war.

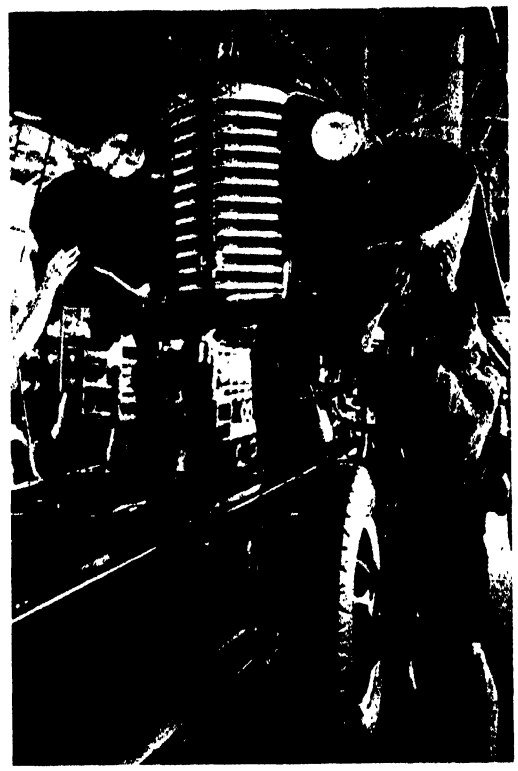
"It is also fitting in this time of stress that we express our devotion to our courageous mothers, many of whom are sending out their sons to do battle with the enemy and all of whom are so loyally contributing to the waging of the war on the home front.

"Now, therefore, I, Franklin D. Roosevelt, President of the United States of America, do hereby ask that on Flag Day, June 14, 1942, the people of our Nation honor the peoples of the United Kingdom of Great Britain and Northern Ireland, the Union of Soviet Socialist Republics, China, Australia, Belgium, Canada, Costa Rica, Cuba, Czechoslovakia, the Dominican Republic, El Salvador, Greece, Guatemala, Haiti, Honduras, India, Luxembourg, the Netherlands, New Zealand, Nicaragua, Norway, Panama, Poland, the Union of South Africa, Yugoslavia—knowing that only in the strength and valor of our unswerving unity shall we find the force to bring freedom and peace to mankind.

"I direct the officials of the Federal Government, and I request the officials of the State and local governments to have our colors displayed on all Government buildings on Flag Day, and I urge the people of the United States to fly the American flag from their homes in honor of the Nation's mothers and their valiant sons in the service and to arrange, where feasible, for joint displays of the emblems of the freedom-loving nations on that day."

WARTIME

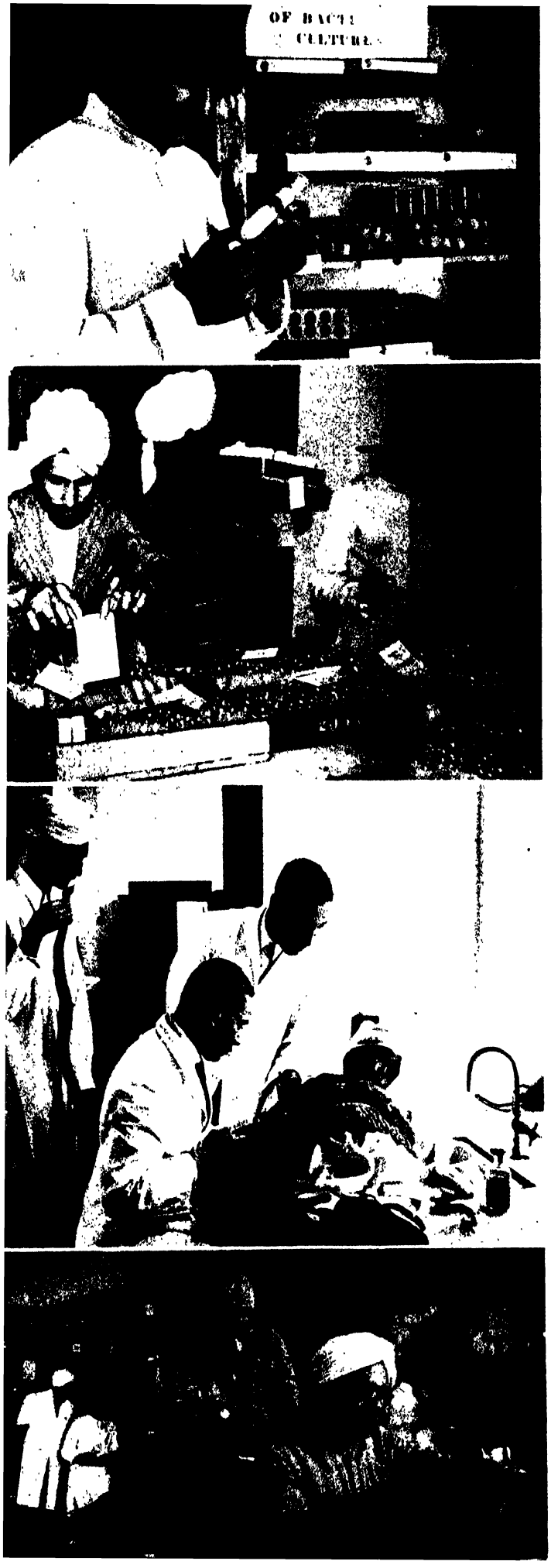
Industrial India



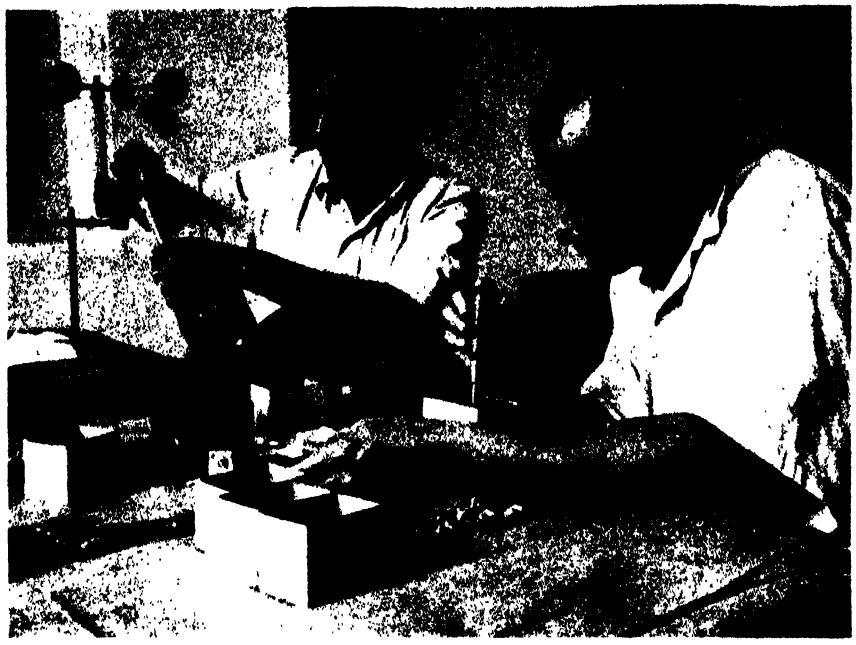
Fender, radiator, radiator grill, and headlight assembled unit being mounted on the chassis from an overhead conveyor at a General Motors plant in India

INDIA'S 350,000,000 persons are predominantly agricultural, deriving support from seasonal crops such as rice, tea, and coffee, or from the harvesting of timber, rubber, and other crops of the land. Now that the tide of war has practically severed this continent from certain and effective aid from England and the United States, India must look to herself for manufactured goods. Although 70 per cent of the people have been farmers and dependent upon exchange of materials between nations, war expediency has founded and expanded heavy manufacturing industries. Chemical industries are producing necessary materials never before made on that continent and new drug companies are not only processing, for domestic consumption, the drugs and herbs indigenous to India but successfully synthesizing modern pharmaceuticals. Heavy machine industries were already well founded before the war began and used to good advantage the traditional patience and skill of the native.

Progress of the newborn heavy chemical industry has been good. Plants to produce soda ash, synthetic ammo-



At India's Central Research Institute. *Top.* Taking stock of collection of living cultures. *Center above.* Cholera vaccine has been tested and passed for dispatch. *Center below.* Antivenin being injected into the vein of a child bitten by a Russell's viper. Child's father holds the dead snake. Where the identity of the type of snake is established, records show over 90 per cent recovery among those bitten. *Bottom.* C. R. I. library, open to all the medical workers in India, contains a highly specialized collection of books in many languages.



Anemometers, for registering wind velocity, are tested and repaired at Poona Institute. The Poona meteorological office administers seven main and 300 surface observatories.

nia, caustic soda, chlorine bleaching powder, and bichromates were all started when wartime transportation difficulties began to squeeze the country's imports.

Plants to manufacture stabilized bleaching powder, soda ash, heavy chemicals, and sulfuric acid were erected. Sulfuric acid is manufactured at various places. Only one establishment uses pyrites for sulfuric acid production. Investigations of the Geological Survey of India have revealed large deposits of high-grade rock sulfur.

Never a heavy importer of acetic acid, India now augments her supply by a small factory which turns out fairly large quantities annually from acetate of lime from a near-by source. A Bengal company is said to be producing other quantities of this acid. Other organic acids, such as tartaric, citric, and oxalic, are imported to a major degree, but it was reported before the outbreak of the Pacific war that a firm was beginning their manufacture.

Soda ash, chlorine, caustic soda, and bleaching powder are made in fairly large quantities.

Ammonium sulfate is produced to a limited extent as a by-product of coking operations. Synthetic ammonia is also made for nitric acid and explosives. Later this will be the base for creating a fertilizer industry.

Demand for khaki-dyed cloth, plus India's large supply of chromite ores, have facilitated creation of a bichromate industry. The gap between demand and local supply has, heretofore, been filled by imports from the United Kingdom and the United States. Even with the contemplated expansion of all India's bichromate productive facilities to meet the present extraordinarily heavy demand, authorities in India say that a thorough overhaul of manufacturing processes and techniques will be necessary if the industry is to meet competition successfully and survive in a postwar world.

Methyl alcohol, acetone, and calcium have been produced by wood distillation as by-products of the manufacture of charcoal for iron and steel industries. Acetone is made in ordnance factories from acetate of lime.

Some of the most promising advances toward Indian independence have come in the field of drugs and pharmaceuticals. More than 290 drugs and many other items of medical supply formerly imported are being manufactured by home industries. The surgical instrument industry has been fully mobilized, and India is supplying 85 per cent of its own needs in this field.

Serums for treatment of tetanus, diphtheria, and anthrax are made. A cod liver oil substitute, oil from the livers of sharks caught in Indian waters, has entered large-scale manufacture. The government has purchased a large amount of this material.

The Central Research Institute is one of the most important factors in India's fight for health. It is known throughout the world for its research on the major epidemic and endemic diseases which ravage the native population.

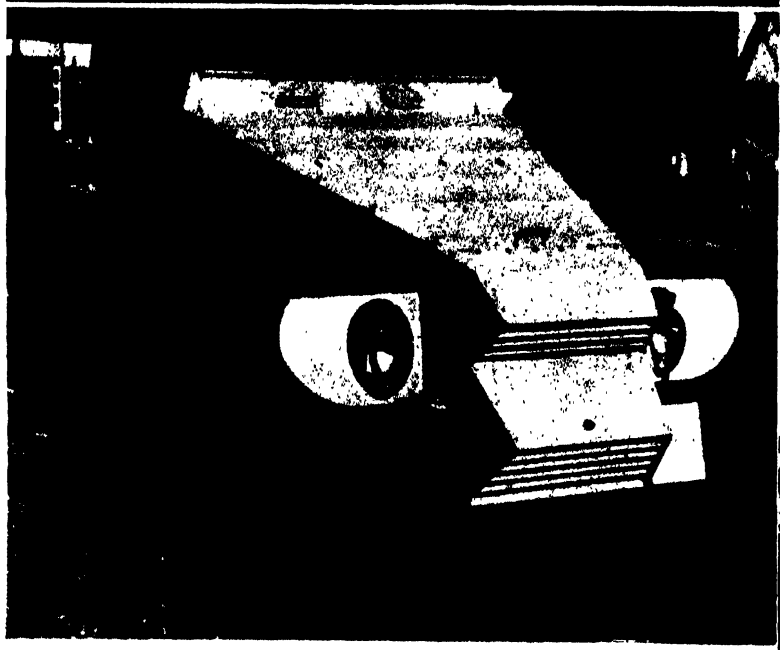
Production of anticholera vaccine is calculated in millions of doses annually, and the institute is staffed for the production



At the Central Research Institute. *Top.* Colonel Webster, director of the Kasauli Pasteur Institute before the decentralization of antirabic treatment and now senior assistant director of the Central Research Institute in charge of the production of serum and vaccine. *Center.* Sealing ampoules with a blow pipe. All ampoules used by the C. R. I. are now manufactured in India. *Bottom.* Scrutinizing a rolled bottle of the cholera culture for vaccine.







of 200,000 doses a week. The C. R. I. also carries on the antirabic treatments, formerly under the guidance of the Kasauli Pasteur Institute, and is producing serum for the treatment of 20,000 cases of dog bite yearly.

A speciality is the production of snake bite antivenin, the venom being supplied by a sister institute. The C. R. I. manufactures a serum which is bivalent for the treatment of cobra or the Russell's viper bites. These two snakes are responsible for the largest number of deaths from snake bites throughout India.

Anesthetic ether output is 10,000 pounds a month, a new factory for galenicals is under construction, and dried blood plasma operations are being started. Emetine hydrochloride, required for treatment of amoebic dysentery, is obtained from ipecacuanha which grows wild in the forests of South America. It has been proved that it grows well in Mungpoo, Bengal, and cultivation is under way. Acriflavine, a disinfectant, is also made.

To prevent scurvy in soldiers, vitamin C is usually included in the diet of the army. India makes a concentrated vitamin C by drying amli berries, collected in Nilgris, and pressing them into tablets of suitable form. Amla berries are the most concentrated form of vitamin C that India has.

To utilize imported Tibetian borax, a small-scale plant for production of boric acid has been started.

Rubber goods, such as waterproof sheeting, hot-water bottles, and air cushions, are being made at various companies throughout the nation. The needs of the Medical Stores Department for rubber goods such as these has caused one firm to expand and erect two extra mills to meet the increased demand.

Government ordnance factories have been working at high pressure for some time. Before the war total employment in ordnance was 17,000. Today the number is over 50,000 and still rising. Plans under way call for a greater expansion amounting to 20 per cent and the provision of new plant and machinery which would enable the manufacture of the more modern types of armament including guns, car-



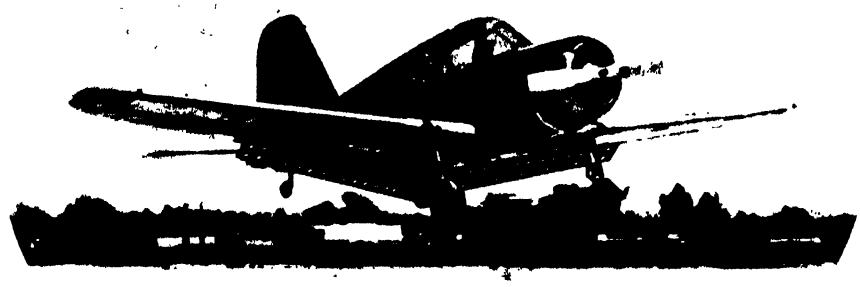
Production of armored carriers from Indian steel in a railway workshop somewhere in India. *Top.* Riveting in progress on assembly line. Steel for bulletproof rivets was supplied by an Indian steel company. *Center.* Armor plates being assembled on the erection jig prior to welding and riveting. *Below.* The finished armored carrier.

***Right.* At General Motors in India, mounting truck wheels with electric nut runner.**

riages, and ammunition, aircraft bombs, light machine guns, and loose liners for the 3.7-inch antiaircraft guns.

Small arms ammunition is manufactured to R. A. F. specifications in India, and a plant for high explosives is being installed. To provide raw materials for explosives manufacture, facilities for production of benzene and toluene were greatly extended.

For the manufacture of high-grade steels, existing plants were expanded and modernized. Similar extensions are being carried out in ordnance factories producing guns, gun carriages, finished shells, fuses, and miscellaneous components. When complete, these expansions will enable India to produce, in addition to guns already being manufactured, certain field guns of the most modern type, to maintain the latest types of antiaircraft guns, and to supply these weapons with ammunition.



The Harlow, the first plane assembled in India, was designed in America

The Search for Unity[1]

RAYMOND B. FOSDICK

President, Rockefeller Foundation, New York, N. Y.

IF WE are to have a durable peace after the war, if out of the wreckage of the present a new kind of cooperative life is to be built on a global scale, the part that science and advancing knowledge will play must not be overlooked. For although wars and economic rivalries may for longer or shorter periods isolate nations and split them up into separate units, the process is never complete because the intellectual life of the world, as far as science and learning are concerned, is definitely internationalized, and whether we wish it or not an indelible pattern of unity has been woven into the society of mankind.

There is not an area of activity in which this cannot be illustrated. An American soldier wounded on a battlefield in the Far East owes his life to the Japanese scientist, Kitasato, who isolated the bacillus of tetanus. A Russian soldier saved by a blood transfusion is indebted to Landsteiner, an Austrian. A German soldier is shielded from typhoid fever with the help of a Russian, Metchnikoff. A Dutch marine in the East Indies is protected from malaria because of the experiments of an Italian, Grassi; while a British aviator in North Africa escapes death from surgical infection because a Frenchman, Pasteur, and a German, Koch, elaborated a new technique.

In peace as in war we are all of us the beneficiaries of contributions to knowledge made by every nation in the world. Our children are guarded from diphtheria by what a Japanese and a German did; they are protected from smallpox by an Englishman's work; they are saved from rabies because of a Frenchman; they are cured of pellagra through the researches of an Austrian. From birth to death they are surrounded by an invisible host—the spirits of men who never thought in terms of flags or boundary lines and who never served a lesser loyalty than the welfare of mankind. The best that every individual or group has produced anywhere in the world has always been available to serve the race of men, regardless of nation or color.

What is true of the medical sciences is true of the other sciences. Whether it is mathematics or chemistry, whether it is bridges or automobiles or a new device for making cotton cloth or a cyclotron for studying atomic structure, ideas cannot be hedged in behind geographical barriers. Thought cannot be nationalized. The fundamental unity of civilization is the unity of its intellectual life.

There is a real sense, therefore, in which the things that divide us are trivial as compared with the things that unite us. The foundations of a cooperative world have already been laid. It is not as if we were starting from the beginning. For at least three hundred years the process has been at work, until today the cornerstones of society are the common interests that relate to the welfare of all men everywhere.

In brief, the age of distinct human societies, indifferent to the fate of one another, has passed forever; and the great task that will confront us after the war is to develop for the community of nations new areas and techniques of cooperative action which will fit the facts of our twentieth century interdependence. We need rallying points of unity, centers around which men of differing cultures and faiths can combine, defined fields of need or goals of effort in which by pooling its brains and resources the human race can add to its own well-being. Only as we begin to build, brick by brick, in these areas of common interest where cooperation is possible and the results are of benefit to all, can we erect the ultimate structure of a united society.

A score of inviting areas for this kind of cooperation deserve exploration. Means must be found by which the potential abundance of the world can be translated into a more equitable standard of living. Minimum standards of food, clothing, and shelter should be established. The new science of nutrition, slowly coming to maturity, should be expanded on a world-wide scale. The science of agriculture needs development, not only in our own climate but particularly in the tropic and subtropic zones. With all their brilliant achievements the medical sciences are in their infancy. Public health stands at the threshold of new possibilities. Physics and chemistry have scarcely started their contributions to the happiness and comfort of human living. Economics and political science are only now beginning to tell us in more confident tones how to make this world a home to live in instead of a place to fight and freeze and starve in.

All these matters await the future peace. Nevertheless they constitute the stern realities of the present, for as Vice-President Wallace has said: "From the practical standpoint of putting first things first, at a time when there are not enough hours in a day and every minute counts, planning for the future peace must of necessity be a part of our all-out war program."

[1] Reprinted from "The Rockefeller Foundation. A Review for 1941", President Fosdick's Report.

Herman Frasch—Chemical Engineer

Peculiarly fitting is some recognition this year of the 90th anniversary of the birth of Herman Frasch. Probably there is no chemist who does not know of the sulfur-mining method he invented and developed, which has established this country as the world's foremost producer of this most important chemical raw material. Our chemical industry would be in a sad plight today were it still dependent on Sicily for sulfur as it was previous to the work of Herman Frasch.

Yet another reason for reviewing the life of this great inventor is the current attack on the American patent system by many who do not seem to understand that the purpose of the patent system is to call forth and develop new processes and products enriching life and ensuring our independence. As a 24-year-old pharmacist in Philadelphia, Herman Frasch patented a process for refining paraffin wax. Sale of this process to the Cleveland Petroleum Co. was the beginning of his career as a chemical engineer. His native curiosity led him into many diverse fields where his ingenuity resulted in many inventions for which he obtained patents. With the income obtained in this way he was enabled some 15 years later to solve successfully the problem of mining Louisiana sulfur, a project which has probably never been surpassed in the history of American chemical engineering for its technical and financial uncertainties.

Herman Frasch came to America from Germany at the age of 16, having had a high school education as a pharmacist's apprentice. He spent several years with Professor Maisch at the Philadelphia College of Pharmacy and at the age of 22 established his own laboratory. Work with paraffin wax took him into the petroleum industry where he became affiliated with the Standard Oil Co. at Cleveland. While at Cleveland he made a number of important inventions, including the development of waxed paper and an improved oil lamp.

In 1885 Mr. Frasch went into business for himself, purchasing a small refinery in Ontario where he worked out the process known among petroleum chemists as the Frasch process for desulfurizing oils by agitating and distilling the oil with copper oxide. It was immensely successful in treating high-sulfur crude oils of Ohio and Ontario and resulted in salvaging millions of dollars worth of oil previously unusable. The process was used on a large scale in refineries from Bayonne, N. J., to Whiting, Ind., for over 25 years. Mr. Frasch sold his petroleum business in 1888, but his interest in oil refining and production still continued as is evidenced by the patents he took out in this field, among them one for acidizing oil wells in 1890. Not until recent years was the real value of this method of oil-well treating fully appreciated. Today many thousand barrels of oil are recovered by this method using hydrochloric acid. A more recent development is the use of corrosion inhibitors to retard the attack of the acid on the well casing and equipment.

Many other phases of the chemical scene in the latter part of the 19th century also interested Herman Frasch as shown by his patents on such widely diverse subjects as the manufacture of white lead from galena, ammonia soda process, mining and manufacture of salt, mining of gold and other metals, extraction of linseed oil, and improvements in thermal electric generators.

It was in 1890 that Mr. Frasch applied for his patents on the sulfur-mining process, which was to be his greatest work, and between that time and 1905 he applied for 10 patents on that process. It is not necessary to describe to chemists how the geological structures overlying the sulfur beds in Louisiana made it impossible to mine the sulfur by ordinary methods nor how the Frasch process obtained the sulfur by pumping down vast quantities of superheated water, melting the sulfur in the beds, and raising it with an air lift. Years of arduous work were required to develop the method. A single experiment required 20 boilers of 150 horsepower each to produce the amount of superheated water necessary at 335° F.

Not until 1903 was the success of the sulfur-mining process assured, and in that year Frasch's company produced 35,000 tons. Imports that year, mostly from Sicily, were 188,000 tons. By 1907 imports had dropped to 20,000 tons and exports reached 35,000 tons. In one test extending two months six wells produced 122,000 tons! Since that time the American sulfur industry has been in a position to control the world market by the use of the Frasch process.

For his inventions in oil refining and sulfur mining Frasch was presented with the Perkin medal in 1911, and his address given at that time can be found in *Industrial and Engineering Chemistry*, February 1912. His retirement was spent in France where he died in Paris on May 1, 1914. Although he was born abroad and died abroad, most of his life was spent in America. He never received any formal engineering training, and yet he undoubtedly ranks as one of America's greatest chemical engineers.



Western Reserve Schedules Two Defense Training Courses

Industrial electrochemistry and synthesis and use of strategic organic chemicals are two defense training courses in progress at Western Reserve University in the nation-wide effort to train men and women for scientific positions in the Government and war industries. Both courses started May 26 and require as a prerequisite one year of chemistry or its equivalent in practical experience. Information on defense training courses may be obtained from E. T. Downer, Cleveland College, Western Reserve University, Cleveland, Ohio.

Grants for Research in Nutrition

The Nutrition Foundation, Inc., has awarded 36 grants totaling $125,000 for independent research in the science of nutrition. Recipients included universities and research agencies throughout the United States and one in Canada, with awards ranging from $250 to $7,000. Each grant has been earmarked for a specific project, chosen from 81 applications by an advisory committee headed by Charles G. King.

Founder companies which contributed $50,000 each to make the scientific program possible are the American Can Co., Beech-Nut Packing Co., California Packing Co., Campbell Soup Co., Coca Cola Co., Continental Can Co., Corn Products Refining Co., General Food Corp., H. J. Heinz Co., Libby, McNeil and Libby, National Biscuit Co., National Dairy Products Corp., Owens-Illinois Glass Co., Quaker Oats Co., Standard Brands, Inc., Swift & Co., and United Fruit Co.

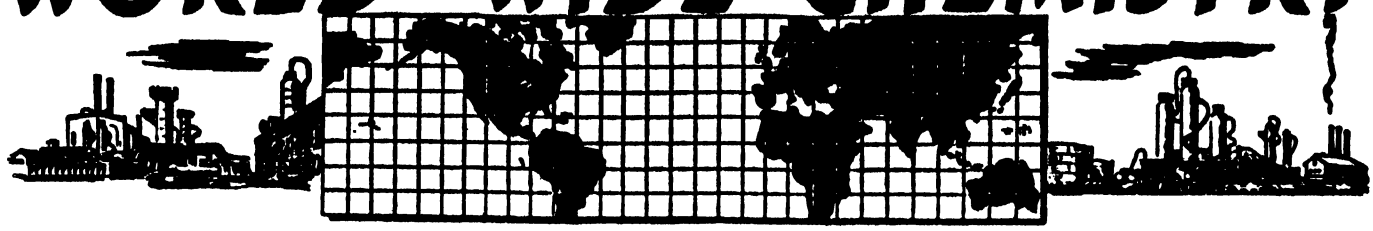
Research Fellowship

A new research fellowship in chemical engineering has been established at Vanderbilt University, Nashville, Tenn., by the Tennessee Products Corp. The work will pertain to development of products from wood distillation tars, under E. E. Litkenhous. William K. Lautner has been awarded the fellowship.

Who Makes It?

The National Registry of Rare Chemicals, Armour Research Foundation, Chicago, Ill., has had several requests for chemicals which have not been registered with it. It seeks sources for the following chemicals: oxy-cellulose compounds, 3-pyridine acetic acid, metanicotine, nornicotine, dioxyphenylalanine, bulbocapnine, very pure chlorophyll, and phosphorus tetrasulfamide.

WORLD-WIDE CHEMISTRY



Continental Europe

Germany

Annual reports of leading chemical companies for 1941 show effects of war on the industry. Chemische Produktenfabriken Pommerensdorf-Milch, Stettin, reports that the superphosphate plants operated temporarily and on a smaller scale, but manufacture of commercial fertilizers increased. Sales of chemicals remained on the 1940 level, and exports rose slightly. The company has taken a financial interest in a new factory in the Wartha district of Poland. Südchemie, Munich, reports that output of heavy chemicals was several times larger, a new factory was opened, and further extensions are under way or planned. Production of bleaching clay was used almost entirely in the home market, but some synthetic materials were sold in other continental countries. Output of superphosphates increased. Other company news from Germany is an increase in the capital of Sprengstoffwerke Oberschlesien G. m. b. H., explosives manufacturers in Upper Silesia, from 500,000 to 6,000,000 marks and the formation at Mannheim, Upper Rhine, of a 1,200,000-mark company, Ligrowa G. m. b. H., for vanillin manufacture.

Five Superpolyamides for Various Purposes Produced

Production of superpolyamides has progressed in Germany. Since various diamines and dicarbonic acids as well as condensation products of these and dialcohols can be used for the production of superpolyamides, many variations in the chemical structure are possible, I. G. Farbenindustrie at present offers five superpolyamides under the trade names Igamid A, B, 6A, 40B, and 85B. Igamid A is said to resemble nylon in properties. Other Igamid products differ mainly in their solidifying points, solubilities, and practical properties. Igamid A, B, and 6A have comparatively low molecular weights and form thin melts which cannot be processed by the methods usual with other plastics. Igamid 85B is recommended as possessing a sufficiently large thermoplastic range to permit processing in the usual way. The 6A compound is used for the manufacture of foils in thicknesses of 0.01 to 0.035 mm., which can be sewn. Igamid 40B has been developed especially for the lacquer industry. In their original states the superpolyamides are white to brownish, with a resemblance to ivory. When melted they can be stretched into thin threads superior to silk in resistance to tearing, elasticity, and water repellence. Threads and strips of superpolyamides can be stretched to four times their former length at normal temperatures, with the result of a considerable increase in tear resistance. Other advantages claimed for Igamid are high mechanical strength, fastness to light, nonflammability, and resistance to organic solvents. Igamid A and B can be pressed, molded, and sprayed, formed hot and cold, forged, and, with suitable precautions, welded like metals. They can be worked with knife and plane like ivory and horn. Igamid solutions are recommended as good adhesives. In combination with plasticizers they can be made into leatherlike substances. Their use is suggested for electrical insulation where good adhesion to metals and sneak current resistance are of advantage. Further Igamid products may be put on the German market.

Paper Fleece Impregnated with Synthetic Resin Replaces Leather

Shortage of hides and leather has stimulated output of artificial leathers. Combinations of synthetic resins and textile materials have often been found either too expensive or not strong enough to stand normal tear and wear. A substitute material, used on a scale equaling one tenth of the production of textile leather, is paper fleece of exceptional absorption power which is impregnated and covered with latex or synthetic resin. The paper character is said to be overcome entirely by the impregnation, and the material has a satisfactory mechanical strength. It was in production before the war and is now sold to manufacturers of leather bags especially. Output, though unrestricted, is limited by allocations of paper and synthetic resins.

Synthetic Fibers, PeCe and Perlon, Are Described

Details of PeCe and Perlon, the two fully synthetic fibers available to German manufacturers, show that the latter product is similar to nylon. When stretched after spinning to four times its length, it is superior to natural silk in elasticity and strength. Its specific weight is 1.1 as against 1.3 of wool and silk, and its melting point may be 270° C. It is used alone or mixed with other fibers.

PeCe fiber is described as containing 64 per cent of chlorine. It is resistant to nearly all acids and alkalies, bacteria, water, and fire and has a higher dielectric constant and better heat-insulation power than silk. Its strength in a wet state is equal to that in a dry state. PeCe fiber is used for filters, chemical protective clothing, fishing nets, and similar purposes. Its disadvantage is a low solidifying point of 80° to 90° C. which makes ironing of fabrics made from PeCe fiber impossible.

Polyvinyl Chloride Used to Protect Textile Fabrics

Polyvinyl chloride, marketed in Germany under the trade name Igelit, is not only used in foils on black sheets to save tin plate in the canning industry but also in paste form with suitable plasticizers in the protection of textile fabrics. Because of the high temperatures necessary for treatment of the textile fabric with Igelit, it cannot be used with woolen materials. It is employed for cotton and viscose rayon fabrics and has also found application on jute fabrics where its resistance to moisture and many chemicals is a particular advantage.

Improved Cellwood Type Said to Resemble Wool

A leading German cellwool manufacturer has begun commercial production of a new type which is said to resemble natural wool more closely. The new cellwool, produced by the viscose spinning process, differs from other types by the existence within the fiber of hollow spaces which give improved insulation value. The volume of the spun thread is

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EDITOR'S NOTE. Those interested in further details should address the correspondent whose name and address appear for each country, and enclose sufficient international coupons to prepay the reply. United States stamps should not be sent.

30 to 40 per cent larger than that of a corresponding quantity of viscose, and appearance and touch, it is claimed, are more wool-like than is usual with cellwool. Difficulties encountered in processing are said not to be important, but no practical experience about the new material is yet available. The shortage of natural wool and cotton is becoming acute in countries under German domination, and consequently interest is shown in the production of cellwool and similar materials. Even those without an adequate raw material basis, such as Denmark and Belgium, pursue plans for cellwool manufacture. Spain, France, Holland, Norway, Sweden, Slovakia, Hungary, and Rumania are all engaged in the erection of cellwool factories, most of which use German processes though some of the Spanish and Hungarian projects are supported by the Italian Snia Viscosa company.

New Process Developed for Wood Impregnation

A new process using highly volatile solvents has been developed to facilitate impregnation of indigenous timbers with synthetic resins, lignite ozokerite, or similar substances. The products are substituted for imported hardwoods. Impregnation is carried out in a closed vessel, and the solvent is extracted after impregnation by application of underpressure. Special advantages are that the wood need not be dry as the water is expelled by the solvent and that the treated timber does not swell, is very hard, especially vertical to the fiber.

Retort Carbon and Pitch-Coke for Carbon Electrodes

The big expansion of the aluminum and magnesium industry and other metallurgical developments have greatly increased demand for carbon electrodes in Germany. Among suitable domestic materials carbon precipitated on the walls of coke-oven and gas-furnace chambers is of considerable importance. It requires no further treatment and has a low ash content of 0.5 per cent, while volatile matter and sulfur are entirely absent. Great interest is also shown for pitch coke which is available in very large quantities. It may contain 0.7 per cent volatile matter, 0.9 per cent ash, and 0.7 per cent sulfur. The ash content may be reduced if the heavy oil fraction obtained by distillation is added to the coal-tar pitch before carbonization. Technical work in recent years has improved the quality of electrode coke and prevented premature deterioration of the furnaces used for the production of pitch coke, but various materials with suitable properties are now said to be offered in sufficient quantities so that availability of plant and costs of production seem to be the principal considerations for the choice of electrode material.

Denmark

Difficulties in fuel supply have resulted in increased burning of peat in rural districts. The peat ash remaining after burning is being used as a fertilizer. Systematic experiments in Denmark have shown that the contents of phosphoric and potassic material vary greatly so that exact dosage is impossible. The peat ash also contains lime and is regarded as a suitable fertilizer on soils lacking in this respect. Handling of the ash causes some difficulty.

Southeastern Europe

Since A. G. Dynamit-Nobel, leading chemical enterprise in Slovakia now under German control, almost doubled its capital in January, German interest in commercial exploitation of the small countries of southeastern Europe has been increasing. Reports are numerous of formation of new companies and extensions of existing plants, mostly under participation of German chemical firms.

In Pistyan, Slovakia, Facet A.-G. has been formed for the manufacture of chemical and pharmaceutical products from the famous mineral springs. The long-closed sulfuric acid and superphosphate factory at Kostolany, Slovakia, has been transferred by Dynamit-Nobel to a new company, East Slovakian Chemical Works, which is to resume operations.

In Agram, Croatia, Chemische Fabriken A.-G. was organized for the manufacture of copper sulfate, sulfuric acid, and superphosphates. The company will receive a monopoly for production of the first two chemicals provided the factories are built within the next two years. Several old mills in Croatia have been equipped with apparatus for extraction by a new method of maize kernel oil for use in the soap industry. An annual output of 500 tons is the goal.

In Rumania Acital Industrie A.-G. has been formed to manufacture various chemicals. German interests have negotiated with a Rumanian rubber manufacturer about erection of a plant to make 3,000 tons a year of synthetic rubber using natural gas. Natural gas is also said to be used as a raw material for formaldehyde in Rumania. A company organized before the end of last year will use it for iron smelting, where it replaces coke in a process developed in Germany.

In Sajetshar, Hungary, a new glue factory, which will also produce casein products, has been built. Hungarian farmers complain of shortages of certain fertilizers. While nitrate of lime seems plentiful and is even exported, other nitrogenous fertilizers are in short supply. The capacity of the plant at Pét is to be raised to 45,000 tons.

Operations of mines of the Galician potash industry were discontinued after the invasion of Poland in 1939. Since reported damage was heavy, it was not expected that great efforts would be made for repair. Germany has a large potash production and intended to send to southeastern Europe large quantities which otherwise would have been shipped abroad. Transportation difficulties made this impractical, and one of the Polish potash mines has now been reopened to meet demands in local and adjoining markets.

Germany has also concentrated in the warmer countries of southeastern Europe on cultivation of plants for chemical manufacture. Poppies for opium production and plants for output of vegetable oils have aroused interest.

France

Increased activity in the French chemical industry is reflected by a large number of capital increases and new incorporations. St. Gobain, the chemical combine which raised its capital from 300,000,000 to 450,300,000 francs last year, will now boost it to 675,470,000 francs. The combine's glass interests were extended by merger with Société des Verriers Mécaniques de Bourgogne and Société Nouvelle de la Soie de Verre Isover. In the Kuhlmann group Société Chimique de l'Industrie, a company formed last year, has expanded its capital from 2,000,000 to 28,000,000 francs. The Péchiney combine has formed a new subsidiary, Société de Recherches et d'Entreprises Industrielles et Chimiques. Other new companies of limited importance are Etablissements Paul Besnard (Montreuil-sous-Bois), Société Commerciale pour les Industries Chimiques (Courbevoie), Société de Fabrication de Coagulants (le Kremlin-Bicêtre), and Savonnerie Franco-Coloniale (Paris).

Production of Artificial Fibers Being Expanded

The shortage of wool, cotton, and other natural fibers has increased interest in the manufacture of synthetic fibers by several foreign processes. Société des Textiles Artificiels du Sud-East will place a loan for 150,000,000 francs for the extension of its artificial silk plant. Société France Rayonne, which recently acquired control of another rayon manufacturer, Société Industrielle de Moy, raises its capital from 200,000,000 to 400,000,000 francs. Zellwolle- und Kunstseidering G. m. b. H., an important German group in the rayon and cellwool industry, has acquired a 33 per cent interest in France Rayonne and put its technical knowledge at the disposal of the French company which intends to build a cellwool factory

in the unoccupied zone with a daily output of 10 tons. Later this plant is to be extended to a capacity of 21,000 tons a year. The company is experimenting with reed and broom as raw materials for cellwool manufacture in a pilot plant in the Département Isère. A cellulose factory is also being built.

Another cellwool company, Le Sanitol Français, has raised its capital from 20,000,000 to 30,000,000 francs. The production of nylon was started in France by Rhône-Poulenc in a plant near Lyons last year. No news has been received since except that the output is on a limited scale.

Synthetic Oil Production Calls for Large Investments

The French motor fuel position is so unsatisfactory that substantial tonnages of mineral oils have to be provided for the occupied zone by German army authorities. While it is hoped that the producer gas program will bring some relief, plans for expansion of the output of liquid substitute fuels are progressing. Société de Combustibles et Carburants Nationaux is building a plant at Mireplisset, Ande, where lignite and shale are to be treated. Société Française des Pétroles has raised its capital from 600,000,000 to 800,000,000 francs and has been authorized to increase it further to 1,000,000,000 francs. Société de Hydrocarbures de Saint-Denis has expanded its capital to 15,250,000 francs, is to increase it further to 30,000,000 francs, and has received an authorization to bring it to 50,000,000 francs. Not all the new funds put at the disposal of French oil companies will be used for the construction of synthetic oil plants. The shortage of coal makes it almost impossible to proceed with some of the projects developed earlier, but work on others which were to be based on lignite and residual petroleum will be continued, if necessary equipment can be obtained.

Government Supports Colonial Developments

Many French industrial companies which have been deprived of opportunities for their normal business have taken an interest in the commercial development of raw materials in the North African colonies. The government has announced that firms formed for the utilization of North African raw material resources can obtain credits and guarantees, and the government may also participate in colonial development by taking a financial interest in new companies. Meanwhile colonial producers complain of lack of transportation. Thus Phosphates de Gafsa has not been able to make use of overseas markets because shipping space was restricted. Ouasta-Mesloula, a company developing lead, zinc, and copper deposits in Algeria, has received a state subsidy, but also suffers from shortage of transportation and fuel. The limitation of shipping has caused some French vegetable oil mills to send their equipment to Africa. It is intended to increase vegetable oil exports from French West Africa from 12,000 to 45,000 tons yearly. Construction of a paper pulp plant and distilleries for the production of vegetable liquid fuels in North Africa has been proposed. These and similar developments are supported by companies which have sold continental interests to German firms and wish to invest the proceeds. The Mirabaud group which owned the Mines de Bor, Europe's largest copper mines, in Yugoslavia, has acquired a financial interest in the Syndicat Pétrolier Colonial. The group is also financing experimental work on the extraction of magnesium from sea water at Sète.

Copper Sulfate Allocations Reduced, to Be Stopped

While the search for new potash and sulfur deposits in southern France is likely to contribute to an increase in the supply of inorganic fertilizers, allocations of copper sulfate to vineyards have had to be reduced this year because of the copper shortage. During the first three months of 1942, 10,000 tons of copper were distributed among copper sulfate manufacturers, compared with 15,000 tons in the preceding year, and no further allocations will be possible. A substantial part of the French copper sulfate demand was covered by imports before the war, and these have stopped completely.

Soap Manufacture and Consumption Restricted

The shortage of vegetable oils has necessitated reductions in the maximum contents of fatty acids in soaps and soap powders. Toilet soaps must not contain more than 18 per cent of fatty and resinous acids, household soap not more than 26.5 per cent, and cleaning powders not more than 9 per cent. Fatty substances will be allocated for soap manufacture only to firms which possess adequate facilities for the recovery of glycerol. The glycerol lyes must be concentrated to at least 80 per cent glycerol contents. The soap ration for the general public has been fixed at 100 grams of household or 75 grams of toilet soap plus 75 grams of household soap or 250 grams of cleaning powders per month, but special allowances are made for certain classes of industrial workers, etc.

Italy

Production in the Italian chemical industry has been greatly impeded by the shortage of coal and electric power. This has been felt especially severely in the Po Valley where electrochemical industries depend upon power supply from hydroelectric stations in the Alps. These could not supply the usual amount of energy because of the low water level and late thaw, but the position has improved recently.

Aluminum Industry Undergoing Extension

Aluminium-Industrie A.-G., Chippis-Neuhausen, the Swiss aluminum holding company with important interests in Italy, reports that during the past year shipments of bauxite suffered from difficulties of transportation. Germany seems to have switched over mainly to French and Hungarian bauxites, which are situated more favorably, with the result that new outlets for Italian bauxite and alumina had to be developed at home. The company's alumina plant at Porto Marghera is undergoing extension. Societa Aluminie Veneto Anonima (SAVA) reports for 1941 that a new aluminum plant has been built with machinery and material received from Germany, and another is to be built this year. The company has substantial surpluses of alumina at its disposal. Some of this has been sent to Germany, but in the future it is to be used in the new aluminum plant. S. A. Laborazione Leghe Leggiere, the light metal manufacturing subsidiary of the SAVA, is also expanding.

Montecatini Combine Takes over Five More Companies

Montecatini, the Italian chemical combine which recently raised its capital to 2,000,000 lire, has taken over the assets and liabilities of Metallurgica Lombarda Piemontese (capital: 10,000,000 lire), Stabilimento Prodotti Chimici (3,000,000 lire), Soarchi Imbarchie Trasporti (2,500,000 lire), Industria Siciliana Acido Citrico (1,500,000 lire), and Industriale Lombarda (1,750,000 lire).

Raw Material Difficulties Met in Synthetic Fiber Industry

Italian production of artificial fibers increased last year, largely owing to progress in the works of Snia Viscosa. Exports of artificial silk declined, but those of cellwool were larger. The cellulose factory at Torviscosa, Province of Udine, which is using reed as a raw material worked normally, and good progress is reported for expansions under way. Thus the shortage of other cellulose materials was partly offset. The lanital (casein wool) production was on the whole maintained, though here also difficulties in the

supply of raw materials were encountered. Under an agreement with the Spanish Government Snia Viscosa is building a cellwool factory at Torrevalega in Spain. The Snia Viscosa process is also used by the Hungarian Viscose Co. which was to commence the production of cellwool in a new factory near Komorn on the Danube River in the spring of this year.

Substantial quantities of synthetic fibers are now used in the manufacture of tires. Societa Italiana Pirelli, the Italian rubber manufacturer who raised his capital from 300,000,000 to 400,000,000 lire and may increase it further to 500,000,000 lire, reported that recently three quarters of all rubber used and two thirds of all fibers were of synthetic origin.

Linoleum Made from Cellwool and Tomato Skins

Societa del Linoleum Anonima has commenced production of a new kind of linoleum from local raw materials. While the jute is replaced by cellwool, a gum resin said to be manufactured from tomato skin is used instead of linseed oil

Italian Company Sets Record Mercury Output

Stabilimento Minerario di Sieli, the second largest mercury producer in Italy, is reported to have reached an output of about 40,000 flasks, equal to 1,500 short tons, in 1941. This is the highest figure on record in the history of the company and exceeds half the total Italian mercury production as reported for the last year before the war. The larger part of the Italian output is sent to Germany, mainly for the manufacture of explosives.

Efforts for Larger Motor Fuel Production Continue

A large number of increases in the capitalization of small, private enterprises in the Italian motor fuel industry reflects the wish of independent firms to profit from the liberal subsidies granted by the government for increased production of liquid fuels, but the output from private quarters has been so disappointing that the authorities have had to take further measures to stimulate oil production from domestic materials. Asphalt deposits in central Italy and Sicily have received much attention more recently. Semi-official companies have been entrusted with oil production from asphalt in central Italy, and in Sicily the ABCD company will in future deliver its whole output to AGIP, another company financed by the state, and receive a subsidy of 100 lire per quintal. It is hoped that up to 25 per cent of all busses in Sicily will be run on asphalt-Diesel oil mixtures eventually.

AGIP Supports Oil Production in Albania

AGIP, the central organization in the Italian oil industry, has lately concentrated on intensification of crude oil production in Albania. Although crude oil from that source cannot be treated by ordinary raffination and is subjected to hydrogenation, the production is to be extended. AGIP has supported research into possible deposits in Epirus, the Greek province adjoining Albania, and other parts of Italian-occupied Greece by AIPA, the Italian petroleum company operating in the Balkan peninsula. In the report for 1941 AGIP argues in favor of a continuation of the autarchy policy after the war. With that purpose in view the company has formed Azienda Lavorazione Bitumi Asfalti, a 50,000,000 lire subsidiary for development of asphalt deposits in central Italy.

Accounts for 1941 show that gross profits of AGIP declined from 105,000,000 to 55,000,000 lire. The net profit dropped from 24,300,000 to 10,600,000 lire, and the dividend, 5 per cent for 1940, was passed.

Montecatini Reports Big Expansion during Past Year

Accounts of Montecatini for 1941 show a rise in gross profits from 342,100,000 to 409,030,000 lire and in net profits from 160,840,000 to 195,720,000 lire of which 10 per cent dividend on the increased capital required 160,000,000 lire. No production figures are given, but consumption of electric power increased by 15 per cent to 2,140,000 kw.-hr., accounting for 10 per cent of the total Italian electric power output. The number of plants, mines, and factories owned and operated by Montecatini increased last year to 225 of which 30 were mines (pyrites, sulfur, copper, zinc, lead, bauxite, lignite, fluorite, barites, marble) while about two dozen others are engaged in utilization of these products. Increase in the number of factories seems to be mainly due to the policy of dispersal for fertilizer factories. No less than 58 plants, mostly small, are owned by Montecatini for the manufacture of phosphatic manure.

There are also eight factories for nitrogenous compounds which cover the whole agricultural and explosives demand, although the big 20,000-ton plant is not operating at present because of shortage of coal. The cyanamide and coke plants, the latter owned by Cokitalia, worked normal. The eight copper sulfate factories were obviously greatly impeded by shortage of copper. Montecatini experimented with insecticides containing citric and tartaric acid with 8 per cent of copper and believes to be near to the manufacture of a copper-free insecticide for vineyards. Twenty-five plants made industrial chemicals. They were affected to different degrees by the price stop orders, generally changed over to essential manufactures, and profited from an improvement in the export trade. No details are published about 18 factories making paints, lacquers, and explosives. The aniline dyes factory, in which I. G. Farbenindustrie holds a 49 per cent interest, increased sales, but only in cheaper grades. Two pharmaceutical factories started some new productions and placed small quantities in the export market. The manufacture of cosmetics was extended by some new types. Montecatini also operates one rayon, three plastics, and eight glue plants. Rhodiaceta Italiana, a Montecatini subsidiary, increased the output of cellwool, cellulose acetate, and plastics. It is reported that two nylon factories were completed and began operations, although machinery ordered from the United States was not received.

Considerable attention has been given to the metal plants. An alumina works was extended, a new aluminum factory is under construction, a new plant for synthetic cryolite was opened. The production of pyrites was raised to leave small tonnages for exports. Good progress is reported for the production of fine zinc and alloys, and output of cobalt and manganese ore is to begin shortly.



The amount of gasoline for passenger cars, rationed since March 30, was first 10 and is now 15 liters a week with larger allotments for doctors, veterinarians, taxis, and trucks. Industrial uses are also rationed. To relieve the shortage the Cía. Sudamerican de Vapores, the largest Chilean shipping company, has rented for four months the Argentine tanker *Los Pozos*, which will ship gasoline from the Peruvian oil port of Talara to Chilean ports.

Government to Establish Two Cement Plants in Chile

Cement is very scarce. The one Chilean factory, Soc. Fábrica de Cemento el Melon, at La Calera, Province of Aconcagua, cannot produce half of the country's needs. In the past year continous imports have been made from Canada and Argentina, with those from the latter entering free of duty. The government recently bought two complete cement plants, it is said, one in New Jersey and one in Pennsylvania, and is transferring them to Chile. These new factories will probably be operated by contractors under auspices of the Corporación de Fomento y de la Producción, underdepartment of the Minsterio de Fomento.

Government May Develop Bituminous Slate Deposits

Possible development by the government of the rich bituminous slate deposits near Lonquimay, Province of Cautín, is again rumored. Analyses made in England and Germany some years ago showed 16 per cent crude oil to the ton of slate. Attempts to exploit the deposits have been made since 1907 but all were stranded by difficulties of finding the necessary funds, about 150,000,000 Chilean dollars. The same financing problem is as yet unsolved.

Chilean Navy Cooperates in Exportation of Nitrates

The Chilean Navy is again serving the chemical industry by shipping nitrates to Brazil. In this way it is combining the instruction of cadets and commercial activity.

During February exports of crude nitrates were 838,030 quintals (1 quintal = 100 pounds).

Government Grants Funds for Development of Natural Resources

The Corporación de Fomento has made the following grants in Chilean dollars:

1,500,000 to a company to be formed for exploiting deposits of manganese in the Province of Antofagasta.

600,000 for exploring and exploiting zinc deposits in the Department of Illapel, Province of Coquimbo.

200,000 to the Soc. Minera Victoria de Quillagua for helping it develop the borax deposits de Quillagua and Punta Negra, Province of Tarapacá. The company will export the bulk of its products—borates and boric acid.

For continuing exploration of oil in Magallanes the government gave 602,-897.50 more Chilean dollars.

Gold and Copper Prices Are Headed for Increases

The contract between the Caja de Credito Minero and the Metal Reserve Company ends August 1. The prices will then be revised and probably increased for gold, refined and concentrate, and copper, refined and concentrate, as well as for other metals not yet mentioned.

Shortage of Acetone Forcing Argentine Cellulose Plant to Close

The most important cellulose factory of Argentina, near Buenos Aires, will be forced to close down very soon because of lack of acetone. This factory employs some 3,000 workers.

Despite Promise of Brazilian Aid, Rubber Supply Tightens

Although tires are not rationed, the supply is tight. A new tire factory, being built near Santiago by two United States citizens, will probably not be finished, it has been rumored. Production of rubber tacks and shoes is prohibited, and the small lots still coming from Ecuador, Peru, and Brazil are being used for pharmaceutical articles and vulcanizing. In February the Government of Brazil promised Chile 50 tons monthly of crude rubber, but until now nothing of this size has been shipped.

Construction of Tire Plant Using Native Rubber Considered in Peru

The Ministerio de Obras Públicas is considering construction of a tire factory because of the extreme shortage of tires. Peruvian rubber, which is no product of plantations but grows in a wild state in the provinces of eastern Peru, could be used.

RODOLFO ZOELLNER

CASILLA 3593
SANTIAGO
May 9, 1942

Sales of Fertilizer in 1941 in Canada Decline

CANADIAN sales of fertilizer materials dropped from 85,600 short tons in 1940 to 74,500 in 1941, according to a special survey by the Dominion's Bureau of Statistics. Sales of mixed fertilizers amounted to 249,700 short tons for the year ended June 30, 1941, compared to 261,100 tons in the same period of 1940.

Canada's production of fertilizers was valued at $15,103,800 in 1940, a 14.7 per cent increase over 1939. The industry also produced 229,800 tons of cyanamide, ammonium sulfate, mixed fertilizers, and fish fertilizers in 1940 valued at $4,914,-700 from establishments classified as to other production as well.

Sodium Carbonate Imports by Brazil Continue Steady

IMPORTS of sodium carbonates by Brazil, largely from the United States and Great Britain, have remained steady for the past five years and are used in appreciable quantities by Brazilian industry, according to official sources. Brazil's glass, soap, textile industries, and tanneries are principal consumers and are centered largely in the areas around São Paulo and Rio de Janeiro. Other centers are situated in Porto Alegre, Pernambuco, Bahia, and Para. Some expansion of these industries is noted for recent years, with the prospect of increased output, especially of glass and soap, in 1942.

Turkish Chemical Industries Expand to Replace Imports

IMPROVEMENT was noted for the end of the year in a tendency on the part of Turkish buyers during most of 1941 to fill their chemical needs on a hand-to-mouth basis, which left very short supplies in some lines. Local industry also, even those branches dependent to some extent on imported chemical raw materials, showed increasing activity. Semigovernmental textile plants especially expanded output to meet the sharp drop in imports.

Prices generally remained high, with maximum profits on chemicals regulated by the government at 25 per cent. There is a 25 per cent levy on the landed cost of goods, so that importers' profits are directly proportional to such landed cost. Few importers feel in a position to quote fixed prices on merchandise because of fluctuating price conditions, shipping delays, etc.

Until late in 1941 Germany continued as a minor source of Turkish chemical imports, with Great Britain as the principal supplier. The year's end, however, saw German shipments in quantity of heavy chemicals and pharmaceutical specialties.

United Kingdom Depends on Home Glue, Gelatin Industry

WAR conditions have thrown almost the entire burden of home supply for glues and gelatins in the United Kingdom on the home industry, which formerly was an important factor in the export trade in these articles. Unable to obtain supplies from Axis-controlled sources and with a mounting demand at home, the industry no longer is in a position to meet demands for its products in the export markets. The government now licenses such shipments and has restricted them to those required for war manufacture in overseas countries.

Nevertheless, British glue manufacturers were able to maintain substantial export levels during the past year, though not at prewar figures. Allocations for 1942 are expected to be considerably reduced. A Glue and Gelatine Export Group has been functioning in the industry for the past year as an advisory aid to the government in the interest of both government and export trade.

Panama's Alcohol Output in 1941 Is 1,008,000 Liters

PRODUCTION of rectified alcohol in Panama in 1941 averaged 84,000 liters per month, a total of 1,008,000 liters for the year. Total production of pure alcohol required for manufacturers of alcoholic beverages amounted to 780,000 liters. Expanded industrial activity in Panama, it is said, has led to increased demand for chemicals generally.

Guatemalan Chemical Firm to Expand Sales

A PROGRAM for expanded output and sales to near-by countries by a Guatemalan firm which has been manufacturing chemicals on a small scale for the past 40 years has been reported. This company produces monthly 8,000 to 10,000 pounds of sulfuric acid, 1,200 pounds of hydrochloric acid, and 200 to 300 pounds of nitric acid. The first could possibly be increased, and the second is insufficient to meet demand. Nitric acid consumption is limited, and the factory's capacity is greater than demand or present output.

Manufacture of sodium sulfate exceeds consumption, permitting possible exports to neighboring export markets. Output of iron sulfate and silver nitrate meets the limited demand. Copper sulfate consumption amounts to 10,000 tons annually and is produced on a small scale only. Aluminum sulfate production is used for purifying drinking water to the extent of about 400 tons per year and is not produced by the company, which is investigating possibilities. The firm also is looking into manufacture of chlorine, potassium dichromate, acetic acid, and citric acid.

British Imports of Casein from Argentina Satisfactory

BRITISH imports of casein from Argentina are proving very satisfactory, according to the British casein plastics industry. The British industry at the beginning of the current year found itself with higher stocks than in 1941, and shipments from the Argentine were coming over with relatively minor losses from German submarine attack. In the past 12 months such losses were stated to be only 10 per cent of total casein shipments.

"As to the future", British trade sources report, "an additional demand for casein plastics is anticipated for the supply of buttons for utility clothing, and quantities running into many tons will be required in the next year. We are confident that we shall be able to meet this additional demand when it arises. The need for a material that will stand up to the government decontamination test has arisen and it has been found that the casein button modified by surface treatment will stand this test."

Eire Produces Industrial Alcohols from Potatoes

A DAILY output of about 1,000 gallons of industrial alcohol is reported for the four factories operating in Eire under the Irish Alcohol Factories, Ltd. This production is blended with gasoline. The alcohol is produced from potatoes, and the original capacity of 7,000 tons has been increased to 8,000. A fifth factory is not yet in operation.

Three Chemical Plants Are Opened in Ireland

THREE chemical manufacturing plants are operating in Ireland, manufacturing carbon dioxide gas, calcium carbide, and industrial alcohol. A special plant for producing industrial gases has been built by Guinness's Brewery at Dublin for utilizing waste carbon dioxide gas which arises from the fermenting vats. Production is scheduled to start in March, with a 200-ton annual output anticipated. This is expected to be enough to supply all creameries with essentials for refrigeration.

A small plant for producing carbide was established in County Limerick. Consumption of carbide in Ireland amounts to about 700 tons annually and this plant produced in February at the rate of 208 tons yearly, but increased output is expected. The Industrial Alcohol Factory at Cardonagh was reopened in January. The maximum output is 1,000 gallons of alcohol daily.

Improvements of Turkish Chemical Industry Reported

ALTHOUGH development has been slow on projected expansion of Turkish chemical production, improvements in that country's chemical manufactures are reported to the United States.

The Karabuk Iron and Steel plant increased by-product output, all of which was absorbed by the market, including 20 tons of toluene, 120 of benzene, 20 of naphthalene, 16 of road tar, and intermittent production, geared to market requirements, of ammonium sulfate. The plant is said to have considerable stocks of sulfuric acid. All the toluene production was utilized by the government.

Construction of a sodium hydroxide and chlorine plant is expected this spring, but failure of Germany to deliver certain small equipment items has held up completion of sulfuric and superphosphate plant construction. A cellulose plant is reported to be nearing completion.

Insecticides Needed in Canada for Rice and Spider Weevils

DEMAND for insecticides and fumigants to deal with two types of destructive pests in western Canada's temporary storage annexes is reported. The insects are said to be new to Canada. The rice weevil has been found in a temporary elevator in Manitoba and the spider weevil in a number of storage annexes in the Prairie Province.

THE United States with Argentina supplied stearic and naphthenic acid to Ecuador in 1941 for that country's candle and soap manufactures. Ecuador itself produces neither of these requirements.

Stocks of Nux Vomica in South India Decrease

SMALL crops and active demand on both coasts of southern India have resulted in dwindling stocks of nux vomica amounting to 500 or 600 long tons, a consular report states. Larger supplies are reported in other districts, among them Calcutta with about 1,200 tons, of which 40 are ready for immediate export. The United States, the largest buyer, however, purchases more from South India than from the Calcutta area. American purchases of nux vomica from India amounted to 679.50 long tons in 1940, compared with 461.75 in 1939. Great Britain is the second largest buyer, but in declining quantities in the two years, 328.15 long tons in 1939 and 146.10 in 1940.

Total shipments from India are also said to have declined, probably because of the war and shipping conditions, as this product has not been given priority in shipping. An increase of around 500 per cent has occurred in price quotations caused partly by withdrawal of Indo-China as a producing area, the increase being quoted on the South India product. Some holders in that section are reported waiting for even larger price rises before releasing stocks. This situation is said not to prevail in the Calcutta area, where loss of the Japanese market is felt.

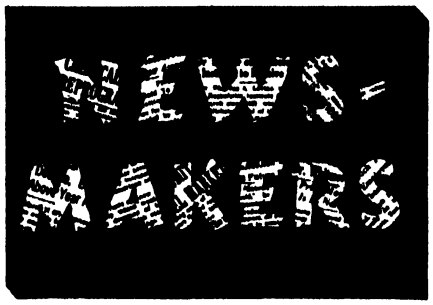
Coal-Tar Coloring Imports into Mexico Are Increased

COAL-TAR coloring showed the largest increase of any chemical imports into Mexico in the first 10 months of 1941, according to an official report. The principal industrial chemicals imported by Mexico during that period were sodium hydroxide, sodium and potassium carbonate, and coal-tar coloring, which were nearly two and half times the earlier intake reported, 1,004 metric tons compared with 417.

Output, Stock Fill Turkish Ammonium Sulfate Needs

TURKEY met the domestic demand for ammonium sulfate during most of 1941 from small carry-over stocks and its production from the Karabuk plant. It was necessary to import some 3,000 tons during the last quarter of 1941, however, imports of 3,700 tons of superphosphate representing about the usual consumption.

TURKISH sulfur production amounts to about 4,000 tons annually, compared with yearly requirements for the country's vineyards of 6,000 to 7,000 tons. The balance is normally obtained from imports, but in 1941 incoming supplies, principally from Palestine, were negligible.



Harold L. Aldrich has been released by the United Carbon & Pigment Co., Newark, N. J., because he has been commissioned a lieutenant in the Navy. He is at present working in the Design Division, Bureau of Ships, Washington, D. C.

William J. Austin, formerly manager of the Chicago, Ill., office of the Explosives Department, Hercules Powder Co., has been appointed director of purchases of the company. He succeeds **Kurt W. Jappe,** who will become manager of detonator operations, Explosives Department, and is succeeded by **Frank W. Roman.**

John G. Beach, formerly raw material chemist and formulator with the Acme White Lead and Color Co., is now research engineer with the Battelle Memorial Institute, Columbus, Ohio.

Bernard Beck has joined the research staff of Lawrence Richard Bruce, Inc., Stamford, Conn., where he will work on synthetic organic chemistry research.



J. R. Brenemen

J. R. Brenemen has been appointed West Coast representative of the Gelatin Products Co., with headquarters in Los Angeles, Calif.

N. H. Brodell has been appointed metallurgical sales engineer for the Copperweld Steel Co., Warren, Ohio. He was formerly connected with the Timken Steel and Tube Division, Pittsburgh Crucible Steel Corp., and United Alloy Corp.



N. H. Brodell

James B. Conant, president of Harvard University, and **Marston T. Bogert,** Columbia University, have been asked to accept honorary membership in the Society of Chemical Industry.

William V. Cruess, University of California, has been awarded the Nicholas Appert Medal by the Chicago Section of the Institute of Food Technologists for outstanding contributions to food technology. Presentation will be made during the annual meeting of the institute in Minneapolis, June 15 to 17.

Charles Galton Darwin, director of the National Physical Laboratory since 1938, has been made scientific adviser to the British Army Council.



F. B. Davis

F. B. Davis, previously connected with the Edgar T. Ward Co., has been appointed by the Copperweld Steel Co. to manage sales of Aristoloy alloy steels and Coppco tool steels in the Buffalo district.

George E. Diamond has been appointed comptroller and **L. C. Vankirk** has been promoted to auditor of the Jessop Steel Co., Washington, Penna.

Robert L. Driver is now a first lieutenant, Foods and Nutrition, Sanitary Corps of the Army's Medical Department.

Graham Edgar, director of research of Ethyl Corp., will deliver the 17th Edgar Marburg Lecture June 24 at the annual meeting of the American Society for Testing Materials, Chalfonte-Haddon Hall, Atlantic City, N. J. Dr. Edgar's subject is "Gasoline—Past, Present, and Future".

After 24 busy useful years presiding over the library of The Chemists' Club, New York, **Miss Emily J. Fell** is retiring as librarian. At the annual meeting the membership voted commendation and good wishes to Miss Fell.

Thomas J. Finnegan, formerly with the Research and Development Department, Consolidated Edison Co. of N. Y., is now engaged in chemical engineering work for the operating companies of the Niagara-Hudson system with headquarters in Buffalo, N. Y.

At the commencement exercises of the New Jersey College of Pharmacy of Rutgers University on May 6 the honorary degree of doctor of science was conferred upon **Robert P. Fischelis,** secretary and chief chemist of the Board of Pharmacy of the State of New Jersey, for his notable contributions to the science of pharmacy.

H. P. Godard has been transferred as Inspecting Officer of Explosives for the Inspection Board of the United Kingdom and Canada from the Welland Chemical Works, Niagara Falls, Ontario, to the Cherrier, Quebec, plant of Canadian Car Munitions, Ltd. Both plants are operated for the Department of Munitions and Supply of Canada.

T. S. Grasselli has resigned as vice president and member of the board of directors of E. I. du Pont de Nemours & Co., Inc., because of ill health. Mr. Grasselli entered the employ of the Grasselli Chemical Co. in 1893, following graduation from Mount Mary's College, and served in all departments until 1916 when he was elected president. After the merger with du Pont he became a director, continuing as president of Grasselli. He retired from active work on November 14, 1939.

Albert B. Green has been granted leave of absence by the Dallas Laboratories, to serve as general manager for the Dallawax Corp., Kilgore, Tex., which will manufacture high melting point waxes developed by the Dallas Laboratories.

Edward J. Hackney has left the graduate school of Duke University to take a position as junior chemist in the Research and Development Division of the Tennessee Valley Authority, Wilson Dam, Ala.



F. R. Holden

Francis R. Holden has been appointed industrial hygienist on the staff of the Industrial Hygiene Foundation, Mellon Institute, Pittsburgh, Penna. For the past year and a half he has been on the natural gas fellowship at the institute.

A. M. Holmes has left the position of assistant chief chemist with Parke, Davis & Co., Detroit, to become assistant to the president of The Wm. S. Merrell Co., Cincinnati.

Walter Jebens, formerly connected with the Technical Division of the Du Pont Rayon Co., Buffalo, N. Y., is now with the Vinylite Research and Development Group of the Bakelite Corp., Plainfield, N. J.

Charles D. Karlsruher has left the Alcohol Tax Unit of the Treasury Department to accept a position as junior engineer in the Airport Design Section of the U. S. Office of Engineers, Albuquerque District, N. Mex.

Victor Lewitus has joined Merck & Co., Inc., New York, N. Y., as a writer in the Advertising Department.

Victor E. Marx has joined the staff of the American Dry Milk Institute, Inc., Chicago, Ill., where he will coordinate laboratory work, research work, and field service into one unit for the benefit of the baking industry.

William C. McIndoe is on military leave of absence from his civilian position of chemical engineer, Market Development Section, Bonneville Power Administration, U. S. Department of the Interior, and is in active service in the Army as a major of field artillery.

Henry E. Melvin, salesman for the J. T. Baker Chemical Co., working for the past year out of the Chicago office, has transferred from the field to the plant at Phillipsburg, N. J., where he will work on engineering problems in connection with the war effort.

R. W. Miller, who has been connected with the Pittsburgh Plate Glass Co. for 12 years, has been appointed manager of the technical service department of the Columbia Chemical Division, Pittsburgh, Penna., succeeding **G. L. Cunningham,** who has resigned.



R. W. Miller

Irving E. Muskat has resigned his position of director of research for the Columbia Chemical Division, Pittsburgh Plate Glass Co., and has been succeeded by **Alphonse Pechukas** as acting director.



FABIAN BACHRACH

A. H. Phelps

Four executives of the Westinghouse Electric and Manufacturing Co. have been elected vice presidents: **Andrew H. Phelps,** of Pittsburgh, Penna., manager of purchases and traffic; **L. E. Osborne** of Philadelphia, Penna., manager of the Steam Division; **Frank C. Reed,** of Jersey City, N. J., president of the Westinghouse Electric Elevator Co.; and **Walter C. Evans,** of Baltimore, Md., general manager of radio, x-ray, and broadcasting divisions.

Harry F. Reid, Jr., has been appointed a research engineer on the technical staff of the Battelle Memorial Institute, Columbus, Ohio, and has been assigned to ceramic research. Mr. Reid was formerly associated with the Ceramic Color and Chemical Manufacturing Co., New Brighton, Penna.

George C. Sheldon, formerly vice president of the General Tire & Rubber Co., Boston, Mass., has been appointed general sales manager of the Union Bay State Co., Cambridge, Mass.

George G. Stoner has been named to the technical staff of the Battelle Memorial Institute, Columbus, Ohio, and is assigned to chemical research. He was formerly associated with the Pittsburgh Plate Glass Co.

James S. Strong is now working at the Naval Research Laboratory, Washington, D. C. He was previously du Pont postdoctoral fellow at the University of Pennsylvania.

Dale R. Torgeson has joined the research and development staff of the Harbison Walker Refractories Co., Pittsburgh, Penna., as chemical engineer. He was formerly chemical engineer with the U. S. Bureau of Reclamation, Department of the Interior, Denver, Colo.

N. Beverley Tucker, formerly in charge of the Organic Research Section, Research Department of Procter and Gamble's Chemical Division, is now with Devoe & Raynolds Co., Louisville, Ky., as technical adviser to William C. Dabney, senior vice president.

Lieutenant Colonel C. E. Watts, formerly of the research staff of the Commercial Solvents Corp., Terre Haute, Ind., was recently promoted from the grade of major. He is on duty in the Ammunition Division, Office of the Chief of Ordnance, Washington, D. C.

James H. Wiegand is now assigned to the Ordnance Staff of the Lake Ontario Ordnance Works, Youngstown, N. Y.

J. W. Young, formerly chemist, Glenmore Water Supply, City of Calgary, has joined the Corps of Engineers, Canadian Army, and is attached as lieutenant to the Experimental Station, Suffield, Alberta, Canada.

Isadore Zipkin, who will receive the Ph.D. degree in biological chemistry at the Pennsylvania State College in August 1942, has been commissioned first lieutenant in the Medical Corps of the U. S. Army.

Chemists Institute Elects Officers

Gustav Egloff was elected president of the American Institute of Chemists at the annual meeting in Atlantic City, May 16. Donald Price is vice president; Howard S. Neiman, secretary; Walter J., Murphy, treasurer; and Henry G. Knight, Foster D. Snell, and Donald E. Andrews, councilors.

Schoellkopf Medal Awarded to Flett

In recognition of research in detergents, Lawrence H. Flett was awarded the Jacob F. Schoellkopf Medal at a meeting of the A. C. S. Western New York Section at the University of Buffalo, May 19. Mr. Flett is a chemist with the National Aniline Division of the Allied Chemical & Dye Corp. Walter Ralph, director of research of National Aniline and a personal friend of Mr. Flett for almost 25 years, introduced the medalist. The presentation was made by Wilmer H. Koch, Chairman, Western New York Section.

Mr. Flett, who was cited for his ability in industrial research "as exemplified by valuable contributions in the fields of dye intermediates, dyes, and detergents, and in further recognition of his encouragement to the spirit of research in industry by precept and example", spoke on "Detergents from Petroleum".

The award was founded in 1930 in honor of Jacob F. Schoellkopf, Sr., a pioneer in establishment of chemical industry on the Niagara frontier, to encourage and recognize the spirit of research in industry.

Herty Medal Presented to Leigh



Townes R. Leigh

The Herty Medal was presented to Townes R. Leigh by the Georgia Section of the American Chemical Society on May 2 at Milledgeville, Ga.

Dr. Leigh is the inventor of the Leigh fog screen for the protection of vessels against submarines, but it was for his work with the soils and plants of Florida that the medal was awarded.



W. H. MacIntire and W. F. Hand, former Herty Medal recipients, with Dr. Leigh

Previous recipients of the medal who were present included W. F. Hand, Mississippi State College, W. H. MacIntire, University of Tennessee; and J. S. Guy of Emory University. Dr. Guy introduced Dr. Leigh at the time of presenting the medal, which was awarded to Dr. Leigh as the chemist in the Southeast who has rendered the most fruitful service in his field.

Midgley Receives Willard Gibbs Medal

The Willard Gibbs Medal, one of the highest honors in American science, was awarded to Thomas Midgley, Jr., vice president of the Ethyl Corp. and chairman of the Board of Directors of the American Chemical Society, at a meeting



Thomas Midgley, Jr.

of the Chicago Section of the American Chemical Society May 29. The medal was awarded to Dr. Midgley for his discovery of tetraethyl lead as an antiknock agent in motor fuels, for his development of safe refrigerants, for his contribution to synthetic rubber research, and for other scientific achievements.

L. M. Henderson, chairman of the Willard Gibbs Arrangements Committee, presided at the medal ceremony, which was held at the Stevens Hotel. Harry N. Holmes, President of the American Chemical Society, made the presentation.

Dr. Midgley chose for the subject of his address "A Critical Examination of Some Concepts in Rubber Chemistry". L. M. Henderson spoke on "The Medal and Its Significance", and Robert E. Wilson, president of Pan American Petroleum and Transport Co., on "The Medalist as I Know Him".

Civilian Protection against War Gas

The California Section of the American Chemical Society has collaborated with the Committee on Decontamination set up by the Alameda County Council of Defense in the training of personnel as war gas officers who would be responsible for the detection of gas and the sounding of alarms.

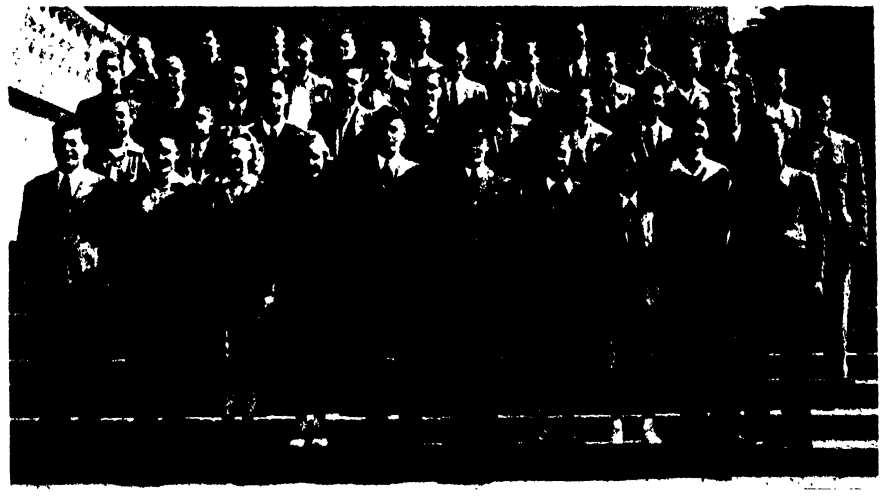
The training was first instituted on a county-wide basis, with about 170 chemists attending three classes, which were concluded early in April. Each of the six major cities of the county has now appointed a resident chemist as city war gas officer. The organization of decontamination stations and decontamination squads is in most cities segregated under associate war gas officers. Each squad is in charge of a chemist who is responsible to the city official in charge of demolition, rescue, and related work. T. D. Steward, Department of Chemistry, University of California, Berkeley, Calif., is chief war gas officer for Alameda County.

OCD Announces Plastic Substitute for Rubber Hose

A satisfactory plastic substitute for rubber hose has been developed to be used in connection with the stirrup pump recently designed by the War Production Board for the Office of Civilian Defense.

Tests of other materials which might prove satisfactory for this purpose are continuing, OCD says, and results of experiments will be announced shortly. Specifications for the plastic hose will be made available to manufacturers within the near future.

James P. Danehy, for the past four years research chemist for the Harris-Seybold-Potter Co., Cleveland, Ohio, has resigned to accept a position with the protein group, Research Department, Corn Products Refining Co., Argo, Ill.



University of California Chapter of Student Affiliates, American Chemical Society

Drying Processes with Gas Heat[1]

DON D. BEACH

Atlanta Gas Light Co., Atlanta, Ga.

In drying, the process of removing water from a body or from the surface of the body being dried, water is evaporated and usually leaves as a vapor. Speed of drying can be increased through greater air circulation and lower relative humidity. Air circulation is attained simply. The relative humidity may be lowered by increasing the temperature of the air or body or by removing moisture from the air before it comes in contact with the work. Raising the temperature of air increases its capacity to take up water. Extracting moisture from the air with a dehumidifier or dehydrator produces lower relative humidities of the air before it is circulated. Two general methods of lowering the relative humidity of air used for drying have applications within certain well-defined limits.

Many materials such as foods, chemicals, drugs, and leather are harmed by excessive heat and must be dried at low temperatures by the dehumidification method. Silica gel and activated alumina are widely used adsorbents. Adsorbed moisture is, at the proper time and with suitable equipment, driven off by heat. Where a considerable lowering of the relative humidity of the air is required, the direct dehumidification method is preferred. Where a smaller change in relative humidity is required, a liquid type of absorbent agent such as lithium chloride brine or so-called Kathene solution is suitable. The density of the solution and the amount of heat applied affect the effectiveness as an absorbent. The field for direct dehumidification is expanding rapidly, principally because much wartime production is dependent on controlled atmospheric conditions. For reasons of economy, however, such methods are not to be used where higher air temperatures can be used for drying.

Most drying is accomplished by the warm air convection method, although it is sometimes possible to use radiant heat. Advantages of infrared or radiant drying are said to be speed of drying, light weight of drying ovens which makes portability possible, and low initial cost. A few of the disadvantages are unfavorable drying and curing of certain finishes and, where polished bases lie underneath, unequal drying of parts not of uniform thickness.

The Nation, as never before, is dependent on adequate and satisfactory supplies of food. Gas is doing its part in processing vital foods for consumption at home, in England, Russia, Libya, and the Western Pacific. Gas is widely used in humidity and temperature control for the curing of sweet potatoes by new processes developed by the U. S. Department of Agriculture. Eggs, milk, fruits, coconuts, tomatoes, molasses, and even bananas are dehydrated by gas heat. The resulting powders occupy far less ship space than normal and often eliminate the need for refrigeration.

In clothing production gas serves an equally important role. Gas is widely used in the ginning of cotton, as drying prior to ginning increases the quantity and quality of lint obtained by increasing the length of staple. Practically every article of clothing, especially shoes, requires drying or carefully controlled humidity conditions in its manufacture.

Gas, because of the close control possible, is widely used in treatment of lumber. Atmospheres surrounding the lumber are first kept highly humid to prevent excessive end checking. As drying progresses the relative humidity of the air is lowered, and the drying is accomplished in hours compared with days formerly required. Furniture is only one of many items requiring this preliminary raw material treatment.

In the construction field gas drying also plays an important part. Brick and tile for building must first be dried before they are fired at higher temperatures. Hardware, iron sheets, wire for nails, and countless other shapes are all dried quickly after pickling and washing to speed the production program. Wall- and plastic-board production requires enormous amounts of heat for drying and forming, and here too gas is extensively used.

In the production of tanks, trucks, automobiles, guns, and planes gas drying is essential. Cores as small as a pencil and those literally as big as a barn are all needed, and gas is unsurpassed for this work. In some installations a movable crane carries a gas-fired air heater that efficiently dries the cope and drag of the huge floor mold, necessary in the production of a tank body. At the same time a gas fire dries the pouring ladle subsequent to pouring steel in this and other similar molds.

Newspapers and magazines require drying. Gas drying heats as high as 350° F. are used in spud presses to prevent the smear of ink and colors. Humidity conditions must be right for fine printing and engraving.

More than 75 per cent of the kaolin used in this country is mined, processed, and dried in Georgia, and 80 per cent or more of this with gas heat. The drying methods used, however, are varied and undoubtedly parallel drying processes in other lines.

In 1741, when production and shipment of kaolin from Georgia to England for the famous Wedgewood potteries was first recorded, it was air dried on wooden poles in sheds by the sun and wind. This method doubtless continued for many years and ruins of such a drying arrangement still remain near Macon, Ga. Later wood- and coal-fired boilers generated steam that heated pipe coils on which the crude clay or filter cakes were placed. Next tunnel dryers through which cars of clay were pushed, and later indirect rotary dryers through which the clay moved by gravity, came into use with coal, both hand- and stoker-fired, as the source of heat.

When natural gas was made available in 1930, efforts were first directed toward replacing solid fuel by converting the existing drying equipment to gas. This proved not unwise for many of the installations made then are still operated. However, it became apparent during the depression of the early 30's that, if this business was to be held without rate reductions and expensive services, some more economical method of drying must be developed. Because of the whiteness of the clay, direct heat drying was believed by the kaolin industry to be impossible. However, the necessary trials, made after persistent experiments, were so successful in every case that today the big majority of the clay produced where gas is available for drying is dried by direct-gas applications.

Rotary dryers, such as those manufactured by Christie, Ruggles, and Louisville, are fired indirect and semidirect by gas. Air is partially recirculated and is in some cases exhausted into direct drying ovens for the final extraction of heat. Most of these dryers are used for reducing the moisture content of the clay from 20 or 30 per cent to 5 or 8 per cent. Where moisture content as low as 1 per cent is required, the clay is often pulverized and dried in a Raymond impact or roller mill with the air heated in a direct-fired air heater supplied at the bottom of the mill, and with the drying being completed as the minute particles of clay are carried upward to the separator. This is an excellent method of drying since the last few per cent of moisture are difficult to extract when the clay is in lumps, for in thorough drying there is danger of burning or calcining.

Tunnel dryers are often operated by using steam coils for heating the air and fans for circulating it. While gas-fired boilers are used for generating the steam,

[1] Abstract of a paper presented before the American Gas Association, Industrial and Commercial Gas Conference, at Pittsburgh, Penna., March 12 and 13, 1942.

the most economical operation seems to be obtained by replacing the boiler and steam coils with direct gas-fired air heaters. Most of these air heaters are of corrugated culvert pipe, lined with firebrick and insulating material. These have a heat input rating of 10,000,000 to 20,000,000 B. t. u. per hour. It has been found advantageous to use a preheating chamber for slowly heating the cold clay with nearly saturated air taken from the main body of the dryer. This preheating prevents case hardening of the clay with subsequent slow release of moisture from the center of the clay. Temperatures of air are controlled automatically at the point of entry to the tunnels, and temperatures in the oven itself are observed as necessary. Sail switches installed in the fresh air intake to the air heaters guard against power failures that might destroy the heaters, since no vent is provided other than through the fan and oven itself.

Some clay drying is done on large, internally steam-heated drums around which are wrapped cords that run through a vat of slip. As the clay is dried by the hot drum, the strings flex and the dry clay is released, to be carried away in a screw conveyor. A recent adaption to gas of a dryer for clay, hitherto largely used in the textile industry for drying yarns, is one made by Proctor & Schwartz. The steam coils in this are replaced with direct gas-fired air heaters of a large size. The clay is extruded through a drilled plate some 6 feet in width and is then carried on a steel mesh belt through the dryer. The clay lies on this belt in the size and shape of macaroni, piled to a depth of 3 to 4 inches, and the heated air readily passes through it for quick and efficient drying.

In one of the most recent installations clay in about the consistency of milk is to be sprayed through specially designed nozzles in the roof of a spray dryer, as made by Tur-bulaire. As this slurry is atomized, heated air furnished by a direct gas-fired air heater and mixed with stack gases from a 400-horsepower gas-fired boiler instantly dries the clay. By the time gravity has pulled it to the floor of the dryer, the clay is in powder form, ready to be removed through the outlet doors provided. While this particular unit is not yet in operation, it is believed that the drying will be economical and satisfactory. Another novel kaolin-drying process is that of intimately mixing superheated steam, produced in a gas-fired boiler and separately gas-fired superheater, with pulverized clay, but this is more a means of obtaining a special quality of clay than of drying.

Industrial Gas Goes to War!

HENRY M. HEYN

Heat Treating Division, Surface Combustion Division of General Properties, Co., Inc., Toledo, Ohio

THE 30-ton tank rumbling across the battlefield, the airplane rocketing through the sky, shell after shell plumeting on its way of destruction, the precise instruments which calculate its path, the ships, cars, communication systems—all these and many more could not be possible in the enormous quantities in which the Nation needs them so badly if, during our all too brief period of peace, we had not utilized our greatest ingenuity and energy toward the solution of problems arising in the normal furtherance of peacetime pursuits.

Scientific research of the practical type has in the past 24 years been the most important item in the advance of industrial gas. We were not thinking in terms of guns and armor plate when, in the steel industry, radiant-tube annealing covers helped make possible the success of the continuous strip mills. We did not think in terms of shells when the problem of improved combustion for forging furnaces was the problem of the hour. When modern tube mills, with their controlled atmosphere, bright annealing and normalizing furnaces were developed, we were not concentrating on the production of planes. No thought of siege guns or blitzkreig entered our minds when the short cut using industrial gas made possible the production of malleable iron in 110 hours less than just a few years ago. Few, if any of us, had ever imagined an airplane flying and fighting at 25,000 feet when we concentrated our efforts on the wire industry and by direct gas-flame annealing made possible wire with qualities thought a wild dream just a decade ago. The gas furnace that this very moment is turning out 82 miles of 50-caliber machine gun bullet clips a day was never conceived with that idea in mind. Controlled atmosphere furnaces in the brass and copper industry for the annealing of nonferrous metals, so important in the manufacture of cartridge cases, were only a short time ago little more than interesting theoretical discussions.

Because it is a principle of Americanism to support private enterprise, these wonders of processing were made possible. We wanted better steel for household appliances, automobiles, surgical instruments, tools, and all of the products which are no longer luxuries to our civilization. We wanted wire—better, stronger, cheaper—to extend our lighting systems, our communication systems. We delved into the secrets of nature, into the secrets of the treatment of metal that controlled atmospheres made possible, because we wanted our world to be a better place in which to live.

Yet with all these peacetime accomplishments we could not forestay greed and avarice and so our problem of the hour, at the challenge of the hour, becomes one of a peculiar character. Now we must apply those research and engineering accomplishments of peacetime years to the mechanics of war.

A good example is the rotary gas furnace, designed during World War I for shell nosing. After the forging operation, the next step in making shells is the tapering of one end to reduce air resistance and increase penetrating power. Some projectiles are nosed cold, but all the large projectiles are tapered under high heat. For these a temperature of about 1,850° F. is necessary for forming. In the rotary furnace of World War I many advantages are to be had, particularly because this furnace ensured a definite time-temperature cycle. The only disadvantage in the older, original furnace was the scaling. It was diffiult not to get a hard, tight scale on the shell which was injurious to the dies and sometimes worked into the projectiles themselves. With this old furnace equipped with the recently developed gas variable-flame burner, firing directly and vertically down into the furnace, this objection is completely overcome. During World War I, the cost of 155-mm. shell was somewhere in the neighborhood of $45. Today the same shell, of better quality and produced in much greater numbers, is being made for less than 50 per cent of the old cost.

Another example is the manufacture of cartridge cases. One of the earliest studies sponsored by the American Gas Association Committee on Industrial Gas Research dealt with clean annealing of brass and now this peacetime industrial gas research is bearing fruit. Cartridge cases require three, four, or even five drawing operations, depending on the process and size. These operations harden the brass, and after each draw an annealing or softening process at temperatures from 1,200° to 1,250° is used to prevent cracking of the metal in the subsequent draw. Knowledge gained in the early research on clean annealing of brass was applied to the present-day manufacture of cartridge cases,

[1] Abstract of a paper presented before the American Gas Association, Industrial and Commercial Gas Conference, at Pittsburgh, Penna., March 12, and 13, 1942.

and the convection-type furnace was found to give a faster rate of heating, better temperature uniformity, and greater economy than the older, outmoded, direct-fired furnaces.

Not many years ago convection heating, which represented radical departures from traditional principles used in the glass lehrs, was introduced in the glass industry. By the use of convection heat and automatic proportioning gas-burner equipment, the old cumbersome muffles, hot dampers, and complex flue systems were eliminated. Since the atmospheres within the lehr are continuously maintained at positive pressures, operation was unaffected by prevailing air currents in the room, one of the old bug-a-boos which caused stratification of hot and cold air within the furnace. Other refinements were made until the glass lehr as developed today represents a compact and durable piece of equipment whose operating and maintenance expense is low. This same gas lehr is now turning our convex and concave inscribed instrument dials, aviators' goggles, and bulletproof cowlings for airplanes. The dials must be precise and accurate. The bending of bulletproof glass and forming of it has been unheard of. The correct shaping of aviators' goggles so as to have the least amount of aberration was quite an impossibility unless the lenses were hand ground. The problem facing the engineers in this case was to use a gas lehr developed for peacetime industry to the necessities of wartime manufacturing.

Our normal automobile industry and appliance industry required such cutting speeds and depths of cuts that the cutting tools became heated to a temperature where ordinary tool steels become soft and the cutting edge was destroyed. This difficulty was overcome primarily by development of high-speed steels. One of the most fundamental elements to be used in high-speed cutting tools was tungsten. All of us are familiar with the 18-4-1 high-speed steel which contained 18 per cent tungsten. When disturbances in other parts of the world prevented our industries from obtaining the amounts of tungsten needed, engineers had either to return to common high-carbon types of steels for tools, which would result in reduced production and considerable increase in machining costs, or to develop something new. This latter was done.

Molybdenum is a satisfactory alloying substitute in high-speed tool steels and a plentiful supply is available. However the main disadvantage against its use was its susceptibility to decarburization during heat treatment. Again the engineers rose to the occasion, and several methods were developed to heat-treat molybdenum high-speed steels satisfactorily. One of the accepted ways of preventing decarburization is the controlled atmosphere furnace. It was found that the decarburizing constituents such as water vapor, carbon dioxide, and oxygen must be kept to a fraction of 1 per cent, and a furnace was developed which had an integral generator for producing the proper atmosphere from a carbonaceous material. The atmosphere, which is produced from charcoal and an oxidizing base gas, consists of about two-thirds inert nitrogen and one-third balanced carbon oxides. With properly controlled atmospheres and proper heat treatment, molybdenum in a great many instances is superior to high-speed tool steels containing the much more expensive and not so readily accessible tungsten.

We could trace the history of the developments of dry cyaniding, the romance and development of DX gases, the production of a new type of malleable iron known as pearlitic iron, of spheroidizing. It would be almost impossible, however, to list the multitudinous applications of industrial gas in our present war manufacturing program—all possible because engineers, during the past 24 years, worked diligently and long and with a faith in the need for advanced development.

Whiting Corp. Expands Plant

APPROXIMATELY 55,000 square feet of manufacturing space will be added to facilities of the Whiting Corp. at Harvey, Ill., under a government-approved building program. Cost of the plant additions is estimated at $325,000, not including the required tools. Construction will begin immediately and, it is hoped, will be completed in the fall.

The increase is necessary to meet requirements of the war program for the company's standard lines of equipment, Howard D. Grant, executive vice president, said. Production records for the 12 months ended April 30 exceeded any previous year in the company's history, 60 per cent greater than the preceding year.

U. S. Aluminum Output to Exceed Two Billion Pounds In 1943

UNITED STATES aluminum production by the end of 1943 will be approximately 2,100,000,000 pounds, six and a half times the 1939 output, T. D. Jolly, chief engineer and director of purchases for the Aluminum Co. of America, told a meeting of the National Association of Purchasing Agents in New York, May 26. Mr. Jolly reviewed the growth and expansion of the aluminum industry in the past few years.

When the company started building for the Government, Mr. Jolly said, buildings and equipment were standardized as much as possible to expedite construction and the start of operations. As an example he cited 175 cranes, all of the same span and capacity, purchased from one manufacturer, which is said to have given the builder 50 per cent more efficiency than with orders for miscellaneous specification cranes.

Aside from operating expenditures Alcoa will have spent about $600,000,000 for construction from January 1, 1940, to the middle of 1943. With its own and the Defense Plant Corporation's programs, the company has 35 major projects under way. By May 2, 1942, 108 subcontracts, only eight of which were negotiated, had been placed for DPC.

Wooster (Ohio) Section Elects Officers

THE Wooster (Ohio) Section of the AMERICAN CHEMICAL SOCIETY at its meeting on May 12 elected the following officers who will assume their duties immediately: *Chairman*, Charles H. Hunt; *Vice Chairman*, Walter P. Arnold; *Secretary*, John W. Chittum; *Treasurer*, Roger Buss; *Councilor*, Milton P. Puterbaugh (term begins January 1, 1943). Roy J. Grady is councilor for 1942.



A. C. S. Student Affiliate Chapter at Grove City College, Grove City, Penna.

Floridin Research Laboratory

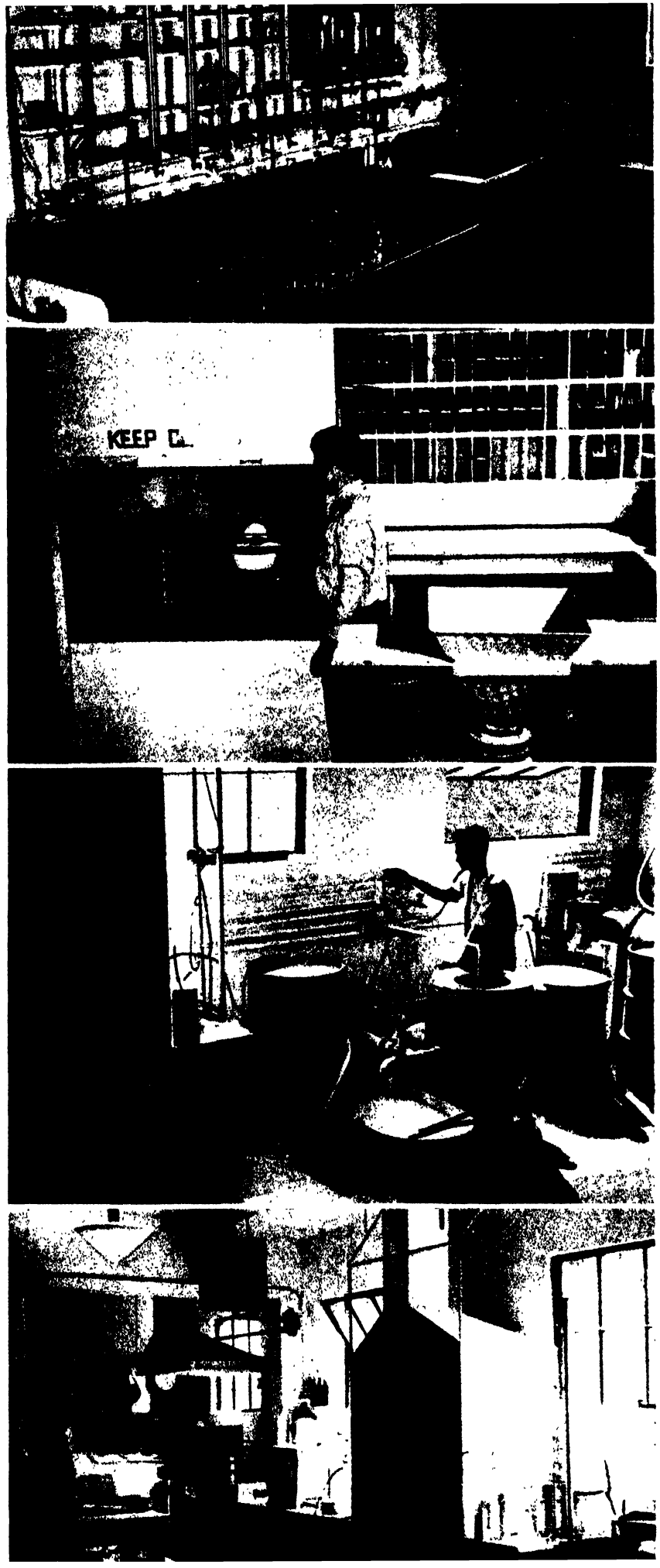
DOUBLED in size in less than three years, the research laboratory maintained by the Floridin Co. at Warren, Penna., serves the dual purpose of product improvement and customer service. The company manufactures adsorbents from Florida fuller's earth and Alabama bauxite.

Laboratory equipment is generally designed or selected to represent actual industrial equipment on a small scale, with arrangements for investigating and controlling variables. A percolation manifold makes it possible to investigate any procedure in the filter house of an oil refinery and to predict results quantitatively within 3 per cent. A Raymond laboratory mill and Rotex screen are used, not only to determine the actual grinding and screening yields of a particular material in commercial production, but also to predict accurately the physical properties of certain products that are altered by grinding procedures.

Activation equipment consists of laboratory ovens at 400° F., muffle furnaces to 2,000° F., and a flash calciner 1 inch in internal diameter and 10.5 feet tall, which gives temperatures of 1,400° F. or higher. All activation equipment is electrically heated, and high-temperature units are controlled with No. 100-QG2 General Radio Variacs or a Leeds and Northrup indicating and recording temperature controller.

In addition to special colorimeters, viscometers, and other equipment required for standardized tests, there are a leaf filter, Manton-Gaulin colloid mill, homogenizer, and 17-inch centrifuge. Laboratory steam is available at 5 pounds pressure, and compressed air is supplied at 100 pounds pressure from a two-stage Erie compressor originally designed for use in a service station.

A very satisfactory library has been developed at a minimum of expense. A complete set of *Chemical Abstracts* is available for preliminary searches of the literature, and any articles of interest are obtained on 35-mm. film through the Bibliofilm Service, Washington, D. C. Many rare manuscripts otherwise unobtainable have been secured. Translations are available through the Friends of the Hooker Scientific Library.



Top to bottom. **Percolation equipment in the Floridin laboratory; equipment for grinding and screening; centrifuge and accessories; muffle furnaces and hoods.**

POTOMAC POSTSCRIPTS

WPB Activities

Acrylonitrile. To ensure continued full production of Buna-N type oil-resistant synthetic rubber, acrylonitrile (vinyl cyanide), is placed under complete allocation control in Order M-153. Production of Buna-N type synthetic rubber is the sole use for acrylonitrile, which is manufactured by only three companies. Supplies are adequate, according to present figures, but allocation is considered necessary to prevent dislocation of supply and demand because of excessive forward buying.

Aluminum. Transactions involving illegal dealings in aluminum by three midwestern companies have resulted in punitive action. Suspension Orders S-55, S-56, and S-57 penalize O. D. Jennings & Co. and Columbia Metal Co., Inc., both of Chicago, and the Ewing Foundry Co., Indianapolis, Ind.

Aromatic Petroleum Solvents. With the objective of increasing the production of aviation gasoline and nitration-grade toluene, Order M-150 limits the delivery of aromatic petroleum solvents, normally used in paint and other protective coatings, to orders bearing high preference ratings. During the period June 4 to June 14, deliveries may be made only to fill orders to which an A-10 preference rating has been assigned; beginning June 15, the required rating is A-2.

Arsenic goes under allocation control in General Preference Order M-152. While no critical shortage of arsenic is anticipated for the immediate future, it is considered prudent to conserve supplies to take care of any contingency. Arsenic, as defined in the order, means arsenious acid or arsenic trioxide, either in crude (black or gray) or refined form. It does not include any other chemical derivatives or compounds.

Butyl Alcohol of all grades is placed under complete allocation control in General Preference Order M-159. Allocation will start on July 1. Producers are required to use grain to the fullest possible extent in making butyl alcohol and may not use molasses unless their grain facilities are in use to the utmost.

Chemical Cotton Pulp will go under full allocation control July 1, according to conservation Order M-157. Chemical cotton pulp, or chemically treated cotton linters, is used for manufacture of smokeless powder, rayon, plastics, and other important products. While no critical shortage exists at present, the allocation control is instituted to direct available supply into vital munitions manufacture and to prevent its use for commercial purposes where substitutes are available. High alpha-sulfite wood pulp can be used for many such purposes.

Chemical Industries. Vital chemical war industries are granted further priority assistance in obtaining maintenance and repair materials by Amendment 1 to General Preference Order P-89. The amendment allows the chemical producer to use an A-1-c rating to obtain 30 per cent of his regular supplies, and an A-3 for the remaining 70 per cent. The original order allowed use of an A-3 rating for the entire quantity. As in the original order, an A-1-a rating may be used to obtain supplies to repair an actual breakdown and an A-1-c rating to avert an immediately threatened breakdown.

The amendment also allows an A-1-c rating to be extended by suppliers to replenish their stocks. The original order permitted an A-1-a or an A-1-c rating to be extended only when the supplier had no stock of the material in question. The supplier had formerly to depend upon an A-10 rating for replenishing his stocks, which was found to be insufficient.

As in the original order, no use of these ratings may be made by any producer or supplier unless he shall have first obtained a serial number from the Chemicals Branch and filed with the branch certain required information.

Dyestuffs. The dyestuffs conservation order, M-103, has been amended to increase the quantity of dyes available for civilian uses. The original order, issued March 28, prohibited the sale and use of 10 dyes for civilian purposes and restricted civilian use of all other anthraquinone vat dyes for the second quarter of 1942 to 12.5 per cent of the quantity of these dyes used during 1941. The amendment removes one of the dyes, Golden Orange G, from the prohibited list of military dyes and changes the quota basis from a percentage of only the civilian vat dyes used in 1941 to a percentage of all the vat dyes used in 1941.

Oils. Control of imports of all known commercial oils not previously under such restriction has been taken by the Director of Industry Operations. The oils were added to the restricted list of General Imports Order M-63. The amendment places also fats, seeds and nuts, cinchona or other bark from which quinine is derived, and corundum under import control.

Steel Drums. Users of metal containers have been warned that an urgently critical situation exists in steel and that immediate and extensive use of substitutes for steel containers, particularly drums, must be undertaken. Materials not needed in war production should be substituted wherever possible, but even critical materials which are less critical than steel can be used where necessary. The Containers Branch pointed out that it is possible steel container users may soon be forced to suspend operations until they are able to develop suitable containers which do not use steel.

Tantalum, the entire output of which is going into vital uses, is placed under complete allocation control in Order M-156.

Price Regulations

Citric Acid. A revision of the maximum price schedule for citric acid, striking at evasive practices which have grown up since the schedule became effective in February, has been announced. The Revised Price Schedule 101, as amended, includes a series of changes in specific provisions of the schedule to conform to established practices in the trade in the light of several months' experience in administering price ceilings on this commodity. Alterations are made in sections relating to transactions covered, credit terms, transportation exports, adjustable pricing, records and reports, and definitions.

Ethyl Alcohol. The sliding-scale method of pricing ethyl alcohol produced from the fermentation of molasses has been revoked because, through United States government purchases of the Cuban crop and resale of such purchases, molasses market price fluctuations have been eliminated. The revocation was made by deleting the specific paragraph providing for this method by Amendment 1 to Revised Price Schedule 28.

RFC Announces $50,000,000 Synthetic Rubber Plant

CONSTRUCTION of a $50,000,000 synthetic rubber plant is scheduled to begin immediately, the Reconstruction Finance Corporation has announced. The plant will be operated for the Government by Rubber Synthetic, Inc., a corporation formed by Standard Oil Co. of Indiana, Sinclair Oil Co., Cities Service, Dow Chemical, U. S. Rubber, and Firestone Tire & Rubber Co. By-products of the Calumet district oil refineries and steel mills will be used to manufacture rubber of Buna-S type.

War Agency Officials Clarify Rubber Situation

To clarify facts about the severe rubber shortage four leading war agency officials have joined in a statement which points out that the shortage is extremely serious, reports to the contrary notwithstanding, and that no rubber of any kind can be spared for purposes not directly connected with the war effort. Donald M. Nelson, chairman of the War Production Board; Arthur B. Newhall, Rubber Coordinator; Joseph B. Eastman, director of the Office of Defense Transportation; and Leon Henderson, administrator of the Office of Price Administration and director of the WPB Division of Civilian Supply, signed the statement.

The situation as described by the statement follows:

The enemy controls 90 per cent of the world's rubber-producing areas, and every ounce of our stock pile is needed desperately for the armed forces. Our biggest stock pile of rubber is on our cars; these tires must be preserved. Autos shelved for the duration for lack of tires put more burden on already overcrowded busses and trolleys. Remember that rubber is precious; save it; every car is now a vital part of the Nation's transportation system.

Background

The amount of rubber which can be made available for civilian, industrial, and essential transportation purposes this year must be held down to not more than 150,000 tons, 79 per cent less than the 700,000 tons consumed for all civilian purposes in 1941. The actual current rate of use, 10,000 tons a month, is 83 per cent less than the 1941 rate of civilian consumption. The 1942 allotments do not include any rubber for new passenger car tires, and are restricted to articles essential to the civilian industrial economy.

In spite of the excellent job the Army and Navy have done in rearranging specifications to reduce the rubber consumption of military articles, our war machine still eats up huge amounts of rubber. The following figures show how the war effort demands rubber that must be made available: a medium tank requires 1,750 pounds; a gas mask, 1.8 pounds; a 10-ton pontoon bridge, 3,200 pounds; a half-ton truck, 125 pounds; a Flying Fortress, 1,250 pounds; the pneumatic rafts carried by planes, 29 pounds each. A 35,000-ton battleship alone requires 150,000 pounds, or enough to equip 2,000 passenger automobiles complete with spare tires.

Synthetic

WPB is making every effort to expand the production of synthetic rubber and is investigating every possible new process, but all the information we have shows that every pound of synthetic rubber which this country will be producing at forced draught between now and the end of 1943 must be reserved for direct and indirect military purposes. None can be made available for the manufacture of tires for nonessential civilian purposes.

The War Production Board has set a goal of 800,000 tons as the production rate to be reached by the end of 1943. Of this, production of Buna S, a butadiene type synthetic is to reach a rate of 700,000 tons by the end of 1943. The balance is made up of butyl and neoprene. But reaching a rate of 700,000 tons is a much simpler thing than actually producing that much rubber in a year.

The present program calls for production of over 300,000 tons during the calendar year of 1943. In addition, the Rubber Coordinator's office is studying the possibility of increasing the currently planned production of synthetic rubbers other than the Buna S. Many difficulties remain to be solved.

Rubber Salvage

All old scrap rubber can be reclaimed and used over again. Reclaimed rubber can be mixed with crude rubber to form a compound usable in many products, military as well as civilian. But we cannot process rubber that is in the basements or back yards or garages of the country. Old tires, tubes, rubber shoes, hose, bathing caps, and other articles must be turned in, in ever-increasing quantities, if we are to maintain the capacity of reclaiming plants. Every American must see to it that every ounce of old rubber he owns gets into war channels.

Guayule

The wild guayule shrub has been producing rubber for years in Mexico, and a small amount of cultivated guayule has been growing in the United States. A recent act of Congress provided for the planting of 75,000 acres of guayule in the Western Hemisphere. Pursuant to this act, all available guayule seeds in the United States have been planted, and from these seedlings will come not only a harvest of rubber-bearing shrubs, but more seeds to increase the plantings. However, it will take four to six years to grow enough guayule rubber to make an appreciable contribution to the supply.

Not more than 10,000 tons annually can be expected soon from Mexican guayule.

South America

Negotiations are in progress with all Latin American countries, and agreements have recently been made with Brasil, Peru, and Nicaragua in which the United States will take the entire exportable surpluses of their rubber for the next five years. This will meet only a small part of our needs. Brasil will be able to ship this country 10,000 to 15,000 tons of crude rubber this year, and perhaps 25,000 to 30,000 tons in 1943. The Peruvian agreement is expected to provide between 6,000 and 10,000 tons over the five-year period.

In 1912 Brasil produced over 40,000 tons of rubber. In recent years, however, the industry has deteriorated and it will take considerable time to revive it. Most of the trees grow wild in the jungle, far from transportation facilities, and points of concentration are few and far between.

Crude Rubber Production in 1940

Crude rubber-producing areas and the areas now Axis-controlled are as follows:

Country	Tons	
Malaya	540,000	Axis-controlled
Netherlands Indies	536,000	Axis-controlled
Ceylon	89,000	Shipments uncertain
French Indo-China	64,000	Axis-controlled
Thailand	44,000	Axis-controlled
Sarawak	35,000	Axis-controlled
North Borneo	17,500	Axis-controlled
South America	17,600	
India	11,500	Shipments uncertain
Burma	9,600	Axis-controlled
Liberia	7,250	
Other African	7,200	
Mexican Guayule	4,106	
Nigeria	2,903	
Philippines	2,267	Axis-controlled
Total	1,387,926	

Of the total, about 1,250,000 tons or 90 per cent are in Axis-controlled areas; and 1,350,000 tons or 97 per cent are either Axis-controlled or originate in areas from which shipment is now uncertain.

Dyestuffs Companies Indicted under Antitrust Act

A world-wide conspiracy to suppress competition in and monopolize the manufacture and sale of dyestuffs was charged in an indictment returned by a federal grand jury May 14 against E. I. du Pont de Nemours & Co., Inc., Allied Chemical & Dye Corp., American Cyanamid Co., General Aniline and Film Corp., General Dyestuff Corp., Ciba Co., Inc., Sandoz Chemical Works, Inc., and Geigy Co., Inc. Among restrictive practices charged in the indictment are allocation of world markets, establishment of limits on the amounts of dyestuffs sold by American manufacturers in foreign markets, fixing of prices at exorbitant levels in the United States, and prevention of small chemical companies in this country from engaging in dyestuffs manufacture.

Assistant Attorney General Thurman Arnold, in charge of the Antitrust Division of the U. S. Department of Justice, said:

The practices charged by the indictment are another example of the influence of cartels on American industry. This cartel has not only resulted in high prices to the American consumer but has also restricted the full development of the chemical industry which is essential to our war effort. The effects of these illegal restrictions on production have not been confined to dyestuffs alone. One of the

principal means of the conspiracy has been restricting the production of the chemical intermediates from which dyestuffs are made and from which important munitions, particularly explosives and plastics, could equally well be made. The chemical industry has been the principal means by which Germany dominated the economy of many countries.

The creation of our new industries by the discovery and development of new chemical products will facilitate the transition from a wartime to a peacetime economy. A free and competitive chemical industry would greatly stimulate such developments. We hope that this indictment will eliminate the monopolistic practices which have hampered the full expansion of our chemical industry.

Individual defendants named in the indictment were Bertrand A. Ludwig, Charles F. Weber, and F. J. Emmerich, vice presidents of Allied Chemical; E. R. Ellis, foreign sales manager, Guy W. Talbert, general manager, and E. M. Maxwell, domestic sales manager, of National Aniline and Chemical Division, Allied Chemical; Lammot du Pont, chairman of the board of directors, W. S. Carpenter, Jr., president, F. W. Pickard, vice president, Cesare Protto, director, Dyestuffs Division, and Ambrose R. Chantler, director of sales, Dyestuffs Division, of du Pont; Ernest K. Halbach, president, and Rudolph Lenz, vice president, of General Dyestuff; F. M. Fargo, Jr., vice president and director, and Sidney C. Moody, sales manager, Calco Chemical Division, of American Cyanamid; Hans Aickelin, former vice president of General Aniline; Walter Saenger, vice president, and William Zipse, vice president, of Geigy; Edgar Gossweiler, vice president and treasurer of Sandoz; and Alfred Lichtenstein, president of Ciba.

Chemical Manufacturers' Indexes

FEBRUARY index of the value of chemical manufacturers' inventories was 150.9 compared with 147.8 in January and 118.1 for February of 1941, taking the average month of 1939 at 100, according to the survey of the U. S. Department of Commerce. During March the index of the value of chemical manufacturers' inventories was 155.3 compared with 119.1 in March of 1941.

The department's figures show also that the index of the value of chemical manufacturers' shipments for February was 181 compared with 184 for January and 146 in February of last year. The March index was 175 compared with 137 in March of 1941.

A COOPERATIVE arrangement has been effected between the U. S. Bureau of Mines, the Chemical Warfare Service, and the University of Maryland whereby work on problems relating to extinguishing incendiaries will be done at the War Department Civilian Protection School, College Park, Md.

$4,000,000 Recommended for Helium Expansion

A $4,000,000 emergency program for expansion of helium production has been recommended by the Senate Appropriations Committee. This amount, which would be spent by the U. S. Bureau of Mines on new wells and helium plants, is needed for military requirements, particularly an increase in the number of blimps used on coastal patrols.

Another appropriation in the bill is for $600,000 for research on methods of smelting sponge iron, which can be used instead of scrap iron in steel production, by gaseous and solid-fuel reduction.

Copper Production for 1941 Up

COPPER production from domestic mines, including Alaska, was 83,219 short tons in December, an increase of 6.9 per cent from that of November, according to the U. S. Bureau of Mines. Estimates for January 1942 indicate an output of 82,772 tons, a decrease of 447 tons from that of December 1941. Total production of recoverable copper for 1941 is calculated at 958,226 short tons and indicates an increase of 80,140 tons or 9.1 per cent over the 878,086 tons produced in 1940.

Fred D. Barber formerly chemist for the National Steel and Copper Plate Co. has become chief chemist for the Perfex Corp., Milwaukee, Wis.

The Chemist's Chance

Editor's Note. "The Chemist's Chance" by Otto Eisenschiml, published in the March 25 issue of CHEMICAL AND ENGINEERING NEWS, page 368, was thought provocative as evidenced by the following letters. We regret that space does not permit printing all the comments received, but those that follow are typical. Several trenchant anonymous letters were submitted which we would be glad to print were it not against our policy to publish anonymous material.

IN THIS article, "The Chemist's Chance", Mr. Eisenschiml has scored direct hits a number of times. Unpraised, unsung, and unappreciated even by himself, nevertheless the chemist today is a most potent factor in industrial America. In times of peace he unconsciously prepares the world for war. In times of war he labors towards that ultimate peace. But, as Mr. Eisenschiml says, he is practically the forgotten man—or better yet, the unknown man.

If American chemists would appreciate their own strength, they would demand and they would receive suitable recognition of their great contribution to the general economy of this land. Not only could they raise their social standing, which is another way of saying they could command greater respect from their fellow men in other fields, but the family budget could be made to ensure the more abundant things in life, which is now the habit of those whom Mr. Eisenschiml calls the noncreative members of society. Can anyone picture this land without the contributions made by the chemists of the past three decades? And what have they to show for it all?

On every hand one hears the cry, "Awake! Awake before it is too late!" That certainly applies to the chemist. If he does not wake up to the realization that his future for the next thousand years, to paraphrase a "certain gentleman", depends on his willingness to join others in demanding a just share of the good things he creates, then there is little hope for his betterment. And he will not be able to blame it on the fifth "communists".

EDW. LYONS
PARKE, DAVIS & CO.
DETROIT, MICH.

I HAVE read with interest the article in your March 25 issue of CHEMICAL AND ENGINEERING NEWS on "The Chemist's Chance" by Otto Eisenschiml.

I agree heartily with the statement made by the author and believe that every opportunity should be taken to publicize the profession of chemistry and the individuals who are contributing constantly to the greater welfare of the Nation and the world at large.

I feel that there is a very tragic result of the circumstances which the author outlined but which he did not mention. That is, the thousands of chemists stuck away in cubby holes throughout the Nation who, through failure to attain pecuniary rewards and social standing comparable to the abilities which they had at one time, have become decadent and have no more value to the chemical profession than the high-school-trained technician.

This is particularly tragic when we think that the majority of these people graduated from college with at least a basic training in chemistry and a zest and desire to accomplish things in the field of their chosen profession but have "back-slid" to nonentity because of the simple fact that their zest was gradually dulled and finally killed. The result is that they are definitely in a rut, satisfied with the assurance of a reasonable salary, and actually contribute little or nothing to their originally chosen profession.

In this light, the program suggested by the author should be further accentuated in order to prevent the reoccurrence of such things happening to the future

graduates of our many colleges of chemistry.

I do not offer a solution, simply am adding my comments to those of the author.

C. N. SPRANKLE

SEARS, ROEBUCK AND CO.
TECHNICAL LABORATORIES
DEPT. 817, CHICAGO, ILL.
April 23, 1942

YOU asked in your March 25 number for comments on "The Chemist's Chance". Here goes:

Mr. Eisenschiml is right when he says that the *routine* analytical work ought to be done by technicians. What possibility has an analyst in a steel mill or brass foundry for research work? He has to repeat day after day the same analysis and has no time to look for new methods. Research requires too much time.

But Mr. Eisenschiml does not go far enough. Social status can only be raised if and when the chemists receive higher salaries. As it is now any ship caulker gets more. Why should every doctor or lawyer, with a bit of a name only, be able to make from $10,000 a year? Why not the chemist? And why should a company have all the rights to a process developed by one of its chemists without being forced to give the inventor his dues?

It is true that all great chemical innovations today are teamwork. But that does not exclude that there is always a chemist who had the right idea and whose name is suppressed by his company in the name of teamwork. And the director of research is thus enabled to accept for *himself* and the unknown chemists a medal from the A. C. S.

Now, therefore, is the time, as Mr. Eisenschiml says, to grab our chance.

OSKAR HOROWITZ

235 LEFFERTS AVE.
BROOKLYN, N. Y.
April 6, 1942

EVEN the most extended imagination could never say that all the 30,000 paid-up members of the AMERICAN CHEMICAL SOCIETY (and they are paid up, too; the Secretary sees to that) are professors or executives. Assuming that 75 per cent of the membership does not classify under either of these two groups, there are 22,500 members who are employees in various degrees of standing in the industry and profession. (In the paragraphs that follow the term "employee" refers to this group.)

With the large number of members now belonging to the AMERICAN CHEMICAL SOCIETY, the SOCIETY has taken on a new character. In a small way this is recognized by some recent activities, especially by a resolution adopted by the Directors at their meeting September 8, 1941, where the relationship between employer and employee is discussed. It is evident that the Directors realize that the SOCIETY owes something besides supplying superior chemical information to its members and especially to its 22,500 employee group.

It is a serious matter if the employee group of chemists as a whole is paid considerably less than its training and intellectual equipment would justify. Many are under the impression that in numerous instances the manual laborer in the same industry with the chemist is paid more than the chemist who is doing essential work in the laboratory—work which makes the whole operation possible and the undertaking a success. For really authentic information on that point we shall have to wait for the publication of the report of the Committee on the Economic Status of the Chemist, presented in outline at Memphis. But the manual laborer's work is visible and tangible, whereas the chemist's is invisible, and his accuracy and intellectual skill cannot be measured by a foot rule or tested under air pressure. The laborer, by joining together with others, is able to make his claims vocal and forceful, but at present this is not true of the chemist.

The chemist owes it to himself and to the community to see that he receives a wage commensurate with the value of the services that he is giving. The AMERICAN CHEMICAL SOCIETY has taken a first step by passing the resolution referred to above, but it should give its employee members a helping hand, so that they need not carry out their fight for social recognition and adequate pay alone.

Group organizations are recognized in all branches of activity to protect and further the interests of the individual groups, be these interests social or economic. Therefore it is time for the AMERICAN CHEMICAL SOCIETY to remember its obligation to the three quarters of its membership who are employees. The SOCIETY should through an active effort make the economic and social well-being of the employee group one of its most important aims. It would be a misfortune if such help came from sources outside of the SOCIETY.

The intellectual end of the SOCIETY works in high gear; the interests of the employee members should be equally vigorously fostered and improved, that they may take their place in the community where they belong. How can this be accomplished? The first step would be to install an official in the SOCIETY, who would be a contact man between the employer and the employee. The right man, with a judicial outlook, could bring about improvement in the condition of chemists, and if carried out intelligently, courageously, and honestly this would result in a cohesive strong SOCIETY. A natural corollary would be a still greater increase of members and an AMERICAN CHEMICAL SOCIETY with real weight in the comumnity and the affairs of the Nation.

JOHN WOODS BECKMAN

7157 CHABOT ROAD
OAKLAND, CALIF.
May 13, 1942

NECROLOGY

Arthur A. Backus

ARTHUR A. BACKUS, vice president in charge of production of U. S. Industrial Chemicals, Inc., died suddenly on May 18.

Mr. Backus was born August 30, 1889, at Madison, S. Dak., and received his B.S. degree from the University of Rochester in 1913. After a year of graduate study at the University of Michigan he entered the employ of the United States Industrial Alcohol Co. From 1916 to 1924 he served as director of research, and from 1924 to 1928 was production manager. In 1928 he was appointed to the position which he held at the time of his death. He was also a director of the Stroock & Wittenberg Corp., Cuba Distilling Co., Dominican Molasses Co., and the Porto Rico Mercantile Co. He had rendered invaluable service to industry, and the operation of the Curtis Bay plants under his direction during the First World War was an outstanding achievement.

Mr. Backus had been a member of the AMERICAN CHEMICAL SOCIETY since 1915. He also belonged to the American Institute of Chemical Engineers, the Society of Chemical Industry, and The Chemists' Club of New York.

Turpentine and Rosin Report Year Ended March 31, 1942

THE eighth annual naval stores report of the U. S. Department of Agriculture, prepared by the Bureau of Agricultural Chemistry and Engineering, contains no entries on exports and imports for the last 12-month season of April 1 to March 31. These figures are "not available for publication". However, the report provides tables on production, carry-over, supply and distribution, and details on the various types of turpentine and rosin on the basis of origin.

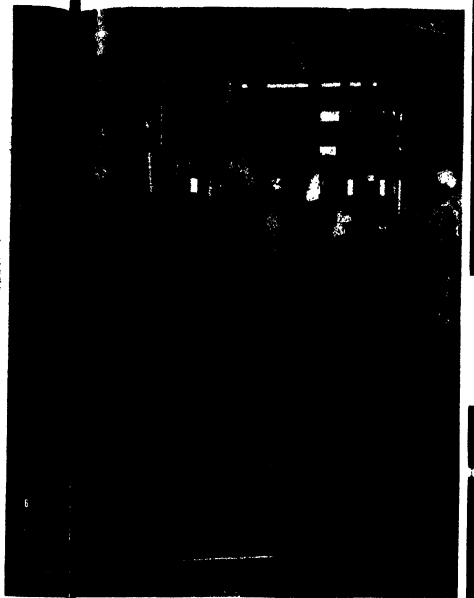
Production for the year ended March 31 totaled 548,796 fifty-gallon barrels of turpentine and 2,135,593 five-hundred-pound barrels of rosin—17,545 barrels less of turpentine and 11,272 barrels less of rosin than the previous year. There was an increase in liquid "sulfate wood rosin" from 18,358 tons in 1940–41 to 26,887 tons in 1941–42. The report also contains monthly turpentine and rosin prices for all seasons beginning with 1921–22.

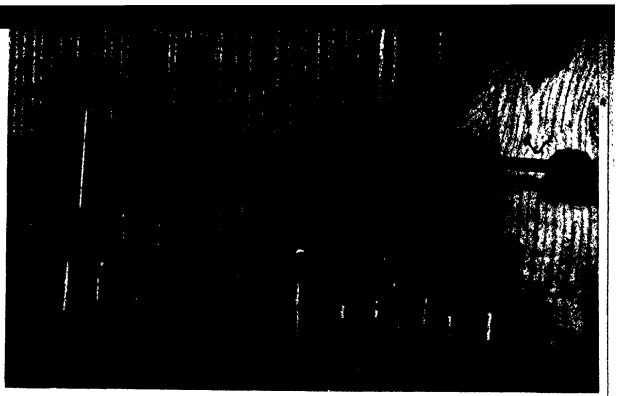
A free copy of the report may be obtained by addressing the Bureau of Agricultural Chemistry and Engineering, U. S. Department of Agriculture, Washington, D. C.

THE CHEMICAL NEWS PARADE





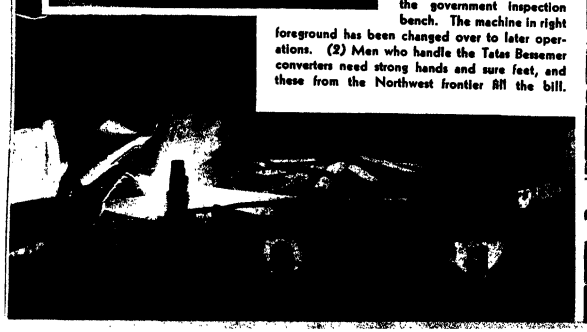


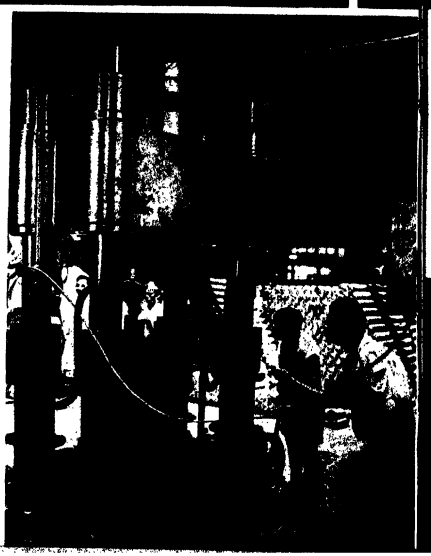


In the photographs on these pages the activities of industrial wartime India, described on page 726 of this issue, are depicted. Some scenes show large-scale production of iron and steel by the well-known Indian company, Tatas, the pioneers of Indian heavy industry.



Others were taken at a railway workshop somewhere in India and indicate how the plant has been adapted to munitions production, contributing to the national war effort. *(1)* In the munitions plant are pictured shells at the finished boring stage. Shells in right-hand chute have been finish-bored and are being sent to the government inspection bench. The machine in right foreground has been changed over to later operations. *(2)* Men who handle the Tatas Bessemer converters need strong hands and sure feet, and these from the Northwest frontier fill the bill.

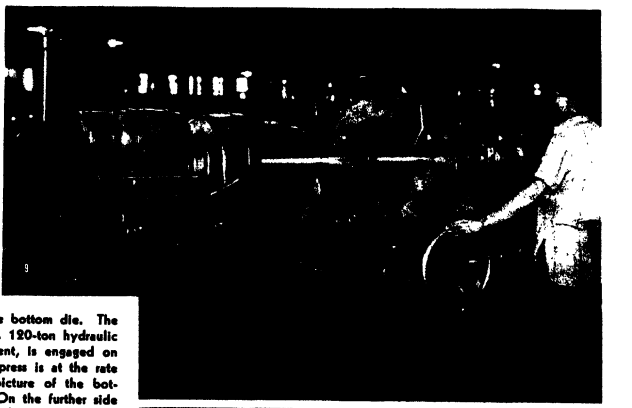


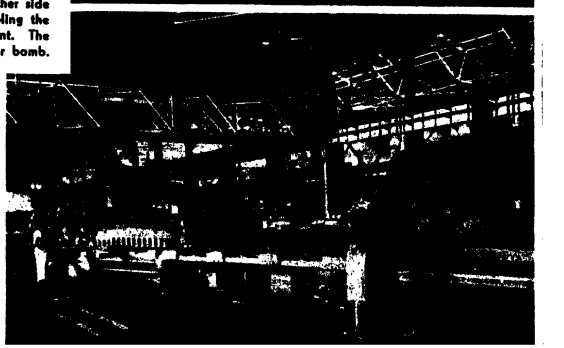


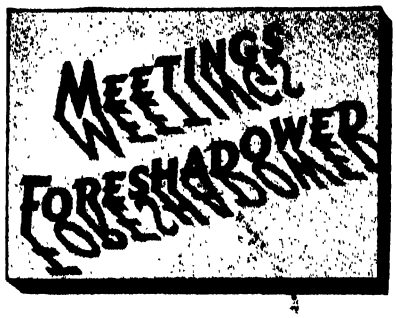
(3) Seam welding a fabricated gun-firing platform at the converted railway workshop. The welding is done electrically. *(4)* Here is a section of the railway workshop's foundry where covers are being fitted to mold of thread milling machines. *(5)* A view of the 250-ton bottling press used in production of munitions. The bottled shell can be seen in the bottom die. The shells in the background are ready for bottling. *(6)* A 120-ton hydraulic press, more of the railway workshop's wartime equipment, is engaged on the cracking of 4-inch shell bar. The output from this press is at the rate of one every 35 seconds. *(7)* From Tatas comes a picture of the bottom of the blast furnace showing the hot blast pipes. On the further side of the furnace the metal is running out into ladles. *(8)* Assembling the noses onto the punches for 4.5-inch shells at the railway plant. The completed one at left is a punch and nose for "A3" trench mortar bomb.



(9) A field-gun axle being ground to fine limits for the ball or roller bearing. *(10)* At Tatas the sheet mill runs day and night but is closed on Sunday for mechanical overhaul. Packed sheets are in foreground; the hot mill is in background. As many other countries, India is looking forward to postwar days when her greatly expanded industries will not be engaged on urgent war contracts, and the government has already appointed a Reconstruction Committee to study postwar economy.







American Chemical Society[1]

104TH MEETING. Buffalo, N. Y., September 7 to 11, 1942.

105TH MEETING. Indianapolis, Ind., April 12 to 16, 1943.

106TH MEETING. Minneapolis, Minn., fall of 1943.

LEHIGH VALLEY SECTION. Lafayette College, Easton, Penna., June 19, 1942. Speaker, Nelson W. Taylor, "Some Recent Researches on Glass."

NATIONAL CHEMICAL EXPOSITION. Stevens Hotel, Chicago, Ill., November 17 to 22, 1942.

NINETEENTH NATIONAL COLLOID SYMPOSIUM, Division of Colloid Chemistry. University of Colorado, Boulder, Colo., June 18 to 20, 1942.

Other Scientific Societies

AMERICAN ASSOCIATION OF PHYSICS TEACHERS. State College, Penna., June 25 to 27.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Chicago, Ill., June 22 to 26.

AMERICAN PHYSICAL SOCIETY. State College, Penna., June 25 to 27; Berkeley, Calif., July 11.

AMERICAN SOCIETY FOR TESTING MATERIALS. Atlantic City, N. J., June 22 to 26.

EASTERN PHOTOELASTICITY CONFERENCE. University Club, Boston, Mass., June 20. Semiannual meeting.

INSTITUTE OF FOOD TECHNOLOGISTS. Hotel Nicollet, Minneapolis, Minn., June 15 to 17. Annual meeting.

NEW ENGLAND ASSOCIATION OF CHEMISTRY TEACHERS. University of New Hampshire, Durham, N. H., August 11 to 14.

OPTICAL SOCIETY OF AMERICA. Massachusetts Institute of Technology, Cambridge, Mass., July 20 to 22.

SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION. Columbia University, New York, N. Y., June 27 and 28. Annual meeting.

[1] The list of the SOCIETY's National Officers and Directors, Editors, members of Council, Divisional and Local Section Officers, Committees, and Chapters of Student Affiliates appears in CHEMICAL AND ENGINEERING NEWS three times a year—usually February 10, May 10, and October 10. The latest list is printed on page 601 of the May 10 issue.

Plant Conversion Round Table

THE third annual meeting of the Institute of Food Technologists, to be held in Minneapolis, Minn., from June 15 to 17, will feature a round-table discussion of ways and means of converting idle or adaptable plant production capacity to the making of products essential to war. A similar session will be held on educational requirements of food technologists.

Hudson Announces First Synthesis of Lactose

C. S. HUDSON, United States Public Health Service, made the first public announcement of the synthesis of lactose at the 109th meeting of the Central Pennsylvania Section of the AMERICAN CHEMICAL SOCIETY held in the New Physics Building, State College, May 27. The structure of this characteristic sugar of the mammalian world has been known for some time, thanks to the methylation studies of Sir James Irvine and of W. N. Haworth. Lactose had never been synthesized, however, until the recent accomplishment in Dr. Hudson's laboratory at Bethesda, Md., in which work he was assisted by W. T. Haskins and Raymond M. Hann.

The difficult step in the process was the obtaining of a suitable intermediate having as its only free and reactive group the 4-hydroxyl. Strange to say, this appeared in the form of mannosan, the anhydride of mannose having 1,5- and 1,6-rings. This was first obtained by the destructive distillation of vegetable ivory obtained as waste from button manufacture. Later, for the sake of completeness in the synthesis, it was obtained by the Tanret reaction of barium hydroxide on beta-phenylmannoside. Mannosan has the 2,3,4-hydroxyls free. Treatment with acetone blocks the *cis*-2,3-hydroxyls, leaving the 4-hydroxyl as the only free reactive group. Treatment with bromotetraacetylgalactose gives the desired beta-linked galactose residue in the 4-position. Treatment with 80 per cent acetic acid removed the acetone, leaving the 2,3-hydroxyls free. These are then acetylated by acetic anhydride and pyridine. Treatment with a mixture of acetic anhydride, glacial acetic acid, and sulfuric acid opens the 1,6-ring in the mannose part of the molecule. Treatment with hydrogen bromide gives the 1-bromo compound. Zinc dust is then used to remove this atom and the acetate group from the adjacent carbon, thus leaving the hexaacetate of lactal having a double bond in the 1,2-position of the original mannose moiety. Treatment with perbenzoic acid adds two hydroxyls, fortunately in the configuration of glucose. Removal of the six acetyl groups by treatment with sodium methylate gives crystalline synthetic lactose.

REPORTED BY FRANK C. WHITMORE

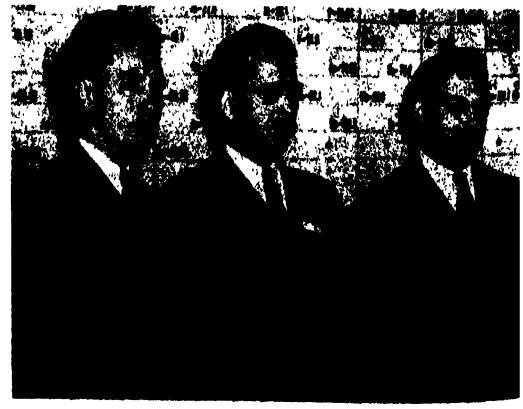
Mid-Hudson Section Holds Charter Meeting



Carroll W. Griffin, Chairman-Elect, and Per K. Frolich, guest speaker, at the charter meeting of the Mid-Hudson Section

AT THE charter meeting of the Mid-Hudson Section of the AMERICAN CHEMICAL SOCIETY in Poughkeepsie, N. Y., May 19, Frank H. Bruner was elected Chairman; Carroll W. Griffin, Chairman-Elect; Fred C. Toettcher, Secretary-Treasurer; and Dorman McBurney, Councilor.

Following a banquet, Per K. Frolich, President-Elect of the SOCIETY, addressed the section on "The Rubber Problem".



New officers of Mid-Hudson Section. *Left to right.* Secretary-Treasurer Toettcher, Chairman Bruner, Councilor McBurney

AT THE END OF THE RAINBOW



THE Pot of Gold people seek at the end of the rainbow is wreathed in mist and never has quite been reached. Very different is the story of those who have investigated the myriad possibilities of Furfural. Just one case where Furfural proves itself a tangible "Pot of Gold" is in it's use as a . . . . . .

SELECTIVE SOLVENT

Furfural

The selective solvent applications of this aldehyde are based largely on the fact that in a series of compounds the solubility in Furfural in creases with higher degrees of unsaturation.

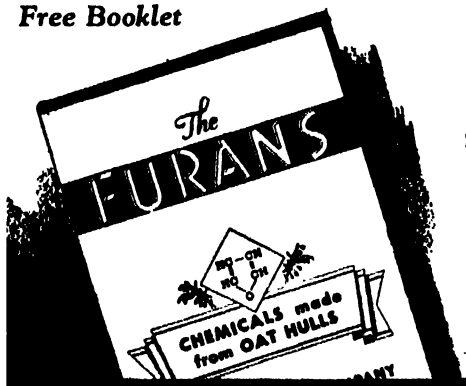
In the case of petroleum, Furfural extracts unsaturated sludge-forming entities. In refining wood rosin, Furfural has gained distinction by extracting the color bodies which heretofore caused large quantities of material to be without a ready market. Recent work indicates that Furfural offers possibilities in separating drying and non-drying fractions of vegetable and animal oils.

TYPICAL PROPERTIES:

Boiling point	157–167°C. (99%)
Specific gravity (20°C.)	1.161
Flash point (open cup)	56°C.
Freezing point	—36.5°C.
Color	Straw yellow to amber

Other major uses are as a resin reactant, wetting agent, preservative, general solvent, and impregnating agent.

Write for this Free Booklet



The Quaker Oats Company

TECHNICAL DIVISION 1-6

141 W. JACKSON BOULEVARD . . CHICAGO, ILLINOIS

FURFURAL – FURFURYL ALCOHOL – HYDROFURAMIDE

. . . TETRAHYDROFURFURYL ALCOHOL . . .

Colorado and the Nineteenth Colloid Symposium

Boulder, Colo., June 18 to 20, 1942

For symposium program—see May 25 issue, page 684

CHEMISTS from all parts of the Nation will register on June 18 for the Nineteenth Colloid Symposium in the West Lounge of the Memorial Building on the campus of the University of Colorado in Boulder. This is the first meeting of the group in the Rocky Mountain region, and it comes at a peculiarly opportune time. The eyes of both East and West are turned there, whether it be for education, industry, or recreation. In spite of threats of gas rationing and fears of a falling off of tourists, Estes Park reports a greater advance reservation of accommodations than last year. Vacationists are planning to stay all summer, and instead of gas rationing being a detriment it may actually be a blessing, since the tourist will have more time for relaxation and fishing than he would have with plenty of gasoline.

The Federal Government has long recognized the strategic importance of Denver, which possibly has more federal bureaus and offices than any city outside of Washington, but it remained for the present war to emphasize the need for locating more of our vital industries in this region. Climatic considerations were responsible for the development of the Fitzsimmons General Hospital in Denver after World War I. With its recent extensive additions it is now the largest building in Colorado and the largest government hospital in the United States. The Lowry Air Field and Training School for Aerial Photography is being increased in importance by the recent location in its immediate vicinity of the Buckley Air Field and Training School for Bombers. Remington Arms recently completed a large plant at a cost of over $10,000,000 and a huge munitions depot is being built in the southern part of the state. Last summer an ambitious young engineer in Denver conceived the idea of putting Colorado's vast machine industry to work on a ship building program. As a consequence, today all subcontract work for the Mare Island Navy Yard is being cared for in Denver. Ships are literally being built in the Rocky Mountains in huge sections and sent on flat cars to the West Coast for rapid assembly. One concern has turned its entire effort toward the making of Army tanks for the British Government. All of this activity has forced the Colorado Fuel and Iron Co., greatly to expand its plant at Pueblo. A large Army camp is being established near Colorado Springs, and final approval has just been given in Washington for the location of a $75,000,000 Chemical Warfare Plant and Arsenal. The Gates Rubber Co. is devoting its entire attention to defense contracts, with the result that its business is on the increase rather than decrease owing to a rubber shortage. The Coors Pottery, makers of fine chemical laboratory porcelain, is located at Golden 10 miles west of Denver, and the Denver Fire Clay, Mine and Smelter Supply Co., Hendrie and Bolthoff Mfg. and Supply Co., and the Stearns Rogers Mfg. Co. are only a few of the many splendid chemical, chemical engineering, and mining supply concerns located in Denver.

Boulder County was the center of the tungsten mining industry during World War I and is again taking its place as a foremost producer of tungsten ores. The Wolf Tongue Mining Co. in Boulder is the leading producer of tungsten in the State. The county also produces large quantities of high-grade fluorspar, the best properties being operated by the Boulder Mill of the General Chemical Co. of New York, N. Y. Colorado still remains a large producer of gold and silver, Boulder County producing about $1,250,000 worth of gold in 1940.

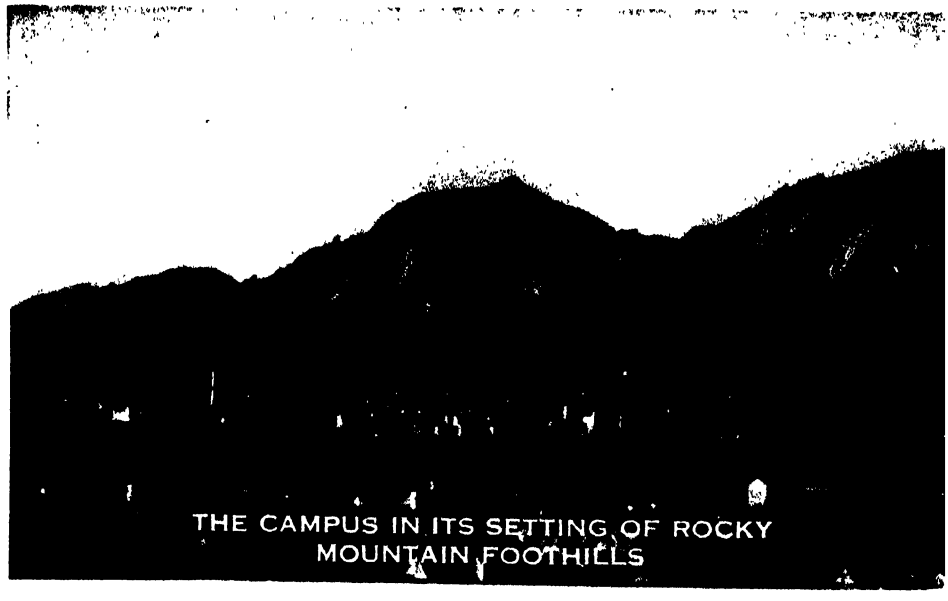
The power requirements for this large and ever-increasing industry are cared for by the State's vast reservoir of bituminous coal, estimated to be sufficient to last the entire Nation for over 300 years.

In 1919 a bill was passed by Congress permitting the city of Boulder to buy out of the Roosevelt National Forest 3,965 acres of land including the famous Arapahoe Glacier, so that Boulder now enjoys the distinction of being the only city in America, if not in the world, that owns a living glacier from which its water supply is obtained. The water is so pure that it needs no filtering or chemical treatment. Except for pedagogical reasons, it could be used in most analytical chemical processes in the laboratory without distillation. The Continental Divide is visible from Boulder and many of the Nation's highest peaks can be seen from here. Fifty Colorado peaks—more than half of the 80 highest in all North America—are 14,000 feet or more. The State has 583 other peaks of more than 12,000 feet in altitude.

The University of Colorado provides Boulder with its largest single pay roll. The regular attendance is in the neighborhood of 4,000 students. For many years the summer school has operated on the basis of giving a full quarter's work, divided in two equal sessions. The attendance for the two sessions usually runs over 4,000, made up of students from all parts of the Nation, seeking a combination of education and recreation. During the summer the university maintains a camp at an altitude of 9,500 feet, 28 miles from Boulder to fulfill both educational and recreational functions. The Science Lodge serves as laboratory, classroom, and library for field classes in geology, botany, and zoology. Weekly drives over Trail Ridge Road, highest continuous automobile highway in the United States, and in the Rocky Mountain National Park are scheduled by the Recreation Department. The department also sponsors frequent longer and shorter hikes and steak fries. A half hour's walk from the campus, and one is in the mountains; a half hour's drive from the campus in Boulder Canyon is Boulder Falls; an easy hour's drive and one is in Estes Park; in another hour, one is on the Continental Divide, over the Trail Ridge Road.

For those desiring other forms of entertainment, public lectures, movies, plays, play readings, orchestra recitals, art exhibits, etc., are available on the campus in

CONTINUED ON PAGE 754



THE CAMPUS IN ITS SETTING OF ROCKY MOUNTAIN FOOTHILLS

Resins designed FOR WAR JOBS



YOU haven't time to test hundreds of resins now. But how else can you be sure you have the best resins for important war jobs?

That's where our consulting service comes in. Our knowledge of resin chemistry is available to help you pick the right resins.

We design resins to fit specifications supplied by industry. We have many resins already designed that meet many of industry's requirements. Just to give you an idea:

There are the three Pentalyns*—pale, hard, heat-stable; Lewisol moleics; Imperial Brand Ester Gums; Hercolyn* and Abalyn*, liquid methyl esters of rosin; ester gums from Staybelite* (Hercules Hydrogenated Rosin); and Vinsol* Ester Gum, dark, hard, high-melting, and solvent-resistant. The new Poly-pale Ester Gum is high-melting and has heavier body than gum esters.

But that's not all we have, and it gives no suggestion of the interesting possibilities in some new Hercules resins.

Let's get together and talk definitely about the characteristics you would like to have in a resin. Every minute saved now helps toward victory.

*Reg. U. S. Pat. Off. SC-17

SYNTHETICS DEPARTMENT

HERCULES POWDER COMPANY
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932 MARKET STREET • WILMINGTON, DELAWARE

DESIGNERS OF RESIN FOR INDUSTRY

Colloid Symposium

CONTINUED FROM PAGE 752

addition to regular evening entertainments at the Boulder, Colorado Chautauqua located at the southwestern edge of the city in one of Boulder's city parks.

In addition to the regular sessions of the Colloid Symposium, those registering will be given a steak fry on Flagstaff Mountain Friday evening. A banquet is being arranged for Thursday evening. This will be followed by a violin and piano recital by the College of Music. A committee is also planning entertainment for visiting ladies to ensure that time does not rest heavily on those not interested in the problems of the colloid chemist.

FRANK E. E. GERMANN

DEPARTMENT OF CHEMISTRY
UNIVERSITY OF COLORADO
BOULDER, COLO.
May 30, 1942

A. O. A. C. Cancels Meeting

BECAUSE of war emergency work, the annual meeting of the Association of Official Agricultural Chemists has been cancelled, according to an announcement of the Association's Executive Committee. The meeting was originally scheduled for October 27 to 29. A. O. A. C. mailing address is P. O. Box 540, Benjamin Franklin Station, Washington, D. C.

THE national production of salt in 1941 rose 23 per cent or 2,350,669 short tons over 1940, the U. S. Bureau of Mines has announced.

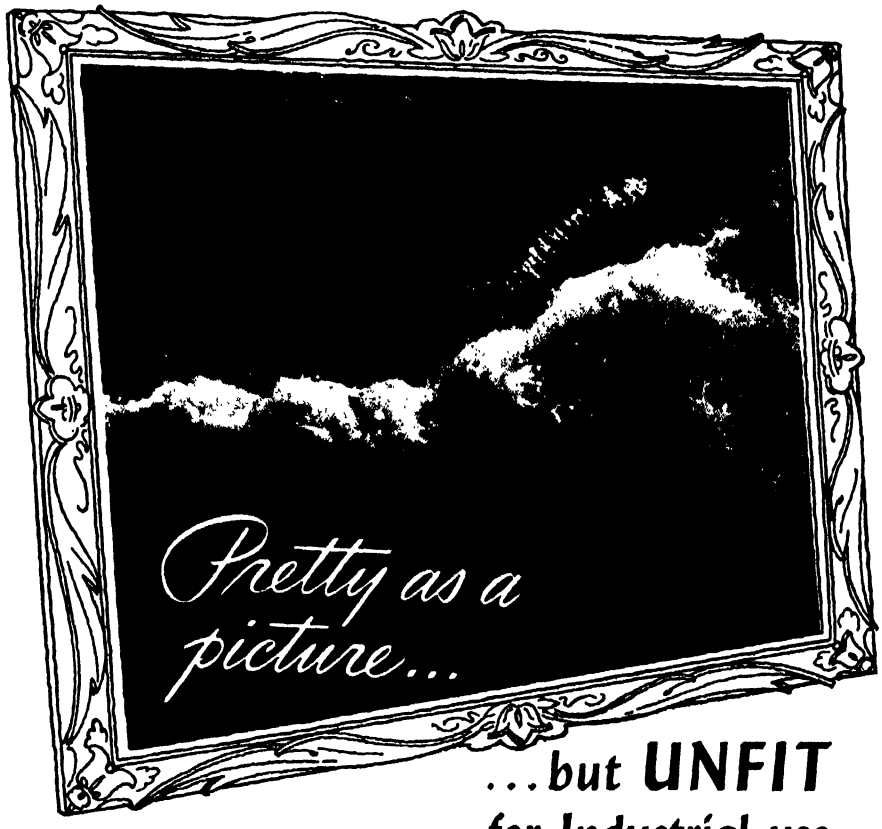
Industrial Research Institute Holds Annual Meeting

THAT the 2,300 industrial research laboratories in this country provide an invaluable reservoir of ideas, organized scientific knowledge, and special facilities for the solution of the many new technical problems growing out of the war effort was given particular emphasis at the fourth annual meeting of the Industrial Research Institute in Cleveland, Ohio, May 22 and 23. Over 50 industrial executives and research directors participated in round-table discussions which dealt chiefly with the adjustment of research programs and personnel to meet war conditions.

Guest speakers at a dinner session Friday evening were George Crile, eminent Cleveland surgeon, and his associates, Otto Glasser and D. P. Quiring. They described their researches into the nature of the living cell, which have been carried on for the past 10 years under the auspices of the Cleveland Clinic Foundation. Inspection visits to the new Thompson Aircraft Products Co. plant at Euclid, Ohio, and the General Electric Institute, Nela Park, occupied the members and their guests Friday afternoon.

H. S. Benson, United Shoe Machinery Corp., Beverly, Mass., was elected chairman, and Wm. R. Hainsworth, Servel, Inc., New York, vice chairman, of the institute's executive committee for the ensuing year. Two new members of the committee were also elected for three-year terms—Philip W. Pillsbury and Harold K. Work.

The Industrial Research Institute, an affiliate of the National Research Council, undertakes to promote improvement of methods and more economical and effective management in industry and research through the cooperative efforts of its members. The membership is composed of 45 industrial concerns maintaining research laboratories. Their top executives in charge of research represent them in the activities of the institute, which has headquarters at 8 South Michigan Ave., in Chicago. Other members of the executive committee are F. W. Blair, Caryl P. Haskins, Maurice Holland, and R. C. Newton.



...but UNFIT for Industrial use

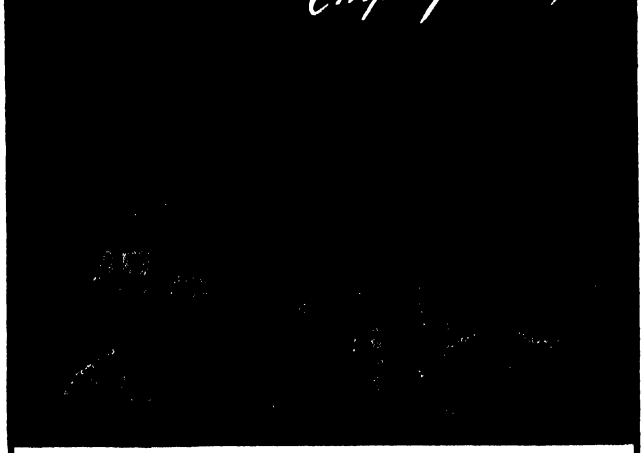
WATER as it occurs in nature may be sparkling and clear—it may even be pure enough to drink—but without conditioning, it is rarely suitable for either power or processing needs.

Betz is an organization of engineers and chemists trained and skilled in detecting and correcting all qualities of water that might limit its usage for any particular water application. Betz service includes Consultation, Plant Studies, Plant Design and Service Supervision for Boiler Water, Process Water, Municipal Water, Waste and Sewage Disposal.

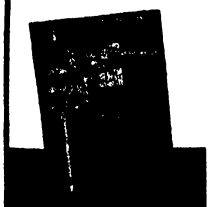
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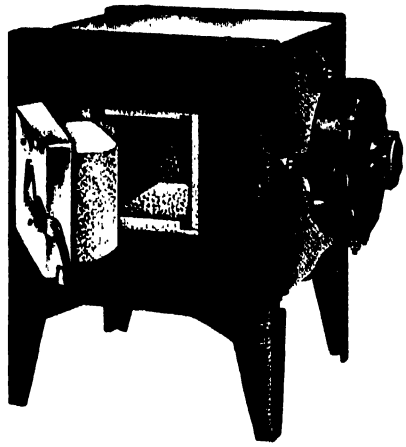
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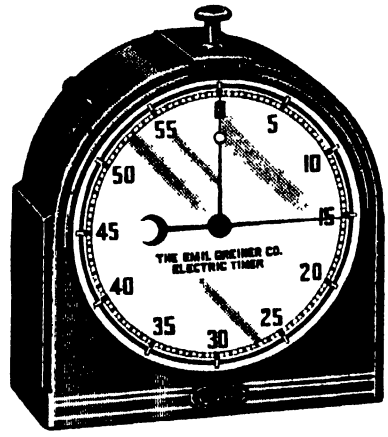
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2. Perfected frictionless device gives instantaneous start and dead stop without coasting. Current makes and breaks with stop and start of movement thus preventing current flow when in stop position without operation of secondary line switch.

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4. Large red hand indicates seconds and split seconds for 60 seconds per sweep and smaller black hand for minutes, thus giving reading range up to 3600 seconds for a single revolution of the small hand.

5. Fine instrumentation and accuracy; set in heavy handsome, lacquered metal case; total weight 3¼ lbs.; plug and 4 ft. flexible wire.

6. Exceptionally low price of about one-third of that usually paid for this type of timer.

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Iota Sigma Pi Cancels Convention Plans

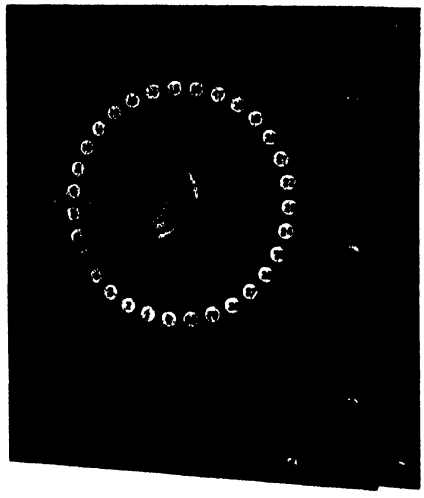
IOTA SIGMA PI, honorary society for women chemists, has just completed its 42nd year and has voted to cancel plans for the national convention in view of present world conditions. The 21 active and alumnae chapters, located in accredited colleges in various sectors of the United States, have elected the following national officers for the next triennium: president, Evelyn Laing McBain, Chemistry Department, Stanford University; vice president, Nellie Naylor, Chemistry Department, Iowa State College; secretary, Marjorie Crawford, professor of chemistry, Vassar College; treasurer, Elisabeth Koch, University of Chicago; editor, Hazel A. Fehlmann, Department of Home Economics, University of Colorado; historian, Agnes Fay Morgan, Department of Home Economics, University of California.

Through the voluntary efforts of Laverra Hill and the national officers, the society has been actively engaged in mobilizing women chemists from the ranks of active and alumnae members, who number several thousand, to aid in meeting the current emergency and professional needs.

Richard N. Armstrong has become associated with the Tool Steel Division of the Jessop Steel Co., Washington, Penna.

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IF THE present world struggle is to terminate successfully, if the forces of right are to triumph, and if Democracy is to survive, we must all save till it hurts. This saving program applies not only to strategic materials, to our national resources of raw materials, and to our liquid assets, but to our time. Time, effectively utilized, is the factor which will determine the outcome of the present struggle.

Do you realize that the preparation of a good test in chemistry costs a minimum of about $5.00, and that by the time it has been typed, edited, mimeographed, and distributed to students approximately $5.00 or more has been added to the cost of the test?

Do you understand that you may obtain valid tests in general chemistry, qualitative analysis, and organic chemistry from the Cooperative Test Service, 15 Amsterdam Ave., New York, N. Y., and that you may obtain 27 topic examinations in organic chemistry from the chairman of the Organic Test Committee, Ed. F. Degering, Purdue University, Lafayette, Ind.? Do you know that these tests may be obtained at a nominal price, and that the energy you normally spend in the preparation of such tests may be directed toward the program of winning the war?

Do you realize that the topic examinations in organic chemistry will be accompanied by validity data, so that you may select the more valid items and thus adapt your test to a 5-, 10-, 15-, or 20-minute quiz?

If you have used these tests, you will use them again. If you have not used them, this is an opportune time to keep your morale high by avoiding the tedious task of preparing and grading tests of your own making.

Swift Sponsors Fellowship in Nutrition

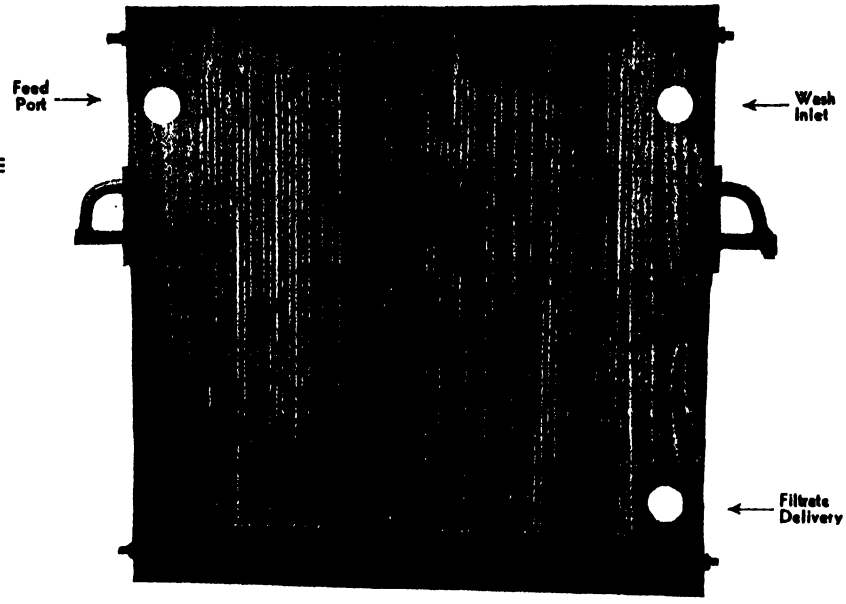
A NEW approach to the study of nutritionally valuable protein and of carotene as provitamin A will be made at the University of California at Berkeley by Agnes Fay Morgan and Lillian Bentley under a Swift & Co. Fellowship in Nutrition awarded to the university. It is of considerable importance to determine how usable the provitamin A, which is found in fruits and vegetables, may be in the human body under the varying conditions of the usual American diets. If low protein diets so affect the liver and other mechanisms that carotene cannot be adequately transformed into vitamin A, some adjustment of low meat, low egg, low milk, and low income diets should be made. Since animal vitamin A is poorly represented in such diets, inadequate utilization of the vegetable carotene in its place may be a serious factor in producing malnutrition.

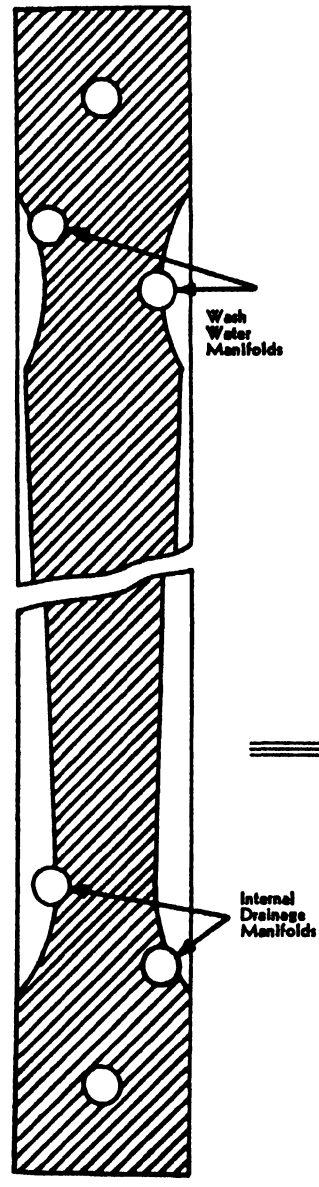
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What Is This?

Editor, Chemical and Engineering News:

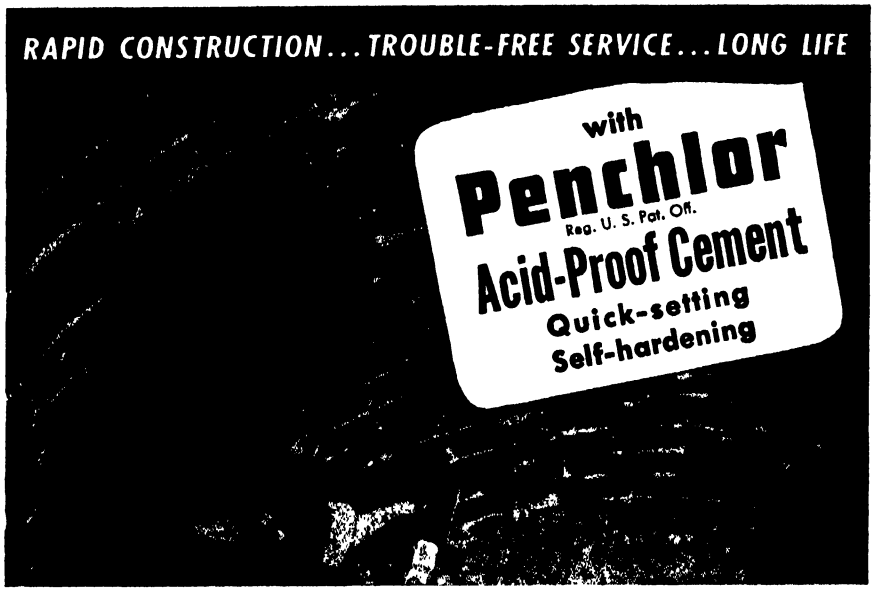


ABOUT 25 years ago, I purchased some laboratory apparatus from a laboratory that was discontinuing. Among the articles delivered was a curious apparatus, the use of which I have never been able to discover, though I have questioned numerous representatives of laboratory supply houses, visiting chemists, and others.

The apparatus was displayed at an exhibition in the University of Minnesota, carrying a tag marked "What is this?" It consists of a cast iron bowl with a small opening at the top, supported by a tripod to which are attached three iron bars hinged at the bottom to the legs of the tripod and held at the upper ends by concealed springs which allow about 0.125-inch motion when pressed toward the central tubular support. This support is threaded into the base tripod and the under part of the upper bowl. The whole apparatus is painted or enameled blue-black. The bowl holds water and I have used it as a vase.

If anyone can suggest a possible use for this apparatus I would be very grateful.

CHARLES H. BRIGGS
HOWARD WESAT AND FLOUR TESTING LABORATORY
MINNEAPOLIS, MINN.
May 2, 1942



PENCHLOR ACID-PROOF CEMENT is used to make the mortar with which these acid-proof bricks are being laid in lining a tank to store hot dilute sulphuric acid at the chemical by-products plant of the Chesapeake-Camp Corp., Franklin, Va. Construction Contractors: A. Lynn Thomas Co., Inc., Richmond, Va.

Here is another installation where *Penchlor Acid-Proof Cement* will prove its worth in years of dependable service. This quick-setting sodium silicate cement was chosen because of its proven record of highly satisfactory service under severe acid conditions . . . a record that includes successful application in most of the important chemical plants throughout the United States, in steel mills, in paper and pulp mills, oil refineries and smelting plants.

With time a vital factor in new construction, the quick-setting and self-hardening qualities of Penchlor Acid-Proof Cement are a greater advantage than ever. There need be no delays in putting brick-lined equipment into service.

If your conditions require a corrosion-proof cement with unusual strength and exceptional resistance to abrasion, use one of our resin cements, such as *Asplit* for conditions which are always acid—or *Causplit* for conditions alternately acid and alkaline. You will find these easy to handle and capable of withstanding a wide range of corrosive conditions at temperatures up to 350 degrees F.

Long experience in our own chemical plants in handling acids and alkalis makes it possible for us to put seasoned engineering service at your disposal—without obligation, of course. Write us fully. Or if you prefer, use the coupon below.

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Auto, Plane, and Oil Industries Research Organization

AUTOMOBILES, airplanes, tractors, and other vehicles of the future may operate better because of the work of a new organization which will coordinate the research activities of the automotive, aeronautic, and petroleum industries.

The best combinations of fuels, lubricants, and equipment powered by internal combustion engines will be sought by the new group, the Cooperative Research Council. The council, which is sponsored by the American Petroleum Institute and the Society of Automotive Engineers, will continue the work of the Cooperative Fuel Research Committee. The committee has done effective research on fuel utilization for 21 years, and its work has been of major importance in the development of automobile and airplane engines and fuels to their present state of perfection.

Other council groups which will centralize, correlate, and promote cooperative research within these industries include a cooperative lubricants research committee, a cooperative equipment research committee, and a war advisory committee.

Material Scarcities of Chemical and Drug Manufacturers

A STUDY of material scarcities of chemical and drug manufacturers, based upon the recently completed Dun & Bradstreet Survey for 1941, shows that the pinch of material scarcities was intense for manufacturers of paint, varnishes, and colors, but slight for manufacturers of drugs, cosmetics, and insecticides. The scarce materials used by mixers of paints, varnishes, and colors are mostly lead, zinc, aluminum, cobalt, tin, steel, manganese, chromium, and graphite. For makers of drugs, cosmetics, and insecticides, the short items are tin, zinc, cork, plastics, rubber, aluminum, chemicals, mercury, and magnesium, some of which are predominantly packing materials.

Shortages serious enough to restrict production fell hardest on middle-sized concerns with $200,000 to $300,000 annual sales, where 11 out of 16 companies had to curtail or stop civilian production of one or more items, and on the very large concerns where 43 per cent of the companies had to cut production.

SOME THINGS NEED NOT BE RATIONED

IN THIS WAR of total resources, many things must be rationed. There must be priorities on men, machines and materials.

You are feeling the effects of this, and we are, too.

But there are some things which need not be rationed, on which, indeed, there is a greater demand than ever before.

At Michigan Alkali we do not intend, ever, to ration service to our customers. Our experience and our technical service men are at your call — as near as your telephone — ready to help you with your problems.

And, like service, research continues at Michigan Alkali, with no reduction in time or enthusiasm. We are working round the clock learning, exploring, *producing.*

We are at your service — and in our country's service, too.

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SODA ASH • CAUSTIC SODA • CHLORINE • BICARBONATE OF SODA • CALCIUM CARBONATE • CALCIUM CHLORIDE • DRY ICE



A Practice Treatise on Manufacture of Soda and Ammonia Process. *Te-Pang Hou.* 2nd ed. 570 pages. Reinhold Publishing Corp., 330 West 42nd St., New York, N. Y., 1942. Price, $9.50.

THE publication of this thoroughly revised and enlarged second edition of T. P. Hou's book is fortunate at this critical period in the history of chemical trade.

Dr. Hou was the first engineer to build soda and ammonia works in China, and this at a time when the ammonia process was developing very rapidly and information regarding it was kept from the public. The first works located at Tangku near Tientsin was captured in July 1934 by the Japanese. The synthetic ammonia plant, consisting of four chemical plants near Nanking, was built under Dr. Hou's personal supervision, and he was one of the last to leave it.

His book was revised under very difficult circumstances and completed after he arrived in the United States, where he has been working for his government. In reading the book, one is impressed both by his knowledge of the detail of alkali manufacture and by chemical science.

The history of the development of the Solvay Process Co. and the different plants is accurate and complete. The chapters on rock salt, sea salt, and the brine wells with purification of brine are now up to date. The burning of limestone, description of the kilns used, and the thermal calculations are very interesting, and suggestions of details of the operation to give good control are valuable.

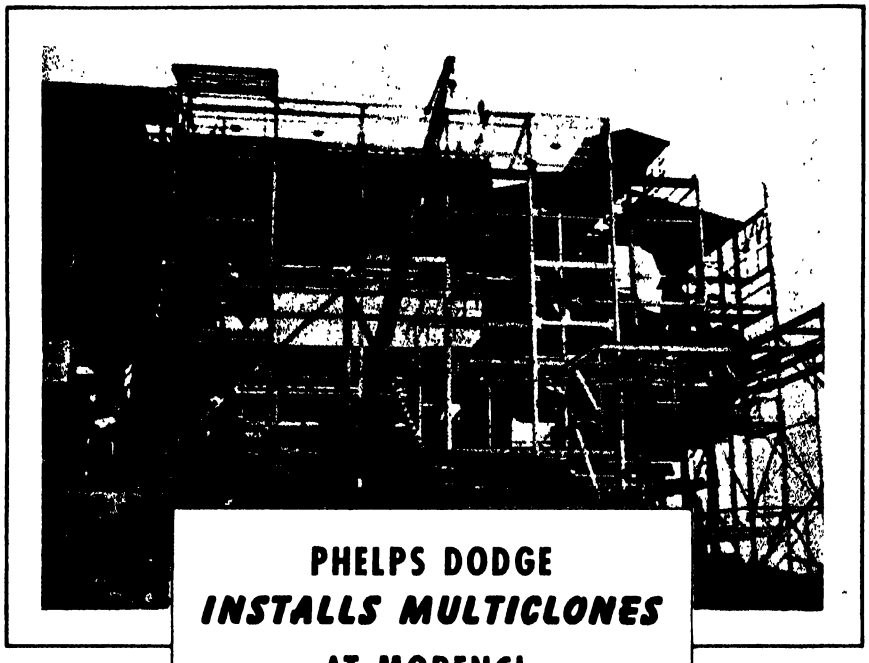
One of the most important parts of the operation which saturates the brine with ammonia is the control of the loss of the very valuable material which is always watching for a way to escape. The exact proportion of gas to brine is very important, as well as loss from the exit of the distillers. The recovery of the ammonia from waste gases by washing with the new brine is well covered.

When the plant at Syracuse was built in 1882, the machinery, developed by Ernest Solvay in Belgium, was very crude. The carbonating columns were showered with water on the outside to keep them cool, and had a capacity of 10 kilo tons of soda ash per day. A suggestion by Mr. Cogswell led to the introduction of internal cooling tubes, with better design as new ones were added, until the same column had a capacity of 60 tons per day. The tank filters, which required much labor to shovel the bicarbonate of soda, were replaced by rotary filters, which have been copied all over the world. As each new element was added, other improvements were introduced.

Dr. Hou has fully described this improved apparatus and the phase rule in the column reaction. These reactions effect the production of good quality crystals, and the subsequent operation of filtering and calcination to soda ash.

The need for ammonia led to the building of the first by-product coke ovens, which in turn resulted in the establishment of plants to use by-products. Dr. Hou has described this, stressing the position of the ammonia soda industry in this critical war

CONTINUED ON PAGE 762



• 450,000 c.f.m. of converter gases at 500° F. will be handled by this MULTICLONE installation at Morenci.

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Complete description and specifications of MULTICLONE *Collectors. Your name on your company letterhead, please.*

RESEARCH

EVEN Pollyanna might have difficulty in finding a ray of sunshine in the situation in which many manufacturers have been placed because of present shortages of many materials. Nevertheless the resulting frenzied search for substitutes has often uncovered a hitherto overlooked product which has proven satisfactory or even superior to that formerly used.

Unfortunately, however, it has quite often been found that a new discovery is available in only limited amounts since the producer had not previously received sufficient encouragement to warrant installation of the equipment necessary for large-scale production. Even in such cases the research has not been in vain since with the return of normal conditions the producer will be able to supply the product in adequate amounts, the value of it having been established, and the user will have been awakened to the necessity of investigating all materials which he might use.

There is often a temptation to consider a particular product of manufacture as being entirely satisfactory as regards both quality and cost and to curtail research involving it. Because of present shortages of raw materials and equipment there is also a temptation to curtail research involving new products or new uses for present products.

Chas. Pfizer & Co., Inc. does not subscribe to such views. We believe that when the job now in hand is successfully completed our nation will find itself with a productive capacity greatly in excess of any that it has previously enjoyed and that now is the time to prepare to utilize this. We are increasing our research program, primarily of course in order to help do our share toward finishing this present job as quickly as possible, but also secondarily that new products and new uses for old products may be available for any surplus productive capacity to come.



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Boats retain their original shape and will not fuse to tubes. Thick base prevents penetration of fused sample. Large inside area permits free flow of sample to form uniform thin layer. Boats are die formed and so have perfectly smooth surfaces, straight sides and excellent dimensional uniformity.

Boats with cover fit ¾" combustion tube. Large flat ends stabilize boat, so facilitating insertion or removal. Outside length, 77 mm; outside width, 12.5 mm; outside height, 9 mm; inside length, 72 mm; inside width, 8mm; inside depth, 5 mm.

S-21850 Sargent High Temperature Combustion Boat without cover.		S-21900 Cover only for Sargent High Temperature Combustion Boat.	
Per 100	$ 7.75	Per 100	$ 7.75
Per 500	31.00	Per 500	31.00
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Write for a sample combustion boat and cover.

E. H. SARGENT & CO.
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SARGENT
SCIENTIFIC
LABORATORY SUPPLIES

Beyond the Flyleaf

CONTINUED FROM PAGE 760

time, and the development at Syracuse of the synthetic ammonia plant which the TVA had failed to develop.

Pure bicarbonate of soda with caustic soda and their by-products are fully treated, as well as electrolytic caustic plant. The methods of control and operation, chemical analysis, and tests in the alkali industry are exceptionally complete and will be a great help to the operators. The chapters on layout and pumps, the tables and charts, and a complete index will be very useful.

Such a book would have been a great help to the reviewer during the 50 years of development of the industry, in which he had engineering responsibility. The process is not perfect; there are more improvements to be made, and the new Chinese plant will make some of them.

EDWARD N. TRUMP

Specifications for Coke-Oven Light Oil Distillates

A TABLE of standard specifications for coke-oven light oil distillates has been issued by the Crowley Tar Products Co., 271 Madison Ave., New York, N. Y., in chart form.

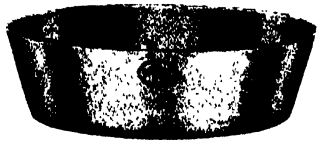
The Engineering Profession. *Theodore Jesse Hoover* and *John Charles Lounsbury Fish.* 1st ed. 441 pages, 29 figures, 42 tables. Stanford University Press, Stanford University, Calif., 1941. Price, $5.00.

THE authors have carried out excellently their objectives of providing a "vocational guide to the young man matching his capacities against the requirements of various professions" and of sketching for the experienced engineer a broad picture of the engineering domain.

The opening chapters discuss: Who is an engineer? What is engineering? What are the fields and functions of engineering? The next five chapters cover civil, mining, mechanical, and electrical engineering, and chemical engineering and other fields, in a manner that should prove very helpful to the young man choosing his profession. The logical pattern of treatment includes examples of engineering activities in each discipline, subfields, functions, sources and conditions of employment, curricula, outstanding engineering accomplishments, lists of typical problems, professional societies, and selected bibliographies. There follows a group of six chapters on the method of engineering, application of the engineering method, uncertainties in engineering, vocational guidance, education, and the new call to the engineering profession. Three appendixes list definitions of engineering, requirements for admission to membership in professional societies, and engineering titles.

The large number of specific examples in all sections of this book will aid prospective engineers in forming a concrete idea of their future duties and responsibilities. Chemical engineers will regret that their field did not receive fuller treatment.

LAWRENCE W. BASS



The American Platinum Works
N. J. R.R. AVE. AT OLIVER ST.
Newark, N.J.
EST. 1875

PLATINUM FLOUR ASHING DISH—ACTUAL SIZE—ABOUT 12 G.—FIG. 68 OUR CAT. N17

Thorpe's Dictionary of Applied Chemistry. Volume V. Fehling's Solution to Glass. *J. F. Thorpe* and *M. A. Whiteley.* 4th ed. 610 pages. Longmans, Green and Co., New York, N. Y., 1941. Price, $25.

VOLUME V is the continuation of Volumes, I, II, III, and IV [NEWS ED., 15, 421 (1937); 17, 579 (1939); 18, 907 (1940)], the quality of the work being fully maintained. This dictionary of applied chemistry has been known to practically every chemist alive today, usually from the time of graduation, it having gone through three previous editions and having been for decades a stand-by of the chemical profession. It has been used as a standard encyclopedic work for reference ever since the first volume was produced under the authorship of Jocelyn F. Thorpe, later

knighted for his accomplishments, who died on June 10, 1940, and to whose memory this work is perhaps his greatest monument.

Volume V, like its predecessors, is arranged alphabetically by subject, each being treated as occasion warrants by England's leading chemical experts. The more lengthy articles are on Fermentation (50 pages), Fertilizers (25 pages), Fibres (71 pages), Finishing of Fabrics (20 pages), Fireproofing (16 pages), Fluorine (12 pages), Food Preservation and Preservatives (20 pages), Fuel (47 pages), Coal Gas (50 pages), and Glass (52 pages). It should be available to all chemists as a reference work, since it will bring them more closely in touch with the present status of applied chemistry and with its literature. The work is invaluable.

CHARLES L. PARSONS

LONGMANS, GREEN AND CO., 55 Fifth Ave., New York, N. Y., have published a 19-page abridged index to Volumes I to V of the new edition of Thorpe's Dictionary of Applied Chemistry. This index is available at $1.00.

The Physical Examination of Metals. Volume II. Electrical Methods. *Bruce Chalmers* and *A. G. Quarrell.* 280 pages. Longmans, Green and Co., New York, N. Y., 1941. Price, $6.00.

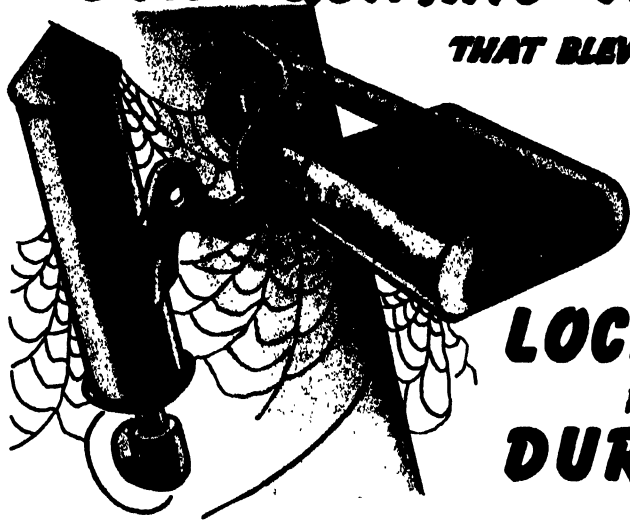
THIS little volume first appeared in London about a year ago. It is of the introductory type. No attempt is made to present an exhaustive study of one or the other of the many topics included: methods for determining and correlating magnetic qualities; resistivity; thermoelectric effects; x-ray diffraction patterns; and finally, the interpretation of the details revealed by the electron microscope, the most recent and probably most important electrical instrument for the examination of metals.

Magnetic and induction methods (the descriptive text for which covers about one quarter of the volume) are used in detecting flaws in metals; likewise for the determination of thickness of electroplate, and for the study of hardening qualities of steel cables.

If the reader feels that a disproportionate section of the volume is devoted to "magnetic qualities of metals", it is well to recall the relatively recent, revolutionary discovery and rapid commercial development of the tungsten-free magnetic alloys of the alnico type. There is every indication that hereafter the metallurgical research laboratories will devote more time and study to the magnetic qualities of new alloys.

More than 100 illustrations supplement the text. These are practically all line drawings, but as such are more enlightening than photographs of apparatus show-

The old "QUITTING" WHISTLE THAT BLEW AT 5....



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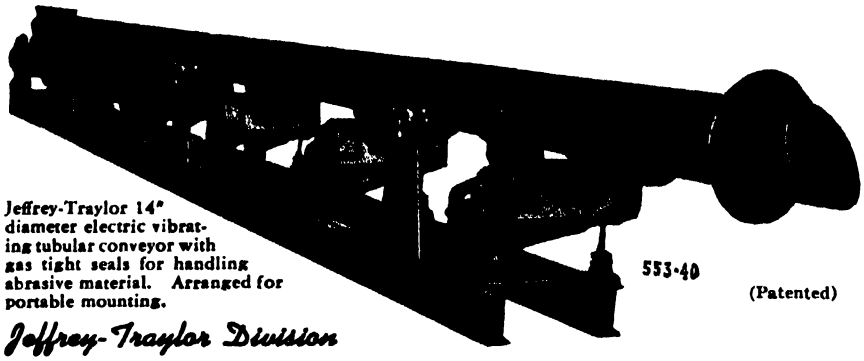
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No, it's not a cannon but it is a powerful conveying agent for hot, gaseous materials found in chemical plants. A Jeffrey-Traylor electric vibrating conveyor for handling material without dust loss or degradation — 30" down to 200 mesh. Tubular or pan types in various diameters and any length. Also electric vibrating feeders, dryers, coolers and screens. Write for engineering data NOW.

ing pretty housings underneath which important wiring diagrams are concealed.

Disappointing is the very little space (less than a page) devoted to photoelectric effects in metals.

COLIN G. FINK

Tin Solders. *S. J. Nightingale*, revised by *O. F. Hudson*. 2nd ed. 118 pages. British Non-Ferrous Metals Research Association, Euston Street, London, N. W. 1, England, 1942. Price, $2.75 postpaid.

THE need for economy in tin makes it necessary to consider where and how composition of tin solders can be modified. Changes must be based on a sound knowledge of existing tin solders and their properties. With this objective the first edition of "Tin Solders" has been thoroughly revised to include investigations carried out in the past 10 years. New sections have been added on creep properties of solders and soldered joints.

Bibliography of References to the Literature on the Minor Elements and Their Relation to Plant and Animal Nutrition. 3rd suppl. to 3rd ed. 80 pages, indexed. Chilean Nitrate Educational Bureau, Inc., 120 Broadway, New York, N. Y., 1942.

Handbook for Decontamination Squads

A HANDBOOK for Decontamination Squads, prepared by the Training Section of the Office of Civilian Defense, has been issued as one of a series of civilian defense handbooks. In 62 pages it discusses the vesicant agents, decontamination, recommended equipment, blackouts, and air raids. It is available through the Government Printing Office, Washington, D. C., for 10 cents a copy.

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Journal of Chemical Education for June

THE *Journal of Chemical Education* for June will contain, among others, the following articles:

C. A. BROWNE. Bernhard Tollens (1841–1918) and Some American Students of His School of Agricultural Chemistry.
THEODORE ASKOUNES ASHFORD. The Problem of Chemistry in General Education.
JOSEPH A. BABOR. The Sequence of Topics in General Chemistry.
B. CLIFFORD HENDRICKS. The Varied Objectives in Service Courses in General Chemistry.
C. S. ADAMS. The Importance of Laboratory Work in General Chemistry at the College Level.
JOHN E. CAVELTI. The Perennial Problem of Course Content in a Growing Science.
F. D. MARTIN. A Diagnostic and Remedial Study of Failures in Freshman Chemistry.
EUGENE ALLEN. The Melting Point of Impure Organic Compounds.
L. P. BIEFELD AND MARGARET GRIFFING. Color Nomenclature in Qualitative Analysis. I. The Inter-Society Color Council Nomenclature.
G. E. VILLAR. On a Suggested Revision of the Seventh Period of the Periodic Table.
F. C. FLINT. Glass.

A. S. T. M. Emergency Specifications Prepared

SINCE the procedure was established late in 1941 by the American Society for Testing Materials for preparing emergency provisions and complete emergency specifications or tests, a number of actions have been developed to expedite procurement and conserve critical or strategic materials during the emergency. The following committees have taken action: A-1 on steel, A-5 on corrosion of iron and steel, A-10 on iron-chromium-nickel alloys, B-1 on copper wires for electrical conductors, B-2 on nonferrous metals and alloys, B-5 on copper and copper alloys, B-6 on die-cast metals and alloys, D-1 on paint, varnish, and lacquer, D-11 on rubber products, and D-12 on soaps and other detergents.

Sixteen Vitamins and Deficiency Diseases

THE recently published 63-page Vitamin Edition of the *Bulletin of the Lederle Laboratories* discusses the fat-soluble factors, vitamins A, D, E, K, and essential fatty acids, and the water-soluble factors identified with the B complex, ascorbic acid (C), and P, as well as the several unknown factors.

A table gives daily allowances for specific nutrients recommended by the Committee on Foods and Nutrition of the National Research Council with minimal daily requirements proposed by the Federal Food and Drug Administration. A 2-page general summary and more than



Three "R-C" Positive Displacement Blowers used for sludge aeration. Combined capacities 5,400 CFM, against 6 lbs. pressure.

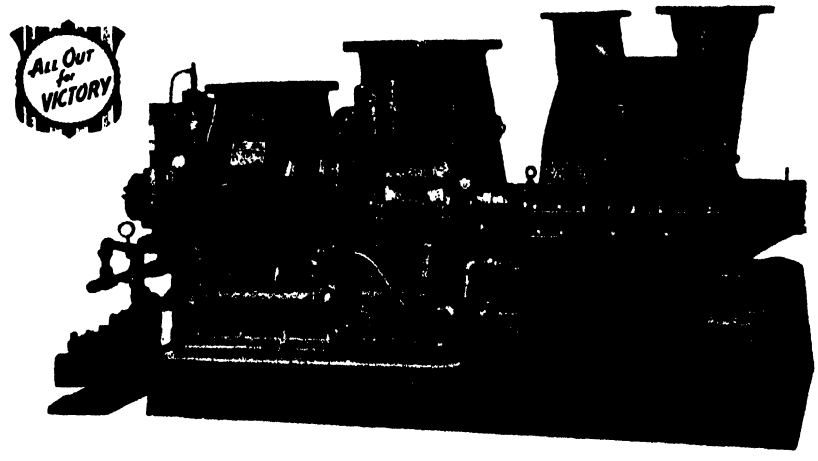
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Since National survival comes FIRST, the co-operation of our customers is earnestly requested when their orders cannot be handled as promptly as in normal times.

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Roots-Connersville 3-stage Centrifugal Blower driven from low pressure steam turbine. Capacity 4,560 CFM, 6 lbs. gauge pressure. Installed in Eastern chemical plant.

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Write for latest catalog, *Eastman Organic Chemicals*

EASTMAN KODAK COMPANY, *CHEMICAL SALES DIVISION*, ROCHESTER, N. Y.

seven pages of literature references are grouped according to the specific vitamins treated in the text.

The bulletin is available only to physicians and research workers in the vitamin field on request to the Lederle Laboratories, 30 Rockefeller Plaza, New York.

Nutrition Report

THE report of the Proceedings of the National Nutrition Conference for Defense, called by President Roosevelt in Washington, May 26 to 28, 1941, has come off the press. Sponsored by the Federal Security Agency Office of the Director of Defense Health and Welfare Services, the report is available from the Superintendent of Documents, Washington, D. C., for 35 cents.

Carbohydrate Nomenclature

THE Committee on Carbohydrate Nomenclature, appointed by the Divisions of Sugar Chemistry and Technology, Chemical Education, and Biological Chemistry of the AMERICAN CHEMICAL SOCIETY, has prepared its third progress report, which will be sent to all persons who request copies. Requests should be sent to the secretary, Horace S. Isbell, National Bureau of Standards, Washington, D. C., or to other members of the committee.

War on the Home Front

AN 8-page pamphlet, presenting the basic facts that everyone should know about poison gas, bombs, and incendiaries, has been prepared by Joel H. Hildebrand of the University of California and made available by the Commonwealth Club of California, San Francisco, Calif., at 10 cents a copy. It is based on an address before the club on March 6, 1942, and tells in plain language to ordinary



For twenty-five years Schaffer Poidometers have all been built with that hidden ingredient—QUALITY. They are all sturdy, reliable and long-lasting. For proportioning raw and finished materials, it will pay you to install Schaffer Poidometers.

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To the vast number of Poidometer users we bring this message: It will more than pay you to keep your machines up to the pink of condition. Check every part of your Schaffer Poidometer. Any part that shows wear or needs replacing should be ordered now. Your Poidometer will serve you best if you keep it in top condition.

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in the solution of their drying problems

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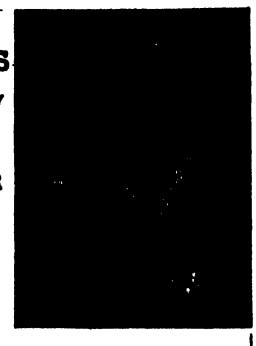
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Ruggedly constructed—expertly calibrated—the "Alnor" indicates air velocities directly on a scale in feet per minute without timing or calculation. This Velometer will also indicate pressures in inches of water when provided with suitable jets. Accuracy within 3% of full scale readings guaranteed. Range includes 15 to 24,000 F.P.M.

Write for Bulletin No. 3448-D

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429 N. LaSalle St. Chicago, Ill.

citizens facts that everyone should know and principles of action that should be followed.

Electrical Terms

FOR the first time American definitions and notes of all important electrical terms have been combined in one volume, known as "Definitions of Electrical Terms, C42". The glossary is the result of 12 years' work by more than 300 persons, including representatives of technical, trade, and government groups. This 300-page, indexed volume may be obtained for $1.00 a copy from American Institute of Electrical Engineers Headquarters, 33 West 39th St., New York, N. Y.

Synthetic Rubber Plant

THE charter of the Neches Butane Products Co. has been filed in the office of the Secretary of State, after being held for several days pending investigation whether operation would be in violation of Texas antitrust laws. The stockholders of the company, which is to make synthetic rubber from butadiene, are the Gulf Oil Corp., Atlantic Refining Co., Socony-Vacuum Oil Co., Texas Co., and Pure Oil Co.

Stock ownership has been apportioned because the raw materials will be supplied from the companies' refineries in the area, and they will furnish the trained personnel necessary for operation.

Butadiene from Ethyl Alcohol

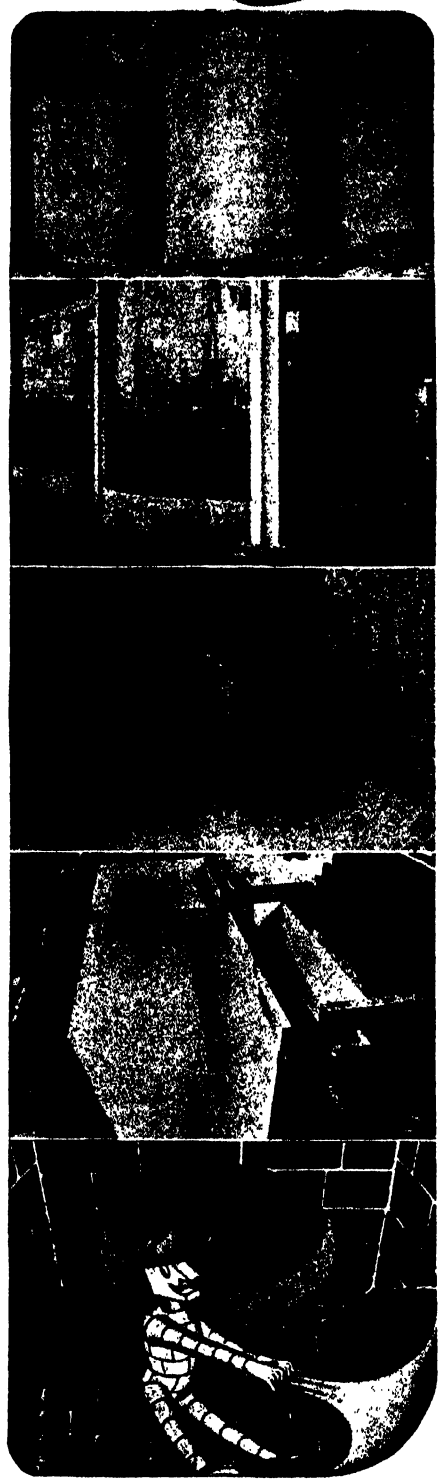
TODAY, when ethyl alcohol is proposed as a source of butadiene, needed in vast quantities for the production of synthetic rubber, it is interesting to note that Vladimir N. Ipatieff, director of chemical research, Universal Oil Products Co., and a professor of chemistry at Northwestern University, was the first to establish formation of butadiene from ethyl alcohol in a single-stage operation.

However, Professor Ipatieff carried this work, which was done in Russia in 1903, only as far as the laboratory stage, being interested primarily in other objectives at the time. Later workers have made further important discoveries in this field and have developed efficient processes to produce this vital chemical in huge volume economically from alcohol. These processes are now being offered to American refiners.

Edward A. Prill, instructor in chemistry at South Dakota State College, resigned his position to join the Research Staff of the Borden Laboratories of Bainbridge, N. Y.

AS OF April 9, 1942, the corporate name of the Ethyl Gasoline Corp., 405 Lexington Ave., New York, N. Y., has been changed to Ethyl Corporation.

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. . . . provide process plants wherever acids, alkalies, corrosive or non-corrosive liquids, gases or vapors are encountered, with an efficient, economical, long-lived and trouble-free installation.

Where sludges, brines, bleaching solutions, process water, pulps, dust, salts, granular products, etc., are to be stored, the new STEBBINS tile tank can be installed without waiting.

Fifty-eight years' experience in meeting specific operating conditions in a great many process plants has provided STEBBINS with one ingredient that is vital today—KNOWLEDGE.

To know how to do a first-class job—saves TIME. Ask STEBBINS when you have a lining or tank problem.

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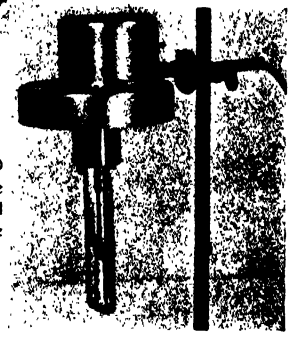
MAKE VISCOSITY TESTS AT POINT OF PROCESS

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VARIABLE SPEED UNIT Four speed changes regulated by finger-controlled lever.



SINGLE SPEED UNIT for use where speed variations are not required.

***SAVE* valuable production time** and insure closer control on defense orders by running viscosity tests direct in plant containers where your material is being processed.

***NOTE* these advantages:** Continuous or intermittent indicating—Simple, sturdy, easy to operate and clean—Permanently standardized, no adjustments.

Operator can easily convert any model to either portable or stationary use as desired.

The Synchro-lectric Viscosimeter operates anywhere in *plant* or *laboratory*. It will test solutions in suspension and of any degree of opacity, and is not affected by temperatures to 600°F. Just a few seconds are required to complete the reading which requires no technical skill. The instrument is permanently standardized, requires no adjustments. Viscosities are indicated in *centipoises* in wide ranges on a large, easily read dial. Accuracy is within one percent of full scale based on Bureau of Standards values.

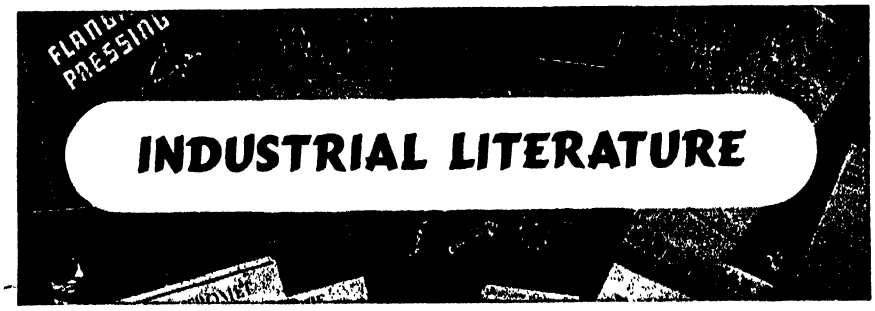
Variable speed units provide a means for measuring materials of plastic flow at different rates of shear.

Standard units operate on 60 cycle, 110 volt current but can be equipped for other frequencies and voltages.

Full information with recommendations will be sent on request.

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Listed publications should be requested directly from the company concerned. Use business stationery, mention bulletin numbers, and refer to this journal. Publications will be sent free unless otherwise noted.

Automatic Lubrication. A 4-page illustrated folder describes a single pipe centralized system that is said to lubricate all connected bearings without employing any springs, diaphragms, packing, or exposed moving parts. *Bulletin 423 CEN.* TRABON ENGINEERING CORP., Cleveland, Ohio.

Caulking Compounds. Developed originally to seal openings in ducts carrying electrical conductors, the caulking compound described in this 4-page bulletin has found many uses. It is said to stick to any clean surface without slumping, flowing, or hardening in service. *Form E1-19A CEN.* JOHNS-MANVILLE, 22 East 40th St., New York, N. Y.

Chloramine-B. This 11-page mimeographed bulletin is devoted to the properties and uses of Chloramine-B (sodium *N*-chlorobenzenesulfonamide). The oxidizing, bleaching, and germicidal properties of this compound suggest many important uses in the industrial field. *Memorandum on Chloramine-B CEN.* THE SOLVAY PROCESS Co., 40 Rector St., New York, N. Y.

Conical Mills. This 28-page illustrated booklet gives data on the construction, operation, and application of conical mills. *Bulletin 13-D CEN.* HARDINGE CO., INC., York, Penna.

Efficient Steam Production and Consumption. This 8-page bulletin is devoted to increasing the efficiency of power and process steam systems through the use of adequate measurements and control. A schematic diagram illustrates the application of meters and control for such a steam plant. *How to Safely Stretch Steaming Capacity Bulletin 5 CEN.* BAILEY METER Co., 1070 Ivanhoe Road, Cleveland, Ohio.

Electrical Resistance Materials. A 4-page folder discusses negative temperature coefficient resistance materials and their industrial applications. The electrical resistance of these materials decreases with rising temperature. *Negative Temperature Coefficient Resistance Material Folder CEN.* KEYSTONE CARBON CO., INC., Saint Marys, Penna.

Elevator-Conveyors. This 32-page illustrated catalog covers conveyor equipment and the handling of many materials. Equipment arrangements for the handling of 10 different materials are shown. *Book 2075 CEN.* LINK-BELT Co., 307 North Michigan Ave., Chicago, Ill.

Filter Papers. A 16-page booklet describes this manufacturer's various grades of filter paper. *Whatman Filter Papers Booklet CEN.* H. REEVE ANGEL & CO., 7-11 Spruce St., New York, N. Y.

Gas Engines. An 8-page bulletin gives information on heavy-duty, stationary type, four-cycle gas engines of 175 and 210 horsepower. *Bulletin S-550-B20 CEN.* WORTHINGTON PUMP AND MACHINERY CORP., Harrison, N. J.

Graphite Lubrication. This data sheet discusses a colloidal natural graphite suspension in lube oil that may be added to many types of lubricants. Addition of this material to lubricants is said to reduce frictional wear of machine parts. *Bulletin 4 CEN.* NATIONAL GRAPHITE CO., INC., 17 John St., New York, N. Y.

Hydraulic Jacks. Three types of hydraulic jacks are covered in this 4-page bulletin. These are the independent-pump type, the vertical and horizontal outside-pump types. Operating data are given for the various units. *Bulletin 710-A CEN.* WATSON-STILLMAN CO., Roselle, N. J.

Iron and Steel Pipe and Tubular Products. This 62-page catalog details information on wrought iron pipe and tubular products, welded steel pipe and tubular products, and wrought iron hot rolled products. *General Catalog CEN.* A. M. BYERS CO., Pittsburgh, Penna.

Laboratory Ovens. This 4-page folder describes forced draft insulated laboratory ovens primarily designed for analytical work. These ovens, available in 48 models with temperature range up to 1250° F., are said to be ideal for test baking and drying of various industrial finishes and for sterilizing. *Bulletin 105 CEN.* DESPATCH OVEN CO., Minneapolis, Minn.

Liquid Flow Control. A 4-page folder covers an automatic flow control unit designed to handle predetermined quantities of liquids. The quantity desired is set on the dial of the instrument. *Gottfried Automatic Flow Control Folder CEN.* BAKER PERKINS, Saginaw, Mich.

Lubricating and Fuel Oil Purifiers. A 4-page bulletin describes a supercentrifuge unit for the removal of dirt, grit, carbon, sludge, and water from oil. *Sharples En Bloc Oil Purifier CEN.* SHARPLES CORP., 2300 Westmoreland St., Philadelphia, Penna.

Manufacturer's Products. Designed to assist new men in industry, this 4-page folder offers a convenient listing of products made by this manufacturer. *To Help You Win the War of Production Folder CEN.* S. F. Bowser & Co., Fort Wayne, Ind.

Mixers. This 8-page bulletin describes bowl type mixers using the planetary principle. These mixers, available with variable speed, are equipped with interchangeable agitators and portable bowls ranging in size from 10 to 85 gallons. *Flexibility in Mixing Operations with Glen Mixers Bulletin CEN.* American Machine & Foundry Co., 511 Fifth Ave., New York, N. Y.

Modern Precision. A 16-page illustrated publication contains news of L. & N. instruments, controls, and heat-treating methods and their applications. It supplements regular catalogs and bulletins of the company. Vol. 2, No. 1, spring, 1942, has just appeared. *Publication CEN.* Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Penna.

Ozone Water Purification. These two bulletins discuss sterilization of drinking water through the use of ozone. The equipment described is said to handle up to 9,000 gallons of water per hour. *Model "A" and "B" Water Purification Units Bulletins CEN.* Technicraft Engineering Co., 5610 South Soto St., Los Angeles, Calif.

Pickling of Iron and Steel. This 12-page booklet describes the use of this manufacturer's acid addition agent, which is said to promote faster pickling, reduce attack upon steel, and save acid. *Modern Pickling of Iron and Steel Booklet CEN.* Enthone Co., 442 Elm St., New Haven, Conn.

Pressure Vessel Pressings and Forgings. This 32-page catalog covers welded necks, manhole necks, nozzles and covers, handhole rings and fittings, and similar forgings and pressings. *Catalog 8-42 CEN.* Lenape Hydraulic Pressing & Forging Co., P. O. Box 536, West Chester, Penna.

Priorities. A 16-page book for salesmen and jobbers explains priorities and how to use them. *Booklet CEN.* Manning, Maxwell & Moore, Bridgeport, Conn.

Pumping Control. An 8-page bulletin describes electric-operated control as employed in pumping applications. Controllers of the recording and indicating type are shown, together with specimen chart records and installation photos. The text is largely devoted to waterworks and sewage engineering but also covers pumping applications. *Bulletin B-294 CEN.* Foxboro Co., Foxboro, Mass.

Radiant Kiln Firing. A factual report on direct radiant kiln firing in various branches of the ceramic industry, reprinted from an address before the American Ceramic Society, Materials and Equipment Division, is given in a mimeographed bulletin, well illustrated. *Bulletin CEN.* The Selas Co., Philadelphia, Penna.

Steam Jet Ejectors. A 32-page booklet gives data on ejectors ranging from 1 to 5 stages. A section is devoted to factors affecting ejector selection. A number of installations are shown by photographs. *Bulletin G-7 CEN.* Elliott Co., Jeannette, Penna.

Thermometers. Three single-sheet bulletins describe new and improved yellow back thermometers. Information on calibrations and uses is given. *Eureka Yellow Back Thermometer Data Sheets CEN.* Nurnberg Thermometer Co., Inc., 236 A Broadway, Cambridge, Mass.

Valves. A 32-page bulletin describes quick-operating valves for blow-off, water columns, and other boiler room services. It is profusely illustrated, with complete tables of specifications, dimensions, and prices. *Bulletin E-100-CEN.* Everlasting Valve Co., 49 Fisk St., Jersey City, N. J.

Welded Steel Plate Construction. This 288-page handbook covers storage tanks, pressure vessels, smokestacks, brewery equipment, bolts, pipes, and tubes. Request should be made on company letterhead. *Buffalo Handbook CEN.* Buffalo Tank Corp., Dunellen, N. J.

Welding. An 18-page bulletin entitled "The Fleet-Fillet Welding Technique for Speeding War Production" is planned as a ready reference for plant production officials. *Bulletin 432 CEN.* The Lincoln Electric Co., Cleveland, Ohio.

The Quaker Chemical Products Corp., Conshohocken, Penna., has established new and larger warehouse and blending plant facilities at 9243 Baltimore Ave., Chicago, Ill. R. L. Phillips is plant manager and members of the technical service staff are K. B. Copeland and C. O. Judd.

Zircon, Rutile, and Ilmenite

Zircon, rutile, and ilmenite supplied by Orefraction, Inc., 7511 Meade St., Pittsburgh, Penna., are said to be of exceptional purity with practically no contamination, owing to the exclusive methods of separating, refining, and beneficiating the raw concentrates. This is particularly true of the zircon in connection with new developments in ceramics and of the rutile as a coating for welding rods. Rutile and zircon can be supplied in grain form or ground to customer's exact specifications. Ilmenite is available only in grain form.

The company specializes in the separation and concentration of minerals and ores. It devotes its efforts largely to the problem of separating ores which are difficult to separate by ordinary means and to the removal of objectionable impurities from commercial ores.

Protection from Mold

More than 75,000,000 pounds of butter will be wrapped in specially impregnated parchment paper during the current year to protect them from losses due to mold, reports the Du Pont Food Research Laboratory. The baking industry also is attacking the mold problem in baked goods by incorporating mold retardants in increasing quantities of bread, pies, and cakes. It is estimated that nearly 2,000,000,000 loaves of bread will be protected this year.

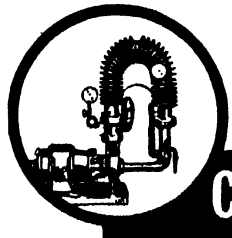
A Simple Statement of What the COCHRANE-BECKER SYSTEM of High Pressure Condensate Returns is Accomplishing in Chemical Process Work

Condensate is removed from process equipment, with automatic and continuous separation and removal of entrapped air and condensate is returned to boiler at high temperature and high pressure.

THE RESULT IS

1. **FASTER HEAT** — Quicker Starting Up — Brings Batch to a Boil More Quickly
2. **HIGHER TEMPERATURE** . . . . . From Steam Pressure Available (or Safe to Use)
3. **MORE UNIFORM HEATING** . . . . Higher Quality • Greater Production • Standardized Batch Timing
4. **LOWER MAINTENANCE** . . . . . Of Traps • Reduced Cleaning Time • Less Need for Cleaning or Dressing Drums, Knives, etc.

+ **LOWER FUEL COST** . . . and Increased Boiler Capacity due to High Pressure Return.

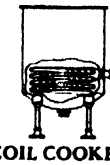


Write for a copy of Publication 3025, or let us make a survey of what a C-B System can do in your plant

COCHRANE CORPORATION
3132 N. 17th St. Philadelphia, Pa.

COCHRANE-BECKER
SYSTEM OF
HIGH-PRESSURE CONDENSATE RETURN

The Cochrane-Becker system can improve results obtained from this kind of equipment



COIL COOKERS



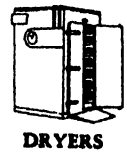
JACKETED KETTLES



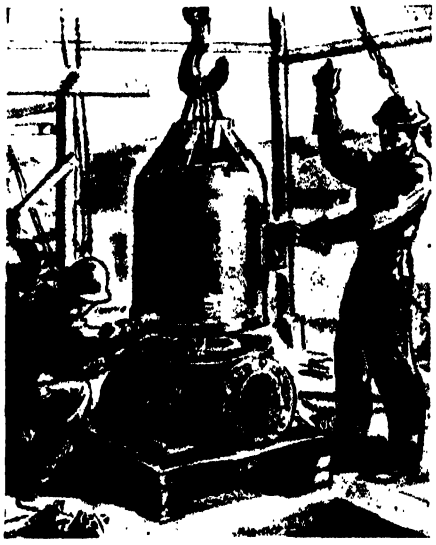
JACKETED MIXERS



DRYING ROLLS



DRYERS



Completed On Time!

"Never have so many, owed so much, to so few!"

That brilliant statement made by Britain's Winston Churchill can be applied to a case in our own country.

Today, millions of soldiers, sailors and marines are being supplied with an abundance of safe water from Layne built Well Water Systems. The Armed Forces can thank less than two thousand Layne Organization employees. In an amazingly short period of time, they undertook—and *completed on time*—the most gigantic Well Water System building task ever accomplished in this, or in any other country. These widely experienced men located water bearing sands, drilled wells in almost every type of earth formation and set tons of casing. Furthermore they built the pumps, made installations and placed their water systems in operation—producing hundreds of millions of gallons of water daily.

Such outstanding service, performed without delay or failure, has created a brilliant chapter in the long and successful career of the Layne Organization. No greater commendation for ability, speed and efficiency could be offered.

LAYNE & BOWLER, INC.
Memphis, Tenn.

LAYNE PUMPS & WELL WATER SYSTEMS

Affiliated Companies

Layne-Arkansas Company.....Stuttgart, Ark.
Layne-Atlantic Company.....Norfolk, Va.
Layne-Bowler New England Corp....Boston, Mass.
Layne-Central Company.....Memphis, Tenn.
Layne-Northern Company.....Mishawaka, Ind.
Layne-Louisiana Company....Lake Charles, La.
Louisiana Well Company.....Monroe, La.
Layne-New York Company.....New York City
Layne-Northwest Company.....Milwaukee, Wis.
Layne-Ohio Company.....Columbus, Ohio
Layne-Texas Company.....Houston, Texas.
Layne-Western Company.....Kansas City, Mo.
Layne-Western Co. of Minn....Minneapolis, Minn.
International Water Supply, Ltd...London, Ont.

THE WALL STREET OF CHEMISTRY

	March Quarter Earnings		Per Common Share	
	1941	*1942*	*1941*	*1942*
Abbott Laboratories	$ 568,419	$ 592,208	$ 0.73	$ 0.74
Columbian Carbon Co.	1,089,335	841,814	2.03	1.57
International Nickel Co.	9,239,709	8,071,966	0.60	0.52
United Carbon Co.	540,028	522,111	1.36	1.31
Vulcan Detinning Co.	148,879	135,066	3.89	3.47
	Twelve Months' Earnings			
Chemical Fund (assets)	7,852,061	7,556,426	8.69	7.54
Jones & Laughlin Steel Corp.	.....	14,606,194	...	9.55
Koppers Co.	4,233,518	6,138,974	3.03	4.94
Pennsylvania Salt Mfg. Co.	1,689,379	1,622,128	11.26	10.81

For six months ending February 28, 1942, **Canadian Industrial Alcohol Co.** and subsidiaries report net profit of $264,673, equal to 23 cents a share on combined Class A and B stock compared with $179,488 or 16 cents a share for the six months ended February 28, 1941.

Although sales and earnings, before provision for income taxes, of the American companies of the **Monsanto Chemical Co.** in the first quarter of 1942 were the highest in history, if the tax recommendations of the Secretary of the Treasury are adopted the amount available for common stock will be the lowest since 1933 and the return on invested capital will be the lowest percentage since 1926. Net sales rose 14 per cent to $16,439,014, and net income was $4,385,364 before provision for income taxes.

Chas. Pfizer & Co., Inc., established in 1849, has completed plans for the first public financing in its history. Ownership heretofore has been confined to employees. The program calls for recapitalization of the company and the sale of more than $5,000,000 of new common stock. Out of the proceeds the company plans to retire all bank debt and preferred stock, to add more than $1,000,000 to working capital and to purchase and retire the old common stock holdings of the estate of Emile Pfizer, son of the founder of the company. A registration statement covering 240,000 shares of common stock is to be filed with the SEC.

The 1941 report of the **Standard Oil Co. of New Jersey** shows consolidated net income of $140,572,419 after taxes, etc., including deduction of $30,000,000 for losses on foreign investments, equal to $5.15 on common. This compares with net income of $123,886,346 or $4.54 in 1940. The prospects for 1942 were said to be not good.

For the year ended December 31, 1941, the **Imperial Chemical Industries, Ltd.**, shows net income of £6,162,212 after depreciation and obsolescence, income taxes, national defense contributions, and excess profits tax. Income in 1940 was £6,418,533.

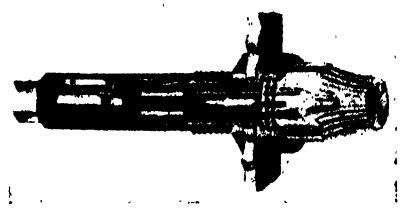
The **U. S. Rubber Reclaiming Co., Inc.**, for the year ended December 31, 1941, shows net profit of $207,601, compared with $319,710 for the preceding year.

Wood Construction Growing in Northwest

The Timber Engineering Co., Inc., Washington, D. C., has opened a branch office in Portland, Ore. Establishment of the office has been occasioned by increased building of war projects which has brought a growing demand from engineers and architects for technical information.

The new branch is to assist distributors and timber fabricators in the Northwest in their promotion of timber construction, render technical advisory service, maintain additional stocks of Teco products readily at hand, cooperate with the West Coast Lumbermen's Association and the Western Pine Association in lumber promotion activities, and do educational work with engineering students and practicing engineers.

Circuit-Break Indicator



The Littelfuse indicator, panel mounting No. 1414, a product of Littelfuse, Inc., Chicago, Ill., is a light that goes on only when the circuit is broken. When installed at any point in connection with remote motor control, it works instantly, with a plainly visible signal to show on or off. It is applicable to any circuits, circuit breakers, line switches, etc.

Air Raid Instruction In Fire and Gas Defense

DURING the present emergency, when it has been necessary to organize and conduct courses in fire and gas defense for air raid wardens, auxiliary firemen and policemen, industrial groups, and other organizations, the city of Minneapolis, Minn., has worked out a very successful procedure.

A corps of 150 to 175 instructors was organized, largely from men who held advanced degrees in chemistry or closely allied sciences, who were reached through the university, the industrial chemists, science teachers in local high schools, and the city fire department. Three meetings were held to furnish the instructors with detailed knowledge on the materials they were to discuss, including suggested lecture demonstrations.

The instructors were furnished with mimeographed copies of six sample lectures—gas defense, chemical agents, first aid in case of exposure, fire defense, bombs, and extinguishing fires. Each instructor was also furnished with a set of large posters and a wooden model of the standard 1-kg. incendiary bomb to be shown in class, and was given a list of reading material.

A limited number of mimeographed copies of the lectures are available on loan to authorized civilian defense instructors through D. F. Defenbacher, Chief of Training, Office of Civilian Defense, Minneapolis, Minn. Richard T. Arnold and Edgar E. Hardy, School of Chemistry, University of Minnesota, Minneapolis, Minn., have been very active in this work.



Artificial Fog

Nozzle jets for creating fire-fighting fog are molded of shatterproof plastic Tenite, made by the Tennessee Eastman Corp. They may be used on any standard pipe or shut-off nozzle. The jets are molded by Northern Industrial Chemical Co. and Niagara Insul-Bake Specialty Co., Inc., and sold by Mul-T-Jet Nozzle Corp., 11 West 42nd St., New York, N. Y.

Raschig Rings

Of "U.S." White Porcelain and Chemical Stoneware are Denser, Better and Stronger.

Any Comparative Test Quickly Proves . . .

"U.S." White Porcelain or Chemical Stoneware Raschig Rings will do a better job for you.

We manufacture more White Porcelain and Chemical Stoneware Raschig Rings than all other producers added together.

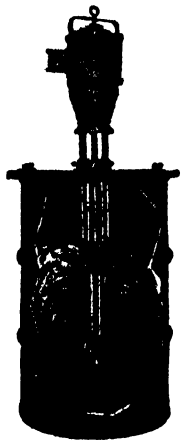
There Must Be A Reason!

New Bulletin No. 54 is now ready for distribution covering our full line of Tower Packing Rings of all types and designs. It is the most complete and comprehensive treatise ever issued on this subject. May we send you a copy?

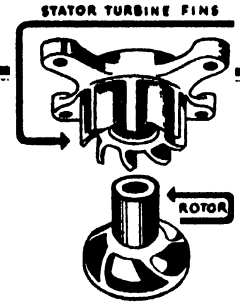
THE U. S. STONEWARE CO.

WORKS (SINCE 1865) AKRON OHIO

S-T-R-E-T-C-H
Man Hours



WITH
HOMO-MIXER'S
ADVANCED PRINCIPLE

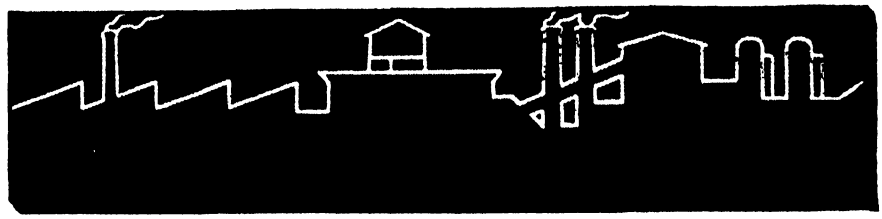


INDUSTRY must win the race against time! But more than a great time-saver is the Eppenbach HOMO-MIXER. It's also engineered for finer diffusion.

Its principle is wholly different. There is no vortex, no air to affect the mixture. Only a fraction of the mass is worked at one time, creating more uniform dispersion. The material is rapidly forced up from the air-free bottom by the stationary turbine fins. With tremendous pressure and turbulence, the flow surges upward, outward and down. The entire batch completes this cycle in just a minute or two. No clamping to tank, no setting at angle, no vibration.

HOMO-MIXERS are doing a big job in process plants today—batteries up to a hundred! Write us!

EPPENBACH
INC.
PROCESSING EQUIPMENT
FOR OVER 29 YEARS
15-19 Vernon Blvd., Long Island City, N.Y.



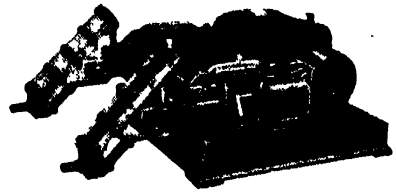
Name of R. & H. Chemicals Department Changed

THE change in name to Electrochemicals Department for one of the manufacturing units most basic in the production of chemicals for peace and wartime uses has been announced by E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. This group of activities was originally known as the R. & H. Chemicals Department. The change is effective June 1. The original name arose after the acquisition by du Pont in 1930 of the Roessler and Hasslacher Chemical Co.

Plastic Cases for Compasses

COMPASSES with cases molded of Lucite methyl methacrylate resin are replacing depleted supplies of French compasses, particularly in high school and college physics laboratories. The plastic cover is molded into a magnifying lens on small compasses so that dial figures may be read easily. Lucite replaces the brass case and glass lens of French compasses and provides top and side visibility. The compasses are made by Chicago Molded Products Corp. from Lucite produced by the Plastics Department of the du Pont company, and are marketed by Chicago Apparatus Co.

Step-Valve Pump in Transparent Plastics

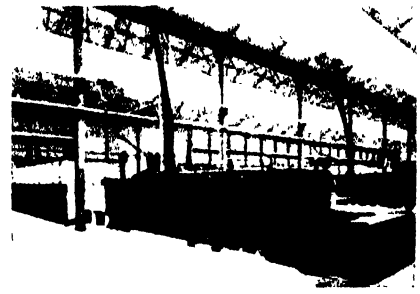


A PLASTICS pump, in which the step-valve and inlet and discharge connections are made entirely from transparent plastics, is recommended for handling alum solutions, hypochlorites, weak acids, mineral and animal oils, and many other liquids, the Plexiglas valve being unaffected by most inorganic solutions and by alkalies and oxidizing acids only in high concentrations.

The valve is said to be nonclogging, self-cleaning, and to eliminate air-binding. The transparency of the plastics material makes it possible to watch the pump function and to detect discoloration or dirt particles in the liquid as it passes through the valve. The pump is made by Milton Roy Pumps, 1300 East Mermaid Ave., Philadelphia, Penna.

SUPPLIES of nylon racket strings and fishing tackle adequate for a normal 1942 season already are on the shelves of sporting goods dealers, reports the du Pont company.

Annealing and Pickling Shell Cases



A high-pressure spray, continuous automatic pickling plant attached to the discharge end of gas-heated muffle furnace.

THE Hanson-Van Winkle-Munning Co., Matawan, N. J., has been appointed sales representative in the United States for equipment of the automatic type for annealing and pickling brass shell cases. The equipment was developed by Curran Bros., Ltd., Cardiff, Wales, which has built and installed virtually all the shell-processing equipment in England and has recently installed several plants in Canada as well as two in New England.

A typical installation includes a pickling chamber placed at the discharge end of a gas-heated muffle furnace so that cold-worked articles can be loaded on conveying mechanism at the mouth of the furnace and need not be touched by hand until they emerge at the other end of the plant, annealed, pickled, washed, and warmed so that they dry very quickly. Pickling chambers are lined with rubber and have a number of zones in each of which the work passes through high-pressure sprays, first of acid and then of hot water, directed upon it from a number of directions from a frame of fine jets.

Ernst Magic Carrier

A NEW Ernst drum and barrel carrier has been announced by the Ernst Magic Carrier Sales Co., Buffalo, N. Y., to handle light wood, fiber, paper barrels, and "one-trip" light gage steel containers with or without chimes. Its capacity is 800 pounds and it will accommodate drums and barrels from 14 to 24 inch diameters.

Plastic Can-Filling Unit

GERMS and condensed moisture can be prevented from entering milk cans while they are being filled in dairies by use of a new can-filling unit with a transparent cover molded of Lucite methyl methacrylate resin, the du Pont company, Wilmington, Del., announces. The plastic cover seals the mouth of the can but allows the dairyman to see the level of the milk without exposing it to the air. Designed to drain any condensed moisture on the feed line to the outside of the can, the unit has a valved feed tube built into the cover to carry the milk directly from the feed

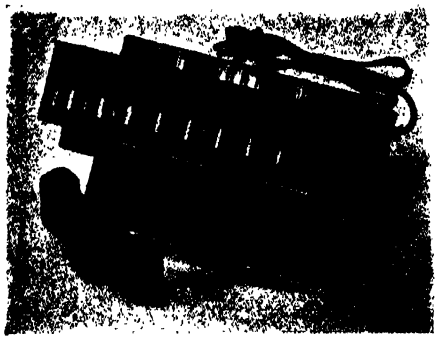
line into the can. The cover is made by Chicago Molded Products Co. from Lucite produced by the Plastics Department of du Pont, and marketed by Majonnier Brothers Co., Chicago.

Fluorophotometer

PFALTZ & BAUER, INC., Empire State Bldg., New York, N. Y., announce a new model fluorophotometer, "C".

This instrument is especially designed to accelerate routine control work in the determination of vitamins and minerals, maintaining established standards of accuracy. It is a complete self-contained unit, incorporating a simple electrical circuit, eliminating the use of amplifier and stabilizer. Features are a novel slide carriage, accommodating both the blank and sample to be tested, and an automatic shutter which shields the sample from the light beam and cuts in the measuring circuit.

Midget Dalite Lamp



WHILE this lamp was designed for use with single Taylor slide comparators when determinations must be made at night or in dark places, it is useful for routine testing even in daylight. The comparator base sits on the shelf at an angle of 45° so that in making readings one can look directly into the slots in the slide and base. This eliminates handling, with possible chance of breakage, as only the sample tubes need be handled. The lamp gives uniform conditions at all times. It is fitted with a Dalite glass, special bulb, cord, and switch and operates on any 110-volt circuit. It can be used with any Taylor pH, chlorine, or phosphate comparator, made by W. A. Taylor & Co., Baltimore, Md.

Hand-Wiping Safety Solvent

THE Research and Development Laboratory of The Curran Corp., Malden, Mass., has developed a new hand-wiping safety solvent which is to be marketed as a safety replacement for naphtha, gasoline, and kerosene in removing cosmoline from rifles issued to troops.

The new solvent is also applicable as a naphtha substitute for grease cleaning and hand-wiping operations in ordnance factories or shell plants.

New Extender Replaces Rubber

EXISTING supplies of rubber can be extended through the use of Extendex C, a new material offered by Wishnick-Tumpeer, Inc., 295 Madison Ave., New York, N. Y. Extendex C can be used to replace from 5 to 20 per cent of the rubber hydro-

CONTINUED ON PAGE 770

SPECIFY *This*
"Radio Principle"
Temperature Controller



With . . .

PROVED-IN-SERVICE SUPERIORITY*

Your investment in this Wheelco "Radio Principle" Controller pays you daily dividends in the form of:

(1) Product Uniformity
(2) Reduced Spoilage
(3) Increased Production

Capacitrols have often paid for themselves during a single production cycle.

The famous "Radio Principle" control employed in Wheelco Controllers eliminates the faults inherent in all other types of controllers. Only Wheelco Controllers can give you instantaneous control combined with extreme accuracy of temperature measurement.

Write *for Bulletin D2-3 giving detailed description of this controller.*

Wheelco CAPACITROL

"Radio Principle" Temperature Controller

A Potentiometers
D Pyrometer Controllers
G Thermometers
H Pressure Gages
J Special Controllers
L Combustion Safeguards
P Valves
S Switches - Thermometers - Protecting Tubes, etc.

**The Proved-in-Service Superiority of the Wheelco Capacitrol has been demonstrated in every application where temperature control is essential.*

Wheelco Instruments Co.

851 Harrison Street Chicago, Illinois

EMPLOYMENT CLEARING HOUSE

BUFFALO, NEW YORK

SEPTEMBER 7–11, 1942

▼ ▼ ▼ ▼

ST. LOUIS, April 1941 — 1200 interviews

ATLANTIC CITY, September 1941 — 1000 interviews

MEMPHIS, April 1942 — 1700 interviews

BUFFALO, September 1942 — ?

A service maintained for and limited to members and paid student affiliates of the American Chemical Society.

Since personal conference between employer and prospective employee is its main objective, the Clearing House will be open only to those registered at the Buffalo meeting.

Prospective candidates for employment are urged to register in advance. Forms will be available July 1. Write to

American Chemical Society
1155 — 16th Street, N. W.
Washington, D. C

See CHEMICAL AND ENGINEERING NEWS
June 10, page 724

CHEMICAL MARKET PRICES

May 29, 1942

Compiled from weekly current price listings in the *Oil, Paint and Drug Reporter*, with permission of the publisher under its copyright. These prices, unless otherwise specified, are those prevailing in the New York market for technical grades in usual large commercial quantities.

Acetaldehyde, drums, c/l., wks.	lb.	.11
Acetamide, tech., kegs, 500-lb. lots, works	lb.	.30
Acetanilide, tech., powd., bbls.	lb.	.27
Acetic anhydride, drums, c/l., frt. allowed	lb.	.11½
Acetone, C. P., drums, c/l., dlvd.	lb.	.08½
Acetophenetidin, bbls., 1000 lbs.	lb.	1.00
Acetophenone, drums, 100 lbs.	lb.	1.55
Acid, abietic, drums, c/l.	lb.	.08¾
Acetic, 28%, bbls., c/l.	100 lbs.	3.38
56%, bbls., c/l.	100 lbs.	5.58
Glacial, synth., drums, c/l.	100 lbs.	9.15
Glacial, U. S. P., drums, c/l.	100 lbs.	10.95
Acetylsalicylic, U. S. P., bbls.	lb.	.40
Anthranilic, tech., bbls.	lb.	.95
Battery, cbys., c/l., E. wks.	100 lbs.	1.60
Benzoic, tech., bbls.	lb.	.43
Boric, tech., gran., bags	ton	99.00
Butyric (99%), drums, c/l., wks.	lb.	.22
Chloroacetic, mono-, tech., bbls. wks.	lb.	.17
Chlorosulfonic, drums, c/l., wks.	lb.	.03
Chromic, 99%, drums	lb.	.16¼
Cinnamic, bottles	lb.	3.50*
Citric, cryst., bbls., c/l.	lb.	.20
Cresylic, H. B., 210-215°, drums, c/l., wks., frt. equal	gal.	.81
Formic, 90%, cbys., f. o. b. works, c/l.	lb.	.10½
Gallic, tech., bbls.	lb.	1.10
Hydriodic, 57%, 5-lb. bot.	lb.	2.90
Hydrobromic, 34%, cbys.	lb.	.35
Hydrochloric, 20°, tanks, wks.	100 lbs.	1.75
Hydrofluoric, 30%, bbls., wks.	lb.	.06
60%, lead cbys.	lb.	.14
Hydrofluosilicic, 30%, bbls., wks.	lb.	.09
Hypophosphorus, U. S. P., 30%, 5-gal. demis.	lb.	.75
Lactic, dark, 22%, bbls.	100 lbs.	2.90
Light, 22%, bbls., wks.	100 lbs.	3.90
Maleic, powd., drums	lb.	.30
Mixed, tanks, wks. N unit.	lb.	.05
S unit.	lb.	.0085
Naphthenic, 220-230, drums	lb.	.13
Nitric, C. P., cbys.	lb.	.13
36°, cbys., c/l., wks.	100 lbs.	5.00
Oxalic, bbls., wks.	lb.	.11¼
Phosphoric, U. S. P., 50%	lb.	.10½
Picramic, kegs	lb.	.65
Picric, bbls.	lb.	.35
Pyrogallic, tech., bbls.	lb.	1.45
Salicylic, tech., bbls.	lb.	.33
Stearic, distilled, d. p., bags, dlvd.	lb.	.1580
Sulfanilic, tech., 250-lb. bbls.	lb.	.17
Sulfuric, 66°, cbys., c/l., E. wks.	100 lbs.	1.50
66°, tanks, E. wks.	ton	16.50
60°, tanks, E. wks.	ton	13.00
Oleum, 20%, tanks, E. wks.	ton	19.50
Tannic, tech., bbls.	lb.	.71
Tartaric, U. S. P., cryst., bbls.	lb.	.70½
Tungstic, pure, 100-lb. pkg.	lb.	2.86
Alcohol, ethyl, 190 proof, from molasses, drums, c/l.	gal.	8.19
Amyl, from pentane, tanks	lb.	.131
Butyl, normal, tanks, frt. allowed	lb.	.12½
Cinnamic, bottles	lb.	3.00
Denatured, C. D. 14, drums, c/l., wks., E.	gal.	.65
Diacetone, tech., drums, c/l.	lb.	.11
Furfuryl, tech., drums, c/l., wks.	lb.	.20
Isobutyl, ref., drums, works	lb.	.0860
Isopropyl, ref., 91%, drums, c/l., f. o. b. dest.	gal.	.40½
Wood, *see* Methanol		
Aldol, 95%, drums, c/l., wks.	lb.	.12
Alpha-naphthol, bbls.	lb.	.52
Alpha-naphthylamine, bbls.	lb.	.32
Alum, ammonia, lump, bbls., wks.	100 lbs.	4.25
Chrome, bbls.	lb.	.12½
Potash, lump, bbls., wks.	100 lbs.	4.50
Soda, bbls., wks.	100 lbs.	3.25
Aluminum, metal, 98-99%, drums, c/l.	lb.	.15
Chloride, anhyd., commercial, drums extra, c/l., wks.	lb.	.08
Stearate, bbls., c/l.	lb.	.23
Sulfate, comm'l, bags, c/l., wks., frt. equal	100 lbs.	1.15
Iron-free, bags, wks.	100 lbs.	1.75
Ammonia, anhydrous, fertiliser, f. o. b. wks., frt. equalized	ton	90.00
Pure, cyls.	lb.	.16
Ammonia, aqua, 26°, tanks (on NH_3 content), f. o. b. wks.	lb.	.04
Ammonium bicarbonate, drums	lb.	.0564
Bifluoride, bbls.	lb.	.15½
Bromide, bbls.	lb.	.31
Carbonate, tech., bbls.	lb.	.08¼
Chloride, gray, bbls.	100 lbs.	5.50
U. S. P., gran., bbls.	lb.	.12
Iodide, 25-lb. jars	lb.	3.65
Linoleate, 80%, anhyd., bbls.	lb.	.12
Nitrate, tech., bags, c/l., wks.	100 lbs.	4.35
Oleate, bbls.	lb.	.14
Oxalate, kegs	lb.	.23
Persulfate, cases	lb.	.21
Phosphate, dibasic, tech., bbls.	lb.	.07¼
Sulfate, bulk, c/l., f. o. b. cars, ports contract	ton	29 00
Sulfide, liq. 40-45%, basis 100%, tanks, dlvd.	lb.	07½
Amyl acetate, from pentane, tanks, frt. allowed	lb.	.14½
Chloride, mixed, tanks, wks.	lb.	.06
Mercaptan, drums, l. c. l., wks.	lb.	1.10
Oleate, drums, l. c. l., wks.	lb.	.31
Stearate, drums, l. c. l., wks.	lb.	32½
Amylene, tanks, wks.	lb.	.09
Anilin oil, drums	lb.	.15
Anthraquinone, subl., bbls.	lb	.70
Antimony, chloride, soln., cbys.	lb.	.17
Needle, Bolivian, 67%	lb	18½
Oxide, bags, c/l.	lb.	.15
Salts, 65%, bbls.	lb.	.40
Argols, test 75-80%, basis 100%, f. o. b. Spanish ports	100 kilos	105.00
Arsenic, metal, kegs	lb.	No prices
White, c/l., kegs	lb.	.04
Arsenous chloride, cans	lb.	4.85
Barium carbonate, natural, 99%-200 mesh, bags, c/l., wks.	ton	43 00
Chloride, tech., cryst., bgs., c/l.	ton	77.50
Dioxide, drums, wks.	lb.	.10
Hydroxide, bbls., wks.	lb.	.06
Nitrate, casks	lb.	.11
Barytes, floated, 350-lb. bbls., wks.	ton	27 65
Benzaldehyde, tech., drums	lb.	.45
Benzidine base, bbls.	lb.	.70
Benzol, tanks, frt. allowed E. of Omaha	gal.	.15
Benzoyl chloride, carboys	lb.	.23
Benzyl acetate, F. F. C., drums	lb.	.55*
Beta-naphthol, tech., bbls.	lb.	.23
Beta-naphthylamine, tech., kegs	lb.	.51
Bismuth, metal, ton lots	lb.	1.25
Bismuth nitrate, cans	lb.	1.30
Oxychloride, kegs	lb.	3.10
Subnitrate, powd., barrels	lb.	1.20
Blanc fixe, dry, bags, c/l.	ton	60.00
Bleaching powder, drums, wks.	100 lbs.	2.25
Bone black, 4, bbls., c/l., frt. allowed E.	lb.	.11
Borax, tech., gran., bulk, c/l., frt. allowed	ton	41.50
Bordeaux mixture, drums	lb.	.11
Bromine, cases	lb.	.25
Bromoform, cbys.	lb.	1.42
Butyl acetate, drums, c/l., frt. allowed	lb.	.14½
Aldehyde, drums, l. c. l.	lb.	.16½
Lactate, drums	lb.	.26½
Stearate, drums	lb.	.31
Cadmium, metal, ingots, cases	lb.	.90
Bromide, 25-lb. jars	lb.	1.65
Sulfide, boxes	lb.	1.35
Caffeine, 100-lb. drums, 10,000 lbs. or more	lb.	2.60
Calcium acetate, bags	100 lbs.	3.00
Arsenate, bgs., c/l.	lb.	.07
Carbonate, precip., bags, 50 lbs., c/l., wks.	lb.	.02⅞
Chloride, bags, flake, c/l., dlvd.	ton	18.50
Gluconate, U. S. P., bbls., 150 lbs.	lb.	.52
Phosphate, dibasic, 38-40% P_2O_5, bags, Atlan. pts.	unit-ton	No prices
Tribas., bbls.	lb.	.0635
Calomel, bbls., kegs, 50 lbs. or more	lb.	2.95
Camphor, synthetic, gran., powd., drums, ton lots	lb.	.42
Carbazole, 95%, drums, ton lots, wks.	lb.	.70
Carbon bisulfide, drums, c/l.	lb.	.05
Black, reg., uncomp., bgs., c/l., works	lb.	.03625
Dioxide, liq., cyl.	lb.	.06
Tetrachloride, drums, c/l., frt. allowed	gal.	.73
Casein, dom., 20-30 mesh, bags, c/l.	lb.	.17½
Cerium oxalate, bbls., wks.	lb.	.35
Charcoal, willow, powd., bbls.	lb.	.06
China clay, bulk, c/l., wks.	ton	7.60
Chloral hydrate, drums	lb.	.90
Chlorine, liq., c/l., cyl., dlvd.	lb.	.05¼
Tanks, wks., frt. equal	100 lbs.	1.75
Chlorobenzene, mono-, drums	lb.	.07
Chloroform, tech., drums	lb.	.20
Chromium acetate, 24%, powd., bbls.	lb.	.22
Sulfate, pearls, dms.	lb.	.40
Coal tar, crude, bbls., c/l., wks.	bbl.	7.50
Cobalt oxide, black, kegs	lb.	1.84
Copper carbonate, 52-54%, bbls.	lb.	.18
Chloride, bbls.	lb.	.23¼
Cyanide tech., bbls.	lb.	.34
Metal, elec.	lb.	.12
Oxide, black, bbls., tons, wks.	lb.	.19½
Sulfate, bbls., c/l., wks.	100 lbs.	5.15
Copperas, cryst., bulk, c/l., wks.	ton	14.00
Cream of tartar, bbls.	lb.	.57½
Cresol, U. S. P., drums, c/l., wks.	lb.	.11
Crotonaldehyde, 97%, c/l., wks.	lb.	.15
Cyanamide, 22% N, pulvd., dlvd., contracts	Nitrogen unit	No prices
Diamylamine, drums, c/l., wks.	lb.	.61
Diamylene, tanks, wks.	lb.	.09½
Diamyl phthalate, tanks	lb.	.21
Diatomaceous earth, dom., bags, c/l., Pacific Cst.	ton	22 00

Dibutylamine, drums, l. c. l., wks.	lb.	.64
Dibutylphthalate, drums, c/l., dlvd.	lb.	.21
Tartrate, drums	lb.	.92
Dichlorethyl ether, drums, c/l., wks.	lb.	.15
Diethanolamine, drums, c/l., wks.	lb.	.23½
Diethylaniline, drums	lb.	.40
Diethylene glycol, drums, c/l., wks.	lb.	.14
Monobutyl ether, drums, wks.	lb.	.22½
Monoethyl ether, drums, c/l., wks.	lb.	.14½
Diethyl phthalate, drums, c/l.	lb.	.21½
Sulfate, tech., drums, wks.	lb.	.13
Diglycol oleate, light, bbls.	lb.	.17
Dimethylaniline, drums	lb.	.23
Dimethyl phthalate, drums, c/l., dlvd	lb.	.20
Dinitrobenzene, tech., drums	lb	.18
Dinitrochlorobenzene, bbls.	lb.	.14
Dinitronaphthalene, bbls.	lb.	.35
Dinitrophenol, bbls.	lb.	.22
Diphenyl, bbls., c/l, wks.	lb.	.15
Diphenylamine, bbls.	lb.	.25
Diphenylguanidine, bbls.	lb	.35
Epsom salt, tech., bags	100 lbs.	1.80
Ether, concn, drums	lb.	.11
Nitrous, bots., 100 lbs	lb.	.93
Ethyl acetate, 85 90%, tanks, frt. allowed	lb.	.11
Acetoacetate, drums, c/l., wks.	lb.	.37½
Bromide, drums	lb.	.50
Chloride, drums	lb.	.18
Formate, drums	lb.	.27¾
Methyl ketone, drums	lb.	.09
Ethylene dichloride, drums, c/l., wks, frt. allowed	lb.	.0742
Glycol, drums, c/l.	lb.	.14½
Monobutyl ether, drums, wks.	lb.	.16½
Monoethyl ether, drums, wks.	lb	.14½
Monoethyl ether acetate, drums, wks	lb.	.11½
Monomethyl ether, drums, wks.	lb.	.15½
Feldspar, 20 mesh, bulk, wks.	ton	9.75
Film scrap colors, dk., cs., 1,000 lbs., E. wks.	lb.	.14
Fluorspar, 95%, bags, f. o. b. mines	ton	33.00
Formaldehyde, bbls., c/l.	lb.	.05½
Fuller's earth, bags, c/l, mines	ton	8.50
Furfural, tech., drums, contract, works	lb.	.10
Glauber's salt, bbls., c/l.	100 lbs.	1.05
Glycol phthalate, drums	lb.	.38
Stearate, drums	lb.	.26
Hexamethylenetetramine tech., drums	lb.	.32
Hydrogen peroxide, 100 vol., cbys., c/l.	lb.	.16
Hydroquinone, kegs	lb.	.90
Indigo, synth., liq., bbls	lb.	.16½
Iodine, resubl., jars	lb.	2.00
Iodoform, drums, 100 lbs.	lb.	3.95
Iron acetate, N. F. IV, cbys.	lb.	.15
Iron chloride, tech., cryst., bbls., wks., frt. allowed	lb.	.05
Isopropyl acetate, tanks, frt. allowed	lb.	.07½
Lead acetate, white, broken	lb.	.12¾
Arsenate, bbls.	lb.	.11
Metal, N. Y.	1 lb.	.0650
Oxide, litharge, bbls., 20-ton lots,	lb.	.0790
Peroxide, powd., tech	lb.	.23
Red, bbls., 20-ton lots	lb.	.09
Sulfate, bbls.	lb.	.0725
White, basic carb, bbls.	lb.	.0825
Lecithin, edible, drums, c/l.	lb.	.34
Tech., dms., c/l.	lb.	.28
Lime, live, chemical, bulk, wks.	ton	7.00
Lime-sulfur, dry, bags, c/l.	lb.	No prices
Lithopone, ordinary, bbls.	lb.	.04½
Magnesite, calcined, dom., bags	ton	80.00
Magnesium carbonate, tech., bags, c/l.	lb.	.06¼
Chloride, drums	ton	32.00
Fluosilicate, cryst., bbls.	lb.	.20
Oxide, light, bbls.	lb.	.26
Manganese chloride, bbls.	lb.	.14*
Dioxide, 85–90%, bbls., c/l., wks.	ton	74.00
Sulfate, anhyd, bbls., wks.	lb.	.10½
Mannitol, commercial, bbls., wks.	lb.	.35
Menthol, nat., cans	lb.	13.00
Mercury bichloride, cryst., drums, 50 lbs. or more	lb.	2.39
Mercury, flasks, 76 lbs., mines	flask	191.00
Meta-phenylenediamine, kegs	lb.	.65
Meta-toluylenediamine, kegs	lb.	.70
Methanol, synthetic, drums, frt. allowed, c/l.	gal.	.34½
Tanks, frt. allowed	gal.	.28
Methyl acetate, 97–99%, tanks	gal.	.09½
Chloride, cylinders	lb.	.32
Formate, l. c. l., drums	lb.	.89
Hexylketone, drums, tech., wks.	lb.	.60
Salicylate, drums	lb.	.35
Monoamylamine, drums, c/l., wks.,	lb.	.61
Monobutylamine, drums, l. c. l., wks.	lb.	.51
Monoethanolamine, drums, wks.	lb.	.24
Naphthalene, crude, dom., 74 deg., bags, c/l., wks.	100 lbs.	2.75
Nickel salt, single, bbls.	lb.	.13
Niter cake, bulk	ton	16.00
Nitrobenzene, drums	lb.	.08
Nitrocellulose, alcohol-sol., bbls., wks.	lb.	.28
Nitrogen solution	unit	1.2158
Octanol, normal, drums.	lb.	.85
Oil, castor, No. 3, tanks	lb.	.12¾
China wood, dms.	lb.	.40¼*
Coconut, crude, tanks.	lb.	No prices
Cod, Newf., bbls.	gal.	.85
Corn, crude, tanks, mills.	lb.	.12¾*
Cottonseed, cooking, bbls.	lb.	.16¾
Linseed, raw, tanks.	lb.	.1320
Menhaden, crude, tanks, f. o. b. Baltimore	gal.	.6660
Neat's-foot, pure, bbls.	lb.	.19¼
Oiticica, bbls.	lb.	.25¼*
Oleo, No. 1, bbls.	lb	.13¼
Olive oil, denat., bbls.	gal.	4.20
Edible, Calif., drums	gal.	4.90
Palm, Niger, bbls.	lb.	.0902*
Peanut, crude, tanks.	lb.	.13*
Perilla, drums	lb.	.2460
Rapeseed, tax incl., bbls.	gal.	.15½*
Red, bbls.	lb.	.1330
Soy bean, crude, tanks.	lb.	.12½*
Sperm, 38°, bbls.	lb.	.1301
Whale, bbls., natural, refined	lb.	.1070*
Ortho-dichlorobenzene, drums	lb.	.06
Ortho-nitrochlorobenzene, kegs	lb.	.15
Ortho-nitrotoluene, drums	lb.	.09
Ortho-toluidine, bbls.	lb.	.19
Para-dichlorobenzene, drums, c/l.	lb.	.11
Para-formaldehyde, drums	lb.	.23
Paraldehyde, tech., drums	lb.	.12
Para-nitraniline, drums	lb.	.45
Para-nitrochlorobenzene, drums	lb.	.15
Para-nitrotoluene, bbls.	lb.	.30
Para-phenylenediamine, bbls.	lb.	1.25
Para-toluidine, bbls.	lb.	.48
Paris Green, 250-lb. kegs.	lb.	.24
Perchlorethylene, drums, c/l., wks.,	lb.	.08
Phenol, drums, c/l., wks.	lb.	.12¾
Phenolphthalein, yellow, drums, ton lots.	lb.	.80
Phenylethyl alcohol, bottles	lb.	2.10
Phloroglucinol, tech., tins, wks.	lb.	15.00
c. p., tins, wks.	lb.	20.00
Phosphorus, red, cases	lb.	.40
Oxychloride, 175-lb. cylinders	lb.	.15
Trichloride, cyl.	lb.	.15
Phthalic anhydride, bbls., c/l.	lb.	.14½
Platinum, metal, solid	oz.	36.00
Potash, caustic, solid, drums	lb.	.06¼
Potassium acetate, tech., bbls.	lb.	.28
Bicarbonate, gran., bbls.	lb.	.14
Bichromate, casks, c/l., wks.	lb.	.09½
Bromide, U. S. P., gran., bbls.	lb.	.27
Carbonate, 80–85%, calc., casks.	lb.	.06½
Chlorate, cryst., kegs.	lb.	.11*
Chloride, tech., cryst., bgs.	lb.	.08*
Cyanide, drums	lb.	.55
Meta-bisulfite, bbls.	lb.	.18
Muriate, fert., bulk	K_2O unit	.53½
Permanganate, tech., drums	lb.	.19¾
Prussiate, red, casks.	lb.	No prices
Yellow, casks.	lb.	.17
Pyridine, denat., drums	gal.	1.71
Pyrocatechin, c. p., drums.	lb.	2.15
Quinine, 100-oz. cans	oz.	.97½
Resorcinol, tech., kegs	lb.	.68
Rochelle salt, powd., bbls.	lb.	.43½
Saccharin, drums	lb.	1.45
Salt cake, bulk, wks.	ton	15.00
Saltpeter, gran., bbls.	100 lbs.	8.20
Silica, amorph., 96%, 325 mesh, bags, c/l., wks.	ton	20.00
Silver nitrate, vials	oz.	.26¼
Soda, ash, 58%, light, paper bags, contract, wks.	100 lbs.	1.05
Caustic, 76%, solid, drums, contract, wks.	100 lbs.	2.30
Sodium acetate, flake, 60%, bbls.	lb.	.05
Alginate, drums	lb.	.69
Antimoniate, bbls.	lb.	.15
Benzoate, U. S. P., bbls.	lb.	.46
Bicarbonate, U. S. P., powd., bbls., c/l., wks.	100 lbs.	1.85
Bichromate, c/l., wks.	lb.	.07½
Bisulfite, bbls.	100 lbs.	3.00
Bromide, U. S. P., bbls.	lb.	.27
Chlorate, cryst., bags.	lb.	.06¼
Chloride, bags	ton	15.70
Cyanide, 96–98%, dom., drums.	lb.	.14
Fluoride, white, 90%, bbls., c/l., frt. alld.	lb.	.08
Metallic, untrimmed bricks, drums, f. o. b. Niagara Falls.	lb.	.15½
Metasilicate, gran., bbls.	100 lbs.	2.50
Napthionate, bbls.	lb.	.50
Nitrate, crude, bulk, works.	ton	27.00
Nitrite, bbls.	lb.	.06¾
Perborate, bbls.	lb.	.14¾
Phosphate, disodium, cryst., bags, c/l., wks.	100 lbs.	2.55
Phosphate, trisodium, bags, c/l., wks.	100 lbs.	2.70
Picramate, kegs	lb.	.65
Prussiate, yellow, bbls.	lb.	.11
Silicate, drums, c/l., 40°	100 lbs.	.80
Silicofluoride, dom., bbls.	lb.	.09
Stannate, drums	lb.	.33½
Sulfate, anhyd., bags	100 lbs.	1.70
Sulfide, cryst., bbls	100 lbs.	2.40
Solid, 60%	100 lbs.	3.15
Sulfocyanide, c. p., bbls.	lb.	.55
Thiosulfate, reg., cryst., bgs.,	100 lbs.	2.25
Tungstate, tech., kegs	lb.	No prices
Strontium carbonate, tech., bbls.	lb.	.25*
Nitrate, bbls.	lb.	.07¾
Sulfur, bulk, mines	ton	16.00
Chloride, drums	lb.	.03
Dioxide, commercial, cyl., wks.	lb.	.07
Tetrachloroethane, 50-gal. drums.	lb.	.08
Thiocarbanilid, bbls.	lb.	.24
Tin, Straits	lb.	.52
Crystals, bbls.	lb.	.39
Oxide, bbls.	lb.	.55
Tetrachloride, anhydrous, drums, bbls.	lb.	No prices
Titanium dioxide, bags	lb.	.14¾
Toluene, tanks	gal.	.28
Triamylamine, drums, c/l., wks.	lb.	.98
Triamylborate, drums, l. c. l., wks.	lb.	.33
Tributylamine, drums, c/l., wks.	lb.	.78
Trichloroethylene, druns, wks., frt. allowed	lb.	.08
Tricresyl phosphate, tech., drums.	lb.	.25
Triethanolamine, drums, c/l., wks.,	lb.	.19
Triphenyl phosphate, barrels	lb.	.31
Tungsten, tech., powder	lb.	2.60
Urea, dom., 46 + % N., bags, f. o. b. wks. or seaboard	ton	80.00
Vanillin, 25-lb. tins	lb.	2.35
Whiting, comm., dry-grd., bags, c/l., wks.	ton	18.00
Xylene, 10°, tanks	gal.	.30
Xylidine, drums	lb.	.35
Zinc ammonium chloride, bbls.	lb.	.0565
Chloride, tech., fused, drums.	lb.	.05
Dust., bbls., c/l.	lb.	.1035
Metal slabs, at N. Y.	lb.	.0865
Oxide, Amer., bags	lb.	.0725
Stearate, tech., bbls.	lb.	.30
Sulfate, cryst., bgs., c/l., wks.	100 lbs.	3.60

* Nominal.

EMPLOYMENT INFORMATION

RATES to be paid in advance. Standard setting 5c a word, minimum charge $2.00 each; include 8 words for box address. Exceptions see ⟶ Display, $10.00 per column inch. 2 inches maximum, larger units at regular display unit rates. No discounts or allowances.
SEND advertisements with remittance to INDUSTRIAL AND ENGINEERING CHEMISTRY, 332 West 42nd St., New York, N. Y., to reach there not later than 10:00 A.M. on the 10th and 25th, closing dates for editions of CHEMICAL and ENGINEERING NEWS of the 25th and 10th, respectively. Insertions made in order of receipt provided necessary remittances are complete.
EMPLOYERS are requested to mention in their announcements the section of the country in which the open position is located to ensure replies only from those who are geographically available.
In printing these advertisements the SOCIETY assumes no obligations as to qualifications of prospective employees or responsibility of employers.

UNEMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking employment for themselves are allowed in one calendar year 3 announcements free (one per issue) set in standard style and limited to 50 words each, including 8-word box address, and 3 additional standard announcements at 50% of regular rate. Further announcements and excess words at full rate.

EMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking new positions are permitted 3 standard announcements during the calendar year at 50% of the regular rate—include 8 words for box address.

EMPLOYERS seeking chemists and chemical engineers are permitted 3 standard announcements, not to exceed 50 words each including box address and not more than one per issue, during the calendar year without charge, provided they agree in writing to acknowledge all replies (excess words 5c each), otherwise full rate applies.

The AMERICAN CHEMICAL SOCIETY is vitally interested in the welfare of its members and in seeing that the chemical industry is manned with competent chemists and chemical engineers. These pages are part of our service in that connection. In addition most of the larger sections of the AMERICAN CHEMICAL SOCIETY and several of the smaller ones have active employment committees. Local section secretaries in your area will inform you as to any employment aids that may be available locally.

An Employment Clearinghouse is operated at each national meeting of the SOCIETY for the purpose of bringing together representatives of industry looking for chemists and members and student affiliates in attendance wishing to make such contacts. For further details, consult the preliminary and final programs as printed in the NEWS EDITION prior to each meeting.

In the New York area, special employment facilities are offered by the Employment Bureau of the Chemists' Club, 52 East 41st St., New York, N. Y. In the Chicago area, the Chicago Section maintains an employment service at 413 Stevens Hotel, Chicago, Ill.

Those replying to announcements should be careful to send copies and not original documents. Advertising circulars will not be forwarded and to that end all letters will be opened at the forwarding office.

SITUATIONS OPEN

Those announcements in which the letter "P" is part of the address key have paid in full and are not committed to acknowledge replies. The Society regards acknowledgment by employers of all applications as an act of common courtesy but can assume no responsibility for their failure to do so.

EXECUTIVES, CHEMICAL ENGINEERS AND CHEMISTS with exceptional backgrounds of experience should use our confidential and individual method of contacting responsible employers. No limit to territory. We negotiate all overtures. Established 1915. The National Business Bourse, 20 W. Jackson Blvd., Chicago, Ill.

PACIFIC COAST college has an instructorship or assistant professorship for a man with physical and analytical training. Ph.D. preferred. Genuine interest in teaching, and in the aims of Christian education in a liberal arts college demanded. Give full details of training and experience, and state minimum acceptable salary.
Box 80-T-5, Ind. & Eng. Chem., Easton, Pa.

GRADUATE ASSISTANTSHIPS available for next year. Salary $540 for nine months' service. Part time laboratory teaching. Write for application blanks. H. D. Newton, Head, Department of Chemistry, University of Connecticut, Storrs, Connecticut.

CHEMIST WANTED: Recent graduate or graduate with a few years of experience, development work. Draft deferred. Chicago area.
Box 32-NP-5, Ind. & Eng. Chem., Easton, Pa.

TWO RECENT graduate chemists for analytical analysis in control laboratory of large Philadelphia chemical plant. Salary $2,150, per year.
Box 59-NP-5, Ind. & Eng. Chem., Easton, Pa.

LARGE NEW YORK engineering firm requires chemical engineers age preferably 25-30 with any following experience: 1. Petroleum refinery experience in operation or design of stabilisers, absorbers and light end equipment. 2. Refinery experience in design or operation of plants for solvent dewaxing and solvent extraction of lube oils. 3. Refinery experience in design or operation thermal or catalytic cracking plants. In reply state education, qualifications and refinery experience in detail. Also salary expected and status regarding military service.
Box 80-NP-5, Ind. & Eng. Chem., Easton, Pa.

RUBBER CHEMIST, experienced in compounding rubber, wanted for research on sealing materials used for hermetic closures. Good opportunity for young, aggressive, well qualified chemist. Middlewestern location. In reply give full particulars of training and experience, draft status, and salary desired.
Box 50-T-5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST or CHEMICAL engineer age 27-30 experienced in development and field application of cutting oils, and compounds also wax products by large oil company; location Milwaukee, Wisconsin. Permanent position. Give complete details, education, experience, salary expected, and photograph.
Box 52-T-5, Ind. & Eng. Chem., Easton, Pa.

GRADUATE RESEARCH assistantships, chemistry, University of Florida, commencing July 1st. Stipend $50.00 per month. 14 hours assisting per week from September through May. Fee of $21.25 per semester. For applicaton blank address Dr. J. E. Hawkins, Department of Chemistry, Gainesville, Florida.

DESIGNERS and DRAFTSMEN

For vital war plant work carrying high priority ratings of A-1-A to A-1-C.

Working 50 hours per week with remuneration on basis of a 40-hour week with time and one-half for work in excess of 40 hours per week. Program covers 1½ years.

Must have experience in design of:

Oil Refinery Process Piping
Concrete and Structural Steel
Heat Exchangers, Pressure Vessels
Electrical Control, Light and Power
Conduit Systems

Instrument Engineers able to select and specify proper control instruments for oil refinery units.

Application should be made by letter giving age, nationality, concise outline of previous experience and educational background, present salary, salary desired and references. Include recent photograph.

BLAW-KNOX COMPANY
Process Industries Dept.
P. O. Box 5087
East Liberty Station, Pittsburgh, Pa.

CHEMIST WANTED: Preferably experienced in foods as associate in laboratory specialising in food products in New York metropolitan area. Good opportunity for one with initiative and ability to make contacts. Liberal pay for one who can produce results. Write giving full information and photograph.
Box 16-N-6, Ind. & Eng. Chem., Easton, Pa.

WANTED: Well trained young chemist, Ph.D., for work largely in analysis and standardisation of new drugs. Salary commensurate with qualifications. Give details of education, experience, references, etc.
Box 21-NP-6, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, draftsman, experienced in Ethyl Alcohol plant work, to assist in laying out plans and in erecting new plant. Later to continue in production supervision. Write full details and submit photograph.
Box 25-N-6, Ind. & Eng. Chem., Easton, Pa.

Sales and Technical Engineer

U. S. Citizen, for sales and engineering development of stainless steels, clad steels and composite steels. In reply state qualifications and salary desired.

Box 22-NP-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, Gentile, with some experience in commercial analytical laboratory and in teaching elementary physics or chemistry, for position with long established institution and commercial food laboratory. State age, experience, draft classification, salary and business references. If possible attach photo or snapshot.
Box 18-N-6, Ind. & Eng. Chem., Easton, Pa.

YOUNG WOMAN, chemical engineer or organic chemist wanted for technical abstracting, translation, and report writing in petroleum industry Chicago area. Must be single, American, preferably under 30. Enclose statement of education, experience, salary requirement, and photo.
Box 23-N-6, Ind. & Eng. Chem., Easton, Pa.

TEACHING POSITION for chemical engineer in rapidly growing department in state university. An unusual opportunity for man of ability and training who likes teaching. Permanent position starting September 1. Kindly give academic history and draft status.
Box 24-N-6, Ind. & Eng. Chem., Easton, Pa.

METALLURGICAL CHEMIST: Recent graduate or several years' experience in sheet steel fabrication and drawing. Company engaged in both vital defense and non-defense activity. Excellent opportunity to establish and develop production control and research. Eastern location.
Box 29-NP-6, Ind. & Eng. Chem., Easton, Pa.

PLANT CHEMIST or chemical engineer with at least two years' manufacturing experience in producing organic chemicals, to take charge of one shift of manufacturing. Essential war work. Permanent. Plant near New York City.
Box 32-NP-6, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST for industrial chemical research. New York State. Previous experience desirable but will consider recent graduate. State qualifications and salary expected. Enclose snapshot.
Box 49-NP-6, Ind. & Eng. Chem., Easton, Pa.

CHEMISTS and CHEMICAL engineers, preferably M.S. or Ph.D. with industrial experience for research in Graphic Arts in Chicago. Give details of training, personal data, and salary desired.
Box 58-NP-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST experienced in extraction of Theobromine from by-products. Applicant should submit details of training and experience, personal data and salary expected, excellent opportunity and permanent employment for qualified man.
Box 70-N-6, Ind. & Eng. Chem., Easton, Pa.

Chemical Engineer
Physical Chemist
Cereal Chemist
Biochemist
Organic Chemist
Food Technologist
Analytical Chemist

Consideration will be given to applications from Bachelors, Masters, Ph.D.s and those with a few years post-doctorate experience. These openings represent opportunities in the Research Laboratories of a food organization located in the East. We are able to consider only men of outstanding qualifications. Applicants should submit educational history, college record, experience, age, and other personal data, with recent photograph.

Box 100-TP-4, Ind. & Eng. Chem., Easton, Pa.

Address communications to the box number indicated and Mail to Easton, Penna.

The American Chemical Society has no information concerning the position advertised, or in regard to those seeking employment.

SITUATIONS WANTED
(A.C.S. MEMBERS)

NEW PRODUCT? Could I suggest or work out with you that new product? Biochemist, Ph.D. with industrial plant and laboratory experience in vitamins and vitamin products, nutrition, foods and bioassays. Desires supervision of production or research with progressive company. Married.
Box 79-T-3, Ind. & Eng. Chem., Easton, Pa.

TEACHER RESEARCH worker; Ph.D. Majors: Physical chemistry, chemical engineering. Twelve years' teaching these with inorganic, analytical chemistry, etc. Sixteen years' industrial research, consulting, testing. Numerous publications. Employed. Seeking broader field.
Box 22-T-4, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. course work and research completed. Physical chemistry minor. Publications. Four years' teaching general and organic. Eastern location preferred but not essential. Draft deferred. Available in June.
Box 35-N-5, Ind. & Eng. Chem., Easton, Pa.

ELECTRO-CHEMIST, M.S. with further graduate work equivalent to Ph.D. (Electrochemistry major). B.S. in Chem. Eng. Six years' successful research and development work in electroplating and metal finishing, including bright nickel, high speed tin, copper and nickel, noble metals, alloy plating including brass and silver alloys, etc. Plant experience. Proven ability. Possesses initiative and ability to work with people. Publications and patent. Age 32, employed, 3A.
Box 86-N-5, Ind. & Eng. Chem., Easton, Pa.

AGRICULTURAL and BIOLOGICAL Chemist, B.S. 1938, Pennsylvania State College. Research in Agr. Exp. Sta. Industrial experience in food and dairy chemistry and bacteriology. Draft deferred, age 24, married.
Box 87-N-5, Ind. & Eng. Chem., Easton, Pa.

CHEMIST PHARMACEUTICAL Organic, training in Pathology and Physiology. Graduate work 4 years, Research assistant 3 years, now operating own successful organic synthetic lab. 2 yrs. Wide experience in analysis, research, production, and sales. Honor societies, publications.
Box 26-T-5, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, B.Ch.E. cum laude, M.S., work toward Ph.D., honor societies. Excellent organic training—synthetic, micro-analytic. Food Analysis, vitamins. Studies, plastics, synthetic rubber. Executive, teaching, experiences. Resourceful, co-operative. Age 35, married, draft 4-C. Desires teaching, research, development, production position.
Box 34-T-5, Ind. & Eng. Chem., Easton, Pa.

COLLEGE TEACHER desires to obtain position teaching chemistry only. Nine years' successful experience teaching general, qualitative and organic in college and engineering school. Now teaching chemistry and other sciences. Present position permanent. Would be pleased to have opportunity to do research while teaching. Good recommendations. Ph.D. 1935. Major, organic; minor, general chemistry. Good background in other sciences. Publications. Membership: Sigma Xi, Phi Lambda Upsilon. Protestant, family.
Box 46-T-5, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, Cornell, B.Chem. 1939, Ch.E. 1940, single 23. Two years' experience development work on organic chemicals, methanol, ammonia. Any location, available immediately. Defense work preferred; principally interested in process development, improvement of existing processes; production if defense industry.
Box 66-T-5, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST

Experienced in design and erection of plants for the manufacture of synthetic coal tar dyes and intermediates, prefers employment as a customer contact man or as a field construction superintendent for large construction company preparing plant and equipment installation plans for new projects. Have thorough knowledge of skillful assembly and practical operation of a wide variety of unit processes. Best assets are keen perception and sound judgment—matured by intensive study of plant ills which retard chemical productions.

Box 10-N-6, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.S. 1940, industrial production, analytical, and investigative experience, with wide responsibilities. Desires research, development, or production in organic field, with company contributing to war effort. Twice classified 2A. Age 24. Presently employed.
Box 77-T-5, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, M.S. Graduate A.C.S. approved college. 2½ years' industrial experience special methods of analysis. Desires to change to research or engineering development with progressive company engaged in vital war work. Married, 26. Draft 3A.
Box 11-N-6, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, M.S. in Physics. Two years' production experience in chlorine, caustic, chlorinated hydrocarbons. One year in refinery pilot plant. Now analytical chemist in aircraft plant. Desires position where his abilities can be utilised fully. Married, Protestant. Middle West preferred but not essential.
Box 12-N-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST B.S., 4 years' analytical experience, 2½ years' research in inorganic non-metallics, plus good background in physics. Defense course "Industrial Spectroscopy." Desires defense work. Prefer supervisory capacity in control.
Box 13-N-6, Ind. & Eng. Chem., Easton, Pa.

RUBBER CHEMIST, 32, married, draft deferred, 10 years' experience in compounding, testing and processing rubber and synthetics. Desires position of responsibility with reliable company.
Box 15-N-6, Ind. & Eng. Chem., Easton, Pa.

YOUNG CHEMICAL engineer, B.S.Ch.E. '42, desires position connected with defense. Part time and summer work in food, wax paper, and plastic coatings. Undergraduate thesis in petroleum research. High scholastic standing. Available June 2.
Box 17-N-6, Ind. & Eng. Chem., Easton, Pa.

RESEARCH DIRECTOR, Ph.D. with many years' successful executive and laboratory experience developing and improving both organic and inorganic industrial products from initial research through to plant production seeks new permanent responsible position offering definite opportunities. East preferred. Minimum salary $7500.
Box 27-N-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST and CHEM. Eng. A.B., Ch.E. Columbia University. 3 years' viscose rayon plant. 11 years' development and research with leading consultant. 3 years' chief analyst large food company. Employed but desires change.
Box 30-N-6, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEERING executive. Successful experience with large manufacturing corporations both in East and on West Coast as research director, technical director and as consultant. Qualified for organization and management of technical department including research, or for special investigations of new processes or applications of products. Experienced with wide variety of products. Registered patent attorney. Ph.D. Numerous patents and publications.
Box 31-N-6, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST, Ph.D. leading Midwest University. Major organic and minor physical chemistry Held teaching fellowship four years, full time instructor in organic chemistry. One year at large midwest university. One year industrial research experience. Married, 28, Protestant, favorable draft status; member several scientific fraternities. Available on short notice.
Box 33-N-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S., M.I.T. 1940. Honor student. Graduate assistant small mid-west college 1941-1942. Defense course in powder and explosives. Desires position utilizing mathematical ability. Am not interested in position involving chiefly laboratory manipulative work. Industrial work preferred to research. Location immaterial.
Box 36-N-6, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Sc.D. which required 2 years' beyond Ph.D. Woman with mathematical, teaching, research, and leadership ability. 14 years' experience, 6 as head of departments. Broad knowledge of all related fields nutrition and health education.
Box 37-N-6, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST M.S. Michigan. Single, 41. Twelve years' experience in explosives, rubber, steel, chemicals, paper. One year government explosives inspector. Had charge of two laboratories. Eastern U.S.A. wanted but will consider other locations. Performed research on inorganic problem. Prefer war work.
Box 38-N-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S. May 10, 1942. Have completed fifty-five semester hours of chemistry. Thoroughly trained in analytical, organic and physical chemistry. Age 22, single, draft deferred. Now available. Eastern location preferable.
Box 39-N-6, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL and INORGANIC chemist, M.A. large eastern university February 1942. Desires position in research or development in industry which contributes to war effort. Prefer New York City area; will consider any location. Unmarried, 31, Phi Beta Kappa; employed. Deferred draft classification.
Box 40-N-6, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST. Thorough understanding of biochemistry and related fields. Thirteen years' experience in hormone and vitamin research, including the synthesis, bio-assay and pharmacology of such substances. Employed but available on short notice.
Box 43-N-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST A.B. Accredited eastern university, June 1942. Major organic. Well trained in physical and analysis. Minor bacteriology. Member Pi Mu Epsilon. Single, 23, draft 2-A. Desires position with company engaged in defense work. Available after June 8.
Box 47-N-6, Ind. & Eng. Chem., Easton, Pa.

PHARMACEUTICAL PHYSICAL organic chemist, Ph.D., May 1942. Thorough undergraduate training in organic, inorganic, physical chemistry. Graduate work in pharmaceutical chemistry. Teaching assistant, graduate fellowships. Desires teaching or industrial research. Publications. Phi Beta Kappa, Sigma Xi. Age 25, single, draft deferred, available immediately.
Box 48-N-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S. 1942. Minnesota. Biochemistry major, organic chemistry and bacteriology minors. Has had intensified course in production and handling of explosives and interested in employment in this field. Personal qualifications and references of high quality. Single, Protestant, age 22. Temporary deferment 2-A. Read chemical German. Location immaterial.
Box 50-N-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST B.S. analytical, organic and physical chemistry. Desires position in defense industry. Has completed National Defense Training Course in Physico-chemical Measurements and is available for immediate employment anywhere in U. S. Married, 3-A draft.
Box 51-N-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, M.S., one year industrial experience. Desires position in research, production, or development, preferably organic. Eastern location, particularly New Jersey, preferred. Age 27, single, draft deferred. Available immediately.
Box 52-N-6, Ind. & Eng. Chem., Easton, Pa.

PRODUCTION CHEMICAL Engineer, experienced in directing manufacture of inorganic and organic chemicals. Development background. Familiar with process equipment, costs, maintenance, record keeping. Age 36.
Box 53-N-6, Ind. & Eng. Chem., Easton, Pa.

MIDWEST UNIVERSITY instructor. Organic chemist, microscopist. M.Sc. from eastern university; year of recent graduate study; minor in physical chemistry. Decade of college teaching. Married. Available September for research, teaching, etc.
Box 54-N-6, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Bacteriologist, M.S. Eight years' diversified industrial experience. Research and development on solvents and their applications. Thorough knowledge of alcohol fermentation and plant operation. Resourceful, industrious. Age 37, deferred.
Box 55-N-6, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST, Ph.D. Pharmaceutical, analytical, portland cement. Seven years' diversified experience in American Medical Association Chemical Laboratory; industrial experience in amino acids manufacture, as pharmaceutical control chemist, and in research in portland cement laboratory. Five years' university teaching. Minors, organic chemistry and physics. Married, dependents.
Box 56-N-6, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, 7 years' general industrial research new products, especially synthetic resins, coatings, intermediates and plasticizers; drying oils and derivatives. Patents, publications on polymerization. Age 28. Employed, 3-A.
Box 62-N-6, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST (Ph.D.) with 12 years' industrial experience in research, supervision, plant and technical service. Desires executive or administrative position with progressive organization. Four years' University teaching experience. Familiar with colloids, finishes and organic specialties.
Box 64-N-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, M.S. 1942. Organic development and research, 5 years' industrial experience. Interested in occupational change with definite opportunity for future. Draft classification 3-A.
Box 65-N-6, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 779)

(Situations Wanted Continued)

ORGANIC CHEMIST, Ph.D. June, eastern university. Research experience in natural products, organic synthesis, microanalysis, and cancer determinations. Graduate assistantship, Phi Lambda Upsilon, Sigma Xi. Single, age 25, draft deferred. Desires position in organic or biochemical research.
Box 69-N-6, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED (NONMEMBERS)

CHEMICAL LIBRARY position desired by woman-chemist. Wide experience in literature and patent searching. Good scientific and technical background. Fluent use of scientific Russian, Ukrainian, French and German. Typing.
Box 17-T-5, Ind. & Eng. Chem., Easton, Pa.

SPECTROGRAPHIC ANALYST; white, male, finishing ESMDT spectroscopy, U. S. C., no experience, Protestant, 56, married, B.S. '09, salary your schedule, location non-essential.
Box 39-T-5, Ind. & Eng. Chem., Easton, Pa.

SPANISH SPEAKING research chemist desires U. S. or foreign position. Unusually well travelled, raised in South America; five years' graduate work, Ph.D. cand. in Physical chemistry; McGill, M.I.T.; graduate assistantships, research assistantship, Sigma Xi, broad experience, three languages; married, 25, available June.
Box 26-N-6, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMISTS, M.S., June 1942, large Eastern University; research experience in the field of "Invert Soaps" and quaternary ammonium salts (phenol derivatives); good training in organic analysis and synthesis; familiar with organic micro technique; desires position in organic research or development.
Box 28-N-6, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST, Ph.D., draft class 3, laid off by priorities, versatile experience in responsible positions, development and production of pure chemicals. Trained in all branches of chemistry and bacteriology, capable analyst, knowledge of several foreign languages; desires appropriate work. Age 35, married, Austrian, holding first papers. Excellent references.
Box 35-N-6, Ind. & Eng. Chem., Easton, Pa.

PHARMACEUTICAL CHEMIST, B.S. 1936, age 27, deferred draft classification. Five years' experience in drug, pharmaceutical and cosmetic fields. Four in analytical work and one in research and development.
Box 41-N-6, Ind. & Eng. Chem., Easton, Pa.

DEVELOPMENT and PRODUCTION in foods and vitamins. Nine years' in research department and ten years' in development of processes and production with large food company. Expert in sterol activation. Capable of directing research and handling men. Location immaterial. Age 43. American.
Box 45-N-6, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, 25 years' experience, plant layout and operation, organic. Research, Coal coke, petroleum coke, toluol, naphthaline, tar acids, intermediates, dyes, dry colors, aniline oil, synthetic coatings, varnish, carbon black. Protestant. American.
Box 61-N-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, native of Austria, first papers, single, age 24. College studies in America. A.B. cum laude, M.S. August, 1942. One year organic research. Excellent record, scholarship student, graduate assistantship. Fluently German, French. Sigma Xi, other honors. Available July 15.
Box 63-N-6, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, B.S. Broad experience in enzymes, food products, vitamines, dehydration. Twelve years' in research and industry. Married, age 37, available July 1. Prefer Pacific coast or New York. References, publications.
Box 66-N-6, Ind. & Eng. Chem., Easton, Pa.

BACTERIOLOGIST-CHEMIST: M.S. Three years' graduate work in leading universities; two years' industrial fellowship. Teaching and commercial research experience. Young, Gentile, draft deferred. Prefer position in defense effort. Location immaterial.
Box 67-N-6, Ind. & Eng. Chem., Easton, Pa.

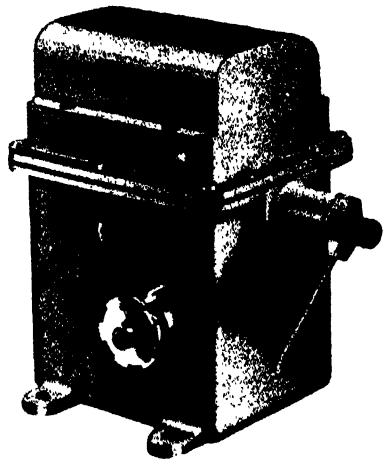
Industrial News

CONTINUED FROM PAGE 778

carbon in all types of compounds without sacrifice of physical properties, according to the supplier.

It is insoluble in water and in common organic solvents and can be used in compounds requiring chemical resistance. It also acts as a plasticizer, permitting easier processing of uncured stock on mill, tuber, or calender, and as a dispersing agent for carbon black in heavily loaded compounds.

Microtrol



A UNIT for operating butterfly valves, multiple ratio fuel valves, and regulation of dampers in air conditioning and drying systems has been developed by the Barber-Colman Co., Rockford, Ill.

Bausch & Lomb MacArthur Month

IN *The Balco News*, Bausch & Lomb announced on April 2 a campaign extending from April 6 to May 9 to be known as "MacArthur Month", a period within which every employee was invited to cudgel his brains for ideas to improve production and save time and materials.

To encourage the flow of ideas, the company doubled its customary awards for suggestions to improve production and put up $5,000 in cash awards to spur workers to a closer scrutiny of their jobs and the production lines around them.

A 30-minute "Production for Victory" program, in which representatives of the Army and Navy participated, was broadcast from Station WHEC in Rochester, N. Y., so that every war worker in the city and surrounding territory could hear a dramatic story of the nation's needs and the urgency of production.

Time Schedule Controller

MAINTAINING exact temperature, pressure, flow, or liquid level according to a predetermined time schedule is the duty of the Taylor Fulscope time schedule controller.

The cam and chart are individually mounted and conveniently located for instant visual comparison on this latest development of the Taylor Instrument Companies, Rochester, N. Y.

Respirator



THE American Optical Co., Southbridge, Mass., announces a new respirator for protection against toxic dusts. Representing a new design in toxic dust respirators, this R9100-T respiratory protector is light in weight and gives full vision, while the entire face piece is itself a filter. The filter has been approved by the U. S. Bureau of Mines for protection against the inhalation of toxic or poisonous dusts (dispersoids or particulate matter formed by the disintegration of solid materials by such processes as crushing, grinding, and abrading) as lead, cadmium, arsenic, chromium, manganese, selenium, vanadium, and their compounds.

Navy E Awards

THE Navy E has been awarded to the Crane Packing Co., Chicago, Ill., for production achievement and a high record in shipping Navy materials on schedule.

The Rome Division of Revere Copper and Brass Inc., New York, N. Y., is the second Revere division to win the Navy E. It was presented on May 9 for excellence in production.

The first All-Navy E burgee with star awarded to an industry in the United States went to the Bausch & Lomb Optical Co. on May 18 in recognition of its outstanding record in naval ordnance production.

The Farrel-Birmingham Co., Inc., has been awarded the Navy E for its three plants at Ansonia and Derby, Conn., and Buffalo, N. Y., in recognition of excellence in the production of gear drives for navy ships. Presentation was made on May 10.

Corrosion Inhibitor

THE D. W. Haering & Co., Inc., Research Laboratories, Chicago, Ill., announces a new corrosion inhibitor identified as ferri chrom glucosate. This is a colloidal gel which may be used for film formation in process operations by dipping or spraying or may be incorporated in paints or lubricants for corrosion control.

Metal Cleaner

A SOLVENT emulsion type of metal cleaner, known as Lixol, has been introduced by the Cowles Detergent Co., 7016 Euclid Ave., Cleveland, Ohio.

MISCELLANEOUS

BUSINESS OPPORTUNITIES • FOR SALE • WANTED • ETC.

Five cents a word, minimum charge $2.00; display available at $7.50 per inch; in advance. No discounts or allowances

MICRO-ELEMENTARY ANALYSES: C, H, N, S, P, Halogens, Methoxyl, Mol. wt., etc., U.S.P. and other official tests, Purity tests, Microinorganic assays, Spot tests, Micro-distillations, Toxicological investigations, and typical micro-chemical research work. Dr. Carl Tiedcke, 366 Fifth Avenue, New York, N. Y.

PRIVATE LABORATORY, advisory and research service in enzyme chemistry. General analytical work by competent staff. Box 685, New Brunswick, N. J.

ANALYTICAL BALANCE like new, A-1 condition Seederer & Kohlbusch. Weighs as fine as 1/100 milligrams. Chainomatic #8E 2535. Price $125.00.
Box 19-N-6, Ind. & Eng. Chem., Easton, Pa.

FOR RENT: Small laboratory in New York City fully equipped for analytical and research work.
Box 20-N-6, Ind. & Eng. Chem., Easton, Pa.

A LONG established company, now heavily engaged in War work, is prepared to develop new processes or products for post-war activity.
Box 34-N-6, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Journal Society Chemical Industry. Vol. 1-52 (1882-1933) half. calf, fine condition $175. Applied chemistry reports. Vol. 1-24 (1916-39) green cloth $30. Annual Reports progr. chemistry. Vol. 1-37 (1904-40) blue cloth $42. Proceedings Chemical Soc. — London. Vol. 1-30 (1885-1914) compl. set—all published, buckram $40. All sets fine condition.
Box 42-N-6, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Transactions American Institute Chemical Engineers vol. 3 to 1940 Schultz, Farbstofftabellen 7. Edition, Zeitschrift anorganische Chemie volumes 38 to 90. 120-139. 217-235. Ullmann, Enzyklopadie der technischen Chemie 1914-1923 complete.
Box 44-N-6, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Check this list or write us your needs. Immediate delivery is still available from our stock. International Centrifuges, Drying ovens, Microscopes, Analytical balances, autoclaves, hydraulic presses, Hanovia Quartz lamps, Torsion scales, Pulverizers, paper testing machine, MicroPhotographic camera Spencer, Electric hot plates (new) three heat heavy duty type, etc. We want to buy complete laboratories or surplus equipment. Send us your lists for immediate offer. The Laboratory Exchange, 24 East 21st Street, N. Y.

WANTED: Rubber mills, laboratory or production size, good condition.
Box 46-N-6, Ind. & Eng. Chem., Easton, Pa.

WE OFFER 100 pounds Pure Titanium Metal Powder, 10 pounds Zirconium Nitrate, 1000 pounds Cerium chloride, 2000 pounds Copper fluosilicate, 2000 pounds Strontium nitrate, 500 pounds Iron Carbonyl, Kilo each Caesium or Rubidium chloride, 5 kilos Indium chloride.
Box 59-N-6, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: "Faraday Society Transactions": Vols. 3-9, 14, 17-36; "The Analyst" (London): Vols. 9-65 (1884-1940); "Journal, Society of Chemical Industry": Vols. 1-60; "Chemical Abstracts", bound set; Beilstein: "Handbuch der organischen Chemie": third edition, complete with supplements; Friedlander: "Fortschritte in der Teerfarbenfabrikation": Vols. 1-12. A. Calvert, 221 Seaman Ave., New York, N. Y.

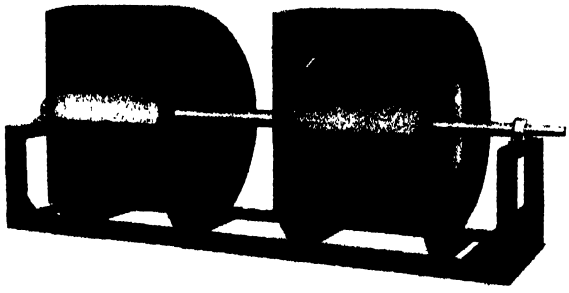
WANTED: Mellor's "Comprehensive Treatise on Inorganic and Theoretical Chemistry," complete set or separate volumes; "Der Aufbau der Zweistoffleigerungen."
Box 18-T-5, Ind. & Eng. Chem., Easton, Pa.

WANTED: Who can supply any salts of the following elements in small or large quantity: Dysprosium, Erbium, Europium, Godilinium, Hafnium, Rhenium, Thulium, Terbium, Ytterbium? State purity. Also wanted 500 pounds Lithium.
Box 60-N-6, Ind. & Eng. Chem., Easton, Pa.

Motor Blower Units

PRODUCTION of motor blower units in a wide range of sizes is announced by the Niagara Blower Co., 6 East 45th St., New York. The units are available in 16 models—one-, two-, and three-fan assemblies to meet resistance up to 4-inch static pressure and in capacity from 880 to 42,600 c. f. m. Fan speeds range from 300 to 1,750 r. p. m.

The blowers are available in two series of fan designs. Series 1,100 gives large volumes of air with quiet operation at low fan speeds for static pressures up to 1.5 inches. Series 1,200 meets the resistance of duct systems and special conditioning equipment, protecting motors from overload by a retarded horsepower curve, for static pressures up to 4 inches.



THE Chamberlain Engineering, Ltd., a unit of The United States Stoneware Co., has purchased a 10-acre group of buildings at Ravenna, Ohio, where the manufacture of Tygon synthetic rubberlike products will be transferred soon. The buildings are being extensively remodeled and new plant equipment is being installed.

Fuel Tank Sealer

A FUEL tank sealer of brush-on type, which resists the action of aromatic fuels, has been developed by the Presstite Engineering Co., St. Louis, Mo. It is designed to seal integral tanks in airplanes and for inside seams and joints in bolted steel tanks.

pH Tests

THE Cargille buffer set No. 1, made by R. P. Cargille, 118 Liberty St., New York, N.Y., is designed for control tests in the plant by unskilled workmen and for quick preliminary tests in laboratories where more elaborate pH apparatus is available.

New Phenolic Resin

A SPECIAL phenolic resin known as Inwal has been produced by the Synvar Corp., Wilmington, Del., for impregnating wood. It is alcohol-soluble, characterized by high-penetration power and chemical and water resistance.

STEAM JET EVACTORS

AIDING NATIONAL DEFENSE

Numerous Croll-Reynolds Evactors are working overtime maintaining high vacuum in plants making explosives, synthetic rubber, airplane lubricants and a long list of other ordnance materials. They are maintaining high vacuum on engines and turbines of dozens of American ships sailing the seven seas.

While the large and special units require up to three months or more for fabrication the smaller ones are sometimes made in two weeks, or less, when the demand is urgent. These include single and multi-stage units for vacuum up to a small fraction of 1 mm absolute, also small condensers and vacuum chilling equipment

A recent development is a vacuum-cooled condenser for maintaining condensing temperatures down to 34° F. Inquiries will be handled as promptly as possible under the circumstances.

CROLL-REYNOLDS CO.

17 JOHN STREET — Established 1917 — NEW YORK

Specify **Florite Desiccant**



For Efficient Dehydration of GASES and LIQUIDS

FLORITE, the new granular drying agent, is now being used successfully for dehydrating natural gas, propane, gasoline, air, nitrogen, carbon dioxide and other gases and liquids where high drying efficiency is required.
It selectively adsorbs 4 to 20% of its weight in water, depending upon the particular application, and is regenerated by heating to 300-350°F. FLORITE is hard, stable, non-corrosive, non-poisonous, and is available in a variety of particle size classifications.

WRITE FOR COMPLETE DETAILS

Floridin Company, Inc.

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CHEMICAL AND ENGINEERING NEWS
HARRISON E. HOWE, Editor
PUBLISHED BY THE AMERICAN CHEMICAL SOCIETY
VOLUME 20 JUNE 25, 1942 NUMBER 12

Manufacturing Chemists' Association Meets



H. L. Derby



George W. Merck



Charles Belknap



Lammot du Pont



W. N. Watson



J. W. McLaughlin

THE Manufacturing Chemists' Association of the United States, with the largest attendance in its history, held its 70th annual meeting on June 4 at the Waldorf-Astoria Hotel in New York, with Lammot du Pont presiding. Following certain committee meetings in the morning, a closed session was held at 2:00 o'clock, when the annual business was transacted and the following officers elected for the ensuing year: president, H. L. Derby, American Cyanamid & Chemical Corp., 30 Rockefeller Plaza, New York, N. Y.; vice presidents, George W. Merck, Merck & Co., Inc., Rahway, N. J., and Charles Belknap, Monsanto Chemical Co., St. Louis, Mo.; treasurer, J. W. McLaughlin, Carbide & Carbon Chemicals Corp., 30 East 42nd St., New York, N. Y.; secretary, Warren N. Watson, 608 Woodward Bldg., Washington, D. C.; executive committee, Lammot du Pont, chairman, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., E. M. Allen, The Mathieson Alkali Works, Inc., 60 East 42nd St., New York, N. Y., Leonard T. Beale, Pennsylvania Salt Manufacturing Co., Widener Building, Philadelphia, Penna., H. I. Young, American Zinc, Lead & Smelting Co., St. Louis, Mo., Russell H. Dunham, Hercules Powder Co., Inc., Delaware Trust Building, Wilmington, Del., C. F. Hosford, Jr., Pennsylvania Coal Products Co., Petrolia, Penna., H. O. C. Ingraham, General Chemical Co., 40 Rector St., New York, N. Y., August Kochs, Victor Chemical Works, 141 West Jackson Boulevard, Chicago, Ill., Clyde D. Marlatt, The Martin Dennis Co., 859 Summer Ave., Newark, N. J., Charles S. Munson, U. S. Industrial Chemicals, Inc., 60 East 42nd St., New York, N. Y., T. P. Walker, Commercial Solvents Corp., 17 East 42nd St., New York, N. Y.

H. L. Derby, chairman of the Executive Committee, presented the Annual Report of the Executive Committee, part of which follows:

Data Published on Selective Service

BECAUSE of the wide interest in this subject and the need for obtaining trained men for our Production Army, we give below references to information we have published on occupational deferments, including those of men in training. Future developments will be brought to the attention of our readers.

Chemical and Engineering News

(NEWS EDITION previous to 1942)

Vol. 18 (1940), pages 890, 1127
Vol. 19 (1941), pages 129, 311, 457, 459, 489, 520, 587, 681, 797, 1164, 1412, 1464
Vol. 20 (1942), pages 110, 157, 472, 579–80
Current issue, 788, 812

Industrial and Engineering Chemistry

Vol. 33 (1941), pages 1, 135, 283, 561
Vol. 34 (1942), pages 2, 131, 259, 648

Annual Report, Executive Committee, Manufacturing Chemists' Association

Since last June, the impact of our war program has deeply and progressively made itself felt upon our entire economy in its conversion to a full war effort. The acceleration after Pearl Harbor is illustrated by the dollar volume of government contracts and commitments as follows:

November 1941	$ 1.8 billions
December 1941	$ 5.1 billions
January 1942	$ 8.4 billions
February 1942	$20.9 billions

The magnitude of the war effort is indicated by funds made available by Congress and the RFC from June 1940 to May 1, 1942, amounting to the stupendous figure of 162 billion dollars, of which over three fourths are committed. About one third of our national income is being expended for war purposes. Government expenditures for war purposes in April exceeded 3.4 billion dollars or an annual rate of over 40 billion dollars. The program contemplates a doubling of this outgo for the coming fiscal year. War funds available to date are approximately divided as follows:

	Per cent
Planes	23
Ordnance	21
Munitions and supplies	12
Naval ships	10
Industrial facilities	9
Posts, depots, and stations	8
Merchant ships	5
Stockpile and food exports	4
Pay, subsistence, and travel for the armed forces	3
Housing	1
Miscellaneous	4
	100

Conversion to all-out war effort has involved the following steps: conversion of industry to war production; control of industry as to products made and destination of shipment through priorities, limitation, and allocation orders; price control, first determined for individual items and followed by the "big freeze" effective last month; control of transportation, both freight and passenger, by rail, water, and truck, which has become an integral part of rationing, and delivery of raw materials and finished products; and control of exports and imports. In addition, labor relations and wage changes are under supervision of various war agencies, more recently by the War Labor Board. Thus, we have reached a point of total government control of our economy even down to the rationing of ultimate consumer items.

The foremost chemical participation in the war program has been for explosives and raw materials therefor. This has necessitated a very large expansion of existing facilities as the pre-war explosive capacity was insignificant in comparison with war demands. During the past year the production program for both explosives and raw materials has been greatly increased. In addition, war demands for many other chemicals have necessitated the installation of increased plant capacity. Direct government purchases of chemicals are only a part of the total war consumption, as virtually all fabricated products purchased by the Government involve processing with chemicals.

A significant feature of our war program has been the constantly rising chemical demands owing to the fact that we not only have the obligation of supplying our own armed forces but those of the United Nations, including heavy shipments to Russia, Great Britain, the Far East, and obligations to the American Republics.

Heavy losses of personnel owing to the recall of reserve officers, the draft, and enlistments have imposed a heavy problem upon the chemical industry, which on account of rapid expansion has of necessity been compelled to dilute its operating and technical personnel. In addition, the new equipment has become so scarce that only equipment for direct war contracts is obtainable, and then only with difficulty and delay. The continuous volume of questionnaires from various war and government agencies has been beyond the capacity of the staff of the industry as a whole to handle within the time prescribed. In the early war period many of the questionnaires were not correlated, and there was much duplication. It is very evident that if you divide your operations into three segments—defense (direct and indirect), essential civilian, and nonessential civilian, the last category represented by nonessential civilian has practically disappeared.

In the spring of 1939 at the request of the Assistant Secretary of War, the Chemical Advisory Committee of the Army and Navy Munitions Board with a series of subcommittees was organized. This advisory committee has had continuous activity with heavy responsibilities during the past year. This work has called for a heavy contribution of time and effort from many members of the industry, with weekly meetings for some of the committees and frequent calls to Washington for conferences. The Chemical Advisory Committee is independent of the Manufacturing Chemists' Association.

Container Standardization

In June 1941, the M. C. A. Executive Committee set up a Container Standardization Committee to survey the chemical container field for possible savings in strategic materials and to recommend standardization and simplification procedures in specific cases where such savings would facilitate transportation of chemicals and aid the war effort. This committee has been composed of the technical committee chairmen, with M. F. Crass, Jr., assistant secretary of the M. C. A., as chairman. It has worked in close cooperation with the several government agencies directly interested in container supply, principally the OPM and its successor, the WPB. Recommendations for standardization and simplification were tentatively agreed upon following the holding of conferences with industry representatives directly concerned. Tentative recommendations were then submitted to individual firms and to the executive committee for approval before they were submitted to the WPB and made public. Specific projects handled are listed below. In each case, the industry voluntarily adopted the standardization recommendations. The accomplishments of this committee have been responsible in substantial measure for the maintenance of supplies of requisite containers needed for the shipment of chemicals absolutely necessary for the war effort and essential civilian supply. Committee projects include:

(1) Standardization of the Glass Carboy Bottle. Agreement among users of the 12-gallon bottle to abandon this type on future orders and adopt the standard M. C. A. 13-gallon type has had the following results: increased by 8½ per cent the volume of liquid shipped per container, and increased the productive capacity of the carboy manufacturer by at least 10 per cent through elimination of lost time and breakages necessitated by size changeovers. Since this project was approved, there has been no shortage of carboy bottles and a substantial inventory of finished stock is now on hand at the bottle plant.

(2) Single-Trip Drums for Liquids. The chemical industry has voluntarily agreed to limit single-trip liquid-type drums to two sizes—5 and 55 gallons. This has reduced stocks of specialty and

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Annual subscription rate, $2.00. Foreign postage to countries not in the Pan American Union, $0.60; Canadian postage, $0.20. Single copies, $0.15. Special rates to members.
No claims can be allowed for copies of journals lost in the mails unless such claims are received within 60 days of the date of issue, and no claims will be allowed for issues lost as a result of insufficient notice of change of address. (Ten days' advance notice required.) "Missing from files" cannot be accepted as the reason for honoring a claim. Charles L. Parsons, Business Manager, 1155 16th St., N. W., Washington, D. C., U. S. A.

odd-gage sheet in drum manufacturers' shops and enabled them to carry higher inventories of volume-size sheet, facilitating delivery of drums. Shippers' delivery problems have been simplified and an over-all saving of steel accomplished.

(3) Returnable Drums for Liquids. Shippers agreed to limit such drums to the 10-, 20-, 30-, and 55-gallon sizes and to order no more intermediate sizes. Advantages gained are similar to those outlined under (2) above.

(4) Caustic Soda and Alkalies. A conference of 13 producers drafted recommendations reducing from 21 to 3 the sizes of drums used for solid, flake, and ground caustic soda and potash, and reducing the gage of metal permissible for construction of such drums. This has resulted in an appreciable saving of steel. Bleaching powder drums, multiwall paper bags, wooden barrels and plywood drums for soda ash, bicarbonate of soda, calcium carbonate, and calcium chloride were standardized to effect savings of container materials, and the use of burlap bags abandoned in most cases in favor of paper.

(5) Trisodium Phosphate Containers. Efforts of the committee have been successful in causing adoption by the industry of a standard multiwall paper bag with abolition of burlap bags in shipping.

(6) Aluminum Sulfate and Alums. Producers have agreed to stop shipping alums in steel drums and burlap bags. Adoption of a standard multiwall paper bag has resulted in savings of substantial quantities of strategic materials.

(7) Sodium Bisulfate (Niter Cake). Use of steel drums has been abandoned by all shippers. Use of wooden barrels and plywood drums of specific construction has been agreed to by producers concerned.

(8) Synthetic Resin Molding Compounds. Although not completed, this project has resulted in the saving of substantial amounts of strategic materials.

Technical Committees

During the past fiscal year the association's technical committees sponsored a number of important container and transportation items before the various regulatory agencies of the U. S. Government, and briefs were submitted or appearances made in other instances. Of considerable importance to the industry was the approval granted by the Interstate Commerce Commission for use of a 16-gage single-trip sulfuric acid drum, and authority for use of I. C. C. 103A and 103B tank cars with safety vents provided with 1/8-inch breather holes. Other submitted items for changes were approved and additional items are pending, including requests for authorization of a light-weight carboy assembly under Specification 1A and for changes in fiber and plywood drum specifications to permit shipment of larger insecticide and other Class B poison units.

Realizing the seriousness of the container procurement situation, representatives of the technical committees met with Bureau of Explosives officials in June 1941 to urge that authorization for re-use of reconditioned single-trip metal barrels and drums be made. On August 7 member executives were advised that the bureau, after consultation with the Interstate Commerce Commission, would grant authorization to individual firms for the transportation of regulatory articles in reconditioned drums upon receipt of application and the furnishing of specific information thereon. This action has been of substantial importance in enabling chemical firms to maintain their scheduled deliveries during the past year.

Manuals

Manual C-1, the shippers' carboy manual, has been completely revised and rewritten during the past year. Manuals now in preparation include unloading of tank cars containing flammable liquids, and handling and use of multiwall paper bags. Revisions will be made in the next reprinting of manuals D-31 and TC-1.

An informal talk was given by E. W. Reid, chief of the Chemicals Branch, WPB, on "Operations of the Chemicals Branch", followed by an open forum in which D. P. Morgan, deputy chief, and W. G. Whitman and H. F. Coith, assistant chiefs, participated. E. R. Weidlein, technical adviser to the Rubber Reserve Company and chief technical consultant to WPB, discussed the "Chemist's Contribution to the War Program". Then followed a sound motion picture in full color on man's fight against insects and plant diseases, a film prepared by the General Chemical Co.

Following a social and cocktail hour the union dinner with the Synthetic Organic Chemical Manufacturers Association was held, at which Neil Carothers, dean of the College of Business Administration, Lehigh University, discussed "Our Present Economic Situation".

Division of Petroleum Chemistry to Meet in Buffalo

The Division of Petroleum Chemistry of the American Chemical Society will hold sessions in Buffalo. This decision was made after the printing of the preliminary program for the meeting in Chemical and Engineering News for June 10, pages 717 to 725. Those wishing to present papers must submit to the acting secretary before July 10 three copies of a 100-word abstract AND three copies of a 1,000-word abstract; before July 16, three copies of the complete paper must be in the hands of the acting secretary. If the paper in form for publication is submitted in triplicate by July 10, the 1,000-word abstract is unnecessary.

Send abstracts and papers to L. M. Henderson, Acting Secretary, Division of Petroleum Chemistry, Pure Oil Co Laboratory, Box 266, Winnetka, Ill.

Chemical Abstracts

Subscriptions and Export Censorship

The Technical Data License Division of the Bureau of Export Control, Board of Economic Warfare, has disapproved the mailing of the June 20 issue of *Chemical Abstracts* to all foreign countries except Canada, England, Australia, New Zealand and Russia. As this has been done without objection to any specific wording or abstract therein, and appears to have been adopted as a policy for this particular scientific publication, the American Chemical Society cannot accept subscriptions to it from other countries pending further notice.

Subscriptions already received and paid for from all Latin American countries (including Cuba and Mexico), from Eire, Belgian Congo, Egypt, Kenya, Liberia, South Africa, Tanganyika, India, Iran, Palestine, Syria, Turkey, British West Indies, Fiji Islands, Iceland, Mauritius, and the Netherlands West Indies will be held in storage until such time as the Government permits their export to the rightful owners.

The American Chemical Society is helpless in the premises.

Charles L. Parsons
Business Manager

Seventh Unit Process Symposium

The Seventh Unit Process Symposium will be held by the Division of Industrial and Engineering Chemistry at the meeting of the American Chemical Society in Buffalo, September 7 to 11. Authors desiring to present papers before the symposium should communicate at once with R. Norris Shreve, Purdue University, West Lafayette, Ind., symposium chairman.

Change in Program for Buffalo A. C. S. Meeting

The general meeting of the American Chemical Society at Buffalo will be devoted to a series of papers on a matter of vital interest to the public and to every chemist and chemical engineer, scheduled for Wednesday afternoon because normally that is the time of maximum attendance. The subject and speakers cannot be announced until publication of the final program in Chemical and Engineering News for August 25.

Divisional programs will start Monday afternoon, continue through Wednesday morning, and be resumed Thursday morning. Divisional officers should bear this in mind in arranging their programs.

Defend Our Patent System

THE present attack upon our patent system is not merely a question of amending the patent law to correct certain alleged abuses, but focuses upon the very essence of the system. We are indebted to the A. C. S. Patent Committee for the following analytical summaries of bills now before the Senate Committee on Patents.

S. 2303

Section 1 provides that whenever during war the President (through anyone he may direct) declares the manufacture, use, or sale of any material, article, product, or commodity or the expansion of facilities or capacity for such manufacture, use, or sale is in the interest of national defense or of the prosecution of war, two results will follow:

(*a*) He may grant licenses under any specific patents with respect to the subject of the declaration on such terms and for such period (not limited to the war period) as he may prescribe and fix a reasonable royalty therefor (all without notice and with no legislative rule for determining royalty). The royalty is not guaranteed by the Government, but if it is not paid the patentee may sue the licensee and recover not more than the prescribed royalty, without damages or injunction, and the licensee may plead lack of validity and lack of infringement.

(*b*) Anyone may infringe any patents with respect to the subject matter of the declaration (without notice) and no royalty is guaranteed by the Government, but the patentee may sue for infringement and recover reasonable royalty, without damages or injunction, and the infringer may plead lack of validity and lack of infringement.

A representative of the Department of Justice before the Senate Committee said (Printed Record, Part 1, page 24):

> These dual effects of the President's finding and declaration may operate independently or together. The President may declare, for example, that the manufacture of magnesium is in the interest of the prosecution of the war for the duration, but may choose to issue no specific licenses thereunder. The declaration will have the effect of a general license to whoever desires to use any patents relating to the manufacture of magnesium, whether or not he or anyone else holds a specific license from the President under those patents. The patent owner will be precluded for the duration of the war from obtaining an injuction against infringement of his patent by such manufacture, and from recovering treble damages on account of the infringement. The exclusive remedy of the patent owner will be the recovery of a reasonable royalty from the infringer, which may either be agreed upon by the parties or fixed by a court.

Section 2 provides that whenever during war or a period of declared national emergency the President (through anyone he may direct) shall determine it to be in the interest of national defense, he may acquire patents, applications, inventions, or licenses by taking or otherwise and issue licenses thereunder. The taking is effected by notice given by the Commissioner of Patents to the record owner and publication in the Official Gazette and the owner must sue in the Court of Claims for fair compensation with all defenses reserved to the Government.

S. 2491

The bill in general follows the recommendations of TNEC and is not limited to war or defense.

Section 2 provides that patents already granted and to be granted shall be subject to compulsory license on such terms as the Commissioner of Patents shall fix if (1) the patentee fails for three years without reasonable justification to manufacture under the patent, (2) patentee has refused for three years to grant licenses for just and reasonable compensation, and it is found that there has resulted or there is likely to result a violation of the anti-trust laws or "is otherwise detrimental to public interest".

Section 3 provides for proceedings before the Commissioner of Patents to procure license with notice to the owner and hearing and review by a court.

Section 4 prohibits license under any patent with any condition which restricts (a) extent, quantity, or value of operations under the license; (b) price of sale; (c) purpose or manner of operations; (d) geographical area of operations.

Section 5 prohibits activities contrary to Section 4 under licenses heretofore made.

Section 6 provides for suit by Government to cancel patents for violation of provisions of the Act.

Section 7 provides that assignments, licenses, etc., must be in writing (including conditions) and publicly recorded with Federal Trade Commission, together with names and addresses of parties and identifying patents.

Section 8 provides manufacturer or supplier must be sued before suit is brought against seller or user and no suit against contributory infringer except after decree against primary infringer.

Section 9 provides no license or conveyance shall substantially lessen competition or create monopoly unless necessary to promote the progress of science or the useful arts.

Individuals and manufacturers generally, particularly those who may be classed as small manufacturers, are urged to express their opinions on this legislation to their own Senators, urging these representatives of theirs to present their constituents' views to the Senate Committee on Patents and on the floor of the Senate, if the bills reach that stage.

Degreasing Solvent

A. F. CURRAN, Curran Corp., Malden, Mass., has received a patent on a new use for Gunk, a self-emulsifying degreasing solvent for automotive use. The new oil is said to be useful for treating gun bores or other metal surfaces which have been wet with salt water and as a lubricant cleaner-preservative which will remove salt and dehydrate the bore of rifled mechanisms in a single operation.



Dyes That Hold

DEVELOPMENT of the American dye industry is an outstanding instance of the new industrial preparedness which has been brought about in the United States through scientific research during the period between the first and second World Wars.

Four times as much cotton as wool is needed to equip the American fighting man for war. That fact is a challenge to the dye maker. Tents and tarpaulins, haversacks and cartridge belts, covers for canteens and cannon, leggings and summer uniforms are all made of cotton fabrics that must be dyed with the fastest of colors—colors that will "hold" despite storm and tropical sun, despite the most punishing kind of wear and repeated washings.

Warned by the first World War, when faded cotton equipment worried every American field commander, as early as 1920 the United States began setting up guards against any recurrence of "whitening" uniforms in future wars. That dyes needed are being produced here now, and in quantities demanded by an unprecedented war effort, represents a significant accomplishment in industrial preparedness—a quarter century of long, hard struggle by the American chemical industry to become self-sufficient in the dyestuffs field.

Today a top rating for a dye means that its color will remain true over many months of strenuous wear and in some cases will withstand years of service under all color-destroying conditions usually encountered. Dyes of this type today constitute the standard colors of the Nation's armed forces on land and sea alike.

The Du Pont company's share in this development has been no small one. The annual production of the largest single dyestuff used in the dyeing of uniform cloth reached in Du Pont plants, in 1941, a point 16.5 times greater than the total 1939 output. It is estimated that Du Pont is producing more than one half of all the essential anthraquinone vat colors required today for the dyeing of cotton uniform cloths and similar equipment for the United States Government.

Phosphorescent Dyes for Blackouts

IMPROVED phosphorescent dyes and pigments to make a pedestrian's clothes visible in a blackout, though not visible from an airplane 2,000 feet above, have been described by S. G. Hibben of the Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penna. After a 20-minute exposure to light, the pigments give off a glow for 6 to 10 hours bright enough to stand out in total darkness on signs, markers, clothing, and streets to guide traffic and pedestrian movements.

Historical Notes on Buffalo

Scene of the 104th Meeting of the American Chemical Society

September 7 to 11, 1942



Looking north from Ferry Street Falls in the village of Black Rock in 1825. Niagara River at left is flowing toward the falls; Erie Canal is at right. Here the boats had to leave the quiet waters of the canal and enter the river, which necessitated harder pulling for the tow animals. The men of Buffalo turned out at the call of their leader and built the first breakwater, that the canal boats might continue in quiet waters to the town of Buffalo and the city not lose the prestige of being the western terminal of the Erie Canal.

GROUPED around lower Main Street and the Terrace, where the new Memorial Auditorium now stands, was once the thriving trading post and settlement of Chabert Joncaire, constructed in 1758 by the order of D'Vaudreuil. This early settlement was short-lived, for the following year Fort Niagara fell to the British under Major-General Sir William Johnson and the village of Joncaire was destroyed along with French power in this part of the country.

Although records in the British Museum dated 1764 show the site of Buffalo, it was 1784 when the first permanent white settlers, Captain William Johnston and his family, constructed their home on a tract of land bought from the Indians. In 1790 the Holland Land Co. bought four large tracts in western New York and sent Joseph Ellicott, their surveyor, to lay out the plans for a town on Buffalo Creek that was to be called "New Amsterdam".

When the war of 1812 came, the village then known as Buffalo, numbered about 1,500 inhabitants. A number of small skirmishes of this war took place in and around Buffalo. The major blow came the night of December 30, 1813, when the British garrison from Fort Erie accompanied by Indian allies attacked and burned the city of Buffalo. The following year it was rebuilt, and Buffalo has had a continuous and progressive growth since. Buffalo became an incorporated village April 5, 1816.

The Holland Land Co. in 1820 donated the site on Shelton Square where St. Paul's Episcopal Cathedral built its original church. This is the earliest known church edifice erected within the city limits.

With the opening of the Erie Canal October 26, 1825, Buffalo's advantages as a navigation center boomed into reality, the hauling costs from the Hudson River to Lake Erie being reduced from $100 to $10 a ton. Buffalo became a chartered city in 1832, and elected as its first mayor Ebenezer Johnson. About 1845 an era of prosperity started which developed Buffalo into a great commercial center. In 1846 the University of Buffalo received its charter from the State Legislature, and began operating as a medical school.

Two presidents of the United States, Millard Fillmore and Grover Cleveland, are honored sons of Buffalo.

In 1901 the Pan American Exposition made known to the world Buffalo's resources. During this celebration on September 6, 1901—one of the saddest days in Buffalo history—President McKinley was assassinated in the Hall of Music situated northeast of the Buffalo Historical Museum, the only permanent building of the exposition.

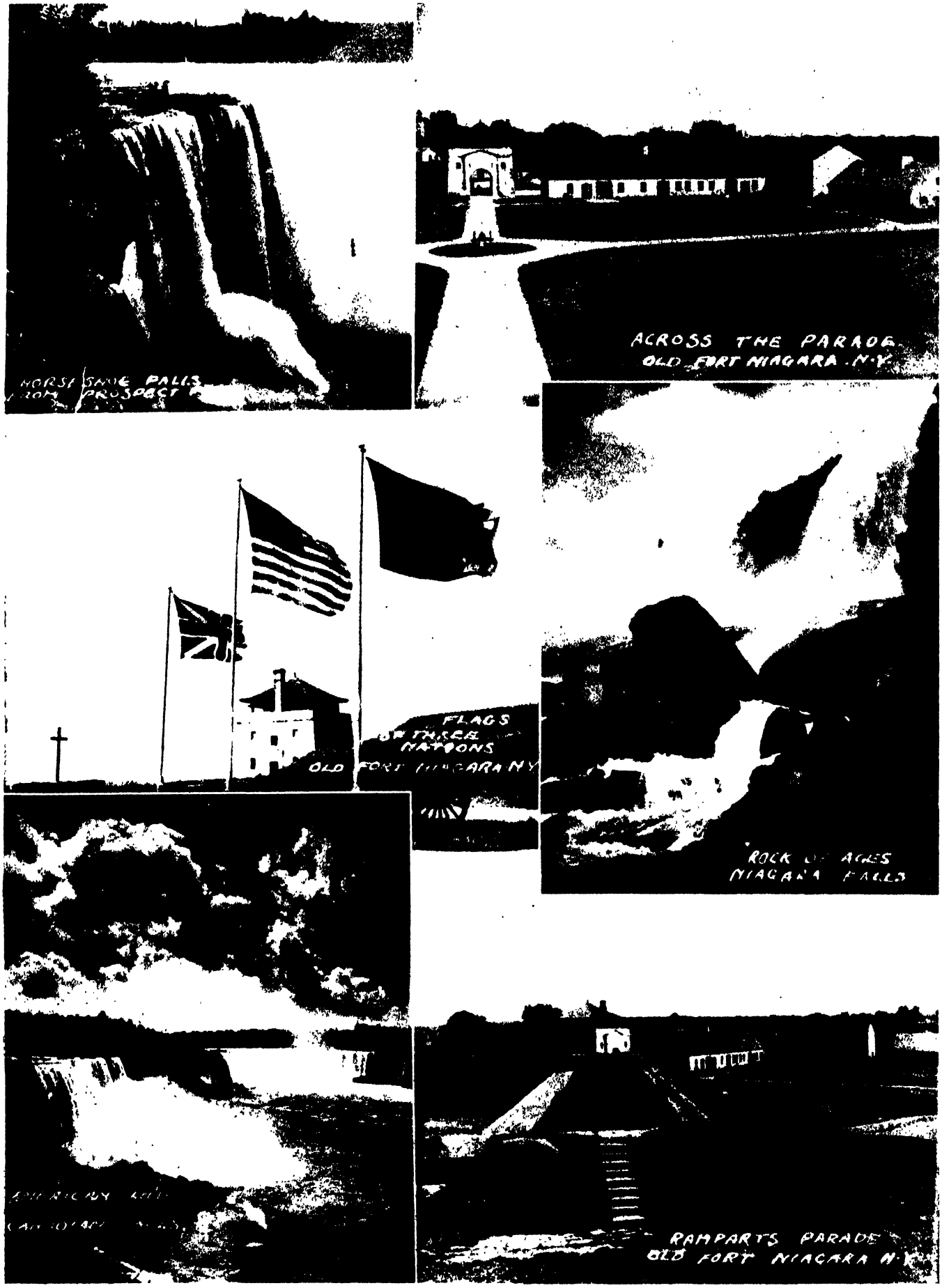
At 641 Delaware Ave. is the Ansley Wilcox home built in the 1830's as the major's house of the old Poinsett Barracks which became famous when Theodore Roosevelt there took the oath of office as President of the United States upon the death of President McKinley in 1901.

At 472 Delaware Ave. still stands the Buffalo home of Mr. and Mrs. Samuel Clemens (Mark Twain), a former editor and part owner of the *Buffalo Express*.

The Hotel Statler stands on the site of the home of President Millard Fillmore, later known as Castle Inn. Niagara Square on which this hotel is situated is the civic center, containing the new City Hall, new United States Court House, new New York State Building, and the Buffalo Athletic Club.

A number of historical points in downtown Buffalo, within easy walking distance of the Hotel Statler, are listed below[1]. For the convenience of the convention guests, there will be posted in a central location in the hotel this same list, but with each item numbered, and a map on which the numbers will be entered. None of the buildings on the list exist any

[1] In preparing these notes Earl L. Booth has leaned heavily on material furnished by the Buffalo Historical Museum.



On to the Buffalo Meeting

September 7 to 11, 1942



Buffalo Creek from the corner of Main Street and the Terrace in 1825. It bears two barges and two sailing ships. Beyond the houses is a second creek, called Little Buffalo Creek, and beyond the tongue of land is the expanse of Lake Erie. This spot was the original settlement which grew into present-day Buffalo.

more, except the Castle at the site of Fort Porter, a water front park, and the Historical Museum.

Samuel Pratt's store and trading post built in 1804.

Site of John Crow Tavern. In 1804 Erastus Granger took up his abode there and was appointed first Buffalo postmaster. In 1806 the tavern was sold to Joseph Landon. After the burning of Buffalo the tavern was rebuilt. In 1843 and 1846 it was rebuilt and altered several times until, as the Mansion House of Civil War days, it was known as one of Buffalo's best hotels.

Home of Louis LeCouteulx, a French gentleman who became an American citizen and one of Buffalo's earliest philanthropists.

Just north of the last-named property on Main Street was the scene in 1814 of the execution of a Chippewa spy by the hand of Farmers Brothers.

House of Cornelius Winney, a meeting place for Captains Johnston, Powell, Brant, and Colonel Butler. Also adjacent stood the house of Asa Ransom, where in 1798 the first white female child in Buffalo, Sophia Ransom, was born.

House of Captain William Johnston, first permanent white settler of Buffalo, built in 1784. On adjoining land was the blacksmith shop of David Reese, appointed by the Government as blacksmith to the Seneca Indians. This shop was used as a morgue for the unfortunate victims of the fire on December 31, 1813.

Ancient Indian fort, more or less circular in form, and center point of the resettlement of the Iroquois nation after it had been driven back in 1779 by the Sullivan-Clinton Expedition. Here also were the original graves of Red Jacket and Mary Jemison until they were moved, the former to Forest Lawn and the other to Glen Iris. This, too, was the location of a Seneca Mission where the Reverend Asher Wright in 1831 printed scriptures, hymns, and spelling books in the Seneca tongue.

First school house in the village of Buffalo, 1807.

Shelton Square, early known as the Vil-



Above. **The first railroad station in Buffalo. It was succeeded by the Union Station on Exchange Street. Today a fine new station at Lovejoy Street houses the New York Central and the Pennsylvania. The Lehigh and the Lackawanna have their separate stations.** ***Below.*** **The twin pumps on the Terrace at Main Street, which was one of Buffalo's earliest sources of water supply. After a pumping station had been built and the water piped to the houses, many citizens continued to insist on drinking the pump water in preference to water in the conduits. "The pump water tasted right."**

lage Common, where Cyrenius Chapin and Seth Grosvenor with a few other villagers manned the old cannon in their futile attempt to obstruct the progress of Riall's forces when invading Buffalo, December 30, 1813. This was the site of the first St. Paul's Church, built in 1820. On adjoining land the first Presbyterian Church was built in 1823.

Old Richmond Hotel and St. James Hall. The latter was where President Lincoln's body lay in state in 1865.

Famous old Eagle Tavern, built in 1816. Among its famous guests were General Lafayette, Daniel Webster, and many other notables.

First Buffalo Court House.

Mrs. St. John's house which, along with David Reese's blacksmith shop and the jail, were the only buildings to survive the burning of Buffalo by the British in 1813.

John G. Milburn house where on September 14, 1901, President McKinley died.

Temple of Music where the assassination of President McKinley took place.

Home of first mayor of Buffalo, Ebenezer Johnson, 1833.

Fort Porter, named for Peter B. Porter. It was a military post until 1926 when it was abandoned. The only remaining building, the home of former commandants known as the Castle, is the headquarters of the Girl Scouts.

Site of a large triangular black rock jutting out into the river from which the early village of Black Rock took its name. This rock made a natural ferry landing, as its nothern edge was about 100 feet and extended down the river about 300 feet. It was blown up and destroyed in 1825 to make way for the Erie Canal. During 1812 old Fort Tompkins and several batteries were located in this vicinity.

Sailor's Battery in the old Scajaquada Creek Navy Yard. Here some of Commodore Perry's immortal fleet were reconditioned and refitted before the battle of Lake Erie.

Buffalo Historical Museum.

Buffalo, now boasting a population of 576,000, is 14th city in size in the United States. Situated at the junction of Lake Erie and Niagara River with an altitude of 583 feet, it has a most enjoyable summer climate and many attractions for the vacationist, among which are 11 large and many beautiful parks totaling 1,561 acres, including the Botanical Gardens at South Park, the new Zoo at Delaware Park, Civic Stadium, Delaware Park Lake, Albright Art Gallery, Buffalo Museum of History, Buffalo Museum of Natural Science, Kleinhans Music Hall, Buffalo Municipal Auditorium, many fine golf courses, and a yachting harbor at Centennial Park.

Buffalo is conveniently located, with rail, steamship, highway, and air connections to the most important centers of the United States. The Peace Bridge links it with Canada.

A most historic and interesting side trip from Buffalo by way of Niagara Falls is a visit to old Fort Niagara where plans were made for the most important battles of the Niagara Frontier. All the structures at the fort have been faithfully restored, with the help of many persons but mainly that of the late Colonel Morrow of the Fort Niagara Army Post.

Manpower

THERE is no recess for those upon whom has fallen responsibility with respect to manpower. The most discouraging thought is the slowness with which some officials learn the situation with which they must deal. Take, for example, the case of an inspector at one of the arsenals. This man, becoming eligible under the Selective Service Law, but meanwhile having demonstrated what he could do, was needed right where he was, doing defense work as an inspector. His superior officer asked the Colonel commanding the arsenal to do all he could to secure his deferment, that he might continue his important work. When told that he was performing the work of three men, the Colonel pounded the desk and said, "Then go and hire three men to take his place." When told that three men of proper qualifications could not be had, there was more desk pounding and something to the effect, "Don't tell me you can't hire three men. Get them." There is little that can be done in a case like that, and while profanity may ease your feelings and reduce the pressure, it does not get the three men.

Officials of the AMERICAN CHEMICAL SOCIETY and many individuals have worked hard and consistently on this problem, with no other motive than to see the best possible service rendered the United States. But there is much yet to be done.

With the permission of the author we have taken excerpts from some of his letters to various officials on this important subject. Doubtless others are doing similar good work, but we have not seen their letters. We regard such efforts of real service to the country. We hope by printing this material we, too, may have rendered some service and that the information conveyed may be useful alike to those who make the appeals and those who reach the decisions. As the war goes on and an increasing number of men are required by the combat Army, the problem becomes more urgent as well as more difficult. But we must remember that without adequate production to supply and support him the combatant is wholly ineffective. The excerpts to which reference has been made follow:

* * * We are certainly not making the best use of our manpower. This is not the Battle of Lexington. We need more than a bunch of men each with a musket and a few rounds of ammunition. We need more than the brave men of Bataan and Corregidor who die as heroes but lose because they do not have the proper backing. In the past few months there has been a hysterical tendency to build an Army of 7,000,000 or 8,000,000 men—an Army so large it would be utterly impossible to supply it with the tremendous tonnage of materiel necessary for a modern war, if it is to result in victory rather than merely in heroic death.

* * * General MacArthur said distinctly that "bravery is not enough".

* * * It is hard to get exact figures as to the number of civilians necessary to back up each fighting man in a modern war. Some give the figure as 10, others at 14, and a few as high as 17. These figures are based on the assumption that the civilians will supply materiel for their own fighting men. In the present war, we shall have to supply materiel not only for our own fighting men but to those of Russia, China, and even England if large numbers of British troops become actually involved in the war. Rumor has it that at the present time most of our TNT is being shipped on Lend-Lease. I have it on good authority in the case of another special high explosive that 90 per cent of the material produced will go to the British. This is as it should be. On the other hand, as our own Army expands, we must expand production facilities so that they can be backed up with materiel to the same extent that our chief enemy backed up his troops in Poland and in France. To do that will require more technical men than we have or can possibly produce. I maintain that any individual who willingly leaves chemistry, chemical engineering, or physics to enter the armed forces for nontechnical work is merely a complicated kind of traitor even though he may be posing as a patriot. Anyone who connives at such a loss to the national effort is merely abetting treason. * * *

* * * Fortunately for the country, there is not confusion in this matter in Selective Service Headquarters in Washington under the leadership of General L. B. Hershey. General Hershey and his colleagues in Washington understand thoroughly what kind of war this is and the importance of the word "selective". They have repeatedly emphasized the importance of keeping in technical work chemists, chemical engineers, and physicists, including those actually engaged in these fields, those in training, and even the instructors in these fields. * * *

* * * There is an increasing amount of uneasiness both among students of chemistry and among men actually engaged in professional chemical work. In many cases, the individual cannot see in what way he is actually helping the war effort. Many feel that they should leave chemistry and enter the combat forces in some definite way. A still larger group feel that they should go to work for the Government in a chemical capacity. Unfortunately both the Army and Navy, by various means, are giving the impression that they need chemists. The abovementioned chemists are listening to these pleas and are tending to answer them out of the faith that their professional training and experience will actually be used in the war effort. A reasonable guess is that over 90 per cent of such men in the Army and Navy are doing work which could be done just as well by ordinary liberal arts graduates with perhaps one year of freshman chemistry. * * *

* * * Practicing chemists come in two categories:

1. Those engaged in work directly related to the war effort. Incidentally this includes a great many things besides making munitions.
2. Chemists working in other lines.

These form our only chemical reserves. They should continue working where they are, in preparation for the time when greater numbers of experienced chemists will be needed and cannot be obtained in any way except by transfer from existing industries. In other words, the switch-over to war activity such as has taken place in the automobile industry will have to come in the chemical industry. When that time arrives, we shall indeed be in a difficult position if, meanwhile, large numbers of the necessary chemists are transferred into nonchemical work. * * *

* * * I keep an unusually close touch with the supply and demand of chemists because of my service during the middle of the depression as Chairman of the AMERICAN CHEMICAL SOCIETY'S Committee on Unemployed Chemists. Most emphatically, there are fewer chemists and chemical engineers available than at any time during the past 30 years. The situation is apparently getting worse each month. The new graduates of May and June did not improve the situation to any great extent for the simple reason that most of them were already hired in advance of graduation. * * *

* * * Whenever I get a chance, I am emphasizing two numbers—27 million and one quarter million. The first number corresponds to men in the Selective Service System up to 35 years of age. The second number is slightly greater than the present total enrollment of the National Roster of Scientific and Specialized Personnel which includes chemists, physicists, chemical engineers, bacteriologists, geologists, and other scientifically trained men from the graduating class of 1942 up to the age of about 80 years. If we lose the war, it will not be because of the 27 million but because either the quarter million is too small or we have not used it effectively. In this group there are about 60,000 chemists and chemical engineers. These are only enough to keep the country going in peacetime. For instance, at the very depth of the depression a detailed survey of the country showed that the largest number of unemployed chemists and chemical engineers was only about 900. The intense activity of modern industrialized warfare calls for a much larger proportion of technical control, direction, and research than is necessary in the more leisurely activities of peace. When the new plants for munitions, synthetic rubber, and the like are finished in 1943, the number of technical men needed to run them adequately will be far in excess of the available supply even with the diversion of those men still engaged in fields not directly connected with the war. * * *

* * * The production of chemists and chemical engineers at the four-year level with a B.S. degree and at the seven- or eight-year level with a Ph.D. degree will not be enough to take care of our increasing needs. There will probably have to be a mass transfer of chemists and chemical engineers from less essential industry into actual war industries. This will be possible without too much difficulty always provided that the chemists in less essential industries have not in the meantime been taken out of their chemical work and training and put in the Army. Of course, eventually we shall have to do as was done in the first World War—comb the troops and take from them every man with chemical training, but this is a most difficult and wasteful process. * * *

* * * General Hershey has repeatedly emphasized his understanding of this critical situation. We must still do our duty in the case of each individual man in helping the draft boards to decide whether he belongs in the 27 million or in the quarter million. * * *

* * * I have only one interest, namely the winning of this war in which we are involved. To that end, each of us must serve in the way his training and ability can be most effectively used. There will be hundreds of thousands of young men who have no wish to fight but will have to fight because that is the way in which they can best serve their country. On the other hand, there will be a much smaller group of men who would like to fight but who cannot be allowed that luxury because their services are needed elsewhere—whether they like it or not. Of course any healthy male would rather fight than work. If he has a reserve commission, he would naturally prefer to retain it and enter active duty when the time comes. That is the easy thing to do. His duty, however, is far different. I can say most emphatically that if he neglects to follow the plan of the War Department for the resignation of his commission because of the key character of his position, he will be just as much of a slacker as is the young man who refuses to fight when called upon to do so. * * *

* * * The argument as to the value of graduate training can be clarified by the fact that all of the great chemical companies do their best to get as many men with the Ph.D. degree in chemistry and chemical engineering as possible. They are willing to pay over twice as much in initial salary for these men as for men with only the undergraduate training. Of course, if anyone is pessimistic and thinks we are going to lose the war in a year or so, I suppose graduate training is not necessary. To me it is inconceivable that anyone can be so optimistic as to think that we can finally win the war in less than about 25 years. We may achieve some sort of an armistice in four or five years or even less but we certainly cannot relax and go back to our normal ways even at that time. We shall need more and more highly trained technical men. These can be obtained only through graduate work. * * *

* * * I must disagree with the feeling that few young chemists are really irreplaceable or hold so-called key positions. Many firms are discovering the fallacy of this reasoning after they have allowed some of their younger chemists and chemical engineers to be drafted with the calm assumption that they can be replaced. The answer lies in the fact that the total number available now and in the next few years is altogether inadequate. * * *

* * * I have recently run into the request from employers that I let them know of any sophomores or juniors who find themselves unable to continue under the speed-up program this summer. They would like to hire these men because of the difficulty of obtaining regular B.S. graduates. I don't know what we shall do to get technical men. We shall probably have to start taking those who have had even freshman chemistry. Since the shortage of chemists and chemical engineers has become so severe, we have had many requests for the names of students who have flunked out during the past few years so that they could be approached regarding chemical jobs. That is a situation which I have never seen before, not even during the shortage of chemists during the first World War or during the boom days of 1928. * * *

* * * Every possible effort should be made to train new men, preferably of over draft age, with definite dependents, or with physical handicaps, to replace men who have received a six-month deferment. If the replacement cannot be made during the first six months, every effort should be made to train a man to make the replacement by the end of the second six-month deferment. Such efforts should be made aggressively and in such a way that evidence can be presented to a draft board or appeal board showing the extent of the efforts. If, in spite of everything which can be done, such a man cannot be replaced, there should be *no hesitancy about insisting on further deferment* with a presentation of all the evidence as to the man's necessary position in the organization and the efforts which have been made to train or obtain a man for a replacement. If the local board refuses deferment in the case of such a necessary man, then an appeal should be made by the man immediately on the basis of his training and experience and the necessary nature of the work in which he is engaged. This appeal has to be made within 10 days of the date of the 1-A notice. He should immediately notify his chief of the appeal. If this appeal is lost he should appeal to his State Selective Service Board and should also send a statement of the appeal, together with his draft number and the address of his board, to any professional organization of which he is a member, such as the AMERICAN CHEMICAL SOCIETY and also the National Roster of Scientific and Specialized Personnel, in Washington, with a request that they give any help they can by writing to the local and state boards. It should be emphasized that the only matter involved is maximum effectiveness of the national effort. * * *

* * * Many groups are interpreting the requirements of the Selective Service System as indicating that there is no use in asking for a deferment after two deferments of six months each have been obtained. All possible should be done to convince employers that end is not the intent of the Selective Service. Of course, if an employer has made no effort to train a replacement or obtain a replacement during the year of deferment, he is in a poor position with the Selective Service System. On the other hand, if the man involved is necessary to activities intimately connected with the national defense, national health, or the national welfare—three things which I believe should now be grouped as the war effort—it is his duty to that effort to give the Selective Service System the evidence in the case. * * *

* * * I cannot think of any better set of rules than those developed by General Hershey and his colleagues. The one thing necessary is a job of education so that technically trained men will first of all recognize that the patriotic place for them is in their technical work and that they must do their part to protect the country by making an appeal in case their local board makes a mistake and attempts to remove them from the Army of Production, or from training for that Army, and places them in the Combat Army in which they can do less good. * * *

* * * Since Paul V. McNutt has now

instructed local boards to consult with the U. S. Employment Service offices, it is to be hoped that they will recognize the serious importance of proper use of all of our manpower, including the 250,000 scientifically trained men. I have been unable to get official figures to confirm this, but indications are that in Germany there are probably nearly twice as many technically trained men as there are in this country. That is for a population about two thirds of ours. Moreover, it does not include perhaps 100,000 technically trained men available in France. * * *

Society of Chemical Industry Elects Officers

FOSTER D. SNELL has been elected chairman of the American Section of the Society of Chemical Industry for 1942–43. Norman A. Shepard is vice chairman, Cyril S. Kimball, honorary secretary, and J. W. H. Randall, honorary treasurer. New committee members elected to replace retiring members are Edward R. Allen, Francis J. Curtis, Donald Price, Archie J. Weith, and Lincoln T. Work.

Preventing Poisoning Among Mercury Miners

DISCOVERY of a method of preventing mercury poisoning among miners was announced by Merle Randall, University of California. Miners exposed to the vapors of free mercury are sickened and disabled and can only work a few days or weeks where the exposure is great. Careful ventilation, previous best method of prevention, has never been entirely satisfactory.

Spraying the walls of mercury mines with a spray containing calcium polysulfide, Dr. Randall discovered, provides a coating through which the mercury cannot vaporize. This method has been tested over a period of 11 months, during which not a single case of mercury poisoning has been reported where the spray was used.

Foods Treated against Mold

DU PONT food experts estimate that over 18,000,000 pounds of cheese will be specially treated this year against losses from mold as part of the dairy industry's food conservation program. Adequate protection is necessary for the increasing amount of cheese being shipped abroad under Lend-Lease.

Swiss cheese, in common with many other foodstuffs, naturally contains propionate salts which act as mold retardants, it was said, but cream cheese and cottage cheese do not. So chemistry is coming to their aid with new inhibitors that can be added in the process of manufacture. The added mold inhibitors, now coming into widespread use, are said to cause no change in the flavor, texture, nutritional value, or appearance of the foods treated.

NECROLOGY



BLANK-STOLLER, INC.

C. R. Hoover

Charles R. Hoover
Laurence S. Moyer

WHILE flying on an experimental mission on the night of June 9, two naval blimps collided and fell into the Atlantic off Manasquan, N. J. Twelve of the 13 men aboard were killed, including two members of the AMERICAN CHEMICAL SOCIETY—Charles R. Hoover and Laurence S. Moyer.

Charles R. Hoover, professor of chemistry at Wesleyan University, was born September 30, 1885, in Oskaloosa, Iowa. He received the Ph.B. degree at Penn College in 1906, the B.S. from Haverford College in 1907, the A.M. from Haverford in 1908, and the Ph.D. from Harvard University in 1915. In 1909-10 he was professor of chemistry at Penn College, Carnegie Fellow at Harvard in 1912–13, and associate professor at Syracuse University from 1913 to 1915. In 1915 he went to Wesleyan University as associate professor, becoming full professor in 1918. From 1917 to 1919 he was chemist and consulting chemist with the Chemical Warfare Service. Since 1928 he had been consulting chemist for the State Water Commission of Connecticut. He had been chairman of the committee on laboratory construction and equipment of the National Research Council, and a member of the Connecticut State Board of Registration of Professional Engineers. He had done valuable work on atomic weights, gas analysis, catalysis, petroleum, laboratory construction and equipment, and trade waste disposal.

Dr. Hoover had been active in the AMERICAN CHEMICAL SOCIETY, which he joined in 1909, serving as divisional secretary, local section chairman, and local section councilor, and being particularly interested in the work of the Division of Water, Sewage, and Sanitation Chemistry. He was a member of the American Association for the Advancement of Science, Society of Chemical Industry, Institute of Chemists, Public Health Association, and New England Association of Chemistry Teachers.

Laurence S. Moyer, botanist at the University of Minnesota, was born in Philadelphia, Penna., July 4, 1907. He received the A.B. degree from the University of Pennsylvania in 1929 and the Ph.D. in 1933. From 1927 to 1929 he was assistant botanist at the University of Pennsylvania, assistant instructor from 1929 to 1933, National Research Fellow in agricultural biochemistry at the University of Minnesota from 1933 to 1935, and Sterling Fellow in public health at Yale University in 1935–36. In 1936 he went to the University of Minnesota as instructor in botany, and at the time of the fatal accident was serving as botanist with the National Defense Research Committee.

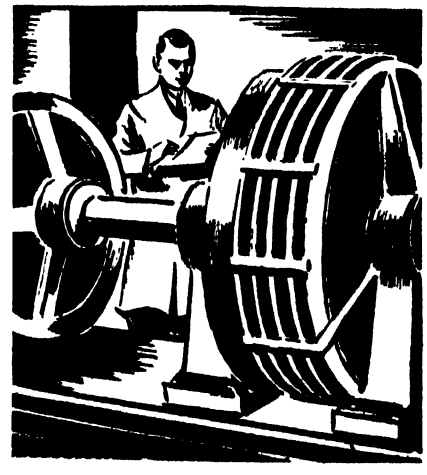
He was a member of the AMERICAN CHEMICAL SOCIETY, which he joined in 1938, the American Association for the Advancement of Science, and the Botanical Society. His principal interests were biochemistry, cell physiology, electrokinetics, properties of latex, sterols, bacteria, proteins, cells, and cell constituents; ionic antagonism, wetting properties of colloids, and physiology of plant cells.

Charles R. Owens

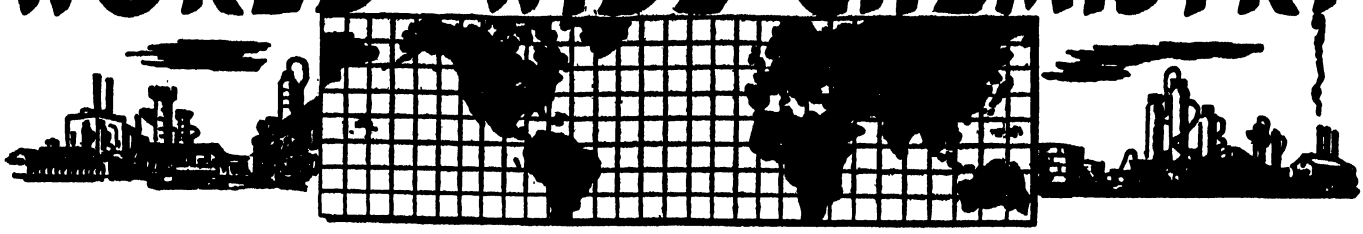
CHARLES R. OWENS, Ohio State University chemical engineer, was shot and killed in his classroom on June 11.

Dr. Owens was born in Columbus, Ohio, May 3, 1906. He received the degree of B.Ch.E. from Ohio State University in 1926, M.S. from the University of Michigan in 1931, and the Ph.D. in 1934. From 1927 to 1929 he was food analyst in the U. S. Department of Agriculture, was engaged in research for the United States Rubber Co., and from 1935 to 1938 was engineer with the Linde Air Products Co.

He had been a member of the AMERICAN CHEMICAL SOCIETY since 1927. He had done considerable work on heat transfer, and on construction materials, especially rubber, rubber substitutes, and plastics.



WORLD-WIDE CHEMISTRY





American experts in vegetable oils and fats recently visited the various oil- and fat-producing states of Brazil to study the possibilities of increasing Brazil's commercial production. A survey of probable commercial production of several derivatives was also discussed. Recommendations made by the American technicians will be further studied through the National Institute of Oils (Instituto Nacional de Óleos), a governmental research laboratory created to promote and to intensify the use and production of vegetable oils and fats obtained in Brazil.

Among the technicians who visited Brazil in March and April were George Jamieson, chief chemist, Division of Oils and Fats, U. S. Department of Agriculture; Charles Edmund, chief, Division of Oils and Fats, U. S. Department of Commerce; H. W. Valteich, director, Best Food Corp.; and Marvin Wood, president, Marvin Wood Co. The visitors were accompanied during their trips by the director and two assistants of the National Institute of Oils.

Group Organized to Establish National Standards to Meet

The Brazilian Standards Association (Associação Brasileira de Normas Técnicas) was created last year to unify the various standards established by industrial and official organizations and thus set up national standards. The new entity nominated technicians and experts to the first 20 committees in the fields of rubber; petroleum and its derivatives; coal; electric materials; vegetable oils and fats; plastic materials; minerals; ceramic products; cement; metal and other products for building purposes; leather and similar products; and nomenclature in engineering and chemistry.

The association is to meet once a year in different Brazilian cities, and the coming meeting will be held in Porto Alegre, State of Rio Grande do Sul, during October. The first committees appointed by the association have already started their duties and various standards will be submitted for discussion and approval at the Porto Alegre meeting.

EDITOR'S NOTE. Those interested in further details should address the correspondent whose name and address appear for each country, and enclose sufficient international coupons to prepay the reply. United States stamps should not be sent.

Exports of Brazilian Bauxite Are Increased

According to estimates the 81 bauxite deposits existing in Brazil contain 150,000,000 tons of ore, and many of the surveys were made only to a very small depth. Although there are deposits in the States of Pará, Maranhão, Paraíba, Baía, Espirito Santo, Rio de Janeiro, Minas Geraes, and São Paulo, the reserves at Poços de Caldas, Pocinhos, and Ouro Preto are the only ones exploited on a large scale. While the aluminum plant to use Brazilian bauxite is being built, development of the deposits is confined to exportation, which was initiated in 1936 when 7,000 metric tons were shipped to Argentina. During 1939 exports of bauxite ore amounted to 18,279 metric tons, dropping in 1940 to only 82 metric tons. Shipments in 1941 totaled 14,365 metric tons and, it is hoped, in 1942 will set a record.

Brazil May Increase Sugar, Alcohol Output for U. S.

To the end of January 1942 production of sugar and alcohol of the last crop amounted to 18,246,036 bags (each bag corresponds to 60 kg.) of sugar and 87,009,490 liters of alcohol. Such figures show that the present 1941–42 crop will be superior to the previous one although restricted to actual market in accordance with regulations issued by the control organization, Sugar and Alcohol Institute. Rumors heard recently in Rio de Janeiro stated that the Brazilian Government was consulted by the American Government regarding possibilities of increasing production of both sugar and alcohol to take care of the shortage now existing in the United States.

Elimination of Tariffs in American Trade Advocated

President Vargas has approved a resolution issued by the Federal Council of Foreign Trade advocating the elimination of tariff burdens and obstacles to noncompeting products of the American countries, with a view of this being recognized as the established policy of inter-American political economy.

New Laboratories to Develop Native Products Inaugurated

Funds have recently been obtained for construction of the new laboratories belonging to the Instituto de Química de Sergipe, a research institute studying the development of products originated from the northern states. A branch of the Minerals Laboratory (Laboratório da Produção Mineral) was recently inaugurated in Campina Grande, State of Paraíba. Being an official organization controlled by the government, the new laboratory will carry out analytical and research work of mineral products from the north of Brazil, avoiding the delay in sending samples for analysis to the main laboratory in Rio de Janeiro.

Decree Sets Up Register of All Brazilian Industries

Considering the necessity of a sound program of industrialization, President Vargas recently promulgated a decree establishing the compulsory registration of all industrial firms and companies in the Industrial Register of the National Department of Industry and Commerce. The new law approved the registration card published with the decree on which all information related to capital, raw materials, products manufactured, number of workmen, technical staff, cost of operation, and other details will be furnished.

In another decree, President Vargas created technical classes and schools for workpeople, artisans, and apprentices and approved the regulations governing the schools and giving full details of the technical courses proposed. The first school will begin to function without delay.

Foreign experts will be brought to Brazil to cooperate with the government and the teaching authorities in developing the program established by the decrees. According to official statistics, the annual value of industrial production in Brazil increased from 20,013,000 contos de réis (about $1,000,650,000) in 1938 to 25,154,-

000 contos de réis (about $1,257,700,000) in 1940. Industries showing the greatest relative expansion were rubber manufactures, toys and games, paper and printing, tiles and building materials, iron, steel and metal goods, machinery, and apparatus.

C. E. Nabuco de Araujo, Jr.

Caixa Postal 970
Rio de Janiero
April 30, 1942



Rationing of foodstuffs, soap, and textiles and the gradual reduction of production in nonessential industries have been felt by chemical manufacturers supplying industries under quota restrictions, and it is likely that the decline of chemical requirements in these consuming trades will continue in the future. A new factor of increasing importance in this sector of the chemical trade is the introduction by the authorities of "utility" qualities of such goods as clothing, glass, and pottery. These "utility" goods require a minimum of essential raw materials and labor and will generally further reduce the demand for chemicals for nonessential purposes, thus freeing the larger tonnages required for the war.

In the field of dyestuffs the British Colour Council is sponsoring coordinated color ranges, designed in consultation with textile and other industries to effect the greatest possible economies and yet retain a wide variety of color schemes in all sorts of clothing. Colors which will be used for all "utility" materials conform to the Dyestuffs Controller's orders regarding maximum depths. Sufficient dyestuffs will be made available for the colors which are promoted by the British Colour Council, but the possibility of further retrenchment is not excluded.

Prices Fixed on Rutile Ore and on Graphite from Ceylon

The sale and purchase of rutile ore and concentrates, ground or unground, are subject to license. The Chrome Ore, Magnesite and Wolfram Controller will distribute the material to British consumers at fixed prices.

The Ministry of Supply has arranged to purchase the entire output of graphite in Ceylon at fixed prices which range up to 700 rupees a ton for best crucible lump. The ministry has also bought the whole production of copra and coconut oil in the island.

Calcium Is to Be Added to Wheatmeal Flour for Bread

While plans for addition of vitamin B to all white flour have been abandoned with the discontinuation of the sale of white flour and bread, the government is arranging for addition of calcium to the wheatmeal flour of 85 per cent extraction, which is now used exclusively. Seven ounces of calcium carbonate are added to each 280 pounds of wheatmeal flour.

New Pharmaceutical Product Produced on Commercial Scale

Production of ethanolamine oleate, which is used for the treatment of varicose veins without operation, is being undertaken on a commercial scale by a British manufacturer of fine chemicals.

Government Supports Sodium Hydroxide Application to Straw

The Ministry of Agriculture is supplying farmers free of charge with straw pulp plant to be used for the sodium hydroxide process to convert straw into an easily digested fodder. The method was developed by Imperial Chemical Industries.

Cornish Tin Mines Reopened in Government Drive to Raise Output

The first measure taken by the government to increase tin production in Cornwall was the provision of labor for existing mines. It is reported that three of the mines which had closed down have been reopened, and exploratory work proceeds with a view to the reopening of other mines which closed down because they were unable to compete on a commercial basis with tin production in the East. As the reopening of closed mines and other measures taken to increase tin supplies are bound to increase production costs, the Ministry of Supply has made financial arrangements with tin mining companies to bear the risk and cost of additional production.

Hydrogen and Sodium Zeolites for Water Softening

A combination of hydrogen or carbonaceous zeolites and sodium zeolites for water softening is recommended as a means of giving the final boiler feed any desired alkalinity. Water treated by the hydrogen zeolite process is likely to contain carbonic acid and sulfuric, hydrochloric, and nitric acids. Most of the carbonic acid is easily removed by passing the effluent water through a suitable aerating tower, while the remainder is effectively removed by an ordinary feed water heater or other means of deaeration. The mineral acids can be neutralized by adding measured quantities of sodium hydroxide to the treated water or by blending a suitable proportion of the effluent water from a sodium zeolite plant with the water from the hydrogen zeolite unit which contains some sodium carbonate and bicarbonate.

Three Refineries Built for Salvage of Waste Engine Oil

During the past few months three new refineries have been built for the salvage of waste engine oil. To avoid unnecessarily high costs, the Petroleum Board is organizing a scheme for the collection of used oil from garages. Users of transformer oil have been advised that considerable savings can be obtained if oxidation is reduced by sealing up, sufficient in the case of small transformers, or "breathing" from a nitrogen bottle when heavy loads alternating with light ones affect internal atmospheric pressure.

Control of Materials for Use in Refractories Progresses

Some important materials for use in refractories, especially important in wartime conditions, are subject to control. This applies in particular to chrome, while magnesite for basic linings must also be imported. Where high refractory power is required, aluminum oxide, either pure or diluted, may be used and, although it is rather an expensive material, it has made progress. For resistance to slag and abrasion a fused mixture of fire clay and alumina is recommended.

Recovery of Wool Fat Proves Asset in Wartime

Tens of thousands of tons of wool grease are recovered every year from the effluents of Yorkshire woolen mills. Although several important outlets had been developed before the war, wool grease has aroused more interest now that foreign raw materials are in limited supply. In English mills wool fat is removed from the wool by dilute solutions of soap and alkali at moderate temperatures. This process, which yields an emulsion along with the dirt and organic matters associated with it, is considered to be superior to solvent extraction as practiced in other countries.

In the usual method of recovery sulfuric acid is added to the wool scourers' suds in very large tanks to "crack" the soaps present and cause precipitation and coagulation of the solid matter and grease. The separated matter is collected for the pressing process after as much water as possible has been drained away. The grease is collected as a brown oil which, after boiling in vats and settling, becomes the common wool fat called "dégras" in the United States. It usually contains 10 per cent or more of free fatty acid.

While this process is used by mills with extracting plants of their own, the Brad-

ford Corp., which treats the effluent of some 50 wool-washing and combing factories in one plant, uses a somewhat different process. The "cracked" precipitated matters are, as H. Wontner-Smith and S. G. Campbell report in an extensive paper dealing with all aspects of production and use of wool fat, settling out as a sludge which is bottled up and filter-pressed. The soaps present are split up, and solid matters and grease settle out together in huge tanks covering 13 acres. The boiled sludge is separated in 160 cotton cloth filter presses into a solid cake away from large volumes of hot water still containing small quantities of grease. The average Bradford-recovered grease contains 29 per cent free fatty acids, 37 per cent combined fatty acids, and 34 per cent unsaponifiable substances. It is this material which is mostly used for industrial purposes.

Lanolin-Resin Solution Paints Used for Aircraft

Among the many outlets for wool grease in the paint industry are pigmented lanolin-resin solution paints which have been investigated for the R. A. F. One of their special advantages is the formation of tenacious and durable protective films which can be applied in very thin coats. It was found that wool fat yields harder and tougher paints when mixed with beeswax, carnauba wax, high-melting paraffin waxes, or with resins. Drying can be accelerated by various treatments. The paints are usually applied in a solution in white spirit or solvent naphtha which, it is claimed, will give good service under the most unfavorable conditions for two or three years, even on bright steel work.

Shellac Research Develops Some Interesting New Outlets

Shortage of other materials and developments in research have attracted much attention to shellac, a material which has, for instance, been proposed for use in blackout paints. For other purposes a glossy, weather-resistant, air-drying varnish suitable for spraying can be obtained by using shellac with coal tar. The fraction of coal tar which distills between 120° and 300° C. is collected separately and combined with shellac. A simple process consists in heating the coal-tar fraction with sulfur and a vulcanization accelerator at 110° to 115° C. while passing a current of air, and mixing the product with a varnish of shellac in rectified spirit.

Another development reported by the Indian Lac Cess Committee is a process for extracting soft resin from shellac by using either single pure solvents or mixtures of solvents which alone would not have the desired effect, such as acetone and water or methyl acetate and glycol.

Blackout Experience Favors Bitumen Paints

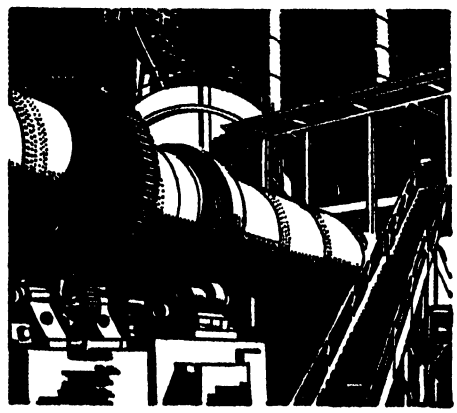
While wool grease paints, usually of a cheaper type than the one previously described for protection of light metals and steel, have found considerable interest for blackout and camouflage painting, experience in England seems to favor bitumen paints. A solution of bitumen in solvent is dark and somewhat opaque even before incorporation of a pigment, but as the dry film is often rather brittle and prone to flaking, it is usually plasticized with linseed oil, lanolin, or stearin pitch. Manganese linoleate may be added as a drier, while clays are incorporated as matting agents. Further improvement of weather resistance can be obtained by inclusion of water-repellent greases or water-resistant resins. Gilsonite, dissolved in heavy naphtha and thinned with turpentine or white spirit, is said to be the most suitable bitumen.

Imperial Chemicals Issues Annual Report for 1941

The annual report for 1941 of Imperial Chemical Industries, Ltd., contains no details regarding production, but it is said that as a result of the pressure of the war for more production I. C. I. factories have worked to capacity throughout the year. Performance of the various plants, maintained at a high level, "testifies to the excellence of the equipment, the standard of maintenance which it is our practice to keep, and the technical control. The volume of output to meet demands has for a number of products touched new peaks."

The main manufacturing subsidiary or associated companies in the British Empire—I. C. I. of Australia and New Zealand, Canadian Industries, and African Explosives and Industries—have continued successful progress. The total gross income shown in the consolidated income statement is £19,956,000, compared with £19,016,000 in 1940, but owing to increased taxation the net consolidated income fell from £6,576,000 to £6,243,000.

G. Abrahamson
150 Halfway St.
Sidcup, Kent
England
May 18, 1942



Abolition of Gum Tragacanth Monopoly in Iran Is Foreseen

Abolition of the private monopoly on exportation of gum tragacanth in Iran is foreseen in reports to this country. This export is at present a monopoly held by a private organization. The plant producing the gum grows wild and is generally gathered on untilled public lands by independent workers who work when so inclined and are paid according to the sale price of the gum. There are no Iranian trade associations which have connection with the production, sale, or export of gum tragacanth, but prices are established by the monopoly.

Normal production is estimated at 4,000 metric tons, with local consumption scarcely exceeding 200 tons, in the absence of any industrial users. There are no public figures from the government, but stocks are said to be normal.

The United States, the most important purchaser, takes the better qualities of the gum, but European countries also share in the market.

U. S. Demand Aids Borax Industry of United Kingdom

Exceptionally active United States demand was listed as a factor in the profitable year enjoyed in 1941 by the United Kingdom borax industry. Profits of one of the larger companies, including subsidiary income, up to September 30, 1941, were said to have increased 17 per cent over 1940. Demand was steady throughout the year, and trade was maintained in markets of Europe and overseas that were still available, including the United States.

Sales in the domestic market are controlled to meet essential requirements and restrict nonessential uses. Prices were raised to cover increased freight and war risk insurance rates and other mounting costs.

Argentina Imports Total Calcium Carbide Needs

Argentina imports all of its annual requirements of calcium carbide, the consumption being reported as between 10,000 and 12,000 tons. Absence of local production is attributed to a lack of cheap hydroelectric power. Of 1940 imports amounting to 10,732 tons, 70 per cent were from Europe. In 1941, however, of imports amounting to 8,250 tons, the United States and Canada supplied the bulk and small amounts came from Brazil and Mexico.

Stocks of rosin and turpentine held in India in the last quarter of 1941 amounted to 1,956 and 402 tons, respectively. Production for the same period was 2,352 tons of rosin and 681 of turpentine.

Cuban Demands for Heavy Chemicals Gain

INCREASED demands for heavy chemicals for industrial use, tanning materials, sodium hydroxide, and allied products featured a more active chemical market in Cuba in 1941 as compared with 1940, according to a consular report. Although mounting textile production improved sales of dyestuffs, little gain was shown in the market for insecticides, and sales of arsenic sprays for tobacco plantations declined. Continued substitution of other materials in certain sugar production processes led to lowered sales of sulfuric acid.

Chemical Supply Short in Colombia

INABILITY of Colombian manufacturers to obtain chemicals is causing increasing uneasiness, according to local reports within the country. Shortage of soda ash in March caused a large glass manufacturer to curtail operations and lay off some workers, while the textile industry was also listed as feeling the lack of essential chemicals.

EGYPT offered a ready market for various chemicals from the United States in 1941, according to a consular report. Closing of former supply sources shifted sales to the United States, which had practically no part in the market before the war.

New Uses Devised for Tung Oil in China

CHINA, faced with curtailed foreign outlets for tung oil, one of its principal products, is putting it to new uses locally, according to a report of experiments conducted in that country. Tung oil is largely replacing kerosene in China's lamps, and factories near Chungking are reported producing a liquid fuel from this oil. It is being used for such diverse purposes as surfacing roads, in which it has been very successful, and in making oilcloth and lacquer polish.

Production and Container Costs Boost Alcohol Prices in Uruguay

HIGHER prices are in effect on alcohol for industrial, heating, and similar purposes in Uruguay incident to higher production costs and lack of tin-plate containers. Since glass demijohns are easily manufactured domestically, the price of alcohol in such containers has been below that of the same product sold in tin cylinders or drums.

Turkey Imports Dyestuffs from Great Britain, Germany

GREATER activity of Turkish textile plants, incident to decreased textile imports by the country, led to an expanded demand for dyestuffs during 1941. Great Britain and Germany supplied a total of 300 tons during the latter part of 1941, which eased a previous shortage. In the final months of the year Great Britain got over to Turkey an additional 270 tons.

Phosphates Shipped from Tunisia to Germany, Italy

TUNISIA is reported to be shipping 60,000 tons of phosphates per month to Germany and Italy. France itself has been unable to receive any from this province, at least in 1941. In that year Germany was cut off for the first five months, but thereafter monthly shipments were resumed. Shipments to Italy were made throughout the year. Of total shipments from Tunisia in 1941, amounting to 502,130 metric tons, Italy received 407,750 tons and Germany, 94,380 tons.

Sweden Turns to Norway and Germany for Fertilizer Needs

SWEDEN has been assured of a supply of fertilizers to meet the effect of several years of unfavorable weather and loss of grain supplies from abroad, according to official reports. Illustrating the difficulties encountered lately, imports of Chilean saltpeter dropped to about 1,600 metric tons in 1941, compared to an average annual import of 48,000 tons in the normal years 1935–36. Domestic apatite has been substituted in the superphosphate industry for raw phosphate, formerly imported and now unobtainable.

Sweden has drawn on the recently expanded industry of Norway for increasingly large amounts of nitrate of lime, imports of which jumped from the normal average of 60,000 metric tons to 120,000 in 1941, and has accordingly been able to maintain allotments of nitrogenous fertilizers to its farmers at peacetime levels. Use of nitrate of lime has proved successful except in cultivation of sugar beets, and the present supply of Chilean saltpeter, being reserved for that crop, is expected to meet this requirement for some time.

Potassium salts are being imported exclusively from Germany, peace-years imports averaging 80,000 metric tons but increasing to 90,000 in 1940 and dropping to 61,000 the following year. Shipments are routed by water from western Germany, and the difficulties are attributed to "severe weather" the past two years.

Output of Explosives in South Africa Expands

THE explosives industry is a leading factor in the development in South Africa of allied chemical industries, according to a report on the expanding output of explosives. The boom is due to the growing demand for fillers in bombs, grenades, small shells, and cartridges. At present production is so far in excess of domestic requirements as to make possible an export trade with other areas, especially Africa.



Monsanto Opens Phosphate Division Plant

Charles Belknap, executive vice president, Felix N. Williams, production manager, Phosphate Division, R. R. Cole, vice president and general manager, Phosphate Division, and Earl A. Tomes, Phosphate Division sales representative in the Detroit office, at the opening of Monsanto's new Phosphate Division plant in Michigan.

France Initiates New Chemical Enterprises

FORMATION in France of a new nitrogenous fertilizer company is reported from trade sources abroad. Of the 620 shares, 300 have been taken up by Kuhlman, 140 by Grande Paroisse, 100 by St. Gobain, and 60 by Produits Azotés. Most of these companies, it is said, have felt the adverse effects of shortages in raw materials and electric power and have been compelled to curtail production.

Several heavy industry firms have evolved plans for constructing extensions of by-product and fertilizer plants which, it is hoped, will provide supplies for French agriculture from chemical sources.

To make up deficiencies from loss of the potash mines of Alsace, a group is sinking a shaft in southwest France where potash deposits have been discovered. Production is scheduled to begin as soon as exploration work has been completed.

Canada Subsidizes Certain Mixed Fertilizers

CANADA is seeking increased production of foodstuffs by subsidizing certain types of mixed fertilizers used on crops of feed essentials in the eastern provinces. The object in part is said to be to relieve transportation lines of heavy shipments from the west.

Under the program fertilizers are not sold to any but bona fide farmers and cannot be resold, but must be used as directed by the local fertilizer board. The subsidy is not paid direct to the farmer. The amount of the subsidy is deducted from the invoice for the material as rendered to the farmer by the merchant. The latter is required to present proper proof of delivery, when he will be given the subsidy by the proper authorities.

PRODUCTION of nitric acid and methanol to meet domestic needs has been announced as a goal in Australia, where reports are made of plans to produce these requirements in four plants adjoining government explosive plants. Domestic needs of these two commodities are said to equal $3,200,000 annually.

ADDITIONAL Indian manufacture resulted in 1941 in a stimulated chemical industry. India, as a result of expansion of its pharmaceutical industry, is said to be remarkably self-sufficient in medical stores. Little progress was reported, however, in the dyestuffs and fertilizer industries.

SULFUR production in Guatemala has ranged from 15,527 kg. in 1938 to 12,350 in the following year and 10,775 in 1940. None was produced in 1941.

Reserve Hotel Rooms Now!

Buffalo Meeting, September 7 to 11

BECAUSE of the large demand for hotel rooms in Buffalo, it is imperative that reservations be made at the earliest possible date. Hotel Statler will be headquarters for the meeting and Hotel Lafayette for the Division of Rubber Chemistry. Official hotels and rates are listed in CHEMICAL AND ENGINEERING NEWS, June 10, page 720. Please make reservations immediately, using the form on page 725 of that issue. Location of the various hotels is shown on the map below.



Hotels

1. Statler
2. Lafayette
3. Buffalo
4. Touraine
5. Ford
6. Graystone
7. Stuyvesant
8. Westbrook
21. Lennox

Meeting Places

1. Statler
2. Lafayette
9. Y. M. C. A.
10. Townsend Hall, University of Buffalo
14. Memorial Auditorium

11. Niagara Square
12. Lafayette Square
13. City Hall
15. Kleinhans Music Hall
16. Buffalo Public Library
17. Grosvenor Library
18. U. S. Post Office
19. Lehigh Valley R. R.
20. N. Y. C. R. R., Terrace Station

POTOMAC POSTSCRIPTS

WPB Activities

Six chemicals have been placed under complete allocation control:

Order	Chemical	Date Effective
M-163	By-product ammonia and ammonium sulfate	June 1
M-164	Synthetic ammonia	June 1
M-165	Cyanamide	June 1
M-167	Capryl alcohol	July 1
M-168	Isopropyl alcohol	July 1
M-169	Methyl ethyl ketone	July 1

Orders M-163, M-164, and M-165 cover chemicals representing the principal sources of industrial and agricultural nitrogen and are likewise needed in large volume for manufacture of explosives. Capryl alcohol is used in the manufacture of certain synthetic rubber and coating materials, as an ingredient in lubricating oils, and as a fluid in hydraulic brakes. Amyl alcohol is now being substituted in brake fluids. Isopropyl alcohol is used chiefly in the manufacture of acetone, an important ingredient of explosives and plastics, though it is to provide other users with adequate supplies that Order M-168 is issued. Methyl ethyl ketone goes principally into materials which are used for protective coatings.

Certain forms are provided which must be filed with WPB, where they will be the basis for allocation. Under M-163 and M-165, Form PD-237 must be used; under M-164, Forms PD-237 and PD-504; under M-167, PD-525 and PD-526; under M-168, PD-521 and PD-522, and under M-169, PD-523 and PD-524.

Benzene goes under complete allocation control in an amendment of General Conservation Order M-137. Because of rapidly growing demand for benzene in making aviation gasoline, synthetic rubber, phenol for plastics, and aniline for the high explosive tetryl, the action was deemed necessary.

Persons seeking delivery of benzene and producers desiring to use benzene must make application on Form PD-223-A. Both producers and distributors must file Form PD-224-A.

Producers of benzene must operate their equipment to obtain the maximum quantity of two-degree benzene possible. The Director of Industry Operations may from time to time direct that maximum production of benzene of some other grade be produced. Sale is permitted of coal-tar derivative oils, petroleum oil not included, containing benzene only when the purchaser is prepared and equipped to extract the maximum amount of benzene possible. Further provisions of the order prohibit the use of benzene as a motor fuel, either pure or in mixture.

Beryllium. Complete allocation control over beryllium, alloying material used to harden copper, is ordered in M-160. Consumers must file requests for allocation on Form PD-496 by the 20th of the month preceding the month in which they wish delivery and must file a monthly report to WPB on Form PD-497. Until July 1, beryllium may be delivered without allocation to produce an article with a rating of A-1-c or higher. The bulk of the United States supply comes from Latin America.

Calcium-Silicon. General Preference Order M-20-a, which places calcium-silicon under complete allocation control, has been extended indefinitely. Calcium-silicon is a steel alloying material.

Cellophane. Use of cellophane has been further restricted by an amendment to Limitation Order L-20. The order as amended covers cellophane or other transparent cellulose sheets of 0.003 inch or less. The original order covered sheets of 0.005 inch or less. A new plastics conservation order is being drawn which will cover use of sheets over 0.003 inch in thickness. Further restrictions prohibit use of cellophane in window cartons, for carton overwraps, and for packaging animal food, rubber nipples, and candy.

Conservation of cellophane under this order is to avert a shortage of military and essential supplies, as well as to conserve some of the 50,000 tons of high alpha sulfite wood pulp, thousands of tons of sulfuric acid, large amounts of plasticizers, chlorine, glycerol, and caustic soda.

Chlorate Chemicals go under complete allocation control in General Preference Order M-171. The chlorate chemicals are used normally for making matches, fireworks, and explosives, as a weed killer, oxidizing agent, and rust preventive, and in chemical processes.

Persons requesting deliveries must file their orders with their suppliers, accompanied by Form PD-516, in the month preceding the month in which delivery is sought. Users of chlorate chemicals as a weed killer do not have to file Form PD-516 if they hold United States explosives licenses. Producers of chlorate chemicals must file Form PD-515 with WPB each month.

Coatings containing certain organic binders or pigments may not be used for coating steel containers of 2 gallons or greater capacity by the terms of General Conservation Order M-158. This order is expected to save nearly 1,000,000 pounds a year of critical oils and resins, which are needed for military purposes. Normally about 1,600,000 pounds each of critical oils and resins are used for drum coating each year.

The order divides coatings into two groups—Class A and others. Class A coatings—containing tung, oiticica, perilla, or dehydrated castor oils; alkyd, phenolic, vinyl, urea, or melamine resin; or cellulose esters or ethers—may not be used for drum coating except for export (other than Class A coatings containing tung or oiticica) or orders for the Army, Navy, Coast Guard, or Maritime Commission. No person shall apply any coating other than black, except for small areas of color for marking or legal requirements.

Cobalt-Nickel Oxide may be used in the manufacture of ground coat frit by terms of Amendment 1 to Conservation Order M-39-b. Consumption of cobalt in the manufacture of ground coat frit, an important ingredient in enameling of steel, was limited in any one quarter to 35 per cent of the amount of cobalt used in the first six months of 1941. The amendment permits use of cobalt–nickel oxide which cannot be practicably separated into cobalt and nickel and at the same time prohibits use of cobalt or compounds which can be so separated.

Laboratory Equipment. To help fill shortages in supplies of laboratory equipment and materials for its manufacture for the war effort, for private account, and for export, WPB has issued General Limitation Order L-144. For purposes of the order laboratory equipment means material, instruments, appliances, devices, parts thereof, tools, and operating supplies for laboratories or for use in connection with operations usually carried on in laboratories, not including second-hand items.

Sale, delivery, rental, purchase, and acquisition of laboratory equipment in which is used aluminum, chromium, copper, iron, magnesium, molybdenum, nickel, steel, tantalum, tin, titanium, any alloys of these metals, rubber, neoprene or other synthetic rubber, or noncellulose base synthetic plastics are forbidden, except pursuant to a purchase order or contract having certified on it a statement that terms of the order will be followed, signed manually or as provided in Priorities Regulation 7 by a duly authorized official. This certification, according to the order, shall constitute a representation to WPB and to the person with whom the purchase order or contract is placed that the subject matter of the order or contract will be used or sold in accordance with provisions of L-144. Every person concerned shall be entitled to rely on the certification,

unless he knows or has reason to believe it false.

No person shall make the certification unless the laboratory equipment is for one of the following uses:

1. Research on or production, analysis, or testing of materials.
2. Research by or for the Army, Navy, Maritime Commission, or any other department or agency of the United States Government or any foreign country entitled to deliveries under the Lend-Lease Act.
3. Training of personnel for the above agencies or government.
4. To the extent necessary for the replacement of essential existing equipment in laboratories affecting the public health and in United States government, state, county, and municipal laboratories.
5. To the extent necessary for repair parts and operating supplies for the maintenance of existing essential equipment and activities in laboratories.
6. For any use which the Director of Industry Operations, WPB, determines is necessary and appropriate in the public interest.

No manufacturer is to use any of the scarce materials described in the order where use of other material is practicable.

Persons to whom the order applies are to keep for not less than two years accurate and complete records concerning inventories, production, and sales, including copies of each purchase order or contract containing the certification required. Appeals may be made to WPB in cases believed working exceptional and unreasonable hardships. Communications concerning the order should be addressed to War Production Board, Safety and Technical Equipment Branch, Technical and Scientific Equipment Section, Washington, D. C., Ref: L-144.

Metals. Another step toward strict allocation of scarce materials and improved control of inventories was taken in an announcement that all but a few classes of companies requiring more than $5,000 worth of metal for the third calendar quarter of 1942 must apply for priority assistance under the Production Requirements Plan before July 1. More than 10,000 companies, including most of those handling large war contracts, will be required to operate under Production Requirements Plan by the terms of a revision of Priorities Regulation 3. About 7,000 companies are now using the plan.

It is anticipated that only the following classes of companies which will use more than $5,000 worth of metal in the third quarter will continue under existing procedures instead of under the Production Requirements Plan: producers engaged in primary production of basic metals; distributors; wholesalers; builders; companies engaged in transportation; utilities, including light, heat, water, and gas companies; mining companies and petroleum enterprises; communications, including telephone and telegraph; and companies engaged in sewage and drainage operations.

While preference ratings will be assigned under the Production Requirements Plan, the War Production Board will assign ratings only to delivery of the amount of material which it is estimated will be available during the quarter.

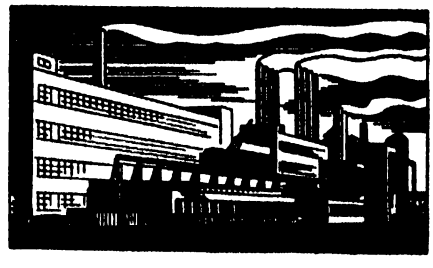
Platinum. WPB has taken steps to prevent Germany from getting any of the platinum she needs so badly for munitions production. All traffic in platinum except that conducted through normal, approved trade channels is halted by General Conservation Order M-162. Where transfer of platinum is permitted, the transaction, as well as inventories, must be filed with WPB on forms designated by WPB.

Platinum is a strategic material of war. That this country has adequate supplies is suggested by the 100 per cent operation of the platinum jewelry industry and the even course of platinum prices. Germany imported most of its platinum before the war, and it is now known that these sources are cut off, strengthening the belief that the German shortage is critical.

To prevent any American platinum being smuggled out of the country, or otherwise finding its way into the hands of our enemies, the present order forbids anyone to buy, sell, transfer, or otherwise dispose of any platinum (by which is meant any compound or alloy containing 1 per cent or more of platinum) except to a person known to the seller to be a dealer, distributor, processor, or consumer of platinum.

Resins. Restrictions on the use of natural resins in the manufacture of playing cards, pencils, house paint, label varnishes, toys, and farm equipment finishes are removed by an amendment to General Conservation Order M-56. The original restrictions were necessary because the demand then visible far exceeded supply. This situation is radically changed now, for restrictions placed on manufacture of many products by various other limitation and restriction orders by WPB have so far reduced general demand for natural resins that curtailment of end uses by M-56 is now considered unnecessary.

Styrene, one of the basic raw materials from which synthetic rubber is made, has been placed under complete allocation control. Producers are ordered to submit monthly delivery schedules to WPB by Order M-170. Purpose of the order is to ensure delivery of needed amounts of styrene to synthetic rubber plants without prohibiting the use of surplus styrene in the manufacture of plastics, such as combs, buttons, and certain types of electrical equipment. As styrene is not storable there is no need to restrict its use to the manufacture of synthetic rubber at present.



Tin. To provide additional tin for the urgent needs of military operations and civilian food supply, tin used in noncritical products will be cut another 10 per cent, effective July 1. This reduction plus certain others are contained in an amended version of Tin Conservation Order M-43-a.

The order as amended prohibits the manufacture and use of tin oxide except on orders carrying a rating of A-1-k or higher and restricts the amount of tin that may be used in solder and in printing plates. Certain imperative military and civilian operations were being jeopardized by restrictions in the original order. To avert an unnecessary hardship the order is changed to permit tinning of dairy implements, as defined in the order, to permit tin to be used in blasting caps for mineral extraction; babbitt for repair of certain Diesel engines; and repair and maintenance of ships for which a preference rating has been assigned by the Maritime Commission under PD-300. No restrictions in the order apply to the use of tin for implements of war (combat weapons and field service equipment) for the armed services, where such use of tin is required by service specifications.

Dyestuffs Antitrust Trial Postponed

ANTITRUST prosecutions of leading dyestuff manufacturers and their affiliates have been postponed because the trials would interfere with conduct of the war, Attorney General Biddle has announced. Secretary Stimson requested the postponement, explaining that the trial would take the time of executives and key production employees. Some of the defendants, he noted, are among the most important producers of war chemicals and other vital munitions and are operating numerous government-owned plants for chemical and explosives manufacture. This action was taken under the agreement, approved by President Roosevelt, Secretaries Stimson and Knox, and Thurman Arnold, Assistant Attorney General, that trials would be postponed if investigations showed it to be advisable.

Indictments were handed down against the dyestuffs makers in Trenton, N. J., May 14, by a federal grand jury. Corporations which will not have to stand trial are Allied Chemical & Dye Corp., E. I. du Pont de Nemours & Co., Inc., American Cyanamid Co., General Aniline and Film Corp., General Dyestuff Corp., Geigy Co., Inc., Sandoz Chemical Works, Inc., and Ciba Co., Inc.

Price Regulations

Antifreezes. Maximum prices for alcohol antifreezes will be established by the Office of Price Administration by mid-June at levels substantially below those now charged by some manufacturers, Price Administrator Henderson has announced.

As now contemplated by OPA, the regulation will hold manufacturers' prices to levels perhaps as low as 69 cents per gallon for high-cost-production alcohol antifreeze delivered by the carload in drums, container included. This ceiling would be approximately 10 cents a gallon under prices now charged by some manufacturers. The regulation also will probably set maximum retail prices at approximately 35 cents per quart for high-cost-production alcohol antifreeze and about 25 cents per quart for low-cost-production alcohol antifreeze.

The schedule will also cover ethylene glycol antifreeze solutions, prices of which have remained relatively stable at established levels.

Oleo. Uniform maximum prices for oleo stock, oleo oil, and oleostearin to all classes of buyers for any purpose are established by Amendment 4 to Revised Price Schedule 53 (Fats and Oils). Under the original provisions of the schedule, the maximums were the individual seller's highest price at which he did business on October 1, 1941, or 111 per cent of his November 26, 1941, sales price, whichever was higher. The new ceiling prices established reflect these peak levels, except that under the amendment they are to be uniform for the industry.

Specific ceiling prices set for oleo—packed in used drums or barrels, f. o. b. Chicago—in cents per pound are: extra oleo stock, 12.75; prime oleo stock, 12.50; extra oleo oil, 13.04; prime oleo oil, 12.75; and prime oleostearin, 10.61.

Copper Industry Featured by Record-Breaking Consumption

All-out aid to nations fighting aggression caused a sharper increase in demand for copper in the United States in 1941 than for almost any other large-tonnage material, according to the U. S. Bureau of Mines. Consumption, as measured by the use of primary refinery shapes, was considerably above all previous annual records. Failure of domestic production to advance in proportion to consumption and shipping restrictions foretold the need for contraction in civilian copper use.

Smelter production of primary copper from domestic sources during 1941 increased, as did total output of new refined copper.

Imports of crude and refined copper set a new annual record in 1941; exports of refined copper and primary fabricated shapes were almost the smallest of the century.

Third WPB Report Shows Increasing Scarcity of Materials

Increased momentum of the Nation's all-out war effort is reflected in the third provisional report on relative scarcity of certain materials, issued by the Conservation and Substitution Branch of WPB's Bureau of Industrial Conservation. The second report was printed in Chemical and Engineering News for May 10, page 607.

Forty additional items are listed in Groups I and II. Referring to previous lists, Harvey A. Anderson, chief of the branch, pointed out the tendency of many items to claim position in the higher brackets where demand exceeded supply. This change of position, generally due to depletion of supply through rising demands for the particular item, in some cases was brought about by the increasing deficiency of its substitutes. The third group is almost devoid of metals and chemicals. Most of its items are used with little change from the condition in which they are mined, quarried, or grown. Even where supplies are almost unlimited, certain varieties or grades have become scarce. In the case of large-tonnage items, problems of labor, manufacturing, and transportation have become increasingly important in making the materials available.

Group I. The available supply of these materials is inadequate for war and essential civilian uses and in many cases for war purposes alone

Metals

- Alloy iron
- Alloy steel
- Aluminum
- Aluminum pigments
- Cadmium
- Calcium-silicon
- Chromium
- Cobalt
- Columbium
- Copper
- Copper scrap
- Iridium
- Magnesium
- Manganese, electro
- Nickel
- Nickel scrap
- Rhodium
- Tantalum
- Tin
- Tinplate and terneplate
- Tungsten
- Tungsten carbides
- Vanadium
- Wrought iron
- Zinc, high grade

Chemicals

- Acetone
- Alkyd resins
- Alumina
- Ammonia
- Aniline
- Anthraquinone derivatives
- Benzene
- Butadiene
- Chlorinated hydrocarbon solvents
- Chlorine
- Cresols
- Diphenylamine
- Methyl methacrylate sheets
- Naphthalene
- Pentaerythritol
- Phenol
- Phenol formaldehyde resins and plastics
- Phosphates
  - Tricresyl
  - Triphenyl
- Phthalic anhydride and phthalates
- Polystyrene
- Polyvinyl chloride
- Sodium nitrate
- Sulfur chlorides
- Toluene

Miscellaneous Products

- Agar
- Asbestos, long fiber
- Babassu oil
- Burlap
- Cashew nut shell oil
- Chrome pigments
- Coconut oil
- Corundum
- Cotton
  - Duck
  - Linters
  - Raw, long staple
- Feathers and down, goose and duck
- Graphite, Madagascar flake
- Hemp
  - Agave fiber
  - Henequen
  - Manila fiber
- Hemp
  - Cordage
  - Seed
  - Sisal
- Jewel bearings
- Jute
- Kapok
- Kyanite
- Lumber, certain grades, hard and soft woods
- Mica, block
- Natural resins, except rosin
- Nylon
- Oiticica oil
- Palm oil
- Palm kernel oil
- Pig and hog bristles
- Quartz crystals
- Quinine
- Rapeseed oil
- Rayon, high tenacity
- Rubber
  - Chlorinated
  - Crude
  - Latex
  - Reclaimed
  - Synthetic
- Shearlings
- Shellac
- Silk
  - Row
  - Noils
  - Garnetted
  - Reclaimed
- Sperm oil
- Teak
- Tung oil

Group II. Materials that are essential to the war industries but the supplies of which are not so limited as those of Group I

Metals

- Aluminum scrap, No. 12, remelt
- Antimony
- Arsenic
- Bismuth
- Calcium
- Ferrosilicon
- Iron
  - Gray
  - Cast
- Iron
  - Malleable
  - Pig
  - Scrap
- Lead
- Lithium
- Manganese, ferro
- Mercury
- Molybdenum
- Palladium
- Platinum
- Ruthenium
- Silicon and alloys
- Steel
  - Bessemer
  - Carbon
  - Basic
  - Scrap
- Zinc, low grades
- Uranium

CHEMICALS

Alcohol
  Butyl
  Ethyl
  Methyl
Atebrin
Barium carbonate
Bleaching powder
Bromine
Cadmium pigments
Carbon tetrachloride
Citric acid
Formaldehyde
Glycol
Halogenated hydrocarbon refrigerants
Iodine
Lactic acid and lactates
Lithopone
Mannitol
Methyl methacrylate powder
Phosphorus
Potassium
  Perchlorate
  Permanganate
Sorbitol
Strontium salts
Tetraethyllead
Titanium pigments
Urea formaldehyde plastic
Vinylidine chloride plastic
Xylene

MISCELLANEOUS PRODUCTS

Albumin, blood
Bauxite
Castor oil
Cellophane
Cellulose nitrate, acetate, and other derivatives
Cork
Cottonseed
Cryolite
Diamonds
  Industrial
  Dies
Fish liver oils
Flax
Fluorspar
Glassine paper
Glues, animal and vegetable
Glycerol
Hides
Lead pigments
Leather
Linseed oil
Magnesite
Mercury pigments
Mica, splittings
Molasses
Natural gas
Parchment paper
Pine oil
Rayon filament, staple fiber
Rotenone
Rutile
Steatite talc
Tanning materials
Vitamin A products
Vulcanized fiber
Wood pulp
Wool
Zircon

Group III. Materials that are generally available in significant quantities as substitutes for less available materials

METALS

Gold
Indium
Osmium
Silver

CHEMICALS

Borax and boric acid
Camphor
Carbon black
Chromic acid for plating
Hydrochloric acid
Sodium metasilicate

MISCELLANEOUS PRODUCTS

Asbestos, common
Asphalt
Brick and tile
Casein
Cement, portland
Ceramics
Charcoal
Clay
Coal and coke
Coal-tar pitch
Concrete
Corn stalks
Cotton, raw, up to 1 3/8 inch
Cottonseed oil
Diatomite
Emery
Feldspar
Felt, hair
Flint
Gilsonite
Glass
Gypsum and products
Hair, cattle, calf, goat
Invert sugar
Kraft paper
Lignin plastic
Lime
Lumber and millwork
  Low grades, hard and soft woods
  All grades, gums
Mica, ground
Mineral wool
Paper, except II
Paperboard
Peanut oil
Petroleum products
  Crude oil
  Gasoline
  Lubricating oil
  Paraffin
Plywood, unrestricted binder
Pottery
Pyrethrum
Rosin and derivatives
Salt
Silica sand
Soybeans
  Oil
  Protein
Starch
Stone
  Granite
  Limestone
  Marble
  Slate
Straw
Sugar
Sulfur
Tripoli
Turpentine
Vermiculite
Wallboard
Wood and products
  Sawdust
  Wood fiber
  Wood flour
Zinc oxide, American process

Buffalo Conference on Examinations

September 5 to 6

THE success of national testing programs depends upon the joint effort of a large number of individuals and institutions, in both the construction and use of the examinations. A test must be representative of what is actually being taught; it must be of greater service to the professor using it than a test of his own construction.

In an endeavor to make the cooperative tests meet these requirements, a Conference on Testing is being sponsored by the Committee on Examinations and Tests, Division of Chemical Education, AMERICAN CHEMICAL SOCIETY. A very successful meeting of one week was held last year at the University of Chicago. This year a two-day conference, September 5 and 6, will precede the AMERICAN CHEMICAL SOCIETY meeting in Buffalo. Arrangements have been made for competent and trained leadership for each of the various groups. It is regretted that Sunday must be included but, because of the war, the time and expense involved are being reduced to a minimum. It is hoped that those interested in the national testing program or in the construction of tests in general, qualitative, organic, or physical chemistry will take advantage of this opportunity.

Chemists wishing to participate and to contribute to the actual construction of tests should select the subject of greatest interest and write to those in charge of the several groups:

GENERAL CHEMISTRY
Application of Principles, F. D. Martin, Purdue University, Lafayette, Ind.
Scientific Method, Theodore Ashford, University of Chicago, Chicago, Ill.
Laboratory Technique, C. S. Adams, Antioch College, Yellow Springs, Ohio.
General Knowledge and Information, O. M. Smith, Stillwater, Okla.

QUALITATIVE ANALYSIS
Rufus D. Reed, State Teachers College, Upper Montclair, N. J.

ORGANIC CHEMISTRY
Ed. F. Degering, Purdue University, Lafayette, Ind.

PHYSICAL CHEMISTRY
Otto M. Smith, Oklahoma A. and M. College, Stillwater, Okla.

Haering Continues Growth

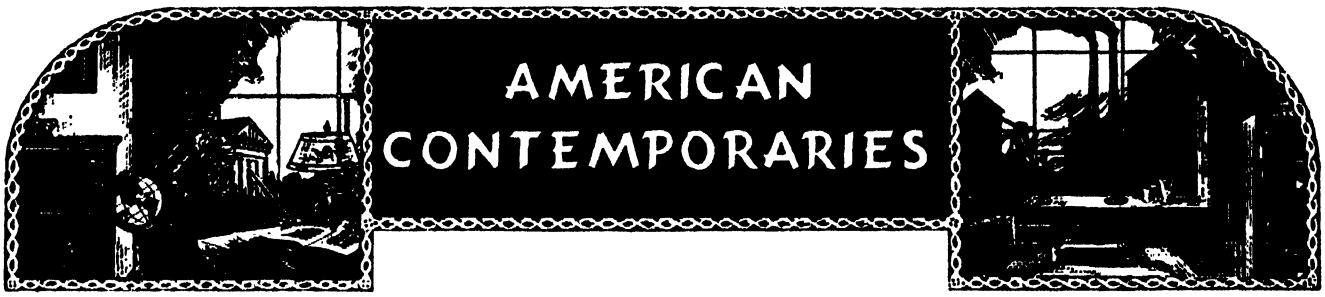
THE rapid rise of the D. W. Haering organization from one man in 1931 to a national organisation in 1942 playing a vital and substantial part in the industrial war effort is emphasized by the recent addition of several thousand feet of floor space to the Haering general offices on the 18th floor of the Engineering Building in Chicago.

Recent personnel additions include the appointment of Arthur J. Grotsma as controller, and Robert Seyl as director of service. Ilya Stephanoff, Mitchell Stanislaus Sniegowski, and Isabelle Luan, chemists, have been added to the laboratory staff.

Jack Daggett has been transferred from the laboratory to the field engineering department and John J. Meacher has been promoted to district manager of the new Cincinnati district offices.

UNIFORM containers for potassium salts are required under recent orders for control of fertilizers in the United Kingdom. Delivery of imported potash fertilizers to agriculturists is restricted to prevent unnecessary use.





A. Cressy Morrison

"MR. CHAIRMAN, who is the gentleman who seems to be the soul of dignity with whom you have conferred so often during the three days that this convention has been in session?"

"That gentleman, my friend, is Cressy Morrison, an elder statesman of the American chemical industries. He is a deep well of good council and sound judgment."

So spoke the chairman of the Executive Committee of the Organic Chemical Manufacturers Association to a new member.

It is hard for those who have known Cressy Morrison's active business life of more than three score years to think of him as having been born. His dynamic personality seems to have been here always. However, his advent into the world in the "wee hoose" in Wrentham, Mass., on December 6, 1864, was more than an ordinary occasion in the Morrison and Cressy families. Here at last was the "man child" to perpetuate their names and carry on the cherished traditions of their rugged Scotch ancestors. Abram Cressy Morrison, son of Abram Batchelder and Mary Elizabeth Morrison, has more than fulfilled the family expectations.

At a very early age Morrison exhibited the qualities of initiative, imagination, self reliance, and determination that have marked him as a leader in a wide range of activities. An older sister could hardly remember a time when he was not able to take care of himself. As a boy he was continually adventuring into new enterprises "on his own hook".

There was a family tradition that his great aunt "Jerushy", a Massachusetts farmer's wife, set out to stop a leak in a barrel into which the family pork was to be packed for the winter by filling the cracks with a concoction of applewood charcoal, ashes, sulfur, and lard. Much to her surprise she found yellow crystals in the mixture which were declared by a "Boston jeweler" to be "diamonds", but of no value because of shape and color. Inspired by the often repeated tale, 10-year-old Cressy decided to repeat the diamond experiment. After two days of persistent mixing and cooking and getting messed up from head to foot, he concluded that the family tradition was a bit unreliable.

At the age of 12 he bought for 5 cents a second-hand and dilapidated book by Robert Mudie entitled, "A Popular Guide



to the Observation of Nature", published in 1832 by J. & J. Harper. "This book", he said many years later, "was a wonderful revelation to me and I clung to it and reread it for years. It started me on a diligent and persistent inquiry into the wonders of nature and chemistry."

After a public school education and a year in business college, he secured a position with the Butler Rubber Co., Butler, N. J., where he not only became familiar with processes for manufacturing hard rubber products, but found his way of life in the field of applied chemistry. Thus began the industrial career of one of America's chief exponents of pandemic chemistry.

Although Morrison had never had a formal course in chemistry or physics he was quick to realize that the manufacturing processes with which he was working were based on them. He read everything on these subjects that he could find in the local libraries. Most of the available books dealt with the chemical aspects of physiology, nutrition, and medicine, but he found them so intensely interesting that he decided to work in those fields. He accepted a position with the Maltine Manufacturing Co. in 1888 where he made a special study of the production and use of malt extracts containing diastase, particularly their utilization as medicinals. In this work he became personally acquainted with more than 6,000 physicians. From them and extensive reading he learned much about practical medicine and its relation to the use of proprietary foods and medicinals. From them he also heard much about the Nation's dependence upon foreign-made drugs and pharmaceuticals, a matter which was to concern him much in later years. The new position gave him an opportunity to use his unusual natural talent for organization and promotion work. He liked people, trusted them, and understood them. They in turn liked and trusted him. News of his success spread rapidly. It came to the attention of Captain Fred Pabst, founder and president of the great Pabst Brewing Co. of Milwaukee, largest manufacturer of malt extracts in the country. Morrison was sent for. Would he take charge of development and publicity, not only for malt extract but also for all fermentation products including beer? What a question to ask a boy whose Puritan parents and forbears taught him that "trafficking in rum" was mortal sin and rum included everything from root beer to whisky! In fact, some straight-laced families of his boyhood community included vanilla extract which was reported to be an aphrodisiac. Morrison accepted the offer with the understanding that he was to have full responsibility and a free hand to introduce high ethical standards into the marketing of beer. It was a tough job. Established tradition in the industry presented almost insurmountable obstacles. In characteristic fashion he studied every angle of the business. He soon became familiar with the theory and practice of fermentation and an authority on the physiological characteristics and nutritional values of malt liquors and beers of various kinds. For the first time in the annals of American brewing, the public learned something of the fundamental facts that gave fermentation products real food values. The business grew by leaps and bounds. In addition to the extensive technical knowledge which he gained, 15 years in this work made him an outstanding expert in the field of public relations in industry.

Morrison has always been a prodigious worker—never satisfied with a single job. In addition to his work in the later years for Pabst, he was the executive in charge of the defense of alum baking powder during what was known as the baking powder controversy, one of the most vicious proprietary food product battles in our industrial history. It had much to do with the hastening of the pure food legislation of 1906. He originated the first

investigation of the physiological effect of the salts of aluminum on man and aided in bringing about governmental investigation of all baking powder. The two volumes of 1,100 pages each, entitled "The American Baking Powder Controversy", of which he is the author, are a monumental testimonial to his capacity to master thoroughly any task that he sets for himself.

In 1907 a young chemical company destined to become one of the giants of the American chemical industries was anxious to develop new uses for calcium carbide, its main product. Use of acetylene gas for general lighting purposes was growing but the electric light was a serious competitor. A vigorous development and public relations department was needed. Who was the man with the requisite experience, vision, initiative, and capacity for growth to head it? That the selection of Cressy Morrison by C. K. G. Billings and George O. Knapp, two of the founders of the Union Carbide Co., was a wise choice is eloquently attested by his 23 years of active service with that company.

Use of calcium carbide and acetylene by the general public involved hazards which were not understood by the layman. Morrison saw at once that if these hazards were not seriously to affect the use of these materials, regulations for their storage, transportation, and use must be put into effect. In cooperation with chemists, engineers, insurance underwriters, state and municipal authorities, and the Bureau of Explosives, he formulated the basic rules and regulations which govern the industry today, including the shipment of cargoes overseas. As a basis for these rules he investigated the physiological effects and the explosive ranges of acetylene and other hydrocarbon gases. These experiments included studies of the effect of poisonous and flammable gases encountered in coal and metal mines in connection with the use of acetylene for mine lighting. He served as secretary of the International Acetylene Association and received the Morehead Medal in recognition of his services.

The introduction and development of the oxyacetylene cutting and welding torch brought to the metal trades a new metal assembly tool and a new structural technique which rapidly increased the demands for compressed oxygen and acetylene. Widespread use of these torches in the form of mobile units necessitated the immediate formulation and adoption of strict regulations. Morrison was called to take charge of this matter for the industry at once. The basic rules and regulations which he prepared covering pressure generators, distribution in cylinders of oxygen and acetylene, design and tests of cylinders for compressed gases, and transportation and storage of the filled containers are the rules now adopted by the Interstate Commerce Commission.

In recognition of his outstanding accomplishments in this field he was elected president of the Compressed Gas Manufacturers Association. Production of oxygen by liquefying air and separating the component gases by fractional distillation was not so simple as it seemed. There were problems. They excited the inventive streak in Morrison's practical imagination. A study of the physical properties of oxygen and nitrogen led him to believe that their separation could be improved by carrying out the distillation in a strong magnetic field. Tests by the National Bureau of Standards confirmed this belief with the result that a basic patent was issued on the process.

The introduction of new chemical products for general public use often brings to the fore hazards which, if not understood and anticipated, create serious marketing difficulties. The organization of the Electro-Metallurgical Co. as a unit of the Union Carbide Co. brought forward the necessity of understanding the production and uses of ferroalloys, such as ferrochromium, ferrosilicon, ferromolybdenum, ferrotungsten, and others. Ferrosilicon in particular required special attention since gases injurious to human health emanated from certain grades during shipment and storage. Extensive studies of the physiological effects of these gases enabled Morrison to formulate the safety rules used today.

Production of a wide range of carbon products was a natural adjunct to the business of making acetylene, metals, and alloys. The National Carbon Co., another vigorous young member of the Union Carbide family, was extending its business in many directions. The proper guiding of its development needed a competent sales engineer to stand at the contact point between production and consumption. Morrison's long experience in similar critical positions enabled him to accept the new appointment with a full understanding of its responsibilities. Six months intensive study with competent experts gave him the necessary knowledge of the characteristics of carbon and the applied chemistry required to manufacture electrodes for illumination and electric furnaces, for the production of brushes adapted to the individual characteristics of motors, and for the manufacture of carbon and graphite for electric cells and lubricants. This work brought him in immediate contact with different kinds of industrial and public relation problems which were handled with the characteristic Morrison diplomatic finesse. His ability to step into new situations, acquire at once the basic and practical knowledge necessary to sense and understand the scientific, economic, social, political, and industrial trends, both domestic and international, that must be considered in the formulation and operation of sound production and merchandising policies for new developments in an industry as complex as that of the chemical industry, requires a vibrant and self-starting mind with a scope of comprehension that is possessed by few men. With the addition of Morrison's patience and strong sense of the responsibility to maintain high ideals in public and business morals, these are the requisite qualifications of the person who must stand as a buffer in charge of the control gates where the orderly rushing streams of scientific developments flow into the meandering sluggish rivers of society, lest they overflow their banks, to the detriment of the common good. Perhaps one of the reasons for the farsightedness that has been characteristic of Morrison's work has been his firm belief that laboratories engaged in fundamental research are the best "listening posts" for reliable information concerning the future course of industrial developments. For this reason he is also a staunch advocate of the necessity of membership in scientific and professional societies which support publications devoted to reporting researches in both pure and applied science.

In the early part of the first World War, Morrison discovered the British demand for helium. Through his interest in the production of compressed gases he was familiar with the pioneer work of Cady and MacFarland at Kansas University in the separation of the rare gases from midcontinental natural gas. He at once set in motion investigations which led to practical methods for the production of helium in this country. For this he was made a fellow in the New York Academy of Sciences.

Busy as Morrison's professional and business life has been, he has found time for public service activities. If he has an obsession, it is his unalterable belief that the future of the American Nation as the outstanding stronghold of democracy in this world depends upon free enterprise and a broad benevolent national policy for the development of industry. Accordingly he has been an ardent advocate of reasonable protective tariffs. His interest in the protective tariff dates from 1882 when the head master of a business school sent him to a course of lectures on free trade. He came out believing ardently in the vital necessity of an adequate tariff protection for American industry. He brought about the reorganization of the American Tariff League and became chairman of the executive committee, holding that position for 10 years.

In 1921 he organized and raised funds for the American Valuation Association which sought to have the values of imported articles on which tariff duties are collected based on the American values under United States jurisdiction rather than on the alleged wholesale values to be ascertained by our customs agents in the alleged country of origin. In this effort he succeeded in the House of Representatives which passed the necessary amendments to the Tariff Law, but the Senate cut out all but the present American valuation

requirements covering the coal tar paragraphs (27 and 28) where it has not only proved workable but without which much of our synthetic organic chemical industry could not have been built up or sustained. His work in revising and extending the chemical paragraphs has proved of primary importance to the United States and has become a foundation on which the synthetic chemical industry as a whole now rests. In view of the chaos ahead of us, with no foreign currency values and possibly forced labor, this work will continue to bear surprising relation to the continued success of the chemical industry if not torn down by impractical theorists.

He has frequently been called upon to serve on important government committees. During the years he was a member and particularly through the eight years he was chairman of the Chemical Advisory Committee of the United States Department of Commerce he rendered outstanding service.

One of the tenets of Morrison's credo is the conviction that the solution of many of the troublesome problems that bedevil mankind will be found in the discovery and understanding of natural laws. This means research. To stimulate fundamental investigation in the various branches of natural science he established in 1922 the A. Cressy Morrison Prize Competitions to be administered by the New York Academy of Sciences. Thirty awards have been made to date, totaling approximately $10,000. The papers selected for the awards, many of them by distinguished American scientists in astronomy, botany, chemistry, physics, biology, geology, zoology, etc., constitute important contributions to the understanding of fundamental laws in these fields. In recognition of his interest in research he was made a member of the executive committee of the National Research Council and president of the New York Academy of Sciences.

To his friends Cressy Morrison is a marvel of perennial youth and efficiency. They are astonished by the catholicity of his interests. How he ever found time, in addition to his other duties, during the Milwaukee years to collect and assemble the material for his large three-volume Encyclopedia of Superstitution is a mystery. It is the most complete work of its kind in the English language. Hobbies like this have had an important place in his life. His fondness for outdoor sports in the late 80's and early 90's made him an energetic cycling enthusiast, so much so that he became a distance racer who finished "within the money" in several 100-mile contests. He served two years as vice president of the American Wheelman's Association, an organization with 107,000 members. This led him to support a good road movement which was then being initiated. He introduced into the Wisconsin legislature the constitutional amendment which authorized the state to contribute to road improvements.

Since his retirement in 1930 from active duties with the Union Carbide and Carbon Corp. as executive in charge of public relations he has given his services generously to support scientific, civic, benevolent, and patriotic organizations. Under his presidency the New York Academy of Sciences expanded its activities and increased its membership greatly. While serving as its president he rejuvenated the old Institute of the City of New York. During the leanest years of the depression the fine work of The Chemists and Chemical Engineers Unemployment Committee could not have been continued without his generous support. In 1935 as chairman of the Finance Committee of the American Chemical Industries Tercentenary Celebration of the AMERICAN CHEMICAL SOCIETY in New York, he performed the Herculean task of raising the large budget requirements almost single handed. An outgrowth of his interest in this great celebration is the excellent memorial book, "Man in a Chemical World", prepared by him under the direction of the executive committee of the Tercentenary and distributed throughout the world. It was reprinted for the English Scientific Book Club, was translated into Polish as a textbook in Poland and into Portuguese for use in Brazil. A recent public service of much importance to the State of Maine, where he has a summer home, was his assistance in arranging for the construction of the $1,000,000 suspension bridge connecting Deer Isle with the mainland. Because of its unusual design, the local inhabitants refer to it with pride as "Morrison's hump".

Cressy, as his intimate friends know him, has had the good fortune to have at his side a tower of strength in the person of Mrs. Morrison, the former Marguerite Snow of New York, whose charming manner, sound advice, and sympathetic encouragement have contributed much to his success. Those who have had the rare good fortune to know them in the intimacy of their home where the simple graces of life abound have enjoyed unexcelled hospitality. To know Cressy at his best one must be invited to Spruce Harbor, his delightful summer home on Deer Isle, for a day's fishing with him in the sunlit waters of the coast of Maine. Then freely doth flow the charm of the true spirit of friendship from the soul of a free man ennobled by rich human experiences and by an abiding faith in his fellowman, his country, and his God.

Today in his 78th year, vigorous in mind and body with sense of humor undimmed, he goes daily to his office with a lilt in his step to work on the agenda of a program that will take several years to complete.

Such have been the achievements of an elder statesman of the American chemical industries and the course of life of a Massachusetts boy whose imagination was fired by his "Aunt Jerushy's" pork barrel experiment and who found time in a busy life to stroll in the pastures of wonder with pleasure and profit.

ARTHUR W. HIXSON



Paul W. Bachman has been appointed assistant research director of the Commercial Solvents Corp., Terre Haute, Ind. He was formerly manager of research and technical supervisor of phosphates for the General Chemical Co.



Paul W. Bachman

John G. Beach has been named a research engineer on the technical staff of Battelle Memorial Institute, Columbus, Ohio, where he has been assigned to the division of electrochemistry. Prior to joining the Battelle staff he was associated with the Sherwin-Williams Corp., Detroit, Mich.

Richard F. Bergmann has been appointed chief engineer for the Link-Belt Co., Chicago, Ill., and **William W. Sayers** has been appointed consulting engineer.

L. P. Biefeld has resigned his position as assistant professor in the Department of Chemistry, Purdue University, Lafayette, Ind., and is now associated with the Chemical Engineering Laboratory of the Owens-Corning Fiberglas Corp., Newark, Ohio.

William H. Browne has been named a research engineer on the technical staff of Battelle Memorial Institute, Columbus, Ohio, and assigned to the division of fuel research.

Ralph E. Burroughs, formerly director of

research of the Ingram Richardson Manufacturing Co., Frankfort, Ind., has been appointed assistant chief chemist of the Aluminum Co. of America plant at Lafayette, Ind.

John O. Burton has been appointed chief of research for the Minnesota and Ontario Paper Co., International Falls, Minn. Dr. Burton joined the company's staff in 1938 as research engineer.

Laurence H. Chase has been named a research engineer on the technical staff of Battelle Memorial Institute, Columbus, Ohio, and assigned to the division of organic chemistry.

Frank B. Cooper, formerly research chemist of the Western Pennsylvania Hospital Institute of Pathology, has joined The Zemmer Co., Pittsburgh, Penna., as director of research and control.

Frank Cowen, who will be a graduate assistant in chemistry at Purdue University next year, has been granted the Senior Award of a year's membership in the AMERICAN CHEMICAL SOCIETY by the Ohio Wesleyan Chemistry Department.

Appointment of **Reginald S. Dean,** chief of the Metallurgical Division, U. S. Bureau of Mines, to the post of assistant director of the bureau has been announced coincident with a streamlining of the bureau's administrative organization. The reorganization is aimed to make possible the utilization of newly developed processes to the fullest extent with a minimum loss of time.

George F. Kroha and **George C. Calvert** have been elected members of the board of directors of The Pfaudler Co. Both have been identified with the company many years.



John S. McAbee

John S. McAbee, divisional sales manager of the J. T. Baker Chemical Co., Phillipsburg, N. J., has joined the Naval Reserve as a lieutenant (j. g.).



Henry J. Masson

Henry J. Masson, professor of chemical engineering and chairman of the Department of Chemical Engineering at New York University, has been appointed assistant dean of the College of Engineering. Dr. Masson, also director of the college's Graduate and Evening Divisions, is an authority on petroleum, lubrication, explosive mixtures, and food technology.

Captain Harry Price, Infantry Reserve, a patent lawyer located at 420 Lexington Ave., New York, N. Y., has been called to active duty and is at present assigned to the Office of Chief of Ordnance, Research and Engineering, Social Security Building, Washington, D. C.

Rebecca Shapiro has resigned her position with the New York City Department of Health to head the Bacteriological Department of Foster D. Snell, Inc., Brooklyn. **S. S. Epstein,** who previously held the position, becomes vice president of Kirsch's Beverages, Inc., but will serve in a consulting and advisory capacity.

W. S. Shipley, chairman of the board of the York Ice Machinery Corp., York, Penna., was invited to be a member of the Honorary Advisory Committee on the occasion of the dedication of the new Technological Institute of Northwestern University on June 15 and 16.

James S. Strong, who previous to April 6 was the du Pont postdoctoral fellow at the University of Pennsylvania under Ralph Connor, is now at the Naval Research Laboratory in Washington, D. C.

Nathan Sugarman, Atlanta, Ga., majoring in cellulose chemistry, was the first to receive the doctor of philosophy degree from the Virginia Polytechnic Institute.

Frank M. Tiller, at present on the chemical engineering staff at the University of Cincinnati, will assume duties as assistant professor of chemical engineering at Vanderbilt University, Nashville, Tenn., in September.

Harlan L. Trumbull has been chosen by the B. F. Goodrich Co. to head a research project to study the present sources of rubber in North America and hunt for new materials.

Roger F. Varney received his Ph.D. in biochemistry at the University of Chicago and since the first of April has been employed as a staff chemist in the Biological Development and Control Laboratory, Biological Laboratories, E. R. Squibb & Sons, New Brunswick, N. J.

Robert R. Williams, chemical director of the Bell Telephone Laboratories, and **Roger J. Williams,** professor of chemistry at the University of Texas, received honorary degrees of doctor of science at the 188th commencement of Columbia University on June 2. In conferring the degrees Robert Williams was cited for "early taking a leading part in research in various fields including submarine cable insulation as well as the structure and synthesis of the antineuritic vitamin" and "a long record of accomplishment and distinction in an exceptionally helpful field of scientific inquiry", and Dr. Roger J. Williams for "giving nearly 20 years of scientific service to two institutions in the State of Oregon, winning distinction by most important contributions in the field of biochemistry, particularly by research as to vitamins with results which have great importance in medical chemistry".



BLACKSTONE

W. P. Yant

W. P. Yant, Director of Research and Development, Mine Safety Appliances Co., Pittsburgh, Penna., received an honorary degree of doctor of science from Wooster College on May 5. Dr. Yant graduated from Wooster College in 1918 and has since distinguished himself in the field of industrial safety and toxicology and has done much to eliminate hazards from gases, vapors, and dusts.

New Members Elected May 1 to June 1, 1942

Total Membership as of June 1—30,909

Akron Section. Grover Duke[1], Judson A. Fisher, Vincent W. Irle[1], Clyde H. Jones[1], William H. Parry, Jr.[1], Robert F. Thome[1].

Alabama Section. Carl Bordenca, Homer Carder, Malcolm W. Ellison, Jr.[1], Allen G. Erdman, Eugene Johnson, Eugenia Olivia Philabert[1].

Baton Rouge Section. Ralph T. Overman[1], S. D. Sumerford.

California Section. Elmer A. Anderson, Orvil Bolduan[1], C. P. Butler, Maxey F. Cobb, Matthew K. Fountain[1], T. H. Geballe[1], George Herbert Guenther[1], Elmer Huber, Jr.[1], Edwin L. Mitchell, Edward N. Squire[1].

Central Pennsylvania Section. A. S. Bewsard[1], Harold Hart[1], James Edward Holland[1], Samuel Kaufman[1], Laurence L. Layton[1], Robert A. Matteson[1], Max S. Peters[1], Adolf Von Hake[1].

Chicago Section. Harry A. Barron[1], Heins R. Berlt, Frederick W. Boebel[1], George E. F. Brewer, Juel Taylor Chapman, Francis G. Ginder, Jr.[1], Sherwin I. Ginsberg, Howard Wendell Hall, Sam S. Levin[1], Edward D. Mintzer, Peter J. Ronchetti, Herbert F. Schwarz, William P. Simmons[1], Charles V. Snell, Collins Veatch, Robert P. Zelinski[1].

Cincinnati Section. William J. Corbett, Jr.[1], Samuel G. Dent, Jr.[1], Albin H. Twardowicz.

Cleveland Section. Frank W. Buck, Claus Andrew Harwick, Robert C. Muhlhauser[1], Adelbert O. Tischler[1], Walter C. Warner[1].

Colorado Section. The Gates Rubber Co., Albert Optican[1].

Columbus Section. Frank L. Davison[1], Morris D. Farbman[1].

Connecticut Valley Section. Lucas P. Hart, Jr.

Cornell Section. Kimball P. Hall[1], Fredric W. Hill[1], James A. Robertson[1].

Dallas–Ft. Worth Section. J. W. Bartlett, W. E. Garrison[1].

Dayton Section. Harold W. Bell.

Delaware Section. Linus M. Ellis, Godfrey W. Wilbert.

Detroit Section. Thomas W. Baker, Donald L. Bishop, William H. Bishop, Benjamin B. Davis, Joseph Epel[1], R. V. Harris, C. Paul Huard[1], Charles A. Kumins, A. S. Miceli, Margaret L. Rosenberg, John M. Stewart[1], William J. Weisenburg, Albert W. Wilson[1].

East Tennessee Section. Aubrey R. McKinney.

Eastern New York Section. Andrew Aylies.

Erie Section. Don Martin Alstadt[1], Jerome N. Haimsohn[1].

Florida Section. John H. Gross[1], Charles R. Picker.

Georgia Section. Thomas S. Boggess, Jr., Moses E. Howell, C. Harris White.

Indiana Section. Steve Bunish[1], Charles L. Crump, Cornelius Gable[1], Paul R. Honan, Jr.[1], Leon L. O'Dell[1], Roger B. Smith, Paul W. Vogel[1].

Iowa Section. Harold A. Hoppens[1], Walter T. Howe[1], George Mahfous[1], Hubert C. Sullivan[1], Charles J. Thelen[1], Norman G. White[1].

Kanawha Valley Section. J. W. Mohlman, James W. Rimmer[1].

Kansas City Section. Louis J. Comaschi, Harry G. Fair[1], Carl E. Johnson[1], Ronald Pankrats[1], William M. Proudfit.

Lehigh Valley Section. Walter J. McCoy, Robert W. Noll[1], Ralph M. Yeager[1], Robert S. Yost[1].

Louisiana Section. Lawrence E. Brown[1], Reuben O. Feuge[1].

Louisville Section. Robert Neiman.

Maryland Section. Nis Hansen Skau.

Memphis Section. Norman Ellis, Edw. F. Smith[1], John D. Tucker, Jr.[1].

Michigan State College Section. Aubrey M. Bacot, James Goodrich Renno, Jr.[1], William H. Willert[1], Merle M. Woodward.

Mid-Hudson Section. Leon Donn.

Midland Section. Fred Andriessen, Raymond H. Rigterink[1].

Milwaukee Section. Roland O. Bartels.

Minnesota Section. David M. Libera[1], Robert Nordgren, Alton V. Oberholtzer, John F. Zalar.

Montana Section. Charles N. Caughlan.

Nebraska Section. Andy Isaac Jordan[1], Fred W. Staton[1].

New Haven Section. Edward N. Case[1], Bernard Kipperman[1].

New York Section. Sidney Braverman, Sarkis M. Casparian[1], Samuel A. Coleman, Colgate Craig, Marie M. Daly[1], Leonard Fine[1], Daniel E. Finkel, Leonard J. Fliedner, Leslie B. Gillie, Herbert D. Gray[1], Murray Guttenplan[1], Howard C. Haas[1], William H. Hoffman, J. Laurence Hutton, Jr.[1], Irving H. Kosofsky[1], S. Morris Kupchan[1], Victor Levine[1], Harry Linkletter, Robert T. Loughran, Justin J. McCarthy, William E. Manring, Herbert Meltser[1], Martin Murray[1], Herbert J. Passino, Monroe B. Petersen, Isidore Pollack[1], Martin H. Quell, Jerome L. Rosenberg[1], Stanley S. Rosner[1], Abraham I. Sawelson[1], Robert S. Sellers, R. E. Thrush, Christian Weaver, Arthur W. Wells.

North Carolina Section. James Scotten[1], David M. Weatherly[1].

North Jersey Section. George W. Apsey, Jackson J. Ayo, Jr., Forrest M. Batson, Robert E. Clayton, Jr., Harry H. Dooley, Jr., Walter S. Konwiser, Albert E. Merwin[1], Vincent F. Mistretta, Thomas W. Newell, Purity Drug Co., Inc., John W. Wilson.

Northeast Tennessee Section. Hugh J. Hagemeyer, Jr., Forrest D. Pilgrim.

Northeastern Section. Nikolai N. Belaef, Rowland S. Bevans[1], Marron W. Fort, Vlasios Georgian[1], Jerome G. Kuderna, Jr.[1], Harry O. Kulberg, Rufus Lumry[1], Albert B. Meservey[1], Alan M. Milman[1], Ralph T. Nassaro, Elaine Spencer[1], John J. Tyner, Jr.[1], Wilfred K. Wilson, Milton Yusem[1].

Northwestern Utah Section. Farrin L. Mangelson.

Oklahoma Section. D. Robert Brown[1], Virginia Joosten[1], Charles S. Moore, Howard R. Sailors[1].

Oregon Section. William H. Evans[1].

Panhandle Plains Section. Paul H. Wilhelm[1].

Pennsylvania–New York Western Border Section. Forrest Cummings, Peter V. Straub[1].

Peoria Section. Lawrence E. Glendenin[1].

Philadelphia Section. William B. Brooks, Joseph A. Dixon[1], Samuel Heiman, John F. McKinney, Jr.[1], Vernon J. Patterson[1], Richard F. Pierce-Ruhland[1], Albert B. Sample, Murray Louis Schwartz[1], Samuel Sirott[1], Robert E. Slack[1], Leonard J. Wissow[1], William J. Zelnick.

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Puget Sound Section. Norman L. Armstrong, J. Bayard DesCamp[1].

Purdue Section. Robert O. Bolt[1], Paul L. Breyfogle[1], Marjorie Rogers.

Rhode Island Section. R. M. Hainer[1].

Rochester Section. Charles W. Conrose, Ival Otis Salyer[1].

St. Louis Section. Donald B. Alnutt, Vincent R. Ameiss[1], Otto H. Eble, Clarence M. Hyslop, Isadore Kowarsky, Elly T. Margolis, Harold F. Ory, Harry U. Rhoads[1], Hartien S. Ritter, Laurence P. Russe, Krsta Tchossitch, Ralph G. Verdieck[1], John William Vogt, Ralph Wehrmann[1], W. Wayne Wheelhouse.

San Diego Section. William N. Drew.

South Carolina Section. T. G. Crawford.

South Jersey Section. Raymond A. Dunphy, Mack F. Fuller[1], Robert M. Girdler, William A. Hodes, Bernard Moss, Leslie A. Robb, Al. B. Wester, Jr.[1], S. Carroll Young[1].

Southeast Kansas Section. Robert A. Ewing.

Southeastern Pennsylvania Section. Malcolm Finlayson[1], Joseph Gliksman[1].

Southeastern Texas Section. Kenneth E. Coulter[1], Ethyl-Dow Chemical Co., Texas Division, Forrest G. Houston[1].

Southern California Section. Richard Bledsoe[1], Homer Jacobson[1], John R. Pownall, Roger T. Robinson, Herbert G. Sturz, R. W. Sutton.

University of Illinois Section. Harry Cade[1], James A. Robertson[1], Bernard H. Velsen[1].

University of Michigan Section. Nydia B. Goetz[1], Malcolm Smith Katz[1], Farrand D. Parker, Tudor L. Thomas[1].

Virginia Blue Ridge Section. James A. Beckett[1], Lewis E. Thomas, Jr.

Washington Section. Daniel Frishman[1], J. Halmer Hayner, Henry M. Pauley, Jr., Somers H. Smith, Jr.[1], Samuel Soloveichik, Edward Walton[1].

Western Connecticut Section. John A Mojcher[1].

Western Maryland Section. John A. Pursley[1].

Western New York Section. Dean DeForest Crandell, Robert C. Haring, F. Noel Hopper, Bernard Kopelman[1], Stephen N. J. Rubach, Curt Rupe[1], Arthur T. Schramm.

Western Vermont Section. Ellen F. Birchall[1].

Wisconsin Section. A. J. Krombholz, E. H. LeMense, Carl Piper.

No Section. Albert P. Centolella, Premo Chiotti, Comite Special du Katanga, Ramon A. Gadea, Jr.[1], Walter L. Gardner, Marcus J. Graham, William F. Griffin, Jr.[1], Orieda Horn[1], Frederick A. Krone[1], Angelo F. Lucadamo[1], Robert C. McGlenn, Louis Nagel, Raymond B. Purdum, Albert William Reed, Russell F. E. Schwetye[1], Carroll F. Shukers, George L. Somer[1], Robert L. Van Voorhies, Janet Vernon, W. H. Welch[1].

[1] Junior member

Cooperative Search for Substitute Retread

THE tire committee of the automotive and rubber industries has announced hope in its search for a substitute chemical material suitable for retreading work tire casings. The committee is an offshoot of the War Engineering Board of the Society of Automotive Engineers, and its membership includes representatives of automobile, rubber, and chemical companies: James Zeder, chairman, Chrysler Corp., Charles F. Kettering, General Motors Corp., and James M. Zeder, Chrysler Corp., representing the National Inventors Council; J. M. Crawford, Chevrolet, R. H. McCarroll and E. F. Wait, Ford, W. M. Phillips, General Motors Research, W. J. McCourtney, Chrysler, E. B. Babcock, Firestone, S. M. Cadwell, U. S. Rubber, R. P. Dinsmore, Goodyear, and Howard E. Fritz, Goodrich, as well as representatives of the Dunlop Rubber Co., Seiberling, General Tire, Hercules Powder, du Pont, Monsanto, Union Carbide & Carbon, Standard Oil of New Jersey, Dow, and Thiokol.

The committee has studied many chemical materials and narrowed the field of possibilities. A preliminary report has been prepared, and a complete report on available materials will soon be made to the Government. The cooperating companies have laid bare their secrets and many suggestions have been received from both technical and nontechnical men on how to solve the tire shortage.



WIDE WORLD PHOTOS, INC.

Goodyear Opens Chemigum Addition

The first batch of Chemigum, synthetic rubber made by Goodyear Tire & Rubber Co., rolls from the intricate maze of reactors and tanks in the new government-sponsored addition to the Goodyear plant. The addition started operation May 20, with still another government-sponsored addition scheduled for completion later this year.

Chemists Flash at "Flash of Genius"

INSPIRED by Thomas Cifelli's article "'Flash of Genius' Patent Doctrine and the Chemist", published on page 523 of CHEMICAL AND ENGINEERING NEWS for April 25, are these comments to the Editor. E. Ward Tillotson, assistant director of Mellon Institute, Pittsburgh, sends a clipping from a Kansas newspaper:

The following is from the transcript of a patent-law case given to the St. John Capital by Frank Richey, a patent attorney, who handled the case.

Question: How did you happen to invent your wrench?

Answer: Well, a Dago fellow reported to me that the nut on the second cut-off in the third slit was stuck. I tried a monkey wrench and it broke. I then tried a gas wrench and the teeth tore out. I then lashed a pipe onto the nut and two Negroes and this Dago strained on it until they busted the pipe. I tried to drive some grease between the threads with a high-pressure grease gun, but the grease recoiled and curled up on the top of the nut. I then tried to drill the nut loose, but the drill broke. It was then half-past eleven at night, so I went home, had me a double rye highball with a beer chaser and then sat down and invented my wrench.

P. J. Gaylor, 1094 Battle Hill Terrace, Union, N. J., writes:

There has been some criticism that the present courts favor the "flash in the pan" genius. It is very impressive to show that the inventor suddenly awoke in the middle of the night, dashed down into the cellar in his pajamas (almost breaking his leg by tripping over the wine barrel), put the frying pan over the old gas stove, and then and there melted down the four ingredients in the correct proportions to concoct his new and novel radiotherascopic alloy. On the other hand, if a recognized scientific worker in a large research organization had in mind making something of that sort and then proceeded methodically to melt up first A and B, then A, B and C, and finally A, B, C and D on the basis of his previous findings and logical deductions, then it is obvious that anyone skilled in the art could have done it.

Such a viewpoint, of course, could be reduced to somewhat of an absurdity. One can argue that there are merely about 40 readily available metals in existence, all known. If one required a metal for a particular purpose, all he need do is to start with aluminum and follow through to zirconium. If none of these gave the required effect, he could then begin on combinations of these, and test each one so that eventually, and without the exercise of any unusual skill, he would be bound to find the right combination, if there is one. Thus, one can conclude that there would be no invention in developing a specific alloy for any purpose.

From Jerome Alexander, 50 East 41st St., New York:

I emulated Edison,
And tried a thousand ways.
They failed—I tried a thousand more,
But still was in a haze.

My money went, my health went, too,
But research held me fast,
Till test eleven forty four
Brought me success at last.

I sued to stop infringers
Of my patent, dearly won.
The court said: "All you did was *work;*
Your patent's no good, son.

"If you had only gnashed your teeth,
Like Hitler, gnawed the rug;
Or pulled some psychiatric stuff
To prove that you're a 'bug',

"Or thrown a fit, or done a deed
That left your comrades pallid—
We'd see a *flash of genius*—and
Your patent would be valid."

Oil Company Denies Opposition to Rubber from Alcohol

THE report that petroleum companies have been fighting the making of tires from grain alcohol so that they can have the synthetic rubber field to themselves is denounced in a statement issued by Edward G. Seubert, president of Standard Oil Co. (Indiana).

Standard of Indiana has taken no such position and does not believe that other companies have done so, Mr. Seubert said. He added that at government request his company is preparing to produce material from petroleum for the manufacture of butadiene, one of the raw materials from which synthetic rubber can be made, as well as to help manufacture the butadiene itself.

"We do a great deal of our business with farmers", Mr. Seubert pointed out. "We should like to see them having a hand in supplying the raw materials for rubber. More rubber will make it more possible that civilian automobiles can be kept running. And the more they can be kept running the better business will be for the oil companies. It just does not make sense that the oil companies should oppose any kind of manufacture of rubber. Whatever the difficulties about manufacture of rubber from alcohol may be, monopolistic designs by oil companies are not among them."

Summer Course in Photoelasticity

THE Department of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge, Mass., is offering a summer course in photoelasticity from July 27 to August 7, 1942. Inquiries should be addressed to W. M. Murray, Room 1-321.

Who Makes It?

SOURCES of the following chemicals are wanted by the National Registry of Rare Chemicals, Armour Research Foundation, 33rd, Federal, and Dearborn Sts., Chicago, Ill.: ethylbenzoyl formate, phosphorylcholin, diallyl acetic acid, guaiacol glyceryl ester, and sodium iodoplatinate.

The Columbia University Organic Laboratories are seeking a source of 100 to 500 grams of erythrose. Replies should be addressed to Marston T. Bogert, Belgrade Lakes, Maine.

Northwestern's Technological Institute Dedicated

(For photographs see pages 808 and 809)

WITH the world turning to technology more than ever before, Northwestern University dedicated its new $6,735,000 Technological Institute June 15 and 16. Extensive research and training for the war effort are already going on within the new building.

Engineering during the war and afterward was the theme of the dedicatory ceremonies. Principal speakers included Alfred H. White, president, Society for the Promotion of Engineering Education; Roger Adams, chairman, Department of Chemistry, University of Illinois; Henry T. Heald, president, Illinois Institute of Technology; William S. Knudson, advisory, War Production Board; Donald M. Nelson, War Production Board; Charles F. Kettering, president, General Motors Research Corp.; Robert C. Disque, acting president, Drexel Institute of Technology; William F. G. Swann, director, Bartol Research Foundation of the Franklin Institute; George O. Curme, Jr., vice president and director of research, Carbide and Carbon Chemicals Corp.; Karl T. Compton, president, Massachusetts Institute of Technology; and Jesse H. Jones, Secretary of Commerce. Kenneth F. Burgess, president of the Board of Trustees of Northwestern, presented the keys of the building to Ovid W. Eshbach, dean of the new institute.

Created through a gift from Walter P. Murphy, the institute was opened in 1939 and moved into its new building last fall. Cost of the structure was $5,000,000, and more than $1,000,000 worth of equipment is in use. When fully under way, the institute will have an enrollment of 800 men in a five-year cooperative course which calls for alternating three-month periods of study at the institute and work in industry.

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Proportioning Control, incorporated in one of the famous Wheelco "Radio Principle" Potentiometer, Pyrometer, or Thermometer Controllers, shown at right, gives you the closest temperature control possible with any of these types of instruments, regardless of price.

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Complete description of Proportioning Control is given in Bulletin No. D2, which also describes the Wheelco Capacitrol. Write for your copy, TODAY!



Potentio-trols

Wheelco POTENTIO-TROL

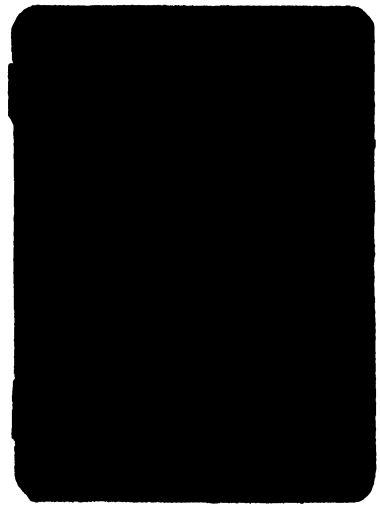
—is the ultimate in temperature control—combining the unexcelled sensitivity of the "Radio Principle" Control System with the time-proved accuracy of the potentiometric method of temperature measurement. Request Bulletin A2 for complete details.



Capacitrols

Wheelco CAPACITROL

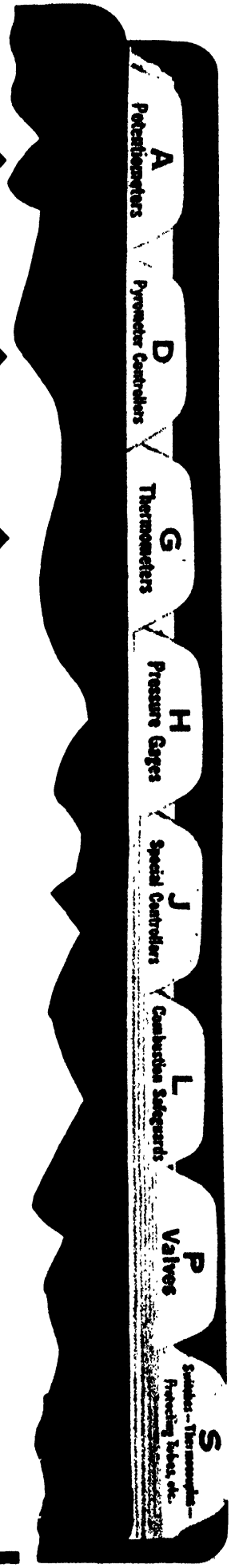
This millivoltmeter type, Indicating Pyrometer, combined with the "Radio Principle" Control System, provides close, instantaneous temperature measurement and control. Capacitrols are fully described in Bulletin D2.



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Recording THERM-OTROL

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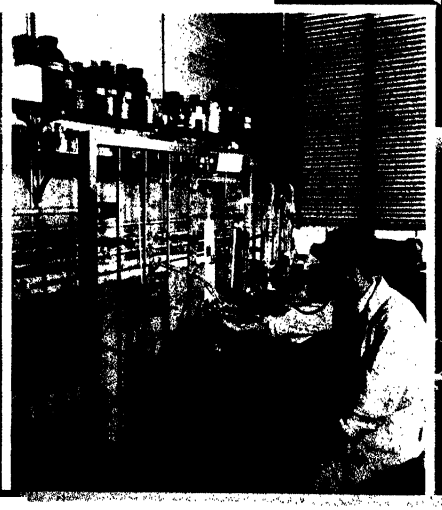
Scenes from Northwestern's new Technological Institute (see page 806). *(1)* Section of the lobby. Photo, Hedrich-Blessing Studio. *(2)* Walter P. Murphy, whose gift of $6,735,000 created the institute. *(3)* A general chemistry laboratory. Photo, Hedrich-Blessing Studio. *(4)* A small air-raid siren being tested by C. J. Overbreck in the only soundproof room in existence that can be scientifically "tuned" by special rubber mountings to eliminate vibration. The room will absorb 98 per cent of air-borne sound and mechanical vibrations from the outside. *(5)* The institute, showing four of the six wings which contain more than 350 rooms, used by departments of chemistry, physics, and civil, mechanical, electrical, and chemical engineering. Photo, Hedrich-Blessing Studio. *(6)* Budding scientists in the catalysis laboratory. Research is carried on under pressures up to 6,000 pounds per square inch at temperatures up to 750° F.

(7) The main entrance. Photo, Hedrich-Blessing Studio. *(8)* Two miles of corridors weave through the building. There are 147 clocks and eight elevators. *(9)* Research in the separation and identification of sugars in mixtures is being carried on in this laboratory. Small laboratories like this adjoin offices of faculty members. *(10)* Rotating chemical "bomb", being put in place by a student in the high-pressure laboratory, will be enclosed in an explosionproof room and subjected to high heat and pressure. *(11)* A physical chemistry laboratory. Photo, Hedrich-Blessing Studio. *(12)* Service shop in chemical engineering. Photo, Hedrich-Blessing Studio.













American Chemical Society[1]

104TH MEETING. Buffalo, N. Y., September 7 to 11, 1942.

105TH MEETING. Indianapolis, Ind., April 12 to 16, 1943.

106TH MEETING. Minneapolis, Minn., fall of 1943.

NATIONAL CHEMICAL EXPOSITION. Stevens Hotel, Chicago, Ill., November 17 to 22, 1942.

Other Scientific Societies

AMERICAN ASSOCIATION OF PHYSICS TEACHERS. State College, Penna., June 25 to 27.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Netherland Plaza Hotel, Cincinnati, Ohio, November 16 to 18. Annual Meeting.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Chicago, Ill., June 22 to 26.

AMERICAN PETROLEUM INSTITUTE. Stevens Hotel, Chicago, Ill., November 9 to 13. Annual Meeting.

AMERICAN PHYSICAL SOCIETY. State College, Penna., June 25 to 27; Berkeley, Calif., July 11.

AMERICAN SOCIETY FOR TESTING MATERIALS. Atlantic City, N. J., June 22 to 26.

NATIONAL INDUSTRIAL CHEMICAL CONFERENCE. Stevens Hotel, Chicago, Ill., November 17 to 22.

NATIONAL PETROLEUM ASSOCIATION. Hotel Traymore, Atlantic City, N. J., September 16 to 18. Annual meeting.

NEW ENGLAND ASSOCIATION OF CHEMISTRY TEACHERS. University of New Hampshire, Durham, N. H., August 11 to 14.

OPTICAL SOCIETY OF AMERICA. Massachusetts Institute of Technology, Cambridge, Mass., July 20 to 22.

SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION. Columbia University, New York, N. Y., June 27 and 28. Annual meeting.

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY. Hotel Statler, Boston, Mass., September 29 to October 1.

[1] The list of the SOCIETY's National Officers and Directors, Editors, members of Council, Divisional and Local Section Officers, Committees, and Chapters of Student Affiliates appears in CHEMICAL AND ENGINEERING NEWS three times a year—usually February 10, May 10, and October 10. The latest list is printed on page 601 of the May 10 issue.

Procurement Problems Discussed

A DESCRIPTION of the urgency of the U. S. Army in procuring chemicals was summed up in one statement by Major S. N. Cummings, chief of Chemical Procurement, at a recent War Production Conference in Newark, N. J., when he said, "Anything we order, we needed yesterday."

Major Cummings was a speaker in the Panel on Substitute Materials, Chemical Equipment, and Plant Safety, and addressed his remarks mainly to the chemical manufacturers in explaining the workings of the chemical procurement group and the particular problems involved in purchasing and letting contracts for chemicals.

"When the Procurement Office asks for a quotation, please be prepared to give it to us", he said. "We are working under pressure and need all the speed and cooperation that can be given us. Remember also", he continued, "that no man in the chemical procurement is an industrial misfit, but rather the chief of the service has chosen each man for his ability and because he knows his special field thoroughly."

The Chemical Procurement Division has the power to raise or lower prices, Major Cummings said, according to the status of the profit made by the manufacturer from the contract. Contracts are granted commensurate with the financial responsibility of the company.

The Chemical Warfare Service works very closely with the Labor Department. If necessary, a branch office of the Labor Bureau will be set up in the plant of any manufacturer with a view to solving labor problems that may arise. If the company is falling behind in its contracts with the Army, a specialist from the labor board will investigate and install necessary corrective measures to speed up the productive output.

In conclusion Major Cummings said that he did not know "of any industry that has cooperated so unselfishly and so wholeheartedly as the chemical industry, but the new program for the chemical industry will make the efforts of the past seem infinitesimal."

On the same program Captain W. F. Plank, C. W. S., spoke on "Safety Precautions in Handling Pyrotechnics". Captain Plank reviewed briefly the many technical precautions that are taken as a mat-

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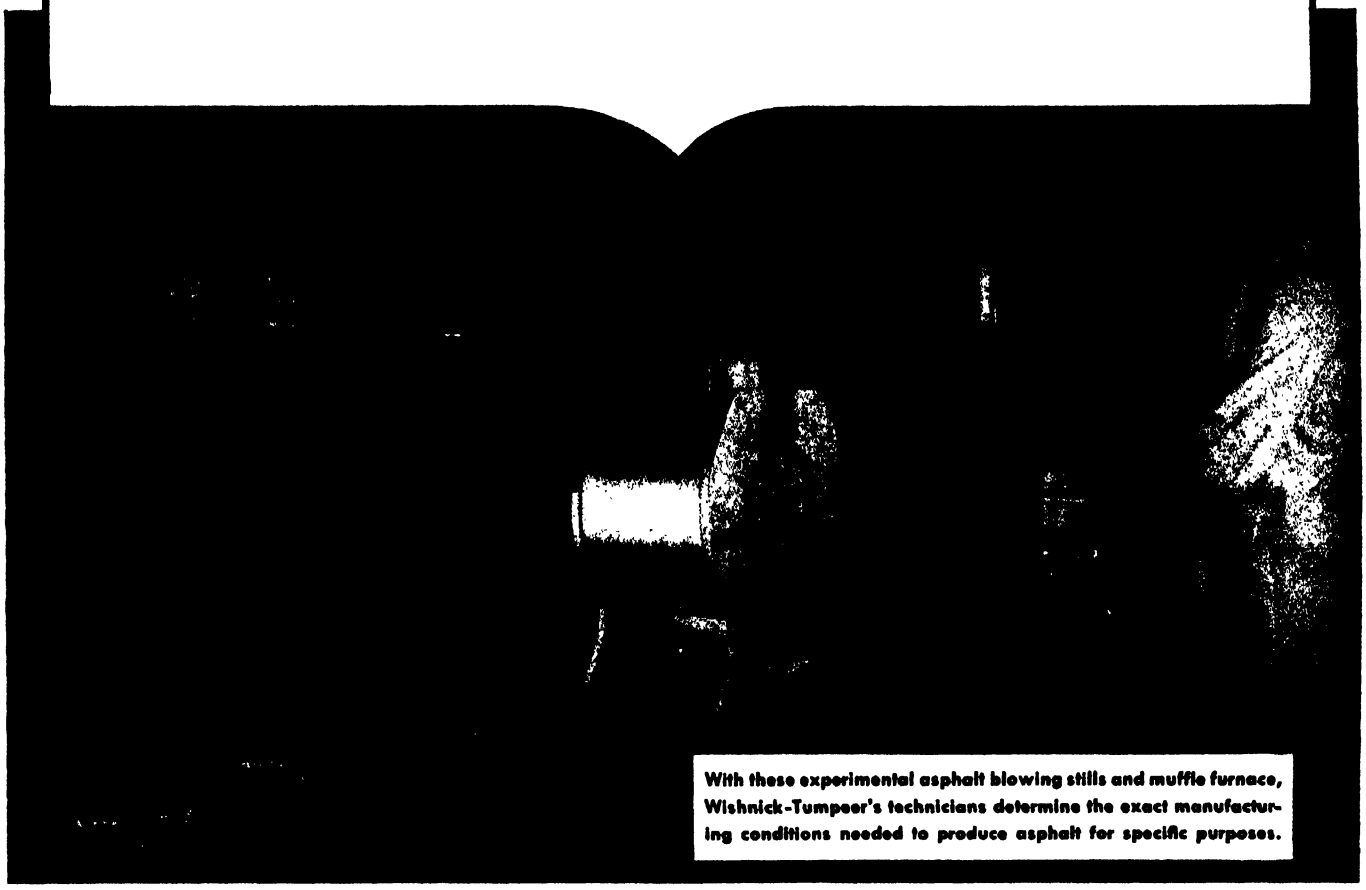
Coal Research at Battelle

IMPROVED equipment for the utilization of bituminous coal for comfort heating, for metallurgical applications, for the locomotive, and for power generation is foreseen by fuel engineers who addressed 140 representatives of the bituminous coal industry, May 28, at an all-day conference and exhibit on bituminous coal research, sponsored by Bituminous Coal Research, Inc., at the Battelle Memorial Institute, Columbus, Ohio. Smokeless space heaters and service water heaters, completely automatic residential stokers, chemical treatment of coal to render it dustless, an industrial forge furnace which utilizes pulverized coal, and other new developments which will increase the markets for coal were demonstrated and discussed.



Coal is sprayed and tested for dustiness on a laboratory scale at Battelle.

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Procurement Problems Discussed

CONTINUED FROM PAGE 810

ter of course in protecting plants working on explosive mixtures. Police protection is provided by the Army, not the FBI, Captain Plant revealed, this responsibility having only recently been taken over from the federal bureau.

Safety in the plants has several broad outlines. Dispersion of manufacturing operations is one of them. All procedures must be isolated in small compact units, built usually with three sturdy walls of reinforced concrete, and with the remaining wall constructed to fracture easily. Dust must be controlled, as it is one of the means of propagating explosions. All mixing is done by remote control and equipment is sparkproof nonferrous construction. Floors are conductive and nonsparking and are usually made with layers of concrete, mastic, copper plate or sheeting, and finally conductive rubber. They are used frequently where dust hazards are extreme. Static potentials on belts are prevented through use of a colloidal graphite dressing. Captain Plant stated that humidity is also controlled as most explosions occur when the humidity falls below 40 per cent relative. Explosions, it has also been noted, he said, happen most frequently when the barometer is falling.

Other speakers briefly outlined the uses of plastics, glass, hard rubber, and protective coatings in the war effort. They were Robert J. Moore, Carbide & Carbon Chemical Co.; J. T. Thompson, Corning Glass Works; Donald Wilkins, American Hard Rubber Co.; Francis Scofield, National Paint and Lacquer Association.

CONSTRUCTION of a Swedish factory to extract turpentine oil and by-products from tree stumps, under government control, is reported from that country.

Army Begins Chemical Plant Visitations



General Paul X. English, chief of Industrial Service of the Chemical Warfare Service, and Colonel Harry A. Kuhn, chief of the New York Procurement District, attending the Army Visitation Exercises at Hooker Electrochemical Co., Niagara Falls, N. Y.

THE first of a series of Army visitations to war production plants in Niagara Falls was held at the main plant of the Hooker Electrochemical Co. on May 26. A large group of enlisted men, soon to move on to one of our fighting fronts, spent two hours going through the various departments and talking with the chemical plant operators individually. Out of these informal discussions, both soldiers and operators gained a clearer understanding of the others' part in the war effort.

General Paul X. English, chief of Industrial Service of the Chemical Warfare Service, headed the staff of officers which included Colonel Harry A. Kuhn, chief of the New York C. W. S. District; Colonel Floyd D. Carlock, commanding officer of Fort Niagara; Lieutenant-Colonel Frank R. Johnson, head of the Niagara Falls Chemical Warfare Division; and Lieutenant-Colonel Leslie Sutherland and Major Cummings, both of the New York Chemical Warfare District Office. General English was accompanied by Major William Brooks from Washington, and Captain Cleveland J. Bishop, also of Washington, represented General Sommervell of the Service of Supply.

Harry M. Hooker, president of the company, and Edwin R. Bartlett, executive vice president, joined the Plant Service Committee as hosts to the Army visitors. Refreshments were furnished in the plant restaurant.

When the tour of the Hooker plant had been completed, the soldiers, officers, and workmen moved out into the plaza in front of the Administration Building to hear a talk by General English, who developed the theme that "the work of you chemical plant operators is just as

CONTINUED ON PAGE 814

STEAM JET EVACTORS
AIDING NATIONAL DEFENSE

Numerous Croll-Reynolds Evactors are working overtime maintaining high vacuum in plants making explosives, synthetic rubber, airplane lubricants and a long list of other ordnance materials. They are maintaining high vacuum on engines and turbines of dozens of American ships sailing the seven seas.

While the large and special units require up to three months or more for fabrication the smaller ones are sometimes made in two weeks, or less, when the demand is urgent. These include single and multi-stage units for vacuum up to a small fraction of 1 mm. absolute, also small condensers and vacuum chilling equipment.

A recent development is a vacuum-cooled condenser for maintaining condensing temperatures down to 34° F. Inquiries will be handled as promptly as possible under the circumstances.

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Choline Chloride
o-Phenylenediamine

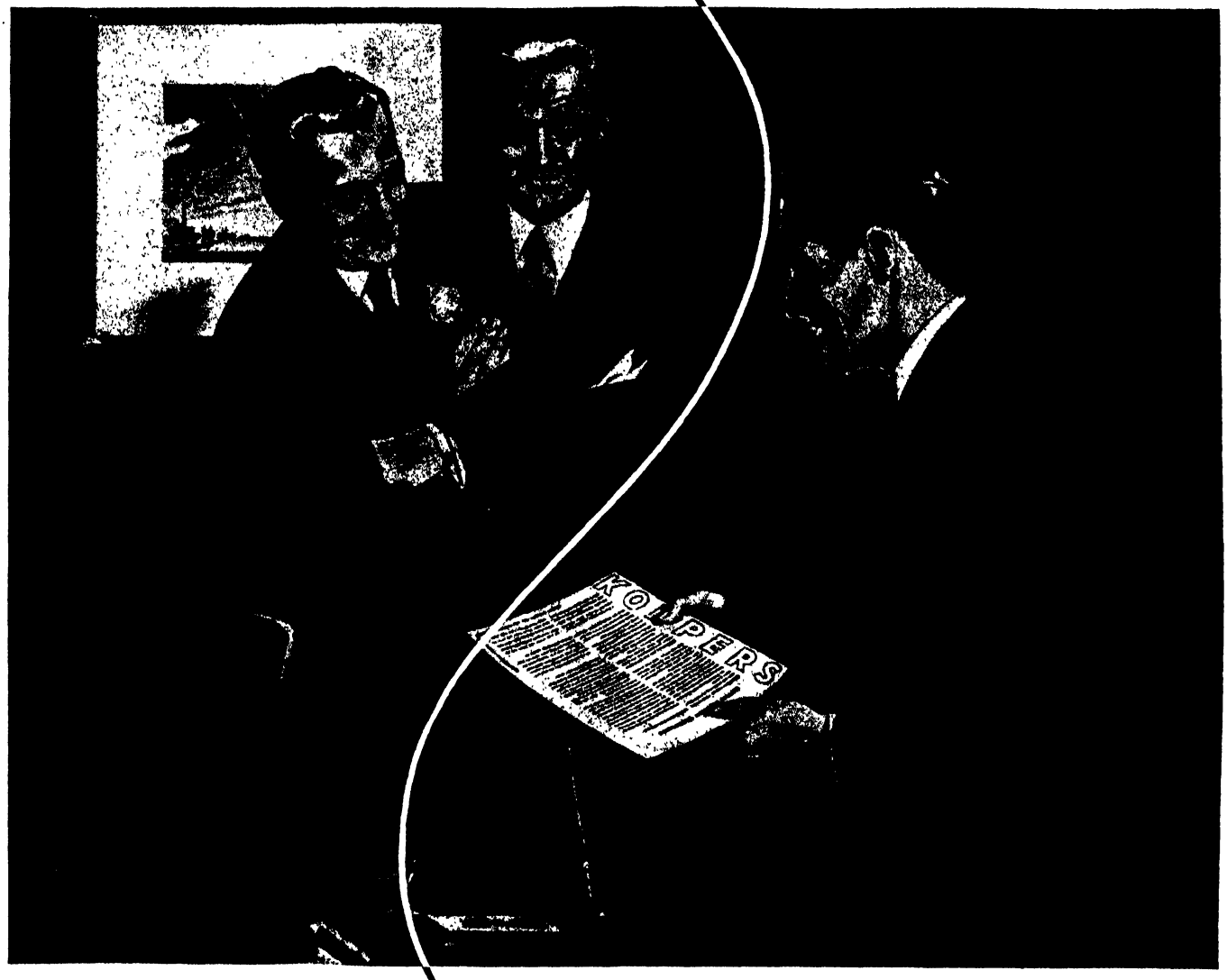
NOW READY! . . . Edwal's New Catalog No. 26N describing many new chemicals with prices. The above are only a few of the many special items listed. Write for the catalog and for quotations on your requirements.

E D W A L

The EDWAL Manufacturing Division Laboratories, Inc.
732 FEDERAL STREET CHICAGO, ILLINOIS

Do you use ammonium salts?

maybe you should consider



ammonium thiocyanate

(Ammonium Sulfocyanide)

Here is a newly-available ammonium salt with interesting possibilities introduced by the thiocyanate group.

If you are now using an ammonium salt in your processes . . . such as chloride, acetate, oxalate, carbonate or nitrate . . . perhaps you will discover valuable modifications by substituting ammonium thiocyanate.

It is worth testing in your laboratory.

Ammonium thiocyanate has a behavior similar to other ammonium salts, but it also brings you all the variations of the thiocyanate group.

This group is remarkably stable and, in many reactions, resembles the halogens.

Koppers has recently placed in operation a large commercial plant for the production of ammonium thiocyanate crystals and can now offer this chemical in quantity at substantial savings over former costs. Koppers can supply ammonium thiocyanate in crystal form having a minimum purity of 95%.

Test samples, quotations and other information sent on request.

VINYL ACETATE
for the preparation of
Poly Vinyl Acetate, Alcohol, and
Acetal resins; synthesis of pharmaceutical chemicals
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CHEMICALS CORPORATION
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from our own laboratories . . . . .
Calcium hexose di-phosphate
NAPHTHORESORCINOL
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SODIUM NUCLEATE
NUCLEIC ACID POLIDASE
Our Chemical Laboratories and our staff of chemists, technologists and professional engineers are available for consultation and research.
Schwarz LABORATORIES, INC.
202 East 44th St. • New York, N. Y.

Army Begins Chemical Plant Visitations

CONTINUED FROM PAGE 812

necessary as the work of the man behind the gun".

His address in condensed form follows:

I speak to you today as a soldier. Every man, woman, and child in the United States wants to know what he can do to help win the war. Those able to bear arms who are not in the Army often have the uncomfortable feeling that they are not serving as fully as they should. Those who cannot bear arms, often feel that their efforts are weak and ineffectual, compared to the total problem. I will tell you how the Army feels about these matters.

This is a new kind of war. It is a war of both machines and men. The armies over which the Nazis rolled were not composed of weaklings or cowards. The Dutch, Jugo-Slavs, French, Belgians, Poles, Greeks, and all the other brave peoples who are enslaved by the Nazi terror wished to defend their homelands, but with what? No amount of bravery, love of country, willingness to do or die could long stand up against armored force, without armored force with which to counter. That is why we in the Army consider the workers as soldiers of production in this war.

Your work is as necessary as the work of the man with the gun. Without it, there can be no gun—and then—no man. The soldier faces hopeless odds, unless you keep him supplied. War has become so mechanized that against the 8 or 10 workmen it took to enable a soldier to pull the trigger in the first World War, it now takes 20 or more workmen.

This is not only a war of machines, it is also a war of chemicals. The steel and metal which the machine makes need to be filled with chemicals. Chemicals must treat a host of materials to protect them against war damage. Chemicals are vital in the course of almost every industrial process to make munitions. Incendiary bombs are filled with chemical materials. These are being used on every hand.

General Doolittle told the Chemical Warfare Service, and the fact was published by the War Department, that he was highly impressed by the workmanship and action of the incendiary bombs he and his heroic fellow soldiers dropped on Tokyo. Inflammable Tokyo was your target as well as General Doolittle's and his men. It was your military objective, as much as the Army's.

The Japs are reported to have used war gas in China. Such gases are chemicals, and chemicals are vitally needed as well for protection against war gases. Prime Minister Churchill warns that Germany may use gas. We must be prepared for all these contingencies. The people know that the best defense against war gas is retaliation.

Chemicals are not alone important to our fighting men, they are just as essential for the protection of our loved ones at home. Chemicals are materials of war, just as vital as guns and tanks and planes.

In this war our preparations and our actions must be complete. There can be no flaws in our armor; no hole through which the enemy can drive a wedge. One such hole, no matter how small, may well prove fatal. We are engaged in a titanic struggle with powerful enemies, but no enemy is greater than ourselves. Complacency and overconfidence can defeat us as they defeated France. Selfish internal bickering and discontent are as effective as bombs and bullets. The factory where time is lost is a factory half bombed. Every minute of idleness or of an idle machine adds to the length of the war.

Americans are used to playing as a team. You and the Army and Navy are a team. You are the passers, we the receivers. You give us the ball, and we will carry it. It takes a very poor judge of the game not to recognize the equal importance of the passers and the receivers. Americans are too adept at games not to see that clearly.

No matter how tough the task is, how uninteresting it may seem, and how many hours you have to put into it, just bear in mind that somewhere, someone in uniform is waiting for what you turn out. If it doesn't arrive on schedule, it may mean the difference between life and death to him. And that person may be a father, or a brother, or a young fellow from this very plant.

You are fortunate in being able to do your particular job in surroundings such as these. You don't have to dodge bombs and bullets in stinking swamps, or on blazing desert sands. You have regular hours. You can wash up and go home at night to loved ones, and enjoy the comforts of your own home. The soldier can't. He doesn't punch a time clock, and his wartime pay check is much smaller than yours. He is fighting for his country under many more disadvantages than you have. He is bearing a very heavy pack, but he does not envy you your modest comforts; he wants you to enjoy them if you will but roll the material out to him in the field.

The godless and inflated egotist Hitler has boasted that a free people can't produce. He has challenged the democracy of free men with a drab collectivism of slogan-chanting robots, but Americans are from Missouri, and he will have to show us! Each of us—workers and soldiers alike—will see to that. Your work clothes are your uniform, as dignified and as important as that of a combat soldier. We, the soldiers, tell you that.

The Army recognizes the importance of your work. The War Department is arranging to award suitable recognition to workers and to plants that distinguish themselves in production. Plants will receive the Army Pennant which will bear an "A" similar in purpose to the "E" flags now awarded by the Navy. Workers will receive a companion button which will honor the individual worker who has earned it by merit.

Every minute of your working day remember the men who are waiting for what you make—in the desert under the blazing sun, in the northland in ice and snow, on the sea, in the forest, on the field and cramped in forts—and grimly and realistically under fire.

As General Sommervell has pointed out, these men are too busy protecting this job of yours to think of the quitting whistle or profits, or wages, or overtime, or vacations. Take as yours the motto of the Chemical Warfare Service:

"The difficult we do promptly; the impossible takes a little longer."

There is no time for bombast and blueprints. These are the tools of too little and too late.

General Porter, chief of the Chemical Warfare Service, has said: "This is a war of production. Whichever side produces the most will eventually win." There is time only for toil. This means sweat and sacrifice on your part today, to prevent unnecessary bloodshed and death on the soldier's part tomorrow. It means unstinting contribution by both labor and management to a degree never before attained, but which must be reached if we are going to win.

You will, I know, cheerfully deny yourselves many a peacetime privilege in order that the men at the front may carry on, and in addition to this, you will work like demons to see that they have the materials with which to win. Our country is like that. Every crisis makes it more determined to gain the victory, and this time it will be satisfied with no patchwork victory—only with a conclusive one—for this

CONCLUDED ON PAGE 816



"WHICH WAY FROM HERE, BROTHER?"

The short and easy way, Mr. Fish . . . the Sharples way. Your trip to the consumer has been a vastly different one since the adoption of the Sharples Process for Fish Oil Recovery.

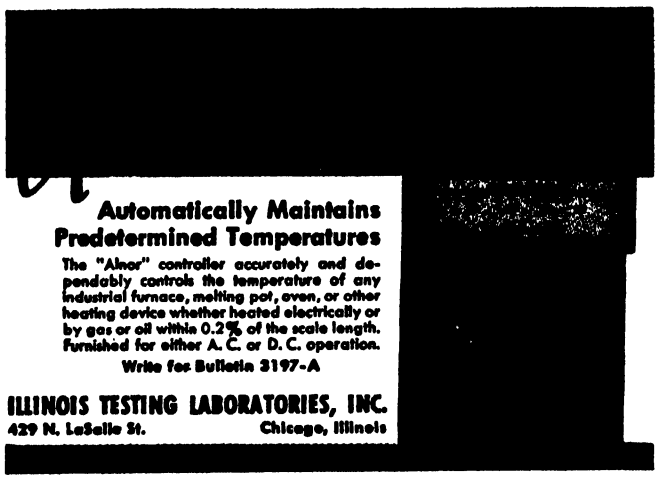
A many-hour gravity settling job with its accompanying degradation of oil quality is now done in five to ten minutes with the Sharples Super-Centrifuge or Nozljector . . . the original light-color and low acidity of oil retained.

The loss of oil as based on water discharge is cut from up to 5% to about 0.25%.

The condition of the fish or its diet in the past are no longer serious considerations.

These are a few facts . . . there are many more . . . and all of them illustrate a typical example of Sharples progress in increasing the efficiency of industrial processes throughout the world.

THE SHARPLES CORPORATION



Automatically Maintains Predetermined Temperatures

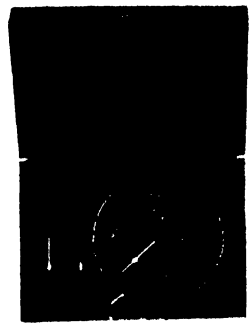
The "Almor" controller accurately and dependably controls the temperature of any industrial furnace, melting pot, oven, or other heating device whether heated electrically or by gas or oil within 0.2% of the scale length. Furnished for either A. C. or D. C. operation.

Write for Bulletin 3197-A

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Sure we're bragging, but—when companies like duPont, Socony-Vacuum, Shell Oil and Warner Quinlan use our tachometer we've got a right to be proud. Portable—less than 2 lbs. in weight, Jones Hand Tachometers are ideal for speed and rating checks on revolving platens, generators, turbines and motors of all types.



Write today for further information.

JONES·MOTROLA
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STAMFORD, CONN.

Army Begins Chemical Plant Visitations

CONTINUED FROM PAGE 814

is no war among nations, it is a world showdown between free men and slaves.

"We shall keep the soldier's faith", promised General MacArthur.

Here and now we dedicate ourselves again that we *will*, you the workers, and we the soldiers.

As part of the general exercises, the entire assemblage sang the following new industrial version of "Over There". Its suitability for general use in similar exercises justifies its reproduction here:

Over Here and Over There

Over there! Over there!
On the land—on the sea—in the air!
While the Navy's gunning—the Army's coming,
Our Leathernecks are everywhere.

Over here! Over here!
We will fight for the right—never fear!
Guns are booming—our plants are zooming,
We will help them win by working over here!

Over here! Over there!
Let's unite—let's be right—don't despair—
While our boys are winging—let's keep them singing,
Let's stand behind them everywhere—

Bob is here! Bill is there!
Hookerites—scaling heights—over there!
We are with them—let's help to give them
All the things they'll need till it's over—over there!

R. Lindley Murray, vice president in charge of development of the Hooker Co., presided at a dinner given to the visiting officers at the Niagara Falls Country Club with the executives of all the principal chemical plants of Niagara Falls. General English and other officers were introduced and spoke briefly.

Power and Mechanical Engineering Exposition

THE Advisory Committee for the 15th National Exposition of Power and Mechanical Engineering, to be held in New York November 30 to December 5, 1942, again has Irving E. Moultrop as chairman with John H. Lawrence vice chairman. Other members include Comfort A. Adams, E. G. Budd Mfg. Co.; Homer Addams, past president, American Society of Heating and Ventilating Engineers; J. T. Barron, Public Service Electric & Gas Co.; R. E. Dillon, Boston Edison Co.; E. O. Eastwood, president, American Society of Heating and Ventilating Engineers; A. C. Fieldner, U. S. Bureau of Mines; N. E. Funk, Philadelphia Electric Co.; Wm. R. Hainsworth, president, American Society of Refrigerating Engineers; David Moffatt Myers, consulting engineer; Joseph Pope, Stone & Webster Engineering Corp.; Arthur L. Rice, *Power Plant Engineering;* Charles F. Roth, manager, exposition; A. Bowman Snavely, Hershey Chocolate Corp.; E. K. Stevens, associate manager, exposition; Philip W. Swain, *Power;* Alfred Vaksdal, Corning Glass Works; and Horace W. Wilds, past national president, National Association of Power Engineers.

One hundred and twenty-five companies have engaged space, and exhibitors are planning displays that will help the war production program by showing how to get more out of existing equipment and ways and means of preventing shutdowns and ensuring continuous operation.

As in the case of previous Power Shows, the forthcoming event is under the management of International Exposition Co. Permanent headquarters are at Grand Central Palace, New York.

Ammonia
Argon
Boron Trifluoride
Butadiene
Butane
Butene 1
Butene 2
Carbon Dioxide
Carbon Monoxide
Chlorine
Dimethylamine
Dimethyl Ether
Ethane
Ethyl Chloride
Ethylene
Ethylene Oxide
Freon (12)
Helium
Hydrogen

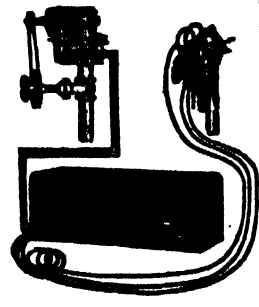
The Matheson Co.

38 Rare & Common
GASES
in six different sizes of cylinders from ½ pound to 150 pounds.

The MATHESON CO.
East Rutherford, N. J.

Hydrogen Chloride
Hydrogen Fluoride
Hydrogen Sulphide
Isobutane
Isobutylene
Methane
Methyl Bromide
Methyl Chloride
Monoethylamine
Monomethylamine
Nickel Carbonyl
Nitrogen
Nitrous Oxide
Oxygen
Phosgene
Propane
Propylene
Sulphur Dioxide
Trimethylamine

DENSITY CONTROLLER for PULPS



The Masseo-Adams Density Controller, first used in ore classifiers, now has many applications in non-metallic and chemical plants—including potash and phosphate plants, washing coal, etc. Maintains *visual* control of density by motor-operated regulation of dilutant supply valve. Also available with standard chart recorder or with arm and weights for sink and float process. Widely optional location. *In writing, please describe your problem.*

The MINE AND SMELTER SUPPLY CO., Denver, Colo.

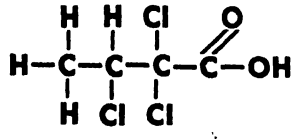
3 CHLORINATED ORGANIC CHEMICALS *developed by* PENN SALT RESEARCH

Hand in hand with manufacturing, Penn Salt carries on unremitting research... seeking new compounds, improvements in present products and better production methods.

Now from our Research Laboratories come three chlorinated organic chemicals with interesting properties and possibilities. One or more of them may aid you in replacing restricted essential materials, help you in developing new products, or suggest important changes in your present processes.

2, 2, 3, TRICHLOROBUTYRIC ACID*

$CH_3 \cdot CHCl \cdot CCl_2 \cdot COOH$



PHYSICAL PROPERTIES:

Appearance—white crystalline solid.
Molecular Weight—191.5.
Melting Point—60° C.
Boiling Point—236° C. with only slight decomposition at the boiling point.
Hygroscopic.
A slightly stronger acid than trichloroacetic acid.
Mild odor.
Soluble in water.
Soluble in organic solvents.

*Available as a white crystalline solid, in 60% aqueous solution, or in other strengths.

SUGGESTED USES:

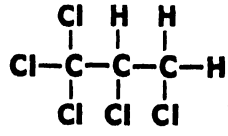
Its similarity to trichloroacetic acid suggests its application where a rather strong organic acid is needed. It appears to have possibilities as a tanning assistant. As an intermediate, it enters into the usual acid reactions forming salts and esters, and in addition it contains reactive halogens greatly increasing its value for the synthesis of further useful compounds.

A full series of aliphatic and other esters have been prepared in our Research Laboratories and are available in research quantities.

Many of these esters are characterized by a fine odor which suggests the possible use of the lower members of the series in soaps, perfumes, and other articles in which fragrance is desirable. The higher aliphatic and polyhydric alcohol esters such as the glycol esters, on the other hand, being practically without odor, but of high viscosity, are potential plasticizers. Formulators will be interested in the penetrant and solvent properties of many of these new materials. Leather, textiles, and paper are a few of the fields suggested for possible use.

1, 1, 1, 2, 3, PENTACHLOROPROPANE

$CCl_3 \cdot CHCl \cdot CH_2Cl$



PHYSICAL PROPERTIES:

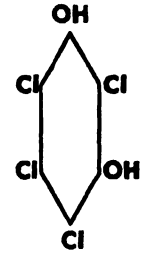
White crystalline solid.
Melting not lower than 178° C. for pure grade, 140° C. for technical grade.
Sublimes.
Has odor of camphor.
Soluble in organic solvents.
Insoluble in water.

SUGGESTED USES:

Its odor suggests its use as an insect repellent. Its compatibility with nitrocellulose and other plastics indicates possible plasticizer value. As an intermediate, it can be dehalogenated, dehydrohalogenated, and enter into other organic halide reactions, producing additional interesting compounds.

TETRACHLORORESORCINOL

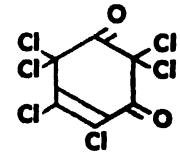
$C_6Cl_4(OH)_2$



PHYSICAL PROPERTIES:

White crystalline solid.
Melting point—141° C.
Faint pleasantly phenolic odor.
Soluble in organic liquids, hot water or dilute alkali—sparingly soluble in cold water.

CHEMICALLY, it is a mild reducing agent, and with chlorine yields* hexachlorocyclohexene-1-dione, 3-5, a quinone of interesting possibilities:



*Beilstein, Vol. VI page 820

SUGGESTED USES:

Condensation of this resorcinol for the preparation of eosin-type derivatives should lead to a series of compounds of possible dyestuff interest. Its antiseptic use is indicated as of probable practical value. In these days of need for phenolics, this compound will probably receive careful evaluation as to uses.

We shall be glad to send samples for investigation and to cooperate with you in working out applications. Probable prices of commercial quantities, when available, supplied on request. Write Dept. CEN.



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STOP
GAS and ACID Leaks
with
CHARLAB
CHEMICAL PUTTY
Waterproof—Acid Resistant—Stays Plastic
20¢ per lb. F.O.B CHARLOTTE, N C
5% discount for quantities of 900 lbs. Packed in Standard 50-lb containers
- Stops Gas and Acid Leaks at Flange Joints
- Packs Expansion Joints Excellently
- Makes Tight Joints at Ball and Spigot Connections

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CHARLOTTE NORTH CAROLINA

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For Efficient Dehydration of GASES and LIQUIDS

FLORITE, the new granular drying agent, is now being used successfully for dehydrating natural gas, propane, gasoline, air, nitrogen, carbon dioxide and other gases and liquids where high drying efficiency is required.
It selectively adsorbs 4 to 20% of its weight in water, depending upon the particular application, and is regenerated by heating to 300–350°F. FLORITE is hard, stable, non-corrosive, non-poisonous, and is available in a variety of particle size classifications.
WRITE FOR COMPLETE DETAILS

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ADSORBENTS
150 LIBERTY AVE WARREN, PENNA

The L. S. O. G. Exchange

Edited by A. A. Ashdown, Ed. F. Degering, J. E. Hawkins, and S. L. Redman

Send Items to Ed. F. Degering, Department of Chemistry, Purdue University, Lafayette, Ind.

ACTIVITY in the North Carolina Section enters in the considerable number of universities and colleges within approximately 20 miles of Durham. Although this area embraces the highest concentration of chemists in North Carolina, it actually includes only about half the total membership of the section. The others are scattered from Henderson to Wilmington, roughly 300 miles, singly and in small groups. The section is thus acutely involved in the problem of a scattered membership, many of whom are unable to attend any of the meetings.

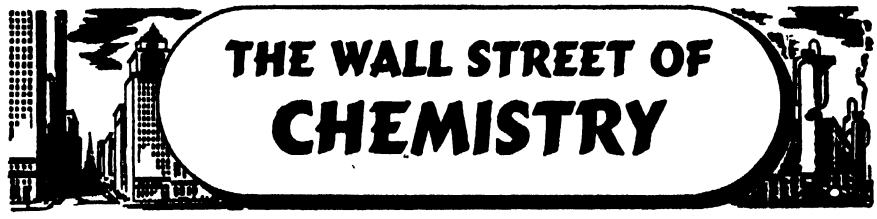
The senior members who are within range of the section's activities are preponderantly teachers who feel that one of the section's most important functions is to present distinguished chemists to several hundred students of chemistry and chemical engineering and thus promote a professional interest in chemistry and the activities of the AMERICAN CHEMICAL SOCIETY.

The affairs of the section are in charge of an executive committee of eight. Included are the chairman, vice chairman, secretary, three immediately past chairmen, and the two councilors. A committee member is usually incumbent for several years and continuity of purpose in section affairs is thus assured.

The North Carolina Section has no local dues and is consequently entirely dependent on the national apportionment for the maintenance of its program. These funds are occasionally augmented by those contributed by other scientific societies for joint meetings. Some of the meetings are also partly underwritten by one of the universities. The budget usually permits six or seven speakers per year, in addition to a joint meeting with the North Carolina Academy of Science at which the members of the section present papers on research subjects. This section has not often called on its own members for lectures.

A highly successful membership drive, under the direction of a capable committee, increased the section's membership from 133 as of December 1940 to its present 162. The committee found a general publicity campaign highly effective. The increase is mostly in junior membership. The section has made the students within range aware of the activity and purpose of the SOCIETY.

Attendance at meetings has suffered somewhat this season in consequence of the national emergency. A considerable number of North Carolina chemists are actively engaged in research on military projects and in teaching courses under the E.S.M.D.T. All in all, the North Carolina Section seems to be performing its functions in a satisfactory manner. It is a going concern and growing.—SHERMAN E. SMITH, *Secretary, North Carolina Section.*



Commercial Alcohols, Ltd., for the fiscal year ended March 31, 1942, reports net profit of $90,111 after depreciation, interest, taxes, etc., equal after preferred dividends to 35 cents a share on common. This compares with $73,515 or 28 cents a share in the preceding year.

For nine months ended March 31, 1942, **E. R. Squibb & Sons** and subsidiaries report net profit of $1,801,516 after federal income taxes and extraordinary reserves of $207,457, equal after dividend requirements on $5.00 preferred stock to $3.71 a share on common. This compares with net profit of $1,347,353 or $2.40 a share on common for the nine months ended March 31, 1941.

For nine months ended March 31, 1942, the **Vick Chemical Co.** and subsidiaries report net profit of $2,458,752 after depreciation, provision for federal and foreign income and excess profits taxes, etc. This is equal to $3.61 a share on common and compares with $2,576,887 or $3.78 a share in the nine months ended March 31, 1941.

The **West Virginia Pulp & Paper Co.** and subsidiaries, reporting for six months ended April 30, 1942, show net profit of $2,513,629 after depreciation, depletion, interest, amortization, and provision for federal and excess profits taxes. This is equal, after dividend requirements on 6 per cent preferred, to $2.27 a share on common, and compares with $2,206,428 or $1.92 a share for the six months ended April 30, 1941.

The **York Ice Machinery Corp.** reports that earnings for the six months ended March 31, 1942, are estimated to be $784,000 (before income and excess profits taxes, surplus charges, and other reserves customarily established at the year end), compared to a $70,000 loss in the same period of the preceding year. Uncompleted orders not reflected in earnings at March 31, 1942, amounted to $14,659,256, or an increase of 104.4 per cent over the same date a year earlier. In view of rising costs and price ceilings it is not likely that the same degree of earnings improvement can be expected to continue. The U. S. District Court has decided the suit to enjoin its plan of merger and recapitalisation in its favor in all respects.



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Eastern Husky Midget Pumps speed up operations, meeting almost any problem of laboratory pumping. Their light weight permits quick, easy moving from one job to the next. They are made in several alloys for all liquids, corrosive or non-corrosive.

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No. 401—Smooth surface, inexpensive, retains fine ppts, starch free.

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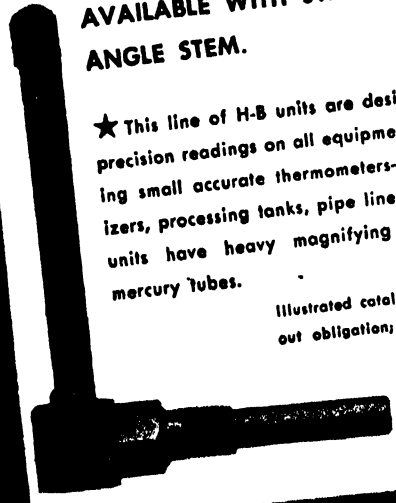
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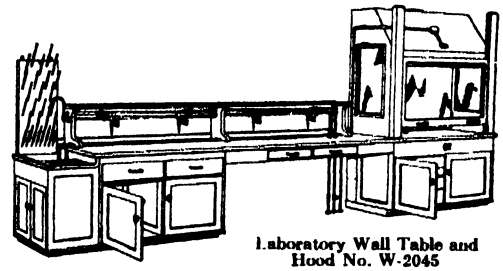
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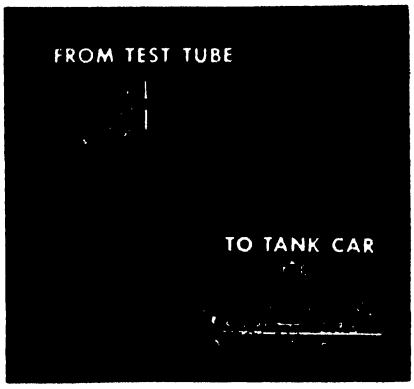
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Business Statistics

We are indebted to the Manufacturing Chemists' Association, 608 Woodward Bldg., Washington, D. C., for the following figures showing business conditions.

Monthly Statistical Report on Business Conditions

	Seasonally Adjusted			Without Adjustment		
	April 1942	March 1942	April 1941	April 1942	March 1942	April 1941
(Base 1935–39 = 100)						
Industrial production[a]	174[b]	172	144	172[b]	168	144
Chemical production	168[b]	161	133	171[b]	165	136
Steel production	217	216	192	217	216	192
Pig iron production	190	189[c]	170	190	189[c]	170
Freight car loadings	143	136	112	136	129	108
(Base 1923–25 = 100)						
Construction contracts, residential	84[b]	95	80	99[b]	99	93
All other	140[b]	149	121	157[b]	147	136
Department store sales, value	117[b]	124	104	114[b]	118	106

	April 1942	March 1942	April 1941
Index of factory employment[d]:			
All manufacturing	135.7[b]	135.0	122.6
Chemicals	192.9[b]	192.5	162.4
Drugs	155.6[b]	155.8	122.4
Fertilizers	152.8[b]	165.6	178.7
Compressed gases	155.8[b]	154.4	135.7
Index of factory pay rolls[d]:			
All manufacturing	186.4[b]	182.9	134.7
Chemicals	293.4[b]	287.8	208.3
Drugs	206.5[b]	199.6	137.7
Fertilizers	177.1[b]	175.9	176.9
Compressed gases	208.6[b]	203.4	160.9
(Base 1926 = 100)			
Wholesale price indexes:			
All products (except farm products and foods)	95.6[b]	95.2	85.9
Chemicals	96.4	96.4	86.4
Drugs and pharmaceuticals	126.7	126.5	97.5
Fertilizer materials	79.2	79.5	71.0
Purchasing power of the dollar:			
All products (except farm products and foods)	$1.046	$1.050	$1.164
Chemicals	1.037	1.037	1.158
Drugs and pharmaceuticals	0.789	0.790	1.026
Fertilizer materials	1.263	1.258	1.409

[a] Source of statistics in first seven items: Federal Reserve Board.
[b] Preliminary figures.
[c] Corrected figures.
[d] U. S. Department of Labor.

New Rubber Reclaiming Process Developed

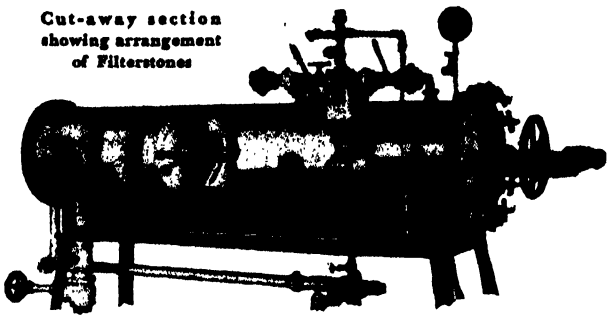
A method of reclaiming used rubber which is said to increase the capacity of certain existing equipment by 60 per cent has been developed by the United States Rubber Co., Rockefeller Center, New York, N. Y. The processing cycle is reduced from 16 to 9.5 hours, and the quality of the finished reclaim is improved because of a change and a reduction in the chemicals used in the process, according to W. G. Kirby, manager of reclaim development of Naugatuck Chemical Division, which operates the reclaim plant for the company.

If present plans for scrap rubber collection are successful and used rubber is made available in large quantities, Mr. Kirby said, this process along with other developments of this kind may be valuable for increasing present reclaim capacities without construction of additional plant facilities.

In reclaiming used rubber, he pointed out, it is necessary to remove or dissolve any fabrics which the used rubber may contain. The scrap is also treated to soften or plasticize the rubber and convert it to a physical state similar to unvulcanized rubber. According to former processes, a digester was charged with scrap rubber, caustic soda, pine tar oils, and water, Mr. Kirby explained, and the mass was heated by steam under pressure and agitated for 16 or more hours. With the new method, air is introduced into the chamber with the scrap, the steam pressure is increased to raise the temperature, the amount of pine tar oils is reduced, and the mixture is agitated for a much shorter time.

One of the most important nitrate plants of Chile has been reopened. This plant, Rica Aventura, was scheduled to resume operations in March, after 12 years of inactivity, and will employ about 1,000 workers.

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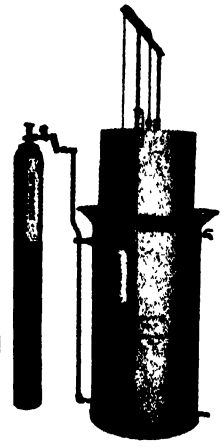
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Chemical Engineering Plant Design. *Frank C. Vilbrandt.* 2nd ed. 452 pages. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York, N. Y., 1942. Price, $5.00.

THE new edition of this book represents a physical expansion of about one third, compared with the original edition which appeared in 1934. Pages have increased from 327 to 452, tables from 103 to 133, and illustrations from 53 to 67. The descriptive text of the earlier edition has not been greatly changed, although numerous significant additions of timely material have been made.

A notable improvement is a rearrangement of chapters, which enables a more logical development of the subject in the following order: Introduction, Foundations, Drainage, Piping Installation, Pumps and Pumping, The Building, Power and Power Transmission, Development of the Design Project, Flow Diagrams, Selection of Process Equipment, Plant Layout and Elevation, Preconstruction Cost Accounting, and Locating the Chemical Plant.

The increased number of tables and figures, which accounts for most of the expansion in the new edition adds greatly to the genuine utility of the book as a source of information. Outstanding additions are tables on Fire Hazard Properties of Certain Flammable Liquids, Gases, and Solids, Recommendations for Nonmetallic Materials of Construction, Chemical Raw Material Sources, and expansion of the section giving typical cost data. The scope of the author's treatment is further widened by a much greater use of literature citations, particularly to recent pertinent material and to lengthy lists of suggested collateral reading following many chapters.

The design of plants in the processing industries involves so many related problems that years of experience would be required to develop first-hand knowledge of many of the factors which must be considered in order to arrive at a satisfactory conclusion. This book can provide the practicing engineer with a wealth of essential information regarding details of both design and cost estimation. At the same time its logical treatment can guide the development of the design project from the initial laboratory stage to the proposal and plans for a large commercial plant. It will be of particular value to the young engineer who, lacking experience, must supplement his theoretical training with an appreciation of the practical details that determine the success or failure of an actual project.

Since its introduction this has been a popular text for a design course often given to senior chemical engineering students. The new arrangement and greater factual content make it even more desirable for such use.

HOWARD S. GARDNER



Liebig and after Liebig. A Century of Progress in Agricultural Chemistry. Publication No. 16 of the American Association for the Advancement of Science. Edited by *Forest R. Moulton.* xii + 111 pages, 19 × 26 cm., 11 figures, 8 portraits. The American Association for the Advancement of Science, Washington, D. C., 1942. Price, $2.00.

THIS volume contains the papers presented before the Sections of Chemistry and Agriculture of the American Association for the Advancement of Science in a Symposium at the Philadelphia meeting December 1940. One hundred years earlier Justus von Liebig's "Organic Chemistry in Its Application to Agriculture and Physiology" had been published and, since it had such a profound effect in directing scientific thought toward agricultural problems, the centenary of its appearance was made the occasion of this symposium.

Following an introductory chapter by Charles A. Browne on Justus von Liebig—Man and Teacher, the volume is divided into two sections. Section I, "Organic Chemistry, Enzymes and Nutrition", contains papers by H. R. Kraybill, "Liebig's Influence in the Promotion of Agricultural Chemical Research"; H. B. Vickery, "Liebig and the Chemistry of Proteins"; A. K. Balls, "Liebig and the

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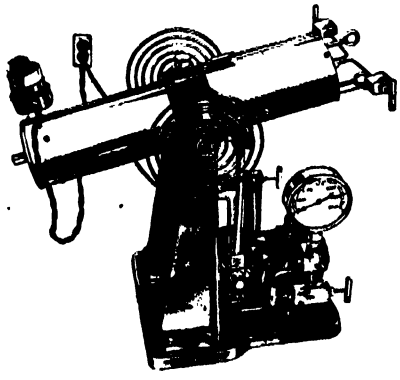
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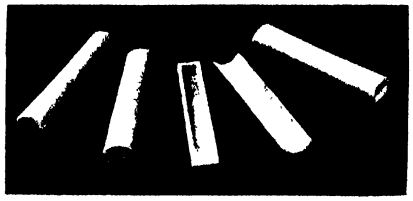
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CONTINUED FROM PAGE 822

Chemistry of Enzymes and Fermentation"; and Paul E. Howe "Liebig and the Chemistry of Animal Nutrition". Section II, "Soils, Fertilizers, and the Mineral Requirements of Plants" contains papers by R. Bradfield, "Liebig and the Chemistry of the Soil"; S. A. Waksman, "Liebig—The Humus Theory and the Role of Humus in Plant Nutrition"; H. A. Curtis, "Liebig and the Chemistry of Mineral Fertilizers"; C. A. Browne, "Liebig and the Law of the Minimum"; and B. E. Livingston, "Liebig and the Mineral Requirements of Plants as Indicated by Means of Solution Cultures".

The authors of the various chapters alone would attest to the excellence and thoroughness with which the topics are discussed. Each and every one of the authors has given evidence in his chapter of a profound study of Liebig's views and scientific contributions, and has shown how these have influenced later workers. The story each tells is fascinating, and most of the chapters sweep the reader along the stream of scientific achievement with an almost endless view of scientific landmarks.

A hundred years later is perhaps the best advantage point from which to view the accomplishments of any individual. That which remains has been stripped from the dross and appears as true gold. Liebig left much gold behind and it is brought out in this volume in all of its brilliance. Too often we forget to look behind our present knowledge for the sources from which our science arose. Every student of chemistry, and especially those interested in agricultural chemistry or in biochemistry, should read this volume. They not only would acquire a historical perspective of how their science came to be but they should get some appreciation of the thrill which is associated with a new discovery or the formulation of a new scientific theory—a discovery or a theory which may profoundly affect the thinking of future generations.

To review adequately any chapter would be to quote it in its entirety. Essentially each paragraph is pertinent. This volume should become a classic in the field of chemical history. It will bear reading and re-reading as the years go by.

Ross Aiken Gortner

Equilibrium and Kinetics of Gas Reactions. An Introduction to the Quantum-Statistical Treatment of Chemical Processes. *Robert N. Pease.* 1st ed. 236 pages. Princeton University Press, Princeton, N. J., 1942. Price, $3.75.

This is a textbook designed for students well grounded in the principles of chemistry and mathematics. It is written in a refreshing style, the author always letting the reader in on what he is going to discuss next. It abounds in practical illustrations, so that a chemist or chemical engineer who has not been in a classroom for years will find much of profitable interest.

Part I consists of three chapters devoted to chemical equilibrium. The first and second chapters contain an excellent review of the contributions of thermodynamics to this subject. In Chapter III is given a survey of the quantum-statistical method of calculating free energies and equilibrium constants. A number of examples shows that equilibrium constants may be calculated from data entirely independent of chemical measurements of equilibria.

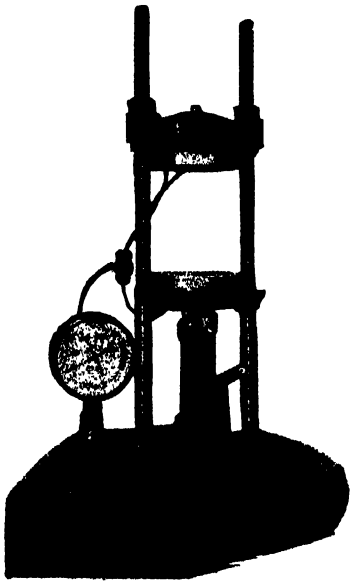
The second and largest part of the book deals with the kinetics of gas reactions. It begins with a brief résumé of a rate equation based on a statistical treatment and on the assumption of the existence of an activated complex in equilibrium with the reactant molecules. Then follow several chapters in which various types of reaction are taken up and discussed in the light of this theory.

The book is sufficiently different from others pertaining to the subject to warrant careful study by all chemists interested in the field. It should prove to be very useful as a text and reference in courses of about the first-year graduate level.

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The Electron Microscope. *E. F. Burton* and *W. H. Kohl.* 233 pages. Reinhold Publishing Corp., 330 West 42nd St., New York, N. Y., 1942. Price, $3.85.

THE reviewer has often been asked to act as critic at amateur theatrical performances because he "represented the audience's viewpoint", as one director put it. It was in this spirit that he agreed to review this book, fearing that courses in quantum mechanics and matrix algebra would be necessary as rudimentary background.

In this respect the book proves to be a pleasant surprise. It is technical and discusses in detail the theory necessary and sufficient for an intelligent understanding of the electron microscope; but it builds up the background so carefully and from such elementary beginnings that the reader can follow quite easily the later chapters dealing explicitly with this extraordinary instrument, especially where the concept of electron lenses is treated. In fact, the introductory chapters provide about the best presentation that the reviewer has seen of the rival wave and corpuscular theories of radiation, reconciled (on paper at least) by the wave concept of electrons. The authors also do an excellent job in explaining the resolving power of optical systems.

The book is hardly to be recommended to the specialist or to one technically trained in the theory and practice of electron lens systems. To the average chemist, however, who wishes to learn in general how the instrument works, what its limitations are, and how its results may be interpreted, the book should prove a valuable addition to his library.

The price seems rather high, but this is doubtless accounted for by the large number of drawings and cuts. For the average chemist and physicist about 25 per cent of the drawings are probably superfluous as being too elementary; the halftones, however, are well chosen and striking and as well reproduced as could be expected on the paper used. The latter is naturally a compromise between poor reproduction on one hand and extremely expensive paper on the other. On the whole, this compromise works out satisfactorily for the authors' purpose and the publishers are to be congratulated on the results.

FRANCIS W. POWER, S. J.

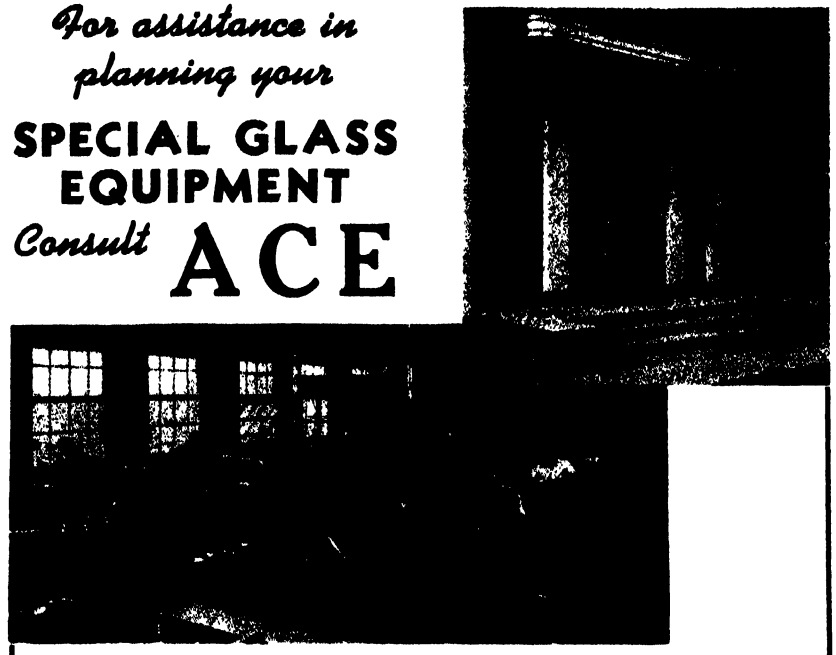
The Spectrum of Hydrogen. *William Mayo Venable,* author and publisher, Blaw-Knox Co., Pittsburgh, Penna., 1942. 184 pages. Price, $2.00.

THIS book summarizes a considerable amount of painstaking effort, on the part of the author, to classify all the lines of hydrogen in one scheme. The treatment is, however, at variance with that accepted

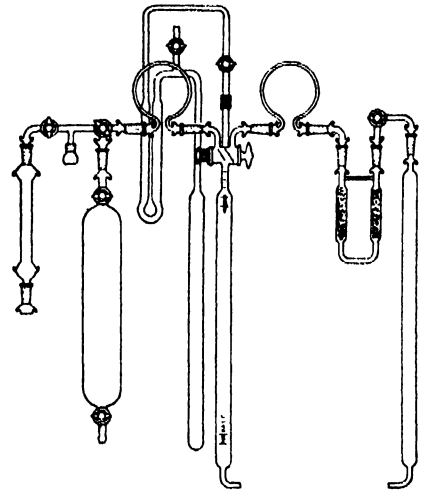
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by physicists and is contrary to a number of usually accepted physical principles.

ALFRED LEE SKLAR

Metallurgical and Industrial Radiology. *Kenneth S. Low.* 88 pages. Sir Isaac Pitman & Sons, Ltd., London, 1940. Price, $2.50.

THIS small book has for its principal object "consideration of metallurgical examinations from a practical rather than an academic or research aspect". It contains a good discussion of apparatus and equipment, radiographic technique, and interpretation of radiographs. There are about 25 radiographs of various defective aluminum, magnesium, and iron-base castings.

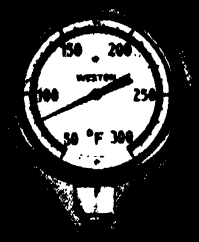
Chapters on industrial fluoroscopy, radiological examination of welds, and x-ray stereoscopy are included. The book should be of interest chiefly to technicians or executives interested in the preparation or interpretation of radiological reports.

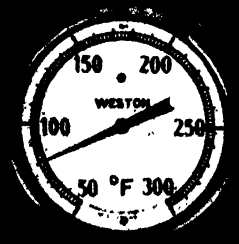
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Gas Producers for Motor Vehicles and Their Operation with Forest Fuels. Technical Communication 1. *I. Kisin.* 37 pages. Imperial Forestry Bureau, 39 Museum Road, Oxford, England, 1942. Price, 3s.

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A. C. S. Members Prominent in Borden Awards

MEMBERS of the AMERICAN CHEMICAL SOCIETY have figured prominently in the awards made by the Borden Co. through scientific organizations, described in a 12-page mimeographed "Report on the Borden Awards" that has recently been made available.

AMERICAN CHEMICAL SOCIETY Award, in recognition of outstanding research in the chemistry of milk: 1939, Leroy S. Palmer, University of Minnesota; 1941, Claude S. Hudson, U. S. Public Health Service; 1942, George E. Holm, U. S. Department of Agriculture.

American Dairy Science Association, or meritorious scientific contributions or discoveries pertaining to dairy production or dairy manufacturing, or invention of a plan, process, or device useful, valuable, or significant in the theory and practice of dairy production of dairy manufacturing: Dairy Manufacturing Research Award, 1938, Kenneth G. Weckel, University of Wisconsin, for research in the field of milk irradiation, which resulted in the development of apparatus making the irradiation of milk commercially possible; 1941, Paul F. Sharp, Cornell University, for research on the lipolytic activity of milk in relation to flavor, vitamin C, oxidized flavor in milk, physical state of milk fat, and deaeration of milk. Dairy Production Research Award, 1941, Edwin Bret Hart, University of Wisconsin, for research on the determination of phosphorus in feeds, the effect of phosphorus in animal nutrition, the ripening of cheese, the use of iodine in the prevention of goiter, the grass-juice factor, etc.

American Home Economics Association, for papers dealing with the feeding of dairy products to human subjects, or to research on laboratory animals that has a direct bearing on problems of human nutrition: 1939, Icie Macy Hoobler, Children's Fund of Michigan, for studies over a period of years of the diets of average-health children, in which the effect of milk, the metabolic variations attributable to various kinds of milk, and their effect upon gastrointestinal motility, received study; 1940, Henry C. Sherman, Columbia University, for extensive studies on all phases of the nutritive qualities of milk and its place in the diet; 1941, Julia Outhouse, University of Illinois, for studies and investigations dealing with the role of milk in the diet, demonstrating that the human system utilizes the calcium found in milk more fully than the calcium found in other foods.

Poultry Science Association, for distinctive contributions to poultry science advancement: 1938, Leo C. Norris, Cornell University, for research on the importance of vitamin G in hatchability and chick growth, necessary levels of manganese in poultry rations, and cause, prevention, and cure of perosis among poultry; 1941,

Roland M. Bethke, Ohio Agricultural Experiment Station, for research on poultry nutrition generally, primarily with protein quality, minerals, and vitamins.

Endeavour

VOLUME 1, Nos. 1 and 2, of *Endeavour*, a quarterly review designed to record the progress of the sciences in the service of mankind and published by the Imperial Chemical Industries, London, S. W. 1, England, has just reached this office. Its name is taken from the vessel commanded by Captain Cook, sent out by the British Admiralty nearly two centuries ago for the purpose of carrying out exploration and research in the interests of science. The present purpose is briefly stated—"to enable men of science, and particularly British men of science, to speak to the world in an hour when not only nations but the internationalism of the sciences are threatened by a recrudescence of barbarism in its grossest and most destructive manifestation".

The publication is very attractively put together, with excellent illustrations. In addition to book reviews, articles of particular interest to chemists include "Science in the U. S. S. R.", "Manufacture and Use of Vitamins", "Prospects for Soil Conservation", "Significance of Metal Single Crystals", "Textile Fibres under the X-Rays", "Action of X-Rays on Living Cells", "Phthalocyanines", and "Vegetable Drugs of Britain". The price is five shillings.

Mathieson Issues Anniversary Booklet

THE founding in 1892 of the Mathieson Alkali Works, 60 East 42nd St., New York, is commemorated in the recently published 46-page booklet "Fifty Years of Chemical Progress". Although 50 years is a relatively brief time in the history of the American chemical industry as a whole, Mathieson ranks as a pioneer in its field—first the manufacture of alkali and bleach and later of liquid chlorine, ammonia, and numerous related products. The development and expansion of the company in this span of years is described in this illustrated and attractively compiled publication. To friends of Mathieson, the company has also sent bronze anniversary medallions.

Synthetic Resins

THE Bakelite Review for April 1942 includes articles on resin-bonded plywood, synthetic resins for coatings, plastics in surgery, designing molded plastic parts, flexible molding plastics, synthetic resin-base protective coatings, and flame-priming steel for painting. Copies are available on request from the Bakelite Corp., 30 East 42nd St., New York, N. Y.

No "Rule of Thumb" Here in Selecting Construction Materials for Pumps . . . .

Fortunately for users of Amsco-Nagle Industrial Material Handling Pumps, the selection and production of "water end" metal most suitable for a given set of corrosive or abrasive conditions are no problems for Amsco. The Amsco division has for years produced heat and corrosion resistant alloy castings for many industries, including, in fact, manufacturers of pumps for the chemical and process industries; 13% manganese steel for users and makers of pumps handling abrasive materials; and other divisions of the company make almost any ferrous or non-ferrous metal likely to be required.

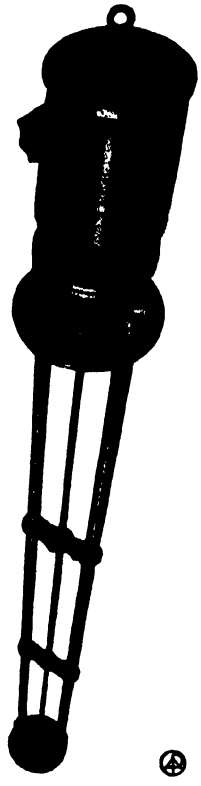
In addition to the chemical and physical testing laboratory and 400,000 volt X-ray inspection equipment maintained at our Chicago Heights plant, we participate in the activities and share in the "findings" of the extensively equipped Mahwah (N. J.) Metallurgical and Physical Research Laboratories.

Starting with a thorough knowledge of the correct alloy for the application, we produce the cast parts in our own plants and can, consequently, control the alloy analysis, as well as foundry practices, so as to insure sound pump castings.

When a purchaser specifies an Amsco-Nagle Pump, he has the advantage of single-company responsibility, from the production of drawings to the finished unit ready to put on the line. Our responsibility does not stop when we have recommended a certain grade of alloy, nor are we confined to a limited range of construction materials. Water ends, for example, may be of an alloy selected to resist a highly active acid, whereas the other parts may be of simpler alloys or ordinary cast iron.

Our long contact with the process industries in making heat, corrosion and abrasion resistant castings for cement mills, pulp mills, petroleum refineries, ore roasters and other operations has given us an insight into their pumping problems; and we may be able to work with you to our common advantage.

Bulletin 940 describes design details of Amsco-Nagle Pumps, and gives specifications and operating characteristic curves.

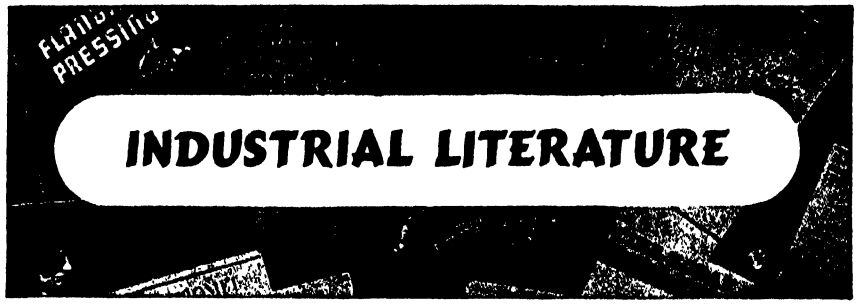


Amsco-Nagle 2" Type "SW" Frame 10D Vertical Shaft Wet Pit Pumps with Muntz metal and monel fittings made for a chemical manufacturer. Note inverted inlet to eliminate air and gas binding and to take advantage of hydraulic thrust in counterbalancing weight of revolving parts. Immersed bearings lubricated through tubular structural member at right.

Amsco

AMERICAN MANGANESE STEEL DIVISION
OF THE AMERICAN BRAKE SHOE & FOUNDRY CO.
Chicago Heights, Illinois

FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO. OFFICES IN PRINCIPAL CITIES



Listed publications should be requested directly from the company concerned. Use business stationery, mention bulletin numbers, and refer to this journal. Publications will be sent free unless otherwise noted.

Agitators—Clarifiers—Thickeners. This 16-page booklet covers general operating characteristics of the three types of equipment. Important construction features are illustrated, correct application of the different types of equipment to industrial problems is discussed, and data tables show the material handled, feed rates, and capacity information on typical operations. *Bulletin 31-C CEN.* HARDINGE CO., INC., York, Penna.

Blackout Ventilation. This bulletin discusses a line of power roof ventilators. Line drawings and photographs indicate the way in which these ventilators can be equipped with blackout hoods to prevent light from showing. *Bulletin 304 CEN.* ILG ELECTRIC VENTILATING CO., 2850 North Crawford Ave., Chicago, Ill.

Centrifugal Pumps. This 4-page data sheet lists the standard features of this line of single-stage pumps with capacities up to 200 gallons per minute and heads up to 300 feet. In addition to a general description of the line, the bulletin carries dimension tables and also a table of capacities, heads, and speeds. *Bulletin W-312-B2C CEN.* WORTHINGTON PUMP AND MACHINERY CORP., Harrison, N. J.

Compressors. Single horizontal, single-stage compressors with 9-, 11-, and 13-inch stroke, available in both motor- and steam-driven types, are described in this bulletin. Sectional views give the purchaser a good idea of the construction details, and a general data table lists sizes, dimensions, and capacities. *Specification L-640-S2 CEN.* WORTHINGTON PUMP AND MACHINERY CORP., Harrison, N. J.

Diesel-Electric Switcher. A 16-page booklet, profusely illustrated, describes a 25-ton Diesel-electric locomotive designed for use in industrial plants and said to embody many features found in railway-type switchers. *GEA Publication 3756 CEN.* GENERAL ELECTRIC CO., Schenectady, N. Y.

Electronic Photometer. The apparatus discussed in this bulletin is designed for the measurement of low light values and is a self-contained unit, built into a portable case. It is operated from the power line, without the use of batteries, and the amplifier circuit is stabilized so as not to be affected by line voltage variations. Phototubes for this photometer, available in a variety of spectral response, can be furnished with high sensitivity in the red and infrared as well as in the blue and near-ultraviolet. *Photovolt Electronic Photometer Bulletin CEN.* PHOTOVOLT CORP., 95 Madison Ave., New York, N. Y.

Heat Exchangers. This illustrated bulletin describes the A. P. V. plate-type heat exchanger designed for use with all types of liquids. In addition to ordinary heat transfer use, this equipment can be employed for the complete pasteurization of liquids, sirups, or oils by continuous process operation under sterile conditions. The essential working unit of the heat exchanger is an assembly of polished die-pressed stainless steel, or other suitable metal, plates with grooves on both sides, which when pressed together form a closed passage for the product and heating or cooling mediums. The ease with which additional plates may be added gives this heat exchanger unit a very high flexibility, permitting its adaptation to a variety of heat transfer jobs. *Heat Exchangers Bulletin CEN.* WALKER-WALLACE, INC., 14 West Utica St., Buffalo, N. Y.

Homogeneous Lead Coatings. This booklet discusses the facilities for applying and the products given homogeneous lead coatings. The equipment described ranges from lead-lined drums to impellers for high-speed agitators. An interesting series of photographs shows the preparation of work for lead coatings. *Bulletin 1700 CEN.* THE UNITED STATES STONEWARE CO., Akron, Ohio.

Liquid Density Recorders. Instruments for the automatic measurement and recording of densities of process liquids are described and illustrated in *Bulletin A-264 CEN.* THE FOXBORO CO., Foxboro, Mass.

Open Steel Flooring and Steps. A folder concisely describes patterns of gratings and their applications, and includes a tabulation of safe loads for various sizes, weights, and lengths of this type of flooring, details of constructions, and methods of installation, with photographs of typical installations. *Folder CEN.* KERLOW STEEL FLOORING CO., 21 Mallory Ave., Jersey City, N. J.

Research Chemicals. A 4-page booklet lists fine organic chemicals, including several rare bile acids, for research workers in the medical sciences. *Bulletin CEN.* GEORGE A. BREON & CO., INC., Kansas City, Mo.

Taste and Odor Control in Water Purification. This booklet, textbook in character, discusses developments in water-supply handling, sources of pollution, and the applications of activated carbon to reach a wide variety of conditions. It includes a description of granular carbon filters and other methods of odor control. *Taste and Odor Control in Water Purification Booklet CEN.* INDUSTRIAL CHEMICAL SALES DIVISION, WEST VIRGINIA PULP AND PAPER CO., 230 Park Ave., New York, N. Y.

Temperature and Pressure Controllers. This 36-page booklet gives information on the controllers themselves, as well as a series of photographs showing their actual application to industrial work. Two new instruments described are a non-indicating controller for temperature or pressure (No. 42) and a self-operating temperature controller which is said to find wide use where compressed air or electricity are not available. *Catalog 900E CEN.* C. J. TAGLIABUE MFG. CO., Park and Nostrand Aves., Brooklyn, N. Y.

Thermometers and Hydrometers. This 28-page catalog gives data on the working values in this line of instruments. In addition to detailed description and recommendations for application, the authors have included some valuable tables for conversion of specific gravity readings into pounds per gallon. Suggestions are given for using a hydrometer to get correct readings, and a handy selection chart lists hydrometers especially calibrated for more than 50 products. *Catalog C-40 CEN.* GEORGE RUEHFEL CO., INC., 103–105 Menahan St., Brooklyn, N. Y.

Vacuum Pumps. Problems of vacuum processing and installation of vacuum equipment are discussed in this 32-page illustrated catalog. Sound use of the equipment in high vacuum practice is covered. A line of Stokes high vacuum pumps described in this booklet ranges from 10 to 225 cubic feet in capacity. A new Devaporizer, designed to remove and recover low-boiling point solvents and other volatiles and prevent loss of vacuum in the system, is discussed, as well as new type portable high-vacuum gages, to meet the need for faster, more accurate readings in high-vacuum practice. *Catalog 38-P CEN.* F. J. STOKES MACHINE CO., Tabor Road, Olney P. O., Philadelphia, Penna.

Vent Valves and Flame Arrestors. This booklet, of particular interest to engineers whose plants must handle and store considerable quantities of volatile liquids and explosive gases, describes equipment designed to make containers gas-tight and prevent flame from entering the tank if vapors vented from it should become ignited. The flame arrestors described range from 2- to 10-inch sizes. *Catalog V-50 CEN.* OCECO DIVISION, THE JOHNSTON & JENNINGS CO., Cleveland, Ohio.

Vibrating Equipment for feeding, conveying, sifting, packing, cooling, and drying is covered in an 8-page illustrated bulletin. *Booklet 42 CEN.* W. RICHARD WITTE & CO., 220 Broadway, New York, N. Y.

"We Read Water in the Bottling Department" is the title of a 6-page pamphlet on bottling water problems. *Pamphlet CEN.* D. W. HAERING & CO., INC., Chicago, Ill.

Hammering Rivets by Radio

One of the most recent instruments is the "radio hammer" which is being used to accelerate certain phases of airplane construction and is described in an RCA publication. The rivets are adapted specifically to the fastening of metal plates accessible from only one side and it is expected that they will find much wider applications. In the cavity of the rivet shank is a small charge of TNT or other high explosive. When the rivet is heated to a critical temperature the charge is exploded, expanding the shank to fasten the metal sheets firmly. The size of the charge is controlled to such a fine degree that the expansions may be held within a range of 0.01 inch. The heat is applied by a short-wave coil known as a radio bombarder. Held against the head of the rivet it heats the rivet in two or three seconds and the explosion results.

Dehydrated Meat

The American Meat Institute has reported processes that will permit the dehydration of meat and reduce the amount of space required for shipping to the armed forces in foreign lands and to Lend-Lease recipients. These involve grinding, precooking, and drying in air dryers or vacuum, and are the result of intensive work by research laboratories of meat-packing companies, the American Meat Institute, and the U. S. Department of Agriculture.

Walnut Shells in Insecticide

Using an orchard waste as part of a protector for orchards, Forrest M. McLane of Montebello, Calif., has developed an insecticide in which walnut-shell flour is a carrier for rotenone. To the rotenone-impregnated shell powder is added a certain quantity of a nonvolatile, nondrying oil as an emulsifier, together with some diatomaceous earth as a filler. The whole is suspended in water and used as a spray. Patent 2,283,275 covers this mixture.

Bottle Crowns from Tin Cans

In an effort to increase its supply of crowns for bottles, the Pepsi-Cola Co. has collected about 10,000-old tin cans for experimental purposes and is building machinery to cut them at the seams and wash them. It is estimated that, if successful, the company will be able to stamp about 40 crowns from a No. 10 can.

Sidney P. Gottfried, assistant chemist in charge of the Division of Biochemistry of the Jewish Hospital of Brooklyn and connected with the hospital for seven years, has accepted a commission as first lieutenant in the Sanitary Corps of the U. S. Army.

Another Beckman pH Development . . .

NEW X-9 GLASS ELECTRODE
Further Simplifies pH Control!

Withstands Severe Abrasion in Flow Lines, Vats, Tanks, etc., Insuring Longer Life, Lower Maintenance, Better pH Control!

Again another important "first" in the pH field is pioneered by Beckman research! Since Beckman pioneered the first rugged type glass electrode . . . an electrode that could be used directly in vats, tanks, flow lines, and even pushed into moist earths and semi-solids without injury . . . modern pH control has spread to more and more industrial applications where operating conditions are severe.

Now, Beckman research has developed a new, even *more* rugged electrode that withstands unusually severe operating conditions — high abrasion, shock, direct pressure — without damage. This new electrode . . . *the Beckman X9 Glass Electrode* . . . makes possible economical and convenient pH control under even the most difficult operating conditions in chemical and industrial processes. . . .



HIGH ABRASION RESISTANCE! The walls of the X-9 electrode are much thicker than those of ordinary glass electrodes . . . stand up under the severe abrasion of continuous operation in abrasive-laden fluids, flow lines, pulps, pastes and similar difficult applications.

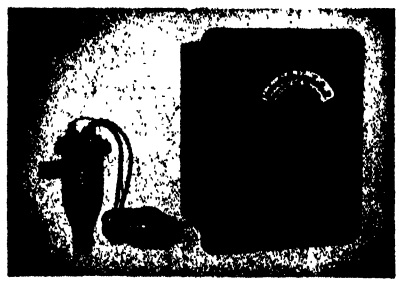


UNUSUAL RUGGEDNESS! To withstand rough plant usage, this X-9 electrode has a ruggedness far above ANY glass electrode heretofore available. *It will withstand a direct push of more than 100 pounds without damage.* That means long life in even the roughest operations!

The X-9 Electrode can be used with all Beckman pH instruments — both automatic and manual. Get the full details from your dealer . . . or write direct!

America's most advanced pH equipment

No other make or type of pH equipment available today offers as many far-reaching advancements as BECKMAN ● It is the only glass electrode pH equipment that can be used for continuous operation on boiling liquids ● It is the only glass electrode pH equipment that can be used in highly alkaline solutions, even in the presence of sodium ions ● It is the *only* glass electrode pH equipment providing a multiple electrode switch, by means of which an accurate pH record of as many as SIX electrode stations can be maintained — *automatically and continuously* — by ONE pH instrument. These are only a few of the outstanding pH developments available in Beckman equipment exclusively!



Illustrated at left is the Beckman Automatic pH Indicator — the ideal instrument for modern industrial process operations. Operates continuously from 115 V A.C. mains (no batteries!) and can be installed to give not only continuous *Indication* of pH but also a written Record and completely automatic Control over the pH in your plant operations. Ask for Bulletin 16 which gives complete details on this outstanding instrument!

WORLD'S LARGEST MANUFACTURER OF GLASS ELECTRODE pH EQUIPMENT!

NATIONAL TECHNICAL LABORATORIES • SOUTH PASADENA, CALIF.

Beckman THE LEADING NAME IN pH

Second Edition ready July 6th

CHEMICAL REFINING OF PETROLEUM

by **VLADIMIR A. KALICHEVSKY**

Research and Development Laboratories, Socony-Vacuum Corpn.
Author of "Modern Methods of Refining Lubricating Oils"

and BERT ALLEN STAGNER, Ph.D.

Consulting and Research Chemist; Member, American Institute of Chemical Engineers;
Formerly: Supervisor Chemical Research, Union Oil Company of California;
Research Fellow, Mellon Institute of Industrial Research

American Chemical Society Monograph, No. 63
550 Pages. Illustrated. $7.50
Second Edition, Revised and Enlarged

THE rapid development of petroleum technology has necessitated a revision of the original volume published in 1933. The newest practice in regard to treatment with sulfuric acid, tetraethyl lead, octane rating, etc., is described in detail. The present emphasis on all phases of this vitally important subject makes this book a particularly timely one, especially since the petroleum problem today is rather one of refining capacity than of crude production. For this reason technical improvements are of the utmost importance for the pressing problems of national defense.

CHAPTERS

Prefaces
Composition of Petroleum
Treatment with Sulfuric Acid
Sulfuric Acid Sludge and Hydrogen Sulfide; Recovery and Manufacture of Sulfuric Acid
Treatment with Alkaline Reagents
Sweetening Operations, Elimination of Elemental Sulfur, and Reduction of Total Sulfur in Light Distillates
Chemical Refining of Petroleum
Refining by Adsorption
Refining with Solvents
Detonation and Antidetonants
Inhibitors of Atmospheric Oxidation of Petroleum Products. Antioxygens
Gums and Cracked Petroleum Products
Deterioration of Lubricating and Similar Oils. Additional Agents
Supplementary List of United States Patents on Petroleum Refining
Appendix. Special Tables
Patent, Author, Subject Indices

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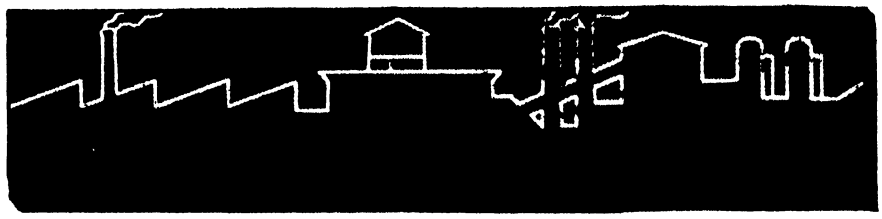
Plastics and Molded Electrical Insulation — by Emile Hemming 6.00

Casein and Its Industrial Applications — by Edwin Sutermeister and Frederick L. Browne. A. C. S. Monograph 6.50

Systematic Survey of Rubber Chemistry — by Clayton W. Bedford and Herbert A. Winkelmann 8.00

Send for circular giving details on each book.

REINHOLD PUBLISHING CORPORATION, 330 W. 42nd Street, New York, N. Y.



H-VW-M Adds to Plant

THE Hanson-Van Winkle-Munning Co., Matawan, N. J., is building an addition to its electrical department, in order to improve the storage and loading facilities for large electrical and mechanical equipment used in war production installations. This extension has been necessitated by the increased production demanded by the war program under which the electrical department has gone on a 7-day, 24-hour, 168-hour per week basis.

Plastic Highway Reflectors

NIGHT automobile accidents are reduced 20 to 25 per cent on Michigan highways marked by plastic reflectors molded of Lucite methyl methacrylate resin, the State Highway Department has reported after a four-year survey. The delineators are the nearest approach to highway illumination without the use of expensive direct lighting that has yet been attained, the report says.

Each delineator is formed of three plastic disks, molded of Lucite, made by the du Pont Company, Wilmington, Del., and set in a vertical line in a metal housing atop a three-foot post. The reflectors are shatter-resistant lenses with many facets. The delineators are spaced at intervals of 100 feet along the highway. They are placed 8 feet from the pavement edge in rural areas and 4 feet in urban areas where the road surface is bordered by a curb.

Radiation Pyrometer

A RADIATION pyrometer known as the Pyrovac has been developed by The Bristol Co., Waterbury, Conn. The new instrument is designed for recording, indicating, or automatically controlling temperatures in furnaces and kilns above 900° F. The temperature-sensitive unit or radiation head is mounted on the outside of the furnace out of the hot zone where it picks up heat rays emitted from the object under measurement, thus registering its surface temperature. The pyrometer is intended for use in measuring and automatically controlling high temperatures out of the range of the thermocouple; temperatures for which rare-metal thermocouples are used; surface temperatures; and those where the object is moving, is inaccessible, or there are space limitations.

The new line is described in Bulletin P1102, available from the company.

Design Assistance on Wood Water Towers

SINCE a War Production Board decision declines priorities for steel to be used in the construction of water towers, the Timber Engineering Co., Washington, D. C., offers aid in designing wood towers for water tanks. It also has in preparation a design for a 100-foot tower to carry a 100,000-gallon wood tank.

Megohm Bridge

TO MEET the growing demand for industrial resistance measurements of the order of ohms $\times 10^{12}$ specific resistance, with simplicity, accuracy, and economy, Industrial Instruments, Inc., 156 Culver Ave., Jersey City, N. J., announce the new Model MB-8-L megohm bridge. Although specifically designed for studies of Stoddard type cleaning fluids, with measurements obtained at low direct current voltage, eliminating fire hazard when working with flammable materials, this bridge will find other uses, particularly in organic chemistry.

Blackout and Shatter Screen

FLYING glass has been the principal cause of casualties in bombed areas, declare English air raid wardens.

The Research Products Corp., Madison, Wis., has developed a research blackout and shatter screen which successfully passed repeated explosion tests. The screen is a porous blanket made up of 16 layers of black flameproof expanded fiber and 4 layers of light-colored flameproof expanded fiber, mounted in a light wooden frame.

Test Separations

can be quickly made on fine particle size products to any desired degree of classification with the Raymond

LABORATORY AIR SEPARATOR

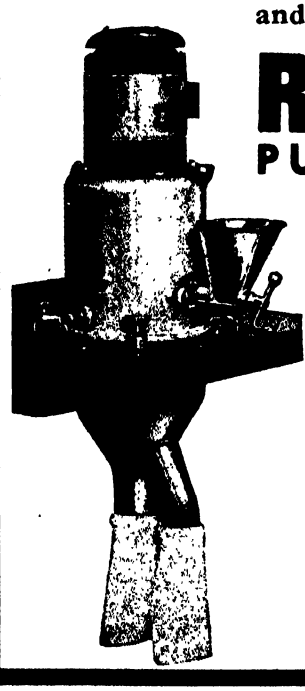
It is useful for the separation of chemical powders, food products, cement specimens, ceramic materials, or, for that matter, any finely divided material whether in the natural or manufactured products field.

The machine is particularly well adapted for experimental work such as engaged in by Chemical and Industrial Laboratories, Government Testing Stations, Universities and Research Institutions.

This compact motor driven unit comes mounted on a metal base and includes a hand operated feeder.

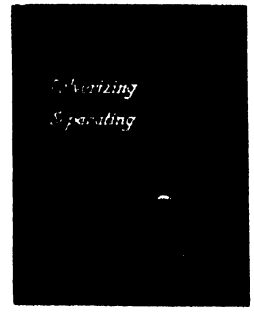
Complete set of whizzers and fans furnished for regulating the fineness of the finished material. Separator is easy to take apart for cleaning and to make adjustments for changing fineness.

The full line of Raymond Laboratory Mills and Separators is described in the Bulletin.



RAYMOND
PULVERIZER DIVISION
Combustion Engineering Company, Inc.
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Sales Offices in Principal Cities
Canadian Representative:
Combustion Engineering Corporation, Ltd., Montreal

Ask for Catalog No. 48

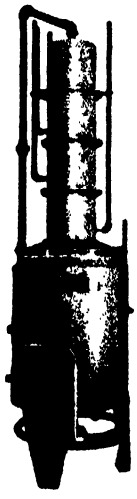


Elastic Stop Gang Channel Nuts



ELASTIC stop gang channel nuts, widely applied in the aircraft industry, are offered by the Elastic Stop Nut Corp., 2332 Vauxhall Road, Union, N. J., for testing in general industry where a multiple, self-locking, bolted fastening is required. These strips of self-locking nuts have the approval of the military and civil air authorities and are used on all American-built military and transport aircraft, on fuselage and wing structures, engine cowlings, cover and inspection plates, around windows and doors, and at other points where a series of fastenings is required.

The strips are factory-assembled, and it is necessary only to rivet or otherwise fasten them to the structure where they are to be used.



Cold Room Air Conditioner

COLD room air conditioners providing constant temperature as low as −50° to −80° F. are available for manufacturers required to test or normalize parts, materials, and machinery at such temperatures, and for experimental laboratories.

It consists of coolers operated in stages, the first stage reducing to temperature just above the freezing point of water and removing humidity; the second stage using the Niagara no-frost method to remove the balance of the moisture; and the third stage producing and holding the required final temperature.

Moisture is removed from the air below 32° F. without causing formation of ice on coolers by employing a special nonfreezing liquid continuously reconcentrated in a concentrator designed especially for this duty. The equipment is manufactured by the Niagara Blower Co., 6 East 45th St., New York, N. Y.

Extruded Synthetic Glass Sealer

THE Presstite Engineering Co., St. Louis, Mo., has developed a sealing compound especially designed to seal joints and seams in aluminum construction and to provide good adhesion to synthetic glass.

Joints sealed with this compound are tight for air, water (salt), 100-octane gasoline, aircraft fuel, and motor oil. It will remain flexible and not lose its adhesion at extremely low temperatures.

Insecticide Concentrate

A NEW insecticide concentrate for contact sprays for which there is a large domestic source of supply is announced by the Naval Stores Department of Hercules Powder Co., Wilmington, Del. The concentrate, known as "Thanite", is effective in low dilutions and requires no other toxic agent or activator for fly sprays, the company says.

The material, a derivative of the southern pine, which assures a dependable supply, is the thiocyanoacetate of a secondary terpene alcohol.

Arc-Welding Electrode

AN ALL-POSITION, high-quality alternating-current electrode, Type W-26, extending the advantages and convenience of high-quality alternating-current welding to both vertical and overhead positions, has been announced by the General Electric Co., Schenectady, N. Y.

Alternating-current arc welding has already demonstrated its advantages for work in the horizontal and flat positions. The W-26, developed after intensive research, fulfills a long-felt need for a vertical and overhead alternating-current welding electrode.

Oil Tank Sealing Compound

A ZINC chromate fuel and oil tank sealing compound has been developed by the Presstite Engineering Co., St. Louis, Mo., and is furnished in extruded form in various thicknesses and widths. The sealer is said to be highly adhesive to metal surfaces, even in the presence of liquid hydrocarbon, to have extreme resistance to drying and evaporation, and to be non-oxidizing and nonpolymerizing.

Reichhold Chemicals Awarded Treasury Flag

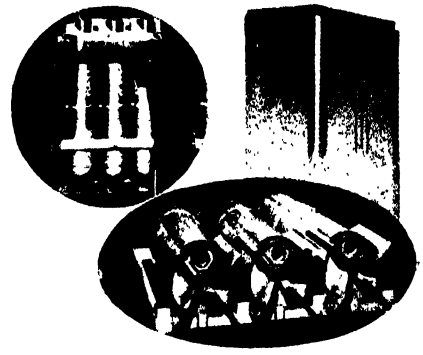
REICHHOLD CHEMICALS, INC., Ferndale, Detroit, has been awarded the Treasury Department certificate and flag which signify that over 90 per cent of its employees are buying United States war bonds through the company's pay roll savings plan.

Employees at two of the factories, Detroit and Elizabeth, N. J., are 100 per cent on the pay roll savings plan, and pay roll deductions for the purchase of war bonds amount to approximately 10 per cent of the company's monthly pay roll.

Conductivity Checkup

INCREASED wartime production coupled with a growing shortage of trained manpower is being met in large part by the electrical conductivity checkup of solutions, condensates, and processes. Industrial Instruments, Inc., 156 Culver Ave., Jersey City, N. J., has developed several electronic instruments which bring accuracy in the form of rugged instrumentation to the average factory worker.

Three Simultaneous Brazes



THE problem of brazing a 0.75-inch threaded flange into a completely closed 20-gauge sheet steel container was solved by the Induction Heating Corp., 389 Lafayette St., New York, N. Y. Inductors, energized from a Model 1070 thermonic induction generator, were placed directly over the flange and caused heating of the flange and a small area of the sheet steel container. With this process it was possible to perform three brazes simultaneously in 35 seconds. A preplaced ring of silver-alloy melted and flowed to form a perfect, air-tight joint.

WANTED

CHEMISTS AND CHEMICAL ENGINEERS

To Register in the Employment Clearing House

Time—September 6-11, 1942 ***Place—Buffalo, New York***

Open only to members and paid student affiliates of the American Chemical Society registered at the meeting. Request forms from the AMERICAN CHEMICAL SOCIETY, 1155-16th Street, N. W., Washington, D. C.

For further details, see CHEMICAL AND ENGINEERING NEWS, June 10, page 724.

EMPLOYMENT INFORMATION

RATES to be paid in advance. Standard setting 5c a word, minimum charge $3.00 each; include 8 words for box address. Exceptions see ⟶ Display, $10.00 per column inch. 2 inches maximum, larger units at regular display unit rates. No discounts or allowances.
SEND advertisements with remittance to INDUSTRIAL AND ENGINEERING CHEMISTRY, 332 West 42nd St., New York, N. Y., to reach there not later than 10:00 A.M. on the 10th and 25th, closing dates for editions of CHEMICAL and ENGINEERING NEWS of the 25th and 10th, respectively. Insertions made in order of receipt provided necessary remittances are complete.
EMPLOYERS are requested to mention in their announcements the section of the country in which the open position is located to ensure replies only from those who are geographically available.
In printing these advertisements the SOCIETY assumes no obligations as to qualifications of prospective employees or responsibility of employers.

UNEMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking employment for themselves are allowed in one calendar year 3 announcements free (one per issue) set in standard style and limited to 50 words each, including 8-word box address, and 3 additional standard announcements at 50% of regular rate. Further announcements and excess words at full rate.

EMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking new positions are permitted 3 standard announcements during the calendar year at 50% of the regular rate—include 8 words for box address.

EMPLOYERS seeking chemists and chemical engineers are permitted 3 standard announcements, not to exceed 50 words each including box address and not more than one per issue, during the calendar year without charge, provided they agree in writing to acknowledge all replies (excess words 5c each), otherwise full rate applies.

The AMERICAN CHEMICAL SOCIETY is vitally interested in the welfare of its members and in seeing that the chemical industry is manned with competent chemists and chemical engineers. These pages are part of our service in that connection. In addition most of the larger sections of the AMERICAN CHEMICAL SOCIETY and several of the smaller ones have active employment committees. Local section secretaries in your area will inform you as to any employment aids that may be available locally.

An Employment Clearinghouse is operated at each national meeting of the SOCIETY for the purpose of bringing together representatives of industry looking for chemists and members and student affiliates in attendance wishing to make such contacts. For further details, consult the preliminary and final programs as printed in the NEWS EDITION prior to each meeting.

In the New York area, special employment facilities are offered by the Employment Bureau of the Chemists' Club, 52 East 41st St., New York, N. Y. In the Chicago area, the Chicago Section maintains an employment service at 413 Stevens Hotel, Chicago, Ill.

Those replying to announcements should be careful to send copies and not original documents. Advertising circulars will not be forwarded and to that end all letters will be opened at the forwarding office.

SITUATIONS OPEN

Those announcements in which the letter "P" is part of the address key have paid in full and are not committed to acknowledge replies. The Society regards acknowledgment by employers of all applications as an act of common courtesy but can assume no responsibility for their failure to do so.

RUBBER CHEMIST, experienced in compounding rubber, wanted for research on sealing materials used for hermetic closures. Good opportunity for young, aggressive, well qualified chemist. Middlewestern location. In reply give full particulars of training and experience, draft status, and salary desired.
Box 50-T-5, Ind. & Eng. Chem., Easton, Pa.

PACIFIC COAST college has an instructorship or assistant professorship for a man with physical and analytical training. Ph.D. preferred.. Genuine interest in teaching, and in the aims of Christian education in a liberal arts college demanded. Give full details of training and experience, and state minimum acceptable salary.
Box 80-T-5, Ind. & Eng. Chem., Easton, Pa.

WANTED: Well trained young chemist, Ph.D., for work largely in analysis and standardisation of new drugs. Salary commensurate with qualifications. Give details of education, experience, references, etc.
Box 21-NP-6, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, draftsman, experienced in Ethyl Alcohol plant work, to assist in laying out plans and in erecting new plant. Later to continue in production supervision. Write full details and submit photograph.
Box 25-N-6, Ind. & Eng. Chem., Easton, Pa.

METALLURGICAL CHEMIST: Recent graduate or several years' experience in sheet steel fabrication and drawing. Company engaged in both vital defense and non-defense activity. Excellent opportunity to establish and develop production control and research. Eastern location.
Box 29-NP-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, either woman or draft-deferred man wanted for industrial fellowship in dairy products research in Eastern public research institution. Salary $2100 per year. Give age, education, experience, nationality, photograph and references.
Box 31-T-6, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST: Research Department heavy chemicals plant Detroit area. Draft exempt man or woman. Industrial experience or advanced degree preferred. Adaptability varied work; development new methods required. Mention training in specialized analytical techniques. Enclose photograph. Salary commensurate with qualifications.
Box 35-T-6, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST: Recent organic Ph.D., preferably with some background and interest in cellulose, papermaking or synthetic resins. Permanent opportunity with large chemical research laboratory for man with ability and initiative. Send photograph.
Box 40-T-6, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER INORGANIC FIBRE FIELD

A leading manufacturer in Eastern Pennsylvania has opening for Chemical Engineer, B.S., M.S. or Ph.D. 28 to 42 years of age with several years of research and development experience preferably in inorganic fibre field. Excellent salary.

Box 34-TP-6, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEERING instruction and research: new position; teaching includes Engineering Materials (chiefly Metallography) and other courses of interest; research on important defense problems as well as long-range attack on fundamentals. Reply with qualifications, personal data, and snapshot. A. P. Colburn, Professor of Chemical Engineering, University of Delaware, Newark, Delaware.

ASSISTANT and FELLOW in Chemical Engineering. Duties include assistance in laboratories and in special research projects; pay, $642 for 10 months; graduate work stressed include unit operations and plastics. Reply with qualifications, personal data, and snapshot. A. P. Colburn, Professor of Chemical Engineering, University of Delaware, Newark, Delaware.

RESEARCH CHEMIST. We have an opening in our research laboratories for an organic chemist of proven creative ability. A substantial salary will be paid to a man with the necessary qualities.
Box 46-TP-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST or CHEMICAL Engineer. Preferably with some industrial experience, for research and development in laboratory of midwest concern manufacturing feeds and other agricultural products. Farm background desirable but not essential. Salary determined by ability and experience. State qualifications fully.
Box 48-T-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, organic and analytical, wanted by well-known midwestern company engaged in manufacturing cosmetics and specialties, for routine control and research. Woman or draft deferred man under thirty-five to replace man entering service. Salary commensurate with ability and experience.
Box 53-T-6, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST. Excellent opportunity for a chemist who has had several years experience in actual formulation of thermosetting and thermoplastic resins for laminated products and also in paints and coatings. One having had experience with paper products preferred but not essential. Should be creative and capable of going ahead with assigned work. Correspondence held strictly confidential.
Box 75-TP-6, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST having had varied experience in thermosetting and thermoplastic resins. One familiar with synthetic lamination of sheets preferred. Creative work appreciated. Splendid opportunity. Correspondence confidential.
Box 76-T-6, Ind. & Eng. Chem., Easton, Pa.

ENGINEERS
FEMALE

Mechanical and Electrical Engineers needed by well known large manufacturer of radio and communication apparatus. Fine opportunity in established engineering group for qualified candidates. Openings in physical and electrical laboratories on technical and special engineering tests, work on filters, equalizers, amplifiers and test set designs requiring good knowledge of fundamental circuits and electronics; also planning for manufacture of product, analysis of parts, machine and tool facilities, and preparation of manufacturing layouts.

Require engineering graduates of high standing from accredited engineering colleges; also will consider outstanding candidates with A.B. Degree in mathematics and physics. Experience desirable but not necessary if recent graduate.

Write stating age, education, experience, place of birth, attach snapshot (not returnable). Box 681, Suite 1800, Times Building, New York.

WANTED: INORGANIC Chemist, M.Sc. required; and Physical Chemist, M.Sc. required, Ph.D. preferred. Rank and salary dependent upon qualifications. State full qualifications, and salary expected. Write G. C. Brous, Chairman, Department of Chemistry, Hofstra College, Hempstead, New York.

FELLOWSHIP AVAILABLE to organic-physical chemistry candidate for Ph.D., who is qualified to make physical measurements on products of the wet milling industry, as thesis requirement. Carry, 6 hrs. course work. Pay, $60.00 per month. Apply to Ed. F. Degering, Department of Chemistry, Purdue University, Lafayette, Indiana.

Technical Market Analyst

Well-established company is in need of a technically-trained man familiar with industrial products and their manufacture to make surveys and prepare reports on uses and markets for chemical products, metals and equipment for processing them. Send all information, including experience record, age, marital status, etc.

Box 90-T-6, Ind. & Eng. Chem., Easton, Pa.

RESEARCH DIRECTOR, Los Angeles independent commercial research laboratory. Ph.D. broad experience, training in biological chemistry particularly foods, nutrition and pharmaceuticals. Good character and personality essential. Married man or mature woman. Give training, experience, nationality, draft status, age and personal data, also recent photo.
Box 94-T-6, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEERS Positions open in defense industry. One opening for graduate chemical engineer with crystallization and evaporation experience; explosive or munition plant experience; preferred age limits 30 to 45. Three openings for graduate chemical, mechanical, or electrical engineers with plant experience; age limits 25 to 35. Two openings for junior graduates (2 years college) of chemical engineering or applied chemistry; age 20 to 25. Write us giving brief outline of education, experience, and salary acceptable. Enclose photo. Nebraska Defense Corporation, Nebraska Ordnance Plant, Mead, Nebraska.

(Continued on page 834)

Address communications to the box number indicated and Mail to Easton, Penna.

The American Chemical Society has no information concerning the position advertised, or in regard to those seeking employment.

(Situations Open Continued)

UNUSUAL IMMEDIATE opportunity for capable, energetic, recent Ph.D. in Organic Chemistry with keen interest in Pharmaceutical research. Opening chemical concern Metropolitan New York area. Give full particulars in first reply, including details academic training, industrial experience if any, salary expected and draft status.
Box 101-TP-6, Ind. & Eng. Chem., Easton, Pa.

Opportunity

WITH Manufacturing Chemists, in Eastern Penna. for wide awake Chemist with experience and new ideas for developing new products for textile and allied trades. State age, draft status, nationality, religion, experience, present employment, references.

Box 102-TP-6, Ind. & Eng. Chem., Easton, Pa.

DYESTUFF CHEMIST

An old established dyestuff manufacturing company wants a chemist with practical vat dye experience, especially vats used for Government Khaki. Do not apply unless you have practical vat experience. Reply should give full details and be held in strict confidence.

Box 103-TP-6, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(A.C.S. MEMBERS)

SPECIAL LIBRARIES ASSOCIATION will recommend trained chemical and technical men and women librarians at no cost to employer or member. Competent persons are now available. Write to the Executive Office, 31 East Tenth Street, New York, New York, for additional information.

CHEMIST PHARMACEUTICAL Organic, training in Pathology and Physiology. Graduate work 4 years, Research assistant 3 years, now operating own successful organic synthetic lab. 2 yrs. Wide experience in analysis, research, production, and sales. Honor societies, publications.
Box 26-T-5, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL RESEARCH, development position wanted by Ph.D., physical chemistry, 1941 Doctoral research in precision calorimetry. Publications. Year experience in plastics. Phi Beta Kappa, Sigma Xi. Age 25. Married. 3-A draft classification. Willing locate anywhere.
Box 54-T-5, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, Cornell, B.Chem. 1939, Ch.E. 1940, single 23. Two years' experience development work on organic chemicals, methanol, ammonia. Any location, available immediately. Defense work preferred; principally interested in process development, improvement of existing processes; production if defense industry.
Box 66-T-5, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, M.S. in Physics. Two years' production experience in chlorine, caustic, chlorinated hydrocarbons. One year in refinery pilot plant. Now analytical chemist in aircraft plant. Desires position where his abilities can be utilized fully. Married, Protestant. Middle West preferred but not essential.
Box 12-N-6, Ind. & Eng. Chem., Easton, Pa.

YOUNG CHEMICAL engineer, B.S.Ch.E. '42, desires position connected with defense. Part time and summer work in food, wax paper, and plastic coatings. Undergraduate thesis in petroleum research. High scholastic standing. Available June 2.
Box 17-N-6, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST, Ph.D. leading Midwest University. Major organic and minor physical chemistry. Held teaching fellowship four years, full time instructor in organic chemistry. One year at large midwest university. One year industrial research experience. Married, 28, Protestant, favorable draft status; member several scientific fraternities. Available on short notice.
Box 33-N-6, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST M.S. Michigan. Single, 41. Twelve years' experience in explosives, rubber, steel, chemicals, paper. One year government explosives inspector. Had charge of two laboratories. Eastern U.S.A. wanted but will consider other locations. Performed research on inorganic problem. Prefer war work.
Box 38-N-6, Ind. & Eng. Chem., Easton, Pa.

PHARMACEUTICAL PHYSICAL organic chemist, Ph.D., May 1942. Thorough undergraduate training in organic, inorganic, physical chemistry. Graduate work in pharmaceutical chemistry. Teaching assistant, graduate fellowships. Desires teaching or industrial research. Publications. Phi Beta Kappa, Sigma Xi. Age 25, single, draft deferred, available immediately.
Box 48-N-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S. 1942. Minnesota. Biochemistry major, organic chemistry and bacteriology minors. Has had intensified course in production and handling of explosives and interested in employment in this field. Personal qualifications and references of high quality. Single, Protestant, age 22. Temporary deferment 2-A. Read chemical German. Location immaterial.
Box 50-N-6, Ind. & Eng. Chem., Easton, Pa.

PRODUCTION CHEMICAL Engineer, experienced in directing manufacture of inorganic and organic chemicals. Development background. Familiar with process equipment, costs, maintenance, record keeping. Age 36.
Box 53-N-6, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST, Ph.D. Pharmaceutical, analytical, portland cement. Seven years' diversified experience in American Medical Association Chemical Laboratory; industrial experience in amino acids manufacture, as pharmaceutical control chemist, and in research in portland cement laboratory. Five years' university teaching. Minors, organic chemistry and physics. Married, dependents.
Box 56-N-6, Ind. & Eng. Chem., Easton, Pa.

PROFESSORSHIP, RESEARCH, director, woman, Sc.D. Johns Hopkins; M.S. Chicago. 14 years' teaching experience, biochemistry, organic, food, colloids, physical. 6 years as director. Excell in ability to create interest.
Box 10-T-6, Ind. & Eng. Chem., Easton, Pa.

PETROLEUM CHEMIST and Technologist, Ph.D. 1931, now employed, available reasonable notice. Age 40, married, two children. Ten years' experience mainly on lubricants; less on gas reactions and motor fuels. Publications. Prefer research and development work.
Box 15-T-6, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. Teaching and 3 years' industrial research and development experience (pharmaceuticals), desires permanent position in the East. Employed but available within reasonable notice.
Box 16-T-6, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, 5 yrs. extensive research experience on surface and colloid chemistry of pigment materials in addition to photochemical and solid-gas reaction investigations. M.S. degree, draft deferred, 28 yrs. old.
Box 17-T-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST B.S., M.S. Want research or analytical work. Three years' experience in Viscose Rayon production. Prefer cellulose industry. Age 37, married, 3A selective service classification.
Box 19-T-6, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. 1935, age 30, draft 3-A, desires research or development position. Five years' experience in synthetic resins and plastics. References. Location immaterial.
Box 21-T-6, Ind. & Eng. Chem., Easton, Pa.

INORGANIC CHEMIST, Ph.D. Interested in research, industrial or teaching position. Age 42. Married. Honor societies and publications. Over 20 years' college teaching experience, chiefly inorganic and analytical. Consulting, research, analytical and administrative experience. Immediately available.
Box 22-T-6, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Ph.D., 1939, Hormones. One year post-graduate fellowship, two years' research pharmaceutical specialties with small house, now employed. Desires research position with opportunity for increasing responsibility. Age 29, married, two children.
Box 23-T-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, Ph.D. Unusual varied and sound background. Research, new product development, productions. Now employed. Available on reasonable notice.
Box 24-T-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, BIOCHEMIST, M.A., Sc.D., assistant professor of biochemistry, now employed, wishes research, teaching, or responsible industrial position, reasonably permanent. 10 years of laboratory research and teaching in biochemistry, nutrition. 37 publications. Married, age 36. Status 3-A. Member four national professional societies.
Box 26-T-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST. Eight years' experience in food, water, fermentation especially brewing fields. Expert analyst. Know all phases of laboratory design and control. Draft deferred. Now employed, seeking more promising position.
Box 28-T-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, Ph.D. Ten years' experience in development and control in foods, drugs and cosmetics. Now in good institutional position with limited advancement prospect. Draft class 3-A. Salary minimum $4000-$6000 depending location.
Box 29-T-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, university graduate, twenty years excellent record in research, development, service and sales; publications, patents, sales and advertising literature, new products and new uses; desires active and responsible position; references from all employers; listed in American Men of Science; 3-A draft classification.
Box 30-T-6, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. June 1941. Age 28, American. At present engaged in industrial research work. Desires new research or development position, preferably in essential defense industry. References and personal history on request. Available July 1st.
Box 33-T-6, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, B.Ch., A.C.S., accredited university with undergraduate training in biochemistry, 5 years' experience in industrial catalytic cracking research. Patents. Supervisory experience in plant operation. Age 32, married, employed, draft 2A. Desires employment west of Mississippi, preferably in the Rocky Mountain States.
Box 36-T-6, Ind. & Eng. Chem., Easton, Pa.

Here is an ORGANIC CHEMIST, well trained in research, development, and general production, who desires a change to a position where his abilities could be more fully utilized! Has degrees in engineering and chemistry in addition to a very diversified experience of over a six year period. Can you offer this man an opportunity which would prove mutually beneficial?
Box 37-T-6, Ind. & Eng. Chem., Easton, Pa.

ASSISTANT PROFESSORSHIP in chemistry wanted by chemist, Ph.D., now holding responsible post in industry but who prefers teaching with chance for independent research. Experienced teacher. Well trained in organic, physical and analytical chemistry. Many publications and patents. Sigma Xi. Age 35, married.
Box 38-T-6, Ind. & Eng. Chem., Easton, Pa.

EXECUTIVE, CHEMIST, Engineer. Experienced research, process development, plant supervision, purchasing, patents. Desires position of laboratory or plant executive or technical assistant to general executive. Age 49 years. American Citizen. Married. Knowledge of French, German and Russian languages. Location immaterial. Presently employed. Prefers defense work.
Box 39-T-6, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, Ph.D., desires industrial research, or teaching in institution offering opportunity for research. Doctorate in electrochemistry, strong background in physics. Publication. Sigma Xi, Phi Lambda Upsilon. Now university research associate; available September. Age 28, married, dependents.
Box 41-T-6, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.A., 1941, A. C. S. accredited university. Employed for past year doing successful research and development for civilian concern. Desire change to research or production work for a defense industry. Location immaterial. Single, 24, draft 2-A.
Box 42-T-6, Ind. & Eng. Chem., Easton, Pa.

RESEARCH and DEVELOPMENT chemist with outstanding training and experience in producing, refining and every kind of treating of vegetable and animal oils and fats, and in all the industries based upon the use of oils. Reducing refining losses. Solving unusual problems.
Box 47-T-6, Ind. & Eng. Chem., Easton, Pa.

RECENT GRADUATE, B.S. Chemistry, Catholic university. Organic chemistry work preferred but will try anything. Not yet registered for army draft, available immediately for service in any part of the country, Washington, D. C., area preferred.
Box 49-T-6, Ind. & Eng. Chem., Easton, Pa.

RESEARCH or TEACHING position wanted by organic and physical chemist Ph.D. Extensive experience in research and teaching at prominent university (Ass't Professor) and research institutes teaching graduate courses and directing Ph.D. researches. Numerous publications in physical and organic chemistry. Research involves absorption and emission spectra, fluorescence, Raman spectra, polarography, optical activity, calorimetry, etc., and their application to organic and biological problems. Organic synthesis, qualitative and quantitative organic microanalysis. Administrative ability. First citizenship papers, age 42, married. Available September 1. Location immaterial.
Box 50-T-6, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER. Technical administrator. Top graduate, top school. 12 years' experience chemical engineering all phases, petroleum, ethyl alcohol. 7 years' as executive, technical administrator, manager above fields. Successful record of accomplishments. Good appearance. Best references. Available immediately. Age 33. Married.
Box 51-T-6, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, Ph.D. summer 1942. Research on overvoltage, minor theoretical physics, desires industrial research position. Available mid July. Single, 22. Belgian native, American citizen. French, German. Twice deferred in the draft. Sigma Xi. Phi Lambda Upsilon. Location immaterial.
Box 52-T-6, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 835)

(Situations Wanted Continued)

CHEMIST, M.S., one year industrial experience. Desires position in research, production, or development, preferably organic. Eastern location, particularly New Jersey, preferred. Age 27, single, draft deferred. Available immediately.
Box 56–T–6, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, PH.D. 1942. Leading midwestern university. Broad basic training in science. Excellent background in biology and physiological, organic, and analytical chemistry; also 5 years of research experience with plant pigments. Specialized courses in nutrition, vitamins, sterols, carotenoids, enzymes, and physiology of humans, plants and bacteria. Interested in biochemical research. Age 27, married, draft 3A. Sigma Xi, Gamma Alpha. Available immediately.
Box 57–T–6, Ind. & Eng. Chem., Easton, Pa.

TEACHER, PH.D. Well qualified in physical, analytical, inorganic and industrial chemistry, chemical microscopy, etc. Thirty years' experience, half teaching, half industrial research, consulting, testing. Many publications. Employed. Available summer or fall.
Box 58–T–6, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.S. Desires research position. Experience: development of pharmaceuticals, research on sterols, amino-acids, synthesis of phenols diazo-compounds. Familiar with organic micro-technique, microbiological work, pH control, electro-spectrophotometry. Draft deferred, dependency.
Box 61–T–6, Ind. & Eng. Chem., Easton, Pa.

SYNTHETIC ORGANIC Chemist B.A. chemistry, M.S. zoology, eastern university. 16 months' experience in analytical control (60% control, 40% research and development) in petroleum synthetics. Age, 24, responsible. Desires position preferably in production or research. Now employed.
Box 63–T–6, Ind. & Eng. Chem., Easton, Pa.

PHARMACEUTICAL CHEMIST, B.S., Columbia. Fellowship study at University of London. Doctorate in pharmaceutical chemistry. Excellent industrial and federal experience, 2½ years. Control, research, formulation, professional literature writing, laboratory direction. Knowledge production. Age 29. Sigma Xi. Publication. Now employed. Draft 2-B. Desire position having future with company contributing to war effort.
Box 64–T–6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, 29, Columbia graduate, 1937. Graduate organic medicinal chemistry in England. 1½ years' with pharmaceutical manufacturer. Year in U. S. government laboratory. Industrial experience in research, control, direction, professional writing. Knowledge unit processes in organic synthesis. Honor societies. Publication. Now employed. Draft deferred. Prefer responsible position in essential industry.
Box 65–T–6, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST: 30, married. Ten years' research, analytical, and plant experience chiefly in the manufacture of pharmaceuticals and aromatics. Desire employment as a defense worker at any nominal salary.
Box 77–T–6, Ind. & Eng. Chem., Easton, Pa.

RESEARCH, DEVELOPMENT and production chemist, M.S. degree, desires making change. Well versed in development, production and sales of special adhesives. 15 years' experience. Locality not essential.
Box 78–T–6, Ind. & Eng. Chem., Easton, Pa.

APPLIED RESEARCH. New trade products for 11 years; developed in food, biological and pharmaceutical laboratory investigations. Experimental process pilots for vitamins, hormones and amino acids also published scientific reports. By-product and food chemicals for market formulae. Control and sales requirements with clinical applications of infant food preparations Trained (M.S., Ph.D.) and experienced manager seeks active post associated with food institute or industry in New York area. Age 37. Family, 3-A, service waiver not granted.
Box 80–T–6, Ind. & Eng. Chem., Easton, Pa.

PETROLEUM CHEMIST. Broad experience in the development and manufacture of petroleum specialties, such as soluble cutting oils, metal soaps, sulfurised oils, and naphthenic acids.
Box 83–T–6, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER B.S. 4 years' experience in process development and survey. Desire similar position or giving technical assistance to production department. Primary consideration is to be of optimum value to the war effort and, therefore, would be willing to consider a temporary position in production. Location and conditions immaterial. Salary commensurate with responsibilities. Single. Now 2-B.
Box 85–T–6, Ind. & Eng. Chem., Easton, Pa.

INORGANIC CHEMIST, M.S. This summer available immediately. Research on boron compounds. Thorough knowledge of inorganic, organic and chemical engineering. Some experience. Location immaterial.
Box 87–T–6, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Ph.D. 1942. Excellent background in physiological chemistry, organic chemistry and physiology. Courses in toxicology, bioassays, spectroscopy and microanalysis. Research experience in fats, oils and fatty acids. Interested in organic or biochemical research. Age 27, single, draft 2A. Sigma Xi, Phi Lambda Upsilon.
Box 91–T–6, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.S. 1940, industrial experience with wide responsibilities. Desires position, preferably research, in organic field, with company contributing to war effort. Favorable draft classification. Age 24. Employed.
Box 95–T–6, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Ph.D. 1936, wishes teaching or research position in college or university. Graduate major, biochemistry; minors, general chemistry, bacteriology, physiology. B.S. degree in pharmacy. Five years teaching in medical school. Agr. Exp. Station experience. Publications on metabolism of minerals, and of amino acids, clinical chemistry. Married, age 31. Draft Class 3.
Box 99–T–6, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(NONMEMBERS)

CHEMICAL ENGINEER, eight years' experience in research, development, specification, applications of vinyl type resins and coatings. Interested in plastics and synthetic rubber. B.Ch.E., M.Sc., age 31, married, class 3-A, Protestant, employed non-defense.
Box 119–T–4, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, 25 years' experience, plant layout and operation, organic. Research, Coal coke, petroleum coke, toluol, naphthaline, tar acids, intermediates, dyes, dry colors, aniline oil, synthetic coatings, varnish, carbon black. Protestant. American.
Box 61–N–6, Ind. & Eng. Chem., Easton, Pa.

PHARMACEUTICAL CHEMIST, M.S. organic, research fluorene series. Two years' experience in small plant where responsibility for vitamin and hormone ampoule production, limited facilities demand skillful technique, rigid control; encourage familiarity with pertinent problems of research, processing and development not common to routine large-scale production. Twice deferred, present work nonetheless non-essential. Who needs such a man more than the army?
Box 11–T–6, Ind. & Eng. Chem., Easton Pa.

CHEMICAL ENGINEER, Ph.D., with 4 years' successful development experience in synthetic organic field and in cereal foods industry desires to contact organization requiring man with imagination and broad practical knowledge in addition to sound technical training, for either development or production work. Especially interested in synthetic rubber and petroleum fields. Tau Beta Pi, Sigma Xi, married, 3-A, now employed.
Box 12–T–6, Ind. & Eng. Chem., Easton, Pa.

PHARMACEUTICAL RESEARCH chemist, 10 years' experience in development work. Now successfully employed, but desires more responsible position with pharmaceutical or similar firm offering good future. Married, 2 children. American, Protestant, 34 years, 3-A draft rating.
Box 13–T–6, Ind. & Eng. Chem., Easton, Pa.

MECHANICAL ENGINEER. Five years' development work, large chemical company. Experience includes many types chemical plant equipment in corrosion resistant materials. Honor graduate leading Eastern university. Age 28, member A.S.M.E., married, draft class 3-A, U. S. citizen. Prefer location East of Rockies.
Box 25–T–6, Ind. & Eng. Chem., Easton, Pa.

FERMENTATION CHEMIST, B.S., 10 years' control labs., research and production; now in third year as production manager, 33, native, married, 3-A.
Box 27–T–6, Ind. & Eng. Chem., Easton, Pa.

PHYSICIST, Ph.D. Johns Hopkins 1941, Research experience: Electronoptics, X-rays, Physical chemistry. Considerable teaching experience with under-graduates and in defense courses. 4 years' in U. S. A., first citizenship papers. Draft deferred, dependency. Age 28. Sigma Xi. Preferred teaching position with research possibilities.
Box 43–T–6, Ind. & Eng. Chem., Easton, Pa.

DEVELOPMENT and RESEARCH chemist. B.S. Excellent training and experience. Ability to initiate and direct research. Four years' diversified experience on plastics, synthetic resins, organic chemicals and pigments. Draft deferred. Location immaterial. Available immediately.
Box 55–T–6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, M.S. 1941. Physical background, colloid and analytical experience. Desires position in Middle West. Industrial research or development, or academic position. Draft deferred, married. Available on short notice.
Box 62–T–6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, M.S. Experienced in organic and biochemical research, development, analysis, and supervision of plant operations. Will consider moderate salary if good opportunity. Good references. Citizen, deferred. Married Immediately available. Any location.
Box 66–T–6, Ind. & Eng. Chem., Easton, Pa.

ASPHALT TECHNICIAN, 29, B.S. (Ch.E.) 1935. Two years' production and three years' research on heavy oil products with major oil company. Nearly two years now doing research and development work on asphalt roofing, flooring, etc., with large building products firm. Desire change to midwest or south. 3-A, two children. Protestant.
Box 74–T–6, Ind. & Eng. Chem., Easton, Pa.

EXECUTIVE CHEMICAL engineer, B.E., with outstanding record in increasing production through administrative and technical improvements. Successful patent prosecutions. Member A.I.Ch.E. Position must be permanent. Age 34. Employed. 3-A draft.
Box 79–T–6, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, 12 years' experience in design, installation, operation synthetic organic chemical plants. Distillation, catalytic dehydrogenation, hydrogenation, development, process design, project engineering, including intimate knowledge of process for butadiene from alcohol. Desire permanent position in production, plant engineering, or design. Employed. Married. Draft 3-A.
Box 81–T–6, Ind. & Eng. Chem., Easton, Pa.

ANALYST SPECTROGRAPHIC: White, male, just completed 16 weeks ESMDT Spectroscopy course, U.S.C., no experience, married, 56, B.S. '09. Location immaterial for war industry. Salary your schedule.
Box 82–T–6, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST, over thirty years' experience developing modern Gutsert method, colloid chemistry of gelatine, dipyridyls, neonicotine (anabasine), nornicotine, nicotine bentonite, and now coordinated nicotine double salts—insecticides of the future—described in patents and publications. Student of Kastle, Stuglits, and Nef.
Box 84–T–6 Ind. & Eng. Chem., Easton, Pa.

B.A. MAJOR in Chemistry, University of Virginia 1942, seeks position in laboratory or plant. Eager to learn, readily adaptable. References. Available immediately.
Box 92–T–6, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER MIT 1939. Wants industrial chemical research or development. Prefer metropolitan New York area. 2-B Draft classification will consider college laboratory work with opportunity for further study. Salary unimportant.
Box 98–T–6, Ind. & Eng. Chem., Easton, Pa.

Synthetic Industrial Gloves

A NEW synthetic "7" rubberized fabric glove is announced by the Edmont Manufacturing Co., 552 Orange St., Coshocton, Ohio. These gloves, through actual work tests, have proved two to four times longer wearing than latex-coated gloves and more flexible than natural rubber and other synthetics. They are said to be highly resistant to oils, greases, solvents, acids, caustics, corrosives, and severe abrasives.

Flexible Coating

A COATING designed to meet insulation requirements of metals, wood, fabric, and compositions is known as Resiflex. This is manufactured by the David C. Brown Co., Detroit, Mich., and is said to be fire-resistant, waterproof, oilproof, resistant to mineral acids, and to have unusual flexibility.

Photoelectric Burglar Alarm

A LONG-RANGE photoelectric burglar alarm control has been developed by Photoswitch, Inc., 21 Chestnut St., Cambridge, Mass. The light source projects a practically invisible light beam for distances of 350 to 700 feet.

THE Wheelco Instrument Co., Chicago, Ill., has appointed the Pasol Engineering Co. as Iowa and Nebraska representative. Fitzgerald, Inc., Wichita, has been assigned the Kansas territory.

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FOR SALE at sacrifice: Food testing service laboratory, specializing in cereal products including flour milling and baking equipment, specialized instruments, apparatus, and chemicals, formulas, etc. Middle west. Opportunity for energetic chemical technologist.
Box 14-T-6, Ind. & Eng. Chem., Easton, Pa.

ABBE TYPE Refractometer Bausch and Lomb, complete, see E. H. Sargent No. 72035, as new. Used only twice, reasonable discount, immediate delivery.
Box 32-T-6, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Luminous pigments for Blackout and display, Ultra Violet lamp $18.00, Germanium, Gallium, Indium, Potassium, Tantalum, Thorium, Uranium, Zirconium metals and salts of same, also carbides of Tantalum, Titanium, Tungsten, Zirconium.
Box 60-T-6, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Subject to prior sale. Available immediate delivery. B & L Polarising microscope, Spencer Microphotographic Camera, Gaertner Spectrometer, B & L Camera Lucida, Dark Field Condensers, Vertical Illuminators, Comparison Microscope, Triple Objective Microscopes, Reichert Binocular Microscope, Zeiss Abbe Refractometer, Schmidt & Haensch Polarimeter, L & N Lummer, Brodhun Photometer, Dubosq Colorimeters, Filar Micrometer, Stage Micrometers. Spencer two objective Microscopes, etc. Write for any instruments not listed immediately. Quotations. The Laboratory Exchange, 24 E. 21st St., N. Y. C.

FOR SALE: Drying Ovens, new. Single wall standard laboratory gravity convection type ovens i.d. 12 × 12 × 10 with Thermostatic control accurate to 1 degree, temperature range to 140 c. Constructed with asbestos walls. Cast door and frame, sturdy, built. Available for immediate delivery. Write for immediate quotations. The Laboratory Exchange, 24 E. 21st Street, N. Y. C.

FOR SALE: Available for immediate delivery. International Centrifuges, Freas Drying Ovens, Incubators, Barnstead Water Stills, Hanovia Quartz Lamps, Vacuum Ovens, Horizontal Autoclaves, Bramhall & Deane and others, Analytical balances, Torsion Scales, Pulp and General Laboratory balances, De Laval Separators, Muffle Furnaces, Multiple Unit combustion furnace, Suter Tensile Strength testing machine, Jumbo Mullen Tester hand model, Three Heat Electric Hot Plates New, Large Mortars and Pestles 12" Unglazed, Porcelain, Ball Mills, Ross Disintegrating Mills 18" Cage, Watson-Stillma Hydraulic Press, Potentiometers, Pyrometers, Sayboldt Universal Viscosimeter, Rotary and Sliding Microtomes, Etc. Subject to prior sale. Write us for all laboratory equipment. We are constantly buying and are able to furnish additional offerings daily. The Laboratory Exchange, 24 E. 21st St., N. Y. C.

FOR SALE: Balances, Pulp enclosed types, specially priced at $27.50 while they last. We made a very timely purchase of these fine general laboratory balances. Fine Mahogany polished case with sliding front door, drawer, leveling screws, Pillar and Beam are laquered brass. Capacity 150 gr. sensitivity 1mg. All new (never used). Order as many as you wish, but hurry as they are moving very rapidly at the very low price of $27.50. No priority is required. These are all packed and ready for shipment immediately. The Laboratory Exchange, 24 E. 21st St., N. Y. C.

FOR SALE: Hot plates. Three heat electric hot plates heavy duty type, enclosed element, steel polished top 7" at $8.75 complete with three heat switch. Heater cord, 110 volts. 550 watts. Also available in 8 inch size 750 watts. 110 volts. at $10.75. Ready packed for immediate shipment. Quantity very limited. Order promptly. The Laboratory Exchange, 24 E. 21st St., N. Y. C.

FOR SALE: Hydraulic presses. New Labtest hydraulic presses 6 × 6 platens, Self contained hydraulic pump, Gauge, adjustable between Plattens, with or without electric hot plates, 10 ton capacity, heavy cast steel construction, precision craftsmanship. Specially priced for immediate delivery. Write for literature. The Laboratory Exchange, 24 E. 21st St., N. Y. C.

WANTED: Volumes 28-37 incl. (1924-33) of Journal of Physical Chemistry. Please state condition and price and whether bound or unbound.
Box 18-T-6, Ind. & Eng. Chem., Easton, Pa.

WANTED: "Farbenchemie" by Fiers David & Blangey, 4th edition 1938; "Dyeing with coaltar dyestuffs" by Whittaker & Wilcock, 3rd edition 1938; "The synthetic dyestuffs & intermediate products" by Thorpe & Cain, 7th edition.
Box 20-T-6, Ind. & Eng. Chem., Easton, Pa.

WANTED: LARGE tonnage residues or other raw materials from which values can be recovered in our completely equipped plant. Give analysis containing Caesium, Scandium or Rhenium.
Box 59-T-6, Ind. & Eng. Chem., Easton, Pa.

WANTED TO BUY: Attention: We have immediate need for practically every type apparatus used in a laboratory. We are buying almost all equipment offered us. Sell us your surplus equipment you no longer need. We are paying the maximum market price. Take inventory now and offer us the equipment that you do not use. One or a thousand complete laboratories or plants which may include other equipment. Most critically needed to fill orders to firms now doing war work, Polariscopes, Microscopes, Wide Field Stereo Microscopes, Binocular type Microscopes, Photomicrographic equipment, cameras, Abbe Refractometers, Metallurgical testing equipment, Balances, Lenses, cameras, platinumware and hundreds of others too numerous to mention. We are interested in sincere offerings only do not write unless you are ready to sell immediately. The Laboratory Exchange, 24 E. 21st St., N. Y. C.

WANTED: CHEMICAL Abstracts: Vol. I (1907) Nos. 12, 16, paying $5.-each; Nos. 2, 5, 8, 9, 13, 14, 15, Index number, paying $3.-each; Vol. 2 (1908) Nos. 1, 2, 4, 15, 17, 18, 19, paying $2.50 each; Vol. 3 (1909) Index number only, paying $4.-American Electrochemical Society, Transactions: Vols. 1-80 complete or parts.
Dr. G. H. Fransius, 201 East 82nd Street, New York, N. Y.

WANTED—ALL pieces of equipment necessary for organic research laboratory in pharmaceuticals. If you wish to sell all or part of organic laboratory not in operation write to C. M. Bundy Co., 819-821 High St., Indianapolis, Indiana.

WANTED—COMPLETE set of Chemical Abstracts covering period from 1925 to present—bound or unbound. Would consider 1930 to present if period 1925 to 1930 unavailable.
Box 97-T-6, Ind. & Eng. Chem., Easton, Pa.

WANTED—ONE used Beckman Portable PH Meter, Industrial Model or equivalent. Advise price, condition, availability, etc.
Box 100-T-6, Ind. & Eng. Chem., Easton, Pa.

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CHEMICAL AND ENGINEERING NEWS

HARRISON E. HOWE, Editor

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EW 16. IBR

War Service of Chemists and Chemical Engineers

Procedure for Deferment

THE intent of the law regarding the selective service of technically trained men has been made plain in many official circulars put out by the National Headquarters of the Selective Service System. Selective Service Memoranda (I-62) and (I-347), the former reprinted in CHEMICAL AND ENGINEERING NEWS, page 520, May 10, 1941, and the latter on page 110, January 25, 1942, point out definitely that there is a critical scarcity of chemists and chemical engineers, as well as of certain other technically trained men. This has been strongly re-emphasized in Occupational Bulletin (No. 10) reprinted in full below. It is the result of very careful study by Selective Service Headquarters and is now officially released over General Hershey's signature. This bulletin should be brought to the attention of local boards. If its recommendations are followed by the local boards, the large number of appeals now necessary to secure proper allocation will be avoided, and the heavy burden of correspondence on the Secretary's office will be lessened.

It is believed that these documents, copies of which will be sent on written or telegraphed demand to the A. C. S. Secretary's office, should impress local boards with the importance of the situation and direct their attention to the advice of Selective Service. Local boards receive so many documents that some are likely to be misfiled and forgotten. Many mistakes have been made, but I have yet to find a local board that does not wish to do its full duty; therefore, necessary information about the situation and the recommendations of Selective Service should be clearly outlined to each board.

In addition to Occupational Bulletin (No. 10) the attention of the local board should be drawn to directives which have been issued outlining the duties of local boards as to reopening questions of deferment where information was lacking. These are given in Amendment No. 60 to Selective Service Regulations, Volume III, Section XXX, Paragraphs 385 and 386, reprinted below.

If appeal must be taken—it should be taken in the case of any properly qualified chemist or chemical engineer necessary to the war effort—the method for doing so is outlined in Memorandum to All State Directors (I-398), Local Board Release (108), also reprinted below.

It is anticipated that a new memorandum applying specifically to the deferment of teachers in our colleges and universities, particularly those teaching technical subjects, shortly will.

CHARLES L. PARSONS, *Secretary*

Occupational Bulletin (No. 10)—Scientific and Specialized Personnel[1]

Part I

1. There are certain persons trained, qualified, or skilled in scientific and specialized fields who, if engaged in the practice of their respective professions, are in a position to perform a vital service in activities necessary to war production and in activities essential to the support of the war effort.

Part II

1. The National Roster of Scientific and Specialized Personnel has certified to the Director of Selective Service that in activities necessary to war production and in activities essential to the support of the war effort, there are certain "critical occupations" which for the proper discharge of the duties involved require a high degree of training, qualification, or skill in scientific and specialized fields. The critical occupations in these scientific and specialized fields, as certified to the Director of Selective Service, are listed on page 4 attached to this bulletin.

2. All of these critical occupations, as listed, require highly specialized periods of training of two years or more. The critical occupations listed on page 4 exist within the provisions of Part V, Memorandum to All State Directors (I-405).

Part III

1. The National Roster of Scientific and Specialized Personnel has certified to the Director of Selective Service that there are serious shortages of persons trained, qualified, or skilled to engage in these critical occupations in activities necessary to war production and in activities essential to the support of the war effort. These shortages exist within the provisions of Part VII, Memorandum to All State Directors (I-405), and accordingly careful consideration for occupational classification should be given to all persons trained, qualified, or skilled in these critical occupations and who are engaged in

[1] Effective June 18, 1942. Distributed to state directors, board of appeal members, local board members, and government appeal agents.

Data Published on Selective Service

BECAUSE of the wide interest in this subject and the need for obtaining trained men for our Production Army, we give below references to information we have published on occupational deferments, including those of men in training. Future developments will be brought to the attention of our readers.

Chemical and Engineering News

(NEWS EDITION previous to 1942)

Vol. 18 (1940), pages 890, 1127
Vol. 19 (1941), pages 129, 311, 457, 459, 489, 520, 587, 681, 797, 1164, 1412, 1464
Vol. 20 (1942), pages 110, 157, 472, 579–80, 788, 812
Current issue 837–39.

Industrial and Engineering Chemistry

Vol. 33 (1941), pages 1, 135, 283, 561
Vol. 34 (1942), pages 2, 131, 259, 648

activities necessary to war production or essential to the support of the war effort.

Part IV

1. There are many registrants who are in training and preparation to acquire the qualification or skill to engage in these critical occupations. Normally the period of training and preparation to acquire the necessary qualification or skill in these scientific and specialized fields extends over a period of four academic years in a recognized academic, professional, or technical college or university. In many instances, however, it is necessary for persons to have additional study in a recognized academic, professional, or technical college or university in order to acquire the more highly specialized qualification or skill necessary for the performance of particular services in activities necessary to war production or essential to the support of the war effort. Persons engaging in further studies in addition to the four academic years normally required are referred to as graduate or postgraduate students.

2. A registrant who is in training and preparation for one of these scientific and specialized fields may not be considered for occupational classification until the close, or approximately the close, of his second or sophomore year in a recognized college or university.

3 A registrant who is in training and preparation for one of these scientific and specialized fields may be considered for occupational deferment at the close, or approximately at the close, of his second or sophomore year in a recognized college or university if he is pursuing a course of study upon the successful completion of which he will have acquired the necessary training, qualification, or skill, and if he gives promise of continuing and will be acceptable for continuing such course of study and will undertake actual further classroom work within a period of not to exceed four months from the close of his second year.

4. A registrant who is in training and preparation for one of these scientific and specialized fields shall be considered for occupational classification during his third and fourth years in a recognized college or university, provided that he gives promise of the successful completion of such course of study and the acquiring of the necessary degree of training, qualification, or skill.

5. A graduate or postgraduate student who is undertaking further studies for these scientific and specialized fields, following the completion of the normal four academic years, may be considered for occupational classification if, in addition to pursuing the additional studies, he is also acting as "graduate assistant" in a recognized college or university or is engaged in scientific research related to the war effort and which is supervised by a recognized federal agency. A graduate assistant is a student in postgraduate studies who, in addition, is engaged in the teaching and instruction of undergraduate students in these scientific and specialized fields.

6. When a registrant has completed his training and preparation in a recognized college or university and has acquired a high degree of training, qualification, or skill in one of these scientific and specialized fields, such registrant should then be given the opportunity to become engaged in the practice of his profession in an activity necessary to war production or essential to the support of the war effort. In many instances following graduation from a recognized college or university, a certain period of time will be required in the placing of trained, qualified, or skilled personnel in an essential activity. When a registrant has been deferred as a necessary man in order to complete his training and preparation, it is only logical that his deferment should continue until he has an opportunity to use his scientific and specialized training to the best interest of the Nation. Accordingly, following graduation from a recognized college or university in any of these scientific and specialized fields, a registrant should be considered for further occupational classification for a period of not to exceed 60 days in order that he may have an opportunity to engage in a critical occupation in an activity necessary to war production or essential to the support of the war effort, provided that during such period the registrant is making an honest and diligent effort to become so engaged.

LEWIS B. HERSHEY, *Director*

Critical Occupations

Accountants
Chemists
Economists
Engineers:
- Aeronautical engineers
- Automotive engineers
- Chemical engineers
- Civil engineers
- Electrical engineers
- Heating, ventilating, refrigerating, and air-conditioning engineers
- Marine engineers
- Mechanical engineers
- Mining and metallurgical engineers, including mineral technologists
- Radio engineers
- Safety engineers
- Transportation engineers—air, highway, railroad, water

Geophysicists
Industrial managers
Mathematicians
Meteorologists
Naval architects
Personnel administrators
Physicists, including astronomers
Psychologists
Statisticians

Amendments to Regulations[1]

Amendment No. 60, effective June 5, 1941, amends Volume III, Section XXX to read:

Section XXX—Reopening Classification

385. CLASSIFICATION NOT PERMANENT.

a. No classification is permanent. At any time prior to induction the case of a registrant may be reopened and his classification considered anew in the manner provided in this section.

b. Each classified registrant shall, within *10* days after it occurs, and any other person should, within *10* days after knowledge thereof, report to the local board in writing any fact that might result in such registrant being placed in a different classification.

c. The local board shall keep informed of the status of classified registrants. Registrants may be questioned or physically or mentally re-examined; employers may be required to furnish information; police officials or other agencies may be requested to make investigations; and other steps may be taken by the local board to keep currently informed concerning the status of classified registrants.

386. HOW CASE REOPENED.

a. The local board may reopen the case of a registrant on its own motion; except that, without evidence of change in registrant's status or of other new pertinent facts not contained in the record considered on appeal, no case shall be reopened in which the existing classification was determined on appeal.

b. A registrant, any person who claims to be a dependent of a registrant, or any interested party in a case involving occupational deferment, may file a request to

[1] Memorandum to All State Directors (I-137).

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reopen a case. The request must contain or be accompanied by written statements showing a change in the registrant's status or other new pertinent facts not considered in determining his existing classification.

* * * * *

Notice to Employer of Right to Appeal, DSS Form 59 (III)[1]

National Headquarters has continually called attention to the necessity that local boards give full consideration to requests for the occupational deferment of men claimed to be necessary in war production, agriculture, or other essential civilian activities.

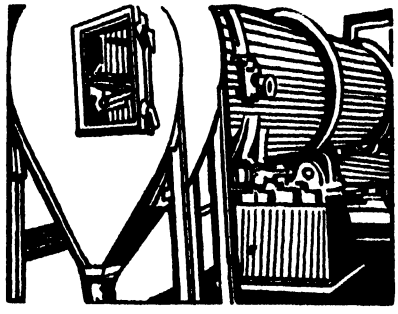
It should be observed that occupational deferments are made in the national interest and not for the convenience of the registrant.

There have been and are now a large number of cases in which the right to appeal on occupational grounds has been overlooked. To expedite final determination of occupational deferment cases and to eliminate the possibility of erroneous classification in such cases, through failure to take advantage of procedural rights, a new procedure has been established. It is directed that when a local board denies a request for Class II-A or Class II-B deferment in a case where there is on file Affidavit to Support Claim for Occupational Deferment, DSS Form 42A, the local board shall no longer send to any person who has signed Form 42A a Notice of Classification, DSS Form 57, but shall send a Notice to Employer of Right to Appeal, DSS Form 59.

Local boards are further directed to give particular attention to cases where neither Form 42 nor 42A has been filed but in which the Selective Service Questionnaire, DSS Form 40, indicates that occupational deferment should be considered. Efforts should be made by the local board to contact those persons who would be likely to provide additional information or affidavits which will assist the local board in determining the proper classification of the registrant.

LEWIS B. HERSHEY, *Director*

[1] Memorandum to All State Directors (I-398); Local Board Release (108); effective March 9, 1942.



American Chemical Society

Progress Report No. 6 of the Committee on the Professional Training of Chemists

THE most recent meeting of the committee, April 16 to 20, 1942, was immediately previous to and during the Memphis meeting of the AMERICAN CHEMICAL SOCIETY.

Students who receive the bachelor's degree from institutions in the appended list after fulfilling the minimum requirements adopted by the AMERICAN CHEMICAL SOCIETY for the professional training of chemists become eligible for full membership in the AMERICAN CHEMICAL SOCIETY following graduation and two years' experience in the field of chemistry or chemical engineering or in postgraduate study. Students who graduate in chemistry or chemical engineering from other colleges will be eligible only after five years. In each institution listed, the head of the Department of Chemistry will be asked after each graduation period to give the Committee on the Professional Training of Chemists the names of those students who have fulfilled the specified requirements and who will thus, in the minimum time, qualify professionally for full membership in the AMERICAN CHEMICAL SOCIETY. Students majoring in chemistry or chemical engineering and graduates without the experience requisite for full membership may join the SOCIETY as junior members with all privileges of membership except that of holding office. They thus gain seniority in the SOCIETY and are automatically transferred to full professional status on acquiring the necessary experience.

Only a small number out of several hundred institutions have yet to be given formal consideration. For several others action has been deferred, either because the committee wishes to obtain further information or because of pending changes which may alter situations within certain institutions.

It should be emphasized that the institutions on the list will be reviewed from time to time and their fitness to retain recognition examined. Any institution for which an unfavorable action has been given may, after an interval of two years following the date of notification of such action, request a review of its situation by the committee. The committee may drop an institution from the approved list (1) if it does not graduate each year at least one student who meets the requirements for attaining membership in the SOCIETY in the minimum time; (2) if changes in department's curriculum or institution's general educational policy tend to be contrary to the best interests of fundamental chemical training; (3) if the attitude and spirit of the department do not show or manifest a definite professional point of view toward student training; (4) if departmental facilities are not kept up and maintained to an adequate standard; or (5) if quality of staff is not maintained when changes occur.

The committee recognizes that one of the most important factors in assessing the quality of work in an institution is concerned with the personnel of the staff. It is felt that the staff should be adequately trained and properly qualified to teach chemistry with its latest developments. Institutions which meet merely formal requirements without at the same time having the proper personnel can scarcely be considered to do high quality work.

The committee realizes that many institutions have a very high type of instruction in the elementary chemistry courses but, either through lack of funds or insufficient size of staff, are unable to give the necessary advanced work of the bachelor's degree level or are unable to give it adequately for the professional training of chemists. The committee feels strongly that this type of institution serves a very useful purpose in the American scheme of education but that it would be unwise for such institutions to attempt professional training in the sense that the committee uses that phrase. Graduate schools and employers of chemists will continue to recognize that high quality men soundly trained in the elementary principles of chemistry may be obtained from these institutions, and it should be understood that no stigma is attached to their omission from the list of institutions the committee deems to be qualified to offer professional training for chemists.

Agricultural and Mechanical College of Texas, College Station, Tex.
Allegheny College, Meadville, Penna.
Amherst College, Amherst, Mass.
Armour College of Engineering of Illinois Institute of Technology, Chicago, Ill.
Brigham Young University, Provo, Utah.
Brooklyn Polytechnic Institute, Brooklyn, N. Y.
Brown University, Providence, R. I.
Bryn Mawr College, Bryn Mawr, Penna.
Bucknell University, Lewisburg, Penna.
California Institute of Technology, Pasadena, Calif.
Carnegie Institute of Technology, Pittsburgh, Penna.
Case School of Applied Science, Cleveland, Ohio.
Catholic University of America, Washington, D. C.
City College, College of the City of New York, New York, N. Y.

Columbia University, New York, N. Y.
Cornell University, Ithaca, N. Y.
Dartmouth College, Hanover, N. H.
DePauw University, Greencastle, Ind.
Drexel Institute of Technology, Philadelphia, Penna.
Duke University, Durham, N. C.
Emory University, Emory University, Ga.
Fordham University, New York, N. Y.
Harvard University, Cambridge, Mass.
Haverford College, Haverford, Penna.
Howard University, Washington, D. C.
Iowa State College, Ames, Iowa.
Johns Hopkins University, Baltimore, Md.
Juniata College, Huntingdon, Penna.
Kansas State College, Manhattan, Kans.
Lafayette College, Easton, Penna.
Lawrence College, Appleton, Wis.
Lehigh University, Bethlehem, Penna.
Louisiana State University, University, La.
Massachusetts Institute of Technology, Cambridge, Mass.
Massachusetts State College, Amherst, Mass.
Miami University, Oxford, Ohio.
Michigan College of Mining and Technology, Houghton, Mich.
Mississippi State College, State College, Miss.
Missouri School of Mines, Rolla, Mo.
Montana State College, Bozeman, Mont.
Mount Holyoke College, South Hadley, Mass.
New York University (University Heights and Washington Square College), New York, N. Y.
Newcomb Memorial College, H. Sophie, New Orleans, La.
Northeastern University, Boston, Mass.
Northwestern University, Evanston, Ill.
Oberlin College, Oberlin, Ohio.
Ohio State University, Columbus, Ohio.
Oklahoma Agricultural and Mechanical College, Stillwater, Okla.
Oregon State College, Corvallis, Ore.
Pennsylvania State College, State College, Penna.
Pomona College, Claremont, Calif.
Princeton University, Princeton, N. J.
Purdue University, Lafayette, Ind.
Reed College, Portland, Ore.
Rensselaer Polytechnic Institute, Troy, N. Y.
Rice Institute, Houston, Tex.
St. Louis University, St. Louis, Mo.
Stanford University, Stanford University, Calif.
State College of Washington, Pullman, Wash.
State University of Iowa, Iowa City, Iowa.
Swarthmore College, Swarthmore, Penna.
Syracuse University, Syracuse, N. Y.
Trinity College, Hartford, Conn.
Tufts College, Medford, Mass.
Tulane University, New Orleans, La.
Union College, Schenectady, N. Y.
University of Akron, Akron, Ohio.
University of Arizona, Tucson, Ariz.
University of Arkansas, Fayetteville, Ark.
University of Buffalo, Buffalo, N. Y.
University of California, Berkeley, Calif.
University of California, Los Angeles, Calif.
University of Chicago, Chicago, Ill.
University of Cincinnati, Cincinnati, Ohio.
University of Colorado, Boulder, Colo.
University of Delaware, Newark, Del.
University of Denver, Denver, Colo.
University of Detroit, Detroit, Mich.
University of Florida, Gainesville, Fla.
University of Idaho, Moscow, Idaho.
University of Illinois, Urbana, Ill.
University of Kansas, Lawrence, Kans.
University of Maine, Orono, Maine.
University of Maryland, College Park, Md.
University of Michigan, Ann Arbor, Mich.
University of Minnesota, Minneapolis, Minn.
University of Missouri, Columbia, Mo.
University of Nebraska, Lincoln, Nebr.
University of Nevada, Reno, Nev.
University of New Hampshire, Durham, N. H.
University of North Carolina, Chapel Hill, N. C.
University of Notre Dame, Notre Dame, Ind.
University of Pennsylvania, Philadelphia, Penna.
University of Pittsburgh, Pittsburgh, Penna.
University of Rochester, Rochester, N. Y.
University of the South, Sewanee, Tenn.
University of South Dakota, Vermillion, S. Dak.
University of Southern California, Los Angeles, Calif.
University of Tennessee, Knoxville, Tenn.
University of Texas, Austin, Tex.
University of Utah, Salt Lake City, Utah.
University of Vermont, Burlington, Vt.
University of Virginia, Charlottesville, Va.
University of Washington, Seattle, Wash.
University of Wichita, Wichita, Kans.
University of Wisconsin, Madison, Wis.
Vanderbilt University, Nashville, Tenn.
Vassar College, Poughkeepsie, N. Y.
Villanova College, Villanova, Penna.
Virginia Polytechnic Institute, Blacksburg, Va.
Wabash College, Crawfordsville, Ind.
Washington University, St. Louis, Mo.
Washington and Lee University, Lexington, Va.
Wayne University, Detroit, Mich.
Wesleyan University, Middletown, Conn.
West Virginia University, Morgantown, W. Va.
Western Reserve University, Cleveland, Ohio.
Williams College, Williamstown, Mass.
Worcester Polytechnic Institute, Worcester, Mass.
Yale University, New Haven, Conn.

The Council Policy Committee recommended the following motion to the Council at the Detroit meeting, September 1940, and it was unanimously passed:

Moved, that the AMERICAN CHEMICAL SOCIETY accredit for chemical engineering instruction those institutions as and when accredited by the American Institute of Chemical Engineers.

In accordance with this action, the list of institutions whose chemical engineering curricula are approved by the American Institute of Chemical Engineers as of October 30, 1941, follows:

Brooklyn Polytechnic Institute (day and eight-year evening), Brooklyn, N. Y.
California Institute of Technology (five-year course), Pasadena, Calif.
Carnegie Institute of Technology, Pittsburgh, Penna.
Case School of Applied Science, Cleveland, Ohio.
Clarkson College of Technology, Potsdam, N. Y.
Columbia University, New York, N. Y.
Cooper Union (day school), New York, N. Y.
Cornell University, Ithaca, N. Y.
Drexel Institute, Philadelphia, Penna.
Georgia School of Technology (including co-operative curriculum), Atlanta, Ga.
Illinois Institute of Technology (Armour College of Engineering), Chicago, Ill.
Iowa State College, Ames, Iowa.
Johns Hopkins University, Baltimore, Md.
Lehigh University, Bethlehem, Penna.
Louisiana State University, University, La.
Massachusetts Institute of Technology, Cambridge, Mass.
New York University (day and seven-year evening), New York, N. Y.
Ohio State University, Columbus, Ohio.
Pennsylvania State College, State College, Penna.
Princeton University, Princeton, N. J.
Purdue University, Lafayette, Ind.
Rensselaer Polytechnic Institute, Troy, N. Y.
Rice Institute, Houston, Tex.
State University of Iowa, Iowa City, Iowa.
Syracuse University, Syracuse, N. Y.
University of Cincinnati, Cincinnati, Ohio.
University of Delaware, Newark, Del.
University of Detroit, Detroit, Mich.
University of Illinois, Urbana, Ill.
University of Louisville, Louisville, Ky.
University of Michigan, Ann Arbor, Mich.
University of Minnesota, Minneapolis, Minn.
University of Missouri, Columbia, Mo.
University of North Dakota, University, N. Dak.
University of Oklahoma, Norman, Okla.
University of Pennsylvania, Philadelphia, Penna.
University of Pittsburgh, Pittsburgh, Penna.
University of Rochester, Rochester, N. Y.
University of Tennessee, Knoxville, Tenn.
University of Washington, Seattle, Wash.
University of Wisconsin, Madison, Wis.
Virginia Polytechnic Institute, Blacksburg, Va.
Yale University, New Haven, Conn.

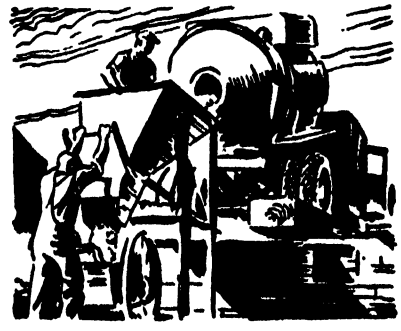
A. W. HIXSON
S. C. LIND
H. B. WEISER
W. G. YOUNG
W. A. NOYES, JR., *Chairman*
E. M. BILLINGS, *Secretary*

June 19, 1942

Western Reserve Reorganizes Chemistry Department

WESTERN Reserve University announces a new organization of the Department of Chemistry. The new plan is intended to distribute the duties of administration so as to interfere as little as possible with the researches of the men in charge of the department.

Harold Simmons Booth, professor of chemistry, has been appointed chairman of the department. Frank Hovorka, formerly associate professor, has been promoted to a professorship and made director of university chemistry laboratories. Herman Peter Lankelma, formerly associate professor, becomes professor of chemistry and secretary of the department, and Robert E. Burk, professor of chemistry, has been assigned to the responsibility of special departmental projects. Oliver Grummitt, instructor in chemistry, has been promoted to assistant professor. Two new members appointed to the staff are William Kieffer, who received his Ph.D. degree from Brown University, and has been for the last two years instructor in chemistry at Wooster College, and Terrell Hill from the University of California.



SKINNER & SHERMAN, INC.

Buffalo Makes the Tools for the Chemist

EMIL RAYMOND RIEGEL

Edmund Hayes Hall, University of Buffalo, Buffalo, N. Y.

MANY events and many objects have spread the name of Buffalo to all parts of the land; to the world as a whole, Buffalo means the home town of Grover Cleveland, the place where William McKinley was killed. Before those days, it meant the place (one might say village and be quite truthful) where the Erie Canal took its water from the Great Lakes in order to carry it to the Hudson and thence to the sea. Buffalo, to still other people, means the birthplace of Katherine Cornell.

To the chemist and his twin the chemical engineer, "Buffalo" means fans, pumps, blowers, made by the Buffalo Forge Co. and its subsidiaries; "Buflovak" means vacuum equipment made by the Buffalo Foundry and Machine Co., heat exchangers, and many other forms of equipment for his manufacturing plants. Other names distinct from that of the city have also carried its fame to faraway points in the form of labels and plates on equipment for the factory—"Zaremba" for evaporators, "Dopp" for kettle, "Niagara" for blowers, again "Niagara" for water meters, "Consolidated" for packing machinery, "Ross" for heaters, meaning exchangers, "Spencer" for optical instruments of all kinds and of high grade, "Globe" or "Hewitt" for belting, "Richmond" for sifters, the clever "Wilson" feeders, dust collectors, porcelain insulators—and these do not make a complete list. All have contributed to make Buffalo a synonym for chemical equipment.

The Buffalo Foundry and Machine Co. was a logical development of the city's primary industry, that of making iron and steel, and that, in turn, was due from the earliest days to its strength as a transportation center. Water transport, and soon after, rail transport, made possible the rapid growth of its iron furnaces. Foundries are numerous in the area. Many of them, such as J. H. Williams, and Vulcan, stand high in the mechanical world with their cut gears and other machined products.

The Buffalo Foundry Co. was started in 1902, and moved to its present location on February 3, 1903. The founder was Henry T. Miles, who is still the president and leader. Associated with him in the earliest period were Mr. Dunbar and Mr. Sullivan. The basic business was and still is foundry and machine-shop jobbing, but from its beginning the company built dryers, soon caustic pots and other pieces which were larger and larger, so that by 1911 a new machine shop had to be built, and again expanded in 1930. To indicate the large-sized equipment which is handled, it may be stated, for example, that the present shop has a 25-foot boring mill, and a 90-foot milling machine.

In order to build a large boring or milling machine, a large casting is necessary, and it is the pouring of these pieces, weighing as much as 115 tons, which has become one of the specialties of the firm. Recently there have been produced for a war plant the castings necessary for a 90-foot lathe.

During the war of 1914–18, the Buffalo Foundry and Machine Co. really got into chemical engineering. War equipment for nitrations, sulfonations, distillation of organic substances useful in the making of explosives, aniline stills, and many other articles were required. At the present time the plant is again doing much war work along its own specialty lines. The plant is under the supervision of police, and a visitor must obtain a pass and exchange it for a large badge with the police officer in charge before he can enter the foundry and shops.

Mr. Miles continues as the active head, but has transferred some of his duties to Charles W. Pearson, executive vice president. Known to many chemical engineers and chemists in New York City as well as in Buffalo is the vice president in charge of all engineering work, Guy Harcourt. Other men with many friends in the profession are Martin Kermer, chief engineer in charge of evaporators, Dirk J. Van Marle, chief chemical engineer in charge of dryer production, and Lambert J. Wischerath, advertising manager. The Buffalo Foundry has another distinction in its extensive and excellent research laboratory which houses, among other apparatus, a fractionating still on which any quantity of interest to chemical engineers can be measured. The laboratory is in charge of Mr. Lavett.

The several lines of business to which this firm's work means strong support are:

Drying and evaporation of foods, including baby foods, for which stainless steel evaporators, mainly double effect, are used.

The dairy industry for which, not so long ago, a two-stage drum dryer was adapted for the drying of whey. This difficult operation is performed in two separate stages, and succeeds so well that a dry, nonhygroscopic product results. The evaporators deliver 40 per cent liquor to the upper drum which drops a 70 per cent liquor to the lower drum where the liquor is seeded, and the crystals dried.

Electrolytic caustic evaporators.

Kettles of all kinds for chemical companies.

Atmospheric dryers and vacuum dryers, one of the latter for drying tannic acid recently. The latest development is a double drum vacuum dryer.

All this is in addition to the general foundry and machine-shop jobbing business mentioned before. Little wonder that the original 6 acres had to be augmented to the present 18. The plant is on the New York Central Belt Line, and has a siding run into its machine shop and into the foundry.

The Buffalo Foundry and Machine Co. sent a large exhibit to the Chemical Show of 1917 at the Grand Central Palace in New York, which caused many favorable comments. It has been an exhibitor ever since.

The Buffalo Forge Co. had its start in 1878, when William F. Wendt, an enterprising young bookkeeper, bought a half interest in a patent for the first portable forge with attached blower. Two mechanics who owned this patent had been carrying on a small, struggling business which Mr. Wendt, by hard work, began to develop. In 1880 the business was sufficient to warrant purchase of a small shop for manufacturing and orders began to come from widespread territory. In 1883 Mr. Wendt became the sole owner and began to add more products to the line until 1888, when the company entered the heating and ventilating field. At that time there was a complete line of blacksmith's forges and blowers, blacksmith's drills, punches, and shears. William's brother, Henry W. Wendt, was made a member of the firm, and business was continued as a partnership until 1900, when it was incorporated and a plant of considerable size was built at the present location.

Export business began to grow, branch offices were established, and soon after a Canadian plant was built. In 1903 the Geo. L. Squier Manufacturing Co., manufacturers of sugar, rice, and coffee machinery, and The Buffalo Steam Pump Co., now Buffalo Pumps, Inc., manufacturers of steam and centrifugal pumps, were acquired.

The growth and development of the company were the result of careful studies of markets and improvement in quality. It was natural to progress from forge blowers to blowers for other industrial applications and ventilating fans for public buildings and air-conditioning purposes; in fact, although the name "air conditioning" did not have public acceptance until nearly 20 years later, all the essentials of air conditioning for comfort were being produced and marketed by this company

beginning with about 1902. Willis H. Carrier, at that time chief engineer of the company, designed the first successful air washer, patented and applied the principles of dewpoint control, and made many industrial installations for winter and summer air conditioning, including every essential feature of the most modern system.

It was natural for a large sheet metal plant that numerous power metal-working machines were invented for its own use. A large business later developed from the sale to other companies of many of these power punches, shears, and bending rolls which were first designed for carrying out processes in the Buffalo Forge Co. plant. These lines of machines have been amplified and carried to sizes far beyond the original applications; also complete lines of drilling machines, single and multiple spindle, have been added.

Anticipating the rapid increase in the variety of applications for blowers and fans in industry, the company early adopted a policy of training young engineers, establishing branch offices, and staffing them entirely with men qualified to assist and guide all types of users in the selection and application of this equipment, thus placing the emphasis on engineering rather than selling. Continued up to the present time, this policy has been quite distinctive.

When in 1916 William F. Wendt retired, his interest was purchased by Henry W. Wendt, and the company was reorganized, some of the employees becoming stockholders, with the stock remaining comparatively closely held. In September 1941 there was a reorganization of the Buffalo Forge Co. and subsidiaries. Buffalo Pumps, Inc., and The Canadian Blower & Forge Co., Ltd., are now wholly owned by the Buffalo Forge Co.

In 1914 the company published the first edition of the handbook "Fan Engineering", which has been occasionally revised and republished and is now in the fourth edition. It was intended to supply information to engineers on the properties of air and air flow as well as on the requirements in the way of equipment for many of the typical applications. This book has long been regarded as the bible for all users of air-moving machinery. Being sold at cost, it has gone to every country in the world, making a total of many thousands of copies.

Chemical engineers in every part of the world are familiar with Buffalo ventilating and exhaust fans. The Buffalo Forge Co. pioneered in the development of rubber covering for exhaust fans handling corrosive fumes and thousands of these fans are in service in the industry. Much special equipment for the chemical industry is also manufactured at 490 Broadway.

If there has been an outstanding reason for the success of the company, it is the willingness to discard old ideas for new and better ones, and the constant emphasis on research and development.

There are about 1,500 employees in the three plants, most of whom are engaged at present in the manufacture of some type of process equipment.

To many chemists "Zaremba" is a synonym for "evaporator". This well-known firm was founded in 1909 by Edward Zaremba, a graduate in chemical engineering of Wisconsin, and Arthur Mantius, who came from Heidelberg. The evaporators built by the young firm were the first to have horizontal tubes. Later the multipass evaporator intended especially for salt-caustic work was developed. Still another special design is one which has its heating element on the outside, so that no boiling takes place in the tubes. For the caustic work, the tubes are generally nickel and the shells nickel clad; as a consequence, no incrustation forms. Zaremba evaporators are sent all over the world. The president of the firm is B. S. Hughes, who has the distinction, among others, that he was the purchaser of the first evaporator designed by Zaremba and Mantius. Among its technical experts, a figure well known to the chemical workers is that of W. H. Eggerts.

The Ross Heater and Manufacturing Co. of Buffalo provides "Ross Equipment and Engineering Service" to the industries; the chemical engineers and chemists know best the Ross heat exchangers, one of the main products of the company. A trip through the plant provides a vision of exchangers of all types, sizes, and even colors. An exchanger so small that it can be held in the hand, made of copper and brass, may be grasped over here, while over there stands a 3-foot shell many feet long, of cast iron, which the crane only can lift; or, again, an all-welded steel surface condenser several times as high as a man.

The company was started in 1915 by S. C. Ross as an independent enterprise; in 1933 it became part of the American Radiator Co. The present general manager is C. H. Currier; of the personnel, the man with most acquaintances among the chemists is T. Tinker, chief engineer. The company makes heat exchangers, steam-jet ejectors, and surface condensers of various material—steel, stainless steel, nickel, copper, Muntz metal, brass, bronze, and admiralty metal. The products are sold nationally and internationally. Ross equipment will be found in the Dutch East Indies, Rumania, Aruba, and every other part of the world. The company employs 280 men; the present plant is in process of being enlarged.

To the west of Buffalo, in Silver Creek, the firm of S. Howes Co. manufactures a line of machinery consisting of many items; among them those of greatest interest to the chemical industries are a cyclone dust collector, in single or twin type, and the "Invincible" tubular dust collector. The latter has a series of radially arranged textile tubes set in rows on a central drum. The fan-driven dust-laden air enters in the center of the drum and passes to the inside of the radial bags; the dust is retained in the bags, the clean air passes through. At each full revolution, a rubber-faced hammer strikes the spring-cushioned wooden buffer to which the outer end of each row is attached, and the dust drops to the central drum onto a small conveyor. The Eureka dust collector is especially well represented in flour mills, where it is frequently found supported from the ceiling. Eureka machinery has been made in Silver Creek since 1856.

Almost on the edge of the city also to the west, lies Blasdell, where the Exolon Co. has for many years manufactured abrasives and, especially, with regard to tools for the chemist, electromagnetic separators second to none. The newest type is a multiroll separator with high capacity, and containing special features of design found in no other similar device. The Exolon Co. manufactures also shaking tables for the dry separation of material by specific gravity, and other equipment. In the near future the plant is to be moved to North Tonawanda. Well known to the chemical trade is Mr. Ramsey, chief engineer.

In Lackawanna, just over the city line to the east, is situated the plant of the Electro Refractories & Alloys Corp., founded in 1919 by Luke Milward, who is still the president, John Edmonds, and William Farrish. One of the well-known products of this firm is the silicocarbide crucible for melting metals, made in a number of sizes, the largest holding 1,000 pounds of aluminum. Other products are bricks and shapes of certain refractories—namely, silicocarbide, crystallized alumina, magnesia, and mullite. The mullite is made in the plant by the fusion of Indian kyanite in an electric furnace. Furthermore, grinding wheels of silicocarbide, and alumina, vitrified and resinoid-bonded, are made here. The company manufactures also nonferrous alloys, among others cupro-nickel. The present executive vice president is Grant Diamond.

In nearby Lockport the Richmond Co. manufactures another well-known tool, the Richmond flour sifter.

The Lapp Insulator Co. is located in LeRoy. A line of chemical porcelain and acid- and heat-resisting equipment of special merit in various respects is made by this firm.

Buffalo is the home of Walker-Wallace, Inc., the makers of the A. P. V. (Aluminum Plant and Vessel) plate heat exchangers and the Paraflow coolers. The A. P. V. plate heat exchanger consists of cast pedestals to which are attached sliding bars, which carry the plates and the cast movable head. The plates are made of polished die-pressed stainless steel, or other

suitable metal, and have grooves on both sides. The resulting assembly has the highest possible efficiency and lowest possible radiation losses. The Paraflow cooler—for instance, the wort cooler—has grooved plates separated by flat dividing sheets. The flat plate has the effect of transforming the grooves into pipes having a series of 180 degree reversals in directions, ensuring high turbulence and, therefore, high rate of heat exchange.

Another interesting Buffalo tool for the chemist is the filter manufactured by the firm of Jacob House and Sons, especially designed for filtering sirups. All of white metal or nickeled, it has an attractive appearance and enjoys high vogue.

The Wilson Chemical Feeder Co. manufactures an almost unique device which permits the proportioning of solutions or liquids in medium, small, and extremely small amounts with a high degree of precision. These devices are chemical feeders which are driven for the most part by either motors or water meters and are rapidly becoming indispensable for proportioning liquids in the chemical, food, and allied industries. So delicate are the machines that they will chlorinate water exactly, for example, with one-tenth part of chlorine to one million parts of water. The incentive for developing these machines was the need of sterilizing drinking water on the Great Lakes freighters, as well as on boats on the Ohio and Mississippi Rivers. The chemical feature is a pulsafeeder and feeds generally small but always precise volumes of liquid by the compression of a rubber tube. At this time the company is about to move to larger quarters on Clinton Street.

The Niagara Blower Co., situated within the city limits, manufactures a line of well-known fans and blowers, distributed nationally. John Smith is one of the active and prominent engineers in this firm.

One of the important units of the Worthington Pump Co. is its plant in South Buffalo at Clinton and Roberts Streets. Originally the Snow Steam Pump Works, it became part of the Worthington interests many years ago. The Buffalo plant makes compressors of the reciprocating type. It manufactures Diesel engines, vacuum pumps also of the reciprocating type, and V-drives. The number of men employed is not far from 2,000. The Worthington Plant at Harrison, N. J., which is probably the mother plant, manufactures pumps, surface condensers, feed water heaters, and hot process water softeners.

The last of the "Makers of Tools for the Chemist" and undoubtedly the oldest, is the business established in 1857 at 462 Ellicott St., Buffalo, by H. Wm. Dopp. Mr. Dopp was a machinist and blacksmith. In those early days, soap was stirred with a crotch or crutch and this was referred to as "crotching". While developing a machine for doing this, which he patented, Mr. Dopp also invented and patented a seamless cast iron steam-jacketed kettle for use as part of this "crutcher", and thus the Dopp kettle came into being.

Upon H. Wm. Dopp's death in 1886 the business was taken over by his son, Wm. H. Dopp, who had been brought up in the business and was a chemist. Under his guidance, the firm moved to a rented wooden building at 1300 Niagara St., long since replaced, where it operated a foundry, but after several reverses its assets were taken over from the receiver in 1903 by a group of eight men headed by D. W. Sowers.

In 1910 Mr. Sowers formed the Sowers Manufacturing Co., which bought the H. W. Dopp Co., the corporate existence of which is maintained for the purpose of retaining the trade mark and name of Dopp.

In 1914, with the United States cut off from Europe as a source of supply of chemicals and equipment due to the first World War, the company's products became increasingly valuable for chemical plant use, and upon our country's entry into that war the Sowers Manufacturing Co. was called upon to produce quantities of equipment for mixing Amatol for loading shells.

With the return of peace, the company more actively turned to the manufacture of equipment for the chemical and other processing industries. It was during this time that the advantages of Dopp positive-scraping were recognized. Positive-scraping was made possible because, owing to the special process and equipment which had been developed for the kettle's manufacture, it had a perfectly true and smooth surface. Positive-scraping brought improved heat transfer, improved quality of product, etc. Today Dopp seamless kettles, mixers, vacuum and pressure pans, etc., are used in more than 90 different industries, important among which are the manufacture of chemicals, soaps, sulfonated oils, lubricating greases, glues and pastes, resins and plastics, waxes, etc.

It is possible that several additional "Makers of Tools for the Chemists" in the Buffalo area have not been included but if so the omission is unintentional. All the "Makers" feel very close to the organizations of chemists and chemical engineers and are ambitious to furnish them more and better tools; on the occasion of the coming meeting of the AMERICAN CHEMICAL SOCIETY in Buffalo, September 7 to 11, they extend, through the writer, a hearty welcome to the prospective visitors.

For pictures, see pages 864 and 865.

Seventh Unit Process Symposium

PAPERS for this Symposium on Unit Processes, under the sponsorship of the Division of Industrial and Engineering Chemistry of the A. C. S., should be sent to R. Norris Shreve, Purdue University, West Lafayette, Ind. Two copies of the title and abstract should be sent at once, followed by the full paper. This symposium will be held for one day at the Buffalo meeting of the AMERICAN CHEMICAL SOCIETY, September 7 to 11, 1942.

Travel—Buffalo Meeting

PUBLIC transportation services are burdened by a tremendous increase in traffic and a decrease in facilities available to civilians. It is *essential* that those planning to attend the fall meeting of the AMERICAN CHEMICAL SOCIETY in Buffalo the week of September 7 make reservations early and buy tickets well in advance of departure; otherwise it may be impossible to secure accommodations. Refunds will be made by the railroads for any tickets not used, provided notice of cancellation of Pullman reservations is given before departure of the train.

A large and important meeting is anticipated. You should be there. To assure this, make railroad reservations promptly.



South Dakota State College Chapter of A. C. S. Student Affiliates

Detergents from Petroleum[1]

LAWRENCE FLETT, National Aniline Division, Allied Chemical and Dye Corp., Buffalo, N. Y.

About 1930 a new era in the science of washing agents started with the introduction of the synthetic detergent. For several thousand years, in fact for practically the entire existence of civilization, soap has had a monopoly of the cleaning business. Soap was a very worthy monopolist. We should have been much less happy without it. We have a general word, "detergent", which embraces soap and other cleaning agents, but it found practically no use up to about 1930 because there was no real detergent other than soap. Today we must take out this word detergent, dust it off, and put it to use because the new cleaning agents are not soaps.

We do not now have a good name for these new washing agents. They are generally called "synthetic detergents". That is not a good name because soap is a synthetic detergent. The new agents have been called "soapless soaps", and that name is not correct because they are not soaps. Another name is "detergents" and that name is safe enough, but it includes soaps. Still more recently these new products have been referred to as "surface active agents". Although this term is broad enough to include soap and the wetting agents, it has come to have a more specific meaning. It is being applied to those agents which have an unusual surface active action. The activity of the new detergents comes from their ability to coat over surfaces with layers so thin that they do not visibly change the coated material. The material so coated no longer presents its own surface to a surrounding solution, with the result that its properties in solution are changed.

Soap has become such a common factor in our lives that we do not realize the limited conditions under which it can be used. Soap must be used in warm to hot water. The washing solution must be alkaline. Lime salts and heavy metal salts must not be present in sufficient amounts to precipitate all the soap. Such salts should preferably be absent. The water used must not be too salty. In the industrial world these conditions are not easily arranged. There are many operations preferably carried out in neutral or acid solutions, in the presence of heavy metals, or in cold water. There was real need for a powerful cleaning and dispersing agent which would be effective under any conditions.

The new detergents, which came with this new era, are detergents which would work under any and all conditions. They wash in acid as well as in alkaline solution; they clean cold; and they clean hot. They wash better in hard water than in distilled water. They wash in sea water. These detergents can be used even with the heavy metal salts in electroplating baths.

The man who dyes and finishes cloth must use cleaning agents, and he has been forced to confine his cleaning to operations which are compatible with soap. Soap precipitates in sticky curds with the lime salts and magnesium salts. The precipitated curds have a way of gathering on textile goods; and of course, a fabric spotted with lime soaps will not dye evenly. This trouble is so serious that the dyer has been willing to pay a premium to obtain a detergent which did not precipitate in sticky curds with lime salts. The new synthetic detergents were developed by companies serving the textile industry to solve the problems of the dyer and finisher. The use of these detergents soon spread until today practically every industry uses these new surface active agents and their use is being extended to the household.

Attempts to develop new agents which would not cause the difficulties soap caused, began by coincidence soon after the petroleum business started. It began with the development of the "wetting agent". Before textile goods can be dyed or finished, they must be wet. If they are not wet, they cannot absorb dyes or anything else from a solution.

The first really important wetting agent to substitute soap came into general use about 1875, and was the sulfonated castor oil, sometimes known as Turkey red oil. About 30,000,000 pounds a year are still used. Sulfonated castor oil precipitates to some extent in hard water, but the precipitate remains dispersed and relatively innocuous. Turkey red oil used with soap made the lime soap precipitates less damaging. The present use of Turkey red oil is largely that of an oil to lubricate and soften textile materials. Although sulfonated castor oil had many of the properties of soap and although it lacked some of the undesirable properties of soap, its use as a soap substitute was limited because it was not a cleaning agent. Products like sulfonated castor oil which cause textile materials to wet out but which had no washing power were called "wetting agents".

In the period from 1912 to 1920, during the last war, the propylated and butylated naphthalene sulfonates appeared commercially as soap substitutes in Germany. These agents gave clear solutions in hard water, they were stable in acid solution, and they lacked many of the faults of soap. Since they did not wash, these agents were classified as wetting agents.

The commercial introduction of wetting agents which were also detergents started in the United States about 1930 when the National Aniline Division of the Allied Chemical and Dye Corp. introduced a wetting agent called Gardinol, which was at that time manufactured in Europe. Gardinol was a mixture of sulfates made from alcohols derived from coconut oil. It was a white solid, stable in warm or hot hard water, reasonably stable in neutral solutions, and not too quickly broken down in cold acid solution. The remarkable thing about this new wetting agent was that it could wash and clean. Soap had a challenger. The high price at which Gardinol was introduced did not prevent its ready acceptance by the dyers. Gardinol was the first product of commercial importance in this new era of synthetic detergents.

After the stock market crash of 1929 upset our economic system, this is how things stood:

1. There was the unsolved riddle of how to make a low-cost but good washing agent from petroleum.
2. There were miraculous new washing agents like Gardinol for which there was a demonstrated demand at a high price, and there was an insistant demand from industry for the new detergents at a price more comparable to that of soap.

Here then was a conjunction of two stars to both of which you could hitch your wagon. The problem was no longer how to produce a low-cost soap from petroleum but how to make one of the valuable new synthetic detergents from petroleum at a cost comparable to that of soap. The successful production of the new detergents from petroleum by the National Aniline Division was a project of considerable magnitude. No one should get the idea that it was done in any reasonable period of time by any one man. It was a project requiring the team work of an organization.

From this work emerged the first commercially important detergent from petroleum which had a powerful washing action—a product which was stable in hard water and in neutral or acid solutions and was a powerful dispersing agent under any conditions of use. It was the first of the synthetic detergents which was completely stable to acid and alkaline solutions.

In general, all detergents are made up of two parts. There is a long hydrocarbon chain sometimes called the hydrophobic group. In the detergents made from pe-

[1] Jacob F. Schoellkopf medal address, presented before the Western New York Section of the American Chemical Society, May 19.

troleum the long hydrocarbon chain or hydrophobic group is the part of the molecule derived from petroleum. Then there is the group which makes the product water-soluble, known as the hydrophilic group. Practically all of the commercially important new detergents are sulfuric acid derivatives. They are practically all sodium salts. Sodium sulfate is well known. It is soluble in water and causes water to froth slightly. All are acquainted with the two petroleum distillates known as white oil and kerosene. If you had a chemical product which was half oil and half sodium sulfate, you would have a detergent. That is the type of detergent which we make from petroleum.

The first step in the process which we have devised for manufacturing detergents from petroleum is to make the petroleum distillate chemically reactive. This can be done in one way by reacting it with chlorine. The aliphatic chloride so produced is still difficult to convert to a sulfuric acid derivative, but it is easily converted to an alkyl aryl compound. The resulting aliphatic aromatic compound may be sulfonated to give the sulfonic acid which is generally converted to the sodium salt. Other metal salts may be made. Practically all of the metal salts, as well as the ammonium salt of this type of compound, are sufficiently soluble to give an adequate cleansing or surface active action. The basic process is very simple. Its operation is complicated by many purification operations directed to giving a cleaning agent which will be effective and relatively colorless and odorless.

The importance of cleaning agents from petroleum has increased since Pearl Harbor. Cleansing agents which can be made entirely from domestic ingredients today assume national importance because the importation of vegetable and animal oils has substantially stopped. Foremost in the list of oils which we no longer receive is coconut oil, most of which came from the Philippines. Coconut oil was used in practically all household soaps. Six hundred million pounds of it were imported in 1941, of which almost 500,000,000 pounds found their way to the soap kettle. The loss of coconut oil will not make itself felt at once because there are large stocks, but when these are consumed what shall we use as a substitute? We cannot use tallow since 90 per cent of that goes to soap now. There is no vegetable or animal oil which is now available in amounts far in excess of the wartime needs. Sales of practically all vegetable and animal oils are under limited restrictions. The soap industry is one of three which are large consumers of oils. The other two are having their own difficulties so they have no oil to contribute to soap. The paint industry for one has been handicapped for some time by the loss of china wood oil from China, and from other consumers it is drawing castor oil which is dehydrated to give a drying oil. In the food industry the edible oils and fats are in greater demand than ever because of declining imports.

Whatever our shortages in animal and vegetable oils may be, we do have an abundant supply of petroleum. The United States production of petroleum is not measured by a billion pounds, but by a billion barrels every year. Our ability to make detergents from petroleum makes potentially possible the release of 2,000,000,000 pounds of fats and oils to become foodstuffs. This would increase by more than 30 per cent the amount of oils and fats available for food. The field of synthetic detergents and wetting agents is likewise affected by the loss of coconut oil. Some of the more important synthetic detergents are made from coconut oil, and it is to be hoped that the dwindling supply of coconut oil will be conserved to make those surface active agents which are more valuable than soap.

If the situation arises where synthetic detergents from petroleum must be used, several basic principles which govern their use should be known. To point out certain peculiarities of the synthetic detergents, it is necessary to select one for illustration, in this case Nacconol NR. Nacconol NR is truly representative of the new detergents from petroleum. It is a product which is stable under any conditions of use which we have yet encountered. Nacconol NR is a little less than 40 per cent alkyl aryl sulfonate and about 60 per cent sodium sulfate.

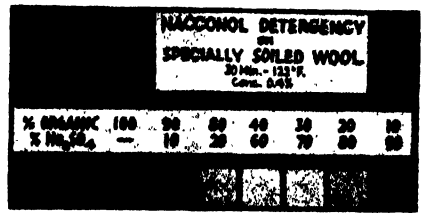


Figure 1

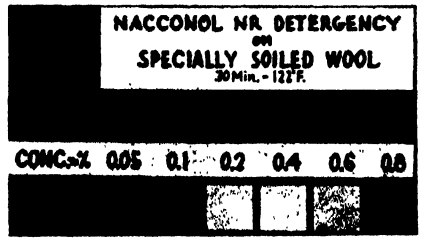


Figure 2

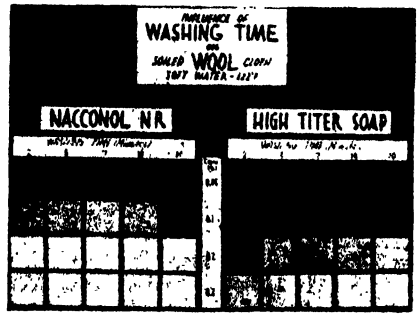


Figure 3

First and foremost in the use of Nacconol NR, the effect of the inorganic salt which it contains should be appreciated.

The alkyl aromatic sulfonates, unlike soap, are salts of strong acids. In very weak solutions they give true solutions in contradistinction to the colloid-like solutions of soap. Sulfonates in very dilute solutions are surprisingly improved in their washing action by the addition of salts, possibly as a result of their conversion by such additions to the colloidal state of solution. The effect of salt is shown in Figure 1 which shows squares taken from pieces of washed wool. The wool is first soiled in a special machine with a mixture of lamp black, fat, and oil. The washings are then made in a Launderometer which gives light scrubbing action. The amount of sulfonate used for washing is reduced, going from left to right, and is replaced by an equal amount of sodium sulfate. The fourth square was washed with only 40 per cent as much sulfonate as the first square where 100 per cent detergent was used and yet it washed whiter. This mixture represents Nacconol NR which is about 40 per cent alkyl aryl sulfonate and 60 per cent salt. In the sixth square was only a fifth as much sulfonate as in the first square and yet the washing obtained was better than the washing obtained with the pure product to which no addition of salt had been made.

Economical use of any of the new detergents from petroleum requires a careful consideration of the correct amount of salt. In the washing represented by this slide, the product could advantageously have had half of the organic matter replaced by salt. However, this is an unusual condition since a relatively strong solution is needed to wash the heavy soil. Ordinarily wool washing is carried on with 1 part per 1,000 or 0.1 per cent.

The next consideration is the amount of detergent required. Commercially detergents are used at concentrations from 0.001 per cent to 20 per cent. There is a damaging misconception that the more detergent used the better cleaning. Figure 2 shows that this is not true. Here is a heavily soiled wool. When the Nacconol is used at a strength of 0.05 per cent there is practically no washing; at 0.2 per cent or 2 parts per 1,000 the washing is practically complete. By the time a 0.6 per cent concentration is reached, washing action is falling off; at 0.8 per cent the washing is no better than was obtained at 0.1 per cent, although 8 times as much Nacconol is used. No detergent should be tested at high concentrations with the idea that the greatest effect will be obtained.

Figure 3 is the first of a series of three slides comparing Nacconol with soap. The wool used in this test has a very heavy soil that is difficult to remove. The dark squares show substantially no washing. First, note that the soap at 0.3 per cent

concentration gives a white washing in 20 minutes, and that the longer time the washing is carried on using soap the whiter the wool is. With the Nacconol a white wool is obtained at 0.2 per cent concentration or two thirds the concentration of the soap, and the organic content of Nacconol is only 40 per cent as compared to soap because of the supplemental use of sodium sulfate. The actual organic material required for a white washing in the case of the Nacconol is only 25 to 30 per cent as much as in the case of soap which is practically pure organic material.

Another characteristic of the Nacconols is their rapid action. You will note that the Nacconol gives substantially complete washing in two to five minutes while the soap requires 20 minutes. This quick action is very desirable in washing things like wool blankets or sweaters where prolonged washing changes a soft, fluffy material to a stiff feltlike fabric. The longer wool is washed the more it shrinks.

Figure 4 shows the same test as does Figure 3 but was made in Buffalo city water which is about 7° hard. Note that the washing with Nacconol is substantially unchanged, while soap has lost its ability to make this wool white within the limits of this test.

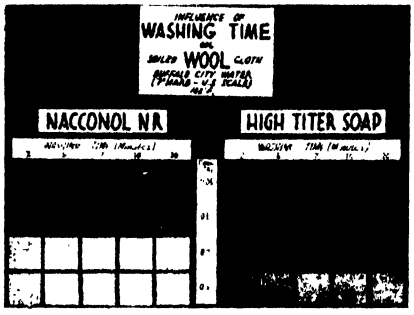


Figure 4

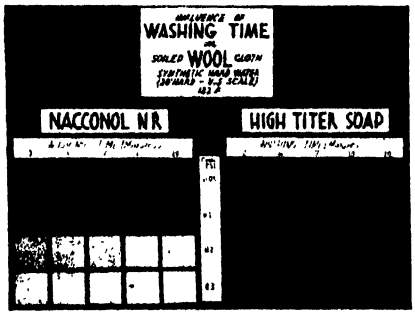


Figure 5

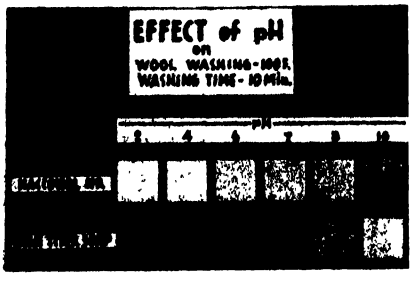


Figure 6

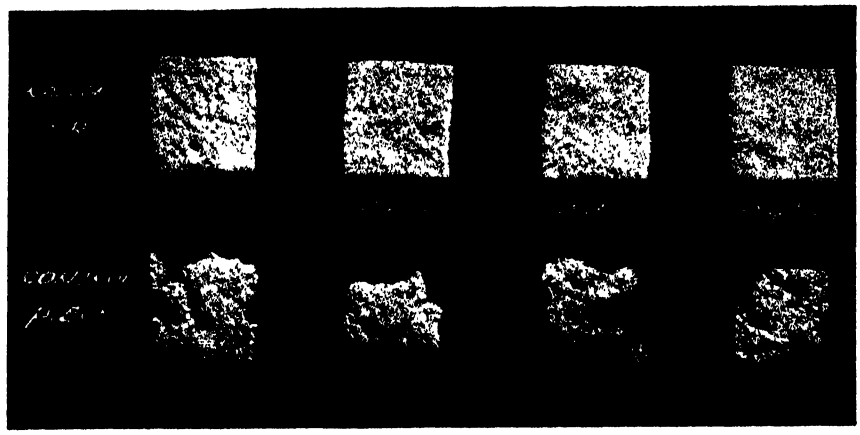


Figure 7. Moth repelling action of Nacconol NR

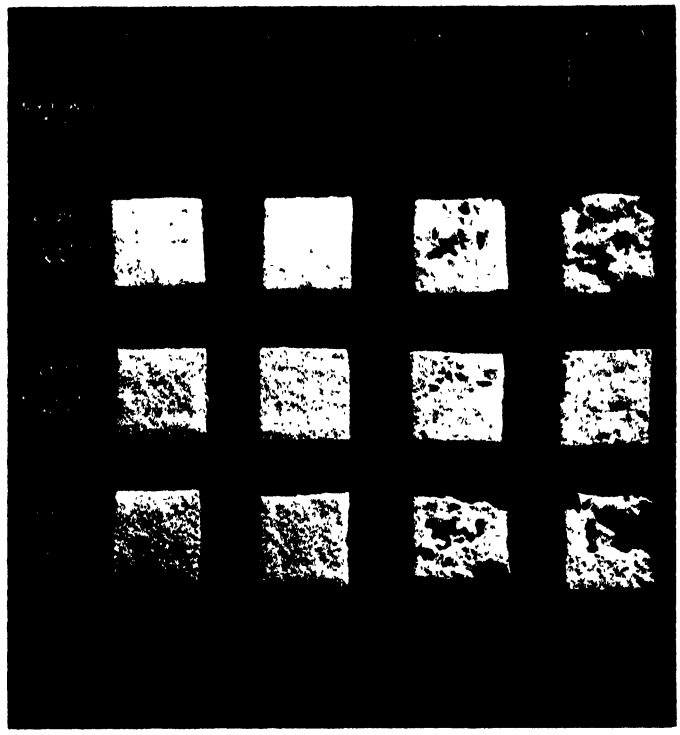


Figure 8. Mothproofing action of Nacconol NR

Figure 5 shows the washing in 20° hard water where soap has lost all its washing action within the limits of the test. The Nacconol on the other hand still shows a fine washing action.

Soap must be used in alkaline solution. Alkaline solutions are damaging to many products such as paint, linoleum, and wool. Many industrial operations, such as acid dyeing and pickling, are carried out advantageously in neutral or acid solution. Figure 6 shows the effect of the hydrogen-ion concentration on washing. As solutions become strongly alkaline, soap increases in efficiency. In neutral or acid solution it becomes worthless. A hydrogen-ion concentration of 10 is about that of a weak modified soda solution. The Nacconol, on the other hand, is effective in neutral solutions and is excellent in strong acid. In strongly alkaline solutions it is not so effective although it still shows a considerable washing action.

Nacconols are insecticides. Whale oil soap was used as an insecticide, but unlike whale oil soap the Nacconols are retained by a substantive action of the wool. They are held in small amounts by the wool much as a dye might be held. Figure 7 shows the moth repellent action of Nacconol NR. In this test the wool washed with Nacconol and moth eggs are placed in the same container as a piece of unwashed wool. Vitamin B is added so that the moth larvae will thrive. In all cases the larvae made a good meal of the unwashed wool. In the case of the washed wool there is a slight attack at 0.1 per cent, a very slight attack at 0.2 per cent, and no attack at 0.3 or 0.4 per cent.

Figure 8 shows mothproofing action as compared to the moth repellent action shown in the last slide. It also shows the effect of water rinsing after washing. In these tests there is no untreated wool for the larvae to thrive on. They must eat

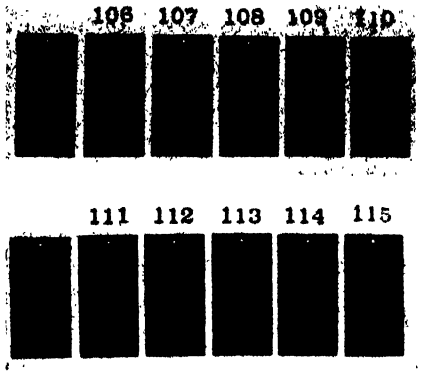


Figure 9

the Nacconol washed wool or die. Here 0.2 per cent of Nacconol is adequate protection since there is no untreated wool for the larvae to grow on. The wool sustains one light rinse without loss of its mothproofing action, and some mothproofing action remains even after the third rinse. Wool washed with 0.1 per cent Nacconol NR sustained moth larvae when they had to eat it, although where other wool was available the moth larvae ate very little of the wool washed with 0.1 per cent Nacconol NR.

Many alkaline cleaners are used particularly in the metal industry. In some cases it is necessary to have better cleaning than is obtained from the alkaline solutions alone. When Nacconol NR is added to improve the cleaning of alkaline solutions, small additions of 5 to 10 per cent based on the weight of the alkaline salts are extremely effective. Large additions generally offer no advantage over the small additions and, since Nacconol costs more than alkaline salts such as sodium phosphate, sodium silicate, caustic soda, and soda ash, it is uneconomical to add more than 5 to 10 per cent. The effect of this small addition is shown in Figure 9. This is a series of metal strips treated with oil and cleaned. The strips are then photographed under ultraviolet light where the oil residues fluoresce and become readily apparent. The upper row shows oiled steel cleaned with a 5 per cent solution of sodium metasilicate. At the left is a blank of unoiled steel; then the cleaned strips. The oily residue is very evident, although this is a good cleaning solution. The different strips represent 2, 4, 6, 8, and 10 minutes' washings without scrubbing. The second row is washed in the same way with a 5 per cent solution of a mixture of 95 parts of sodium metasilicate and 5 parts of Nacconol NR. All of the plates compare favorably with the clean reference strip at the left.

Figure 10 shows the number of dinner plates which can be washed with 5.6 grams (about 0.2 ounce) of soap or Nacconol in 6 quarts of water. Each plate is soiled with 2 teaspoons of a mixture of grease, vegetable juice, and flour. The Nacconol is dissolved in the water and a suds is beaten up. Plates are then washed until the suds are gone. The stacks of plates in back are those washed with Nacconol; the stacks in front are washed with soap. Water which is 3° hard is known as soft water. The Nacconol in this water washed 22 plates, while soap washed only 16 plates. Water 7.5° hard is equivalent to Buffalo city water. In this water the number of plates washed with Nacconol increased to 25 while the number of plates washed with soap dropped to 4. In water of 20° hardness, 5.6 grams of soap in 6 quarts of water is not enough to wash any dishes. With the Nacconol the number of plates washed in 20° hard water is 40 per cent greater than the number which could be washed in soft water.

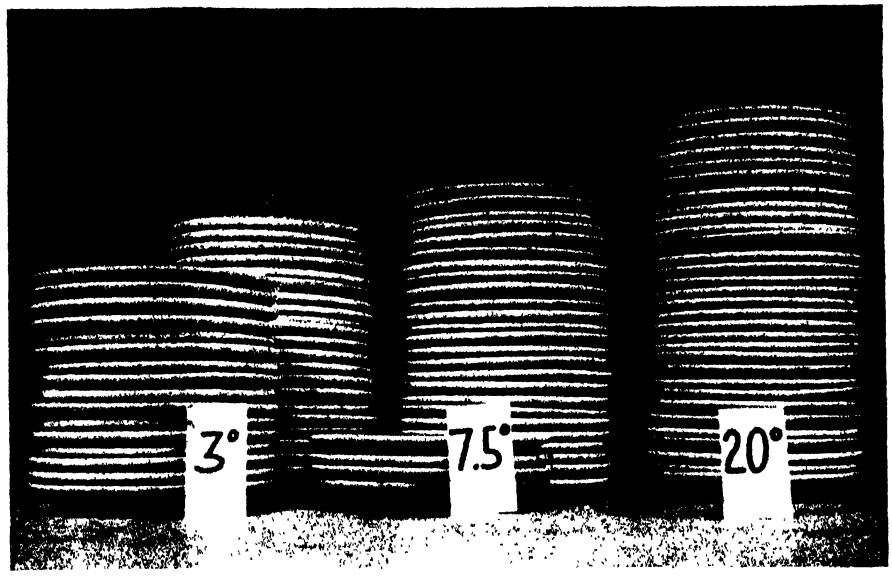


Figure 10

The principal uses for the new detergents are those in which soap is at a disadvantage for one reason or another. For example, special Nacconols are used in foods where the taste of soap is objectionable. They can be used to make an angel food cake which seems to melt in the mouth. Weak solutions of Nacconol NR are used to wash insects and insect fragments from vegetables such as broccoli, spinach, and lettuce. From petroleum products we have produced special detergents which are completely odorless and tasteless.

The Nacconols are used in dentifrices. Enameled woodwork, painted houses, and automobiles can be washed with a tablespoonful of Nacconol in a pail of water. The solution is neutral and does not dull the glossy finish of the coating material. It may be easily rinsed, and the surface will dry clean without polishing. Nacconols are useful in nonaqueous mediums and they disperse pigments in enamels. They clean in a dry cleaner's solvent much as soap does in water. In lubricants they keep the inside of automobile engines clean. They enhance the fungicidal properties of oils and keep leather clean while it is being defatted.

The chemist uses small amounts of Nacconols to speed chemical reactions and to obtain uncontaminated precipitates. Many special uses are made of the new washing agents because of their powerful antiseptic action. Bacteria do not grow in the ordinary Nacconol washing solutions. Such solutions are also powerful insecticides and fungicides. A Nacconol solution is particularly valuable to clean a cellar infected with mildew or insects. For such uses do not bother to rinse the solution off after washing. In tanning leather Nacconol assists the tanning. It is a mild tanning agent by itself. It keeps the leather clean and uniform. Nacconols are used in laundry work and dishwashing where it is desired to reduce bacteria counts. A pile of dinner plates washed with the Nacconol squeaks when you move it because there is no fatty soap residue left to lubricate the surface of the plates. Many people are allergic to soap, particularly in hard water areas. Nacconol NR is used to wash diapers to avoid diaper rash which often is an allergic reaction to lime soap. A special product called Dermanac is prescribed with which people who are unable to use soap can wash. Nacconol added to the bathtub before drawing the bath gives an amusing and cleansing layer of bubbles, and when the water runs out there will be no soap ring around the tub. Wool blankets washed in a tub of almost cold water with a cup or less of Nacconol for three to five minutes and hung in the breeze to dry are enticingly soft, beautifully cleaned, and obnoxious to moths. Since they are not washed long they do not shrink so much as they ordinarily would in washing.

Hot water is a problem with the dairy farmer since the barn is always a long way from the house, but the detergents from petroleum are effective washing agents in cold water and, because the washing solutions are antiseptic, serve to protect the

milking equipment. Because the Nacconol NR emulsifies odoriferous oils, it is valuable for washing dogs. Since the washing solutions are neutral they do not hurt the dogs' eyes, but because the solutions are insecticidal they devastate the fleas.

In acid baths where steel is pickled to remove the rust, soap would precipitate, forming fatty or oily acids. The Nacconols are stable in acid. They not only serve to clean the steel during pickling, but they protect the steel itself from attack by the acid. In electroplating baths the heavy metal salts precipitate the heavy metal soaps. The Nacconols on the other hand are adequately soluble and serve to avoid pits, pinholes, and other plating difficulties.

Very few persons realize the extent to which Nacconol used industrially influences the things they wear, the things they eat, and the things they use. Every one has benefited unknowingly from its industrial application.

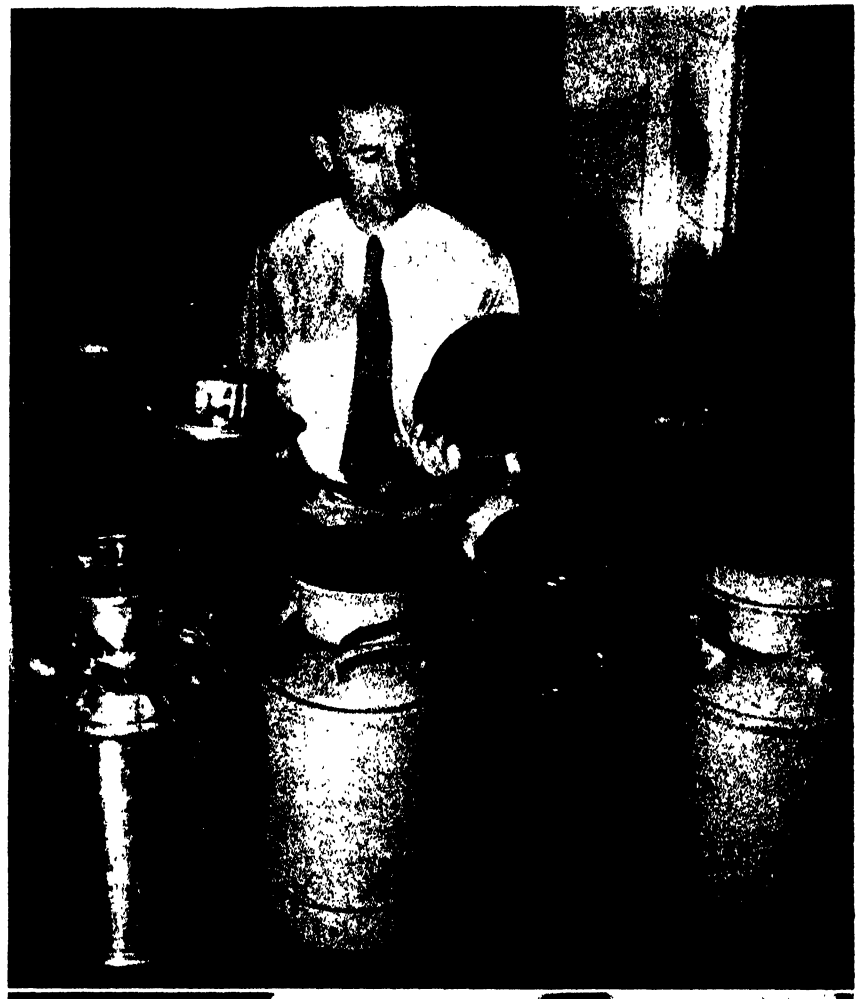
New Zealand Government Plans Mica Development

PLANS for exploiting, under national restrictions, of what are believed to be extensive mica deposits are reported from New Zealand. Preliminary geological examination is said to warrant a more detailed survey, deposits being reported over an area of 89 square miles at elevations of 4,000 and 5,000 feet. It is planned to check indiscriminate licensing, to ensure the area being worked for national and allied benefit under existing mining laws and, if these are not adequate, by special emergency powers.

FORMATION recently of a company in Hungary to produce plastics and synthetic resins, rubber, and leather has been reported from abroad. The company, Hungary Plastics and Chemical Works, Ltd., is said to be capitalized at 2,000,000 pengo.

U. S. D. A. PHOTO BY FORSYTHE

Lacquer Substitute for Tin Coatings





Above. **Paul D. Watson, chemist in the Bureau of Dairy Industry, U. S. Department of Agriculture, contrasts two milk can covers. The one at left is an ordinary tin-coated cover; the other a cover coated with the lacquer he has developed as a substitute for tin on cans for evaporated and condensed milk and for cheese. To test the practicability, the lacquer-coated milk cans, along with tin-coated cans for comparison, are used to haul milk to the department laboratories in Washington, D. C., from the department's dairy farm about 13 miles away in Beltsville, Md.** ***Below.*** **In working out the lacquer formula, samples of dozens of different combinations of materials were baked on glass dishes (in foreground) and small steel strips, and subjected to various tests. The lacquer that proved most promising consists essentially of lactic acid and vegetable oil.**

Ordnance Department Plastic Developments[1]

E. T. McBRIDE

Office of Chief of Ordnance, War Department, Washington, D. C.

When the President declared a limited national emergency two years ago, it was apparent that aluminum, brass, and zinc would become strategic. As the emergency developed and the United States became the arsenal of democracy it was also apparent that substitutes would have to be found for these metals in many applications. The Ordnance Department immediately investigated the possibility of substituting plastic materials for critical metal in some of its materiel.

The substitution program is an effort of the Ordnance Department to conserve highly strategic materials and utilize the less strategic. Plastics, although critical, are more available than the metals formerly used, but plastics are not metals and they cannot be expected to reproduce the physical properties of metals. They are expected to provide moldings having adequate strength characteristics, stability, and temperature resistance.

When a metal is declared critical by the War Production Board, immediate action is taken to effect a substitute for that metal. This substitute must be satisfactory to the using services from the standpoint of its ability to function efficiently wherever the theater of operations may be. It must be readily available in quantity at a nonprohibitive price and capable of withstanding long periods of storage in various climates under the most adverse conditions. It must provide permanence of form and resistance to wear, abrasion, and impact, whether in the subzero weather of the Arctic outposts or the torrid humidity of the tropics. At this time only the thermosetting compounds show definite promise. They alone have satisfactorily filled ordnance requirements. For these reasons thermoplastics have never generally been approved for materiel manufactured for the combat forces.

The Small Arms Division, for example, has been particularly active in plastic substitution. For almost a year this organization considered plastics for the M-1 rifle stock and hand guard, the Browning automatic rifle stock, and machine gun belt links. Although satisfactory results have been obtained in utilizing special phenolic molding compounds for the Browning automatic rifle stock, it has been shown that plastics have not reached the state where they can take the place of black walnut generally. The automatic rifle stocks are slightly heavier than the wood, but the mechanical properties of the material compensate for this excess in weight by their ability to withstand the cracking that the wood was subjected to when certain parts of the firing mechanisms traveled to the rear. This stock has been standardized as a molded fiber-filled phenolic. Plastic substitution for the M-1 rifle furniture has been abandoned because of the cost, weight factor, tendency of plastics to absorb and hold heat, and relatively poor flexibility. The belt link, believed an ideal thermoplastic application, cost too much, stretched under the weight of the ammunition, warped, and fouled before reaching the guns. The rifle-bore reflecting device, formerly a brass component, has been shown to be an ideal plastic application. This device is inserted in the breech of the rifles and machine guns for the purpose of examining the rifling to locate fouling, powder contamination, and defects in the bore.

This group has found that molded grips and handles, being exact replicas for the dies in which they were molded, ensure uniform and accurate assembly. They have found that grips and handles for pistols, machine guns, and bayonets which are far superior to walnut furniture may be obtained at no extra cost. They have, therefore, termed as "alternate standard material" any medium impact phenolic having an impact strength of 0.23 foot pound energy to break, as determined by the Izod notched bar impact test, which can meet requirements of Springfield Armory's tentative specification for molded phenolic shapes.

Thermoplastics, although they do not generally meet Ordnance Department specifications, have contributed to the development of this program. The bayonet scabbard on which Rock Island Arsenal prepared a tentative specification is a cotton mill duck impregnated cellulose acetate butyrate composition. Although a large number of these scabbards have been procured, a variety of thermosetting samples are being investigated and a comparative destructive test is being made with the hope of standardizing a scabbard best capable of withstanding storage, weathering, and combat usage.

The Ammunition Division has also been actively investigating utilization of plastics. The well-known M-52 fuse is an excellent example of cooperation between the Army and industry. This item is now a standard plastic ammunition component and has shown itself to be highly satisfactory when fired from the 60-mm. and 81-mm. trench mortars. This fuse is molded from a medium impact phenolic by the transfer process. The windshield for 37-mm. armor-piercing ammunition will require high-impact rag-filled phenolic which is not only capable of withstanding "setback" stress, a force generated on firing, but also the rotational forces of flight without breaking or separating from the projectile before reaching the target. Setback is the inertia set up in the gun at the moment of firing. It results in a compressive stress and is measured as pounds of pressure per pound weight of projectile. Experimental development of plastic 75-mm. windshield has been suspended by the Ordnance Department because of constant setback failures encountered in firing. The setback in the 75-mm. gun results in a force of 17,000 pounds per pound weight of projectile. All plastic windshields of this caliber fired to date have exhibited longitudinal cracks which start at the threaded section. This shows that the differences in thermal expansion of metal and plastic are too great or the plastic materials do not have sufficient elasticity to give with the projectile.

The M-50 dummy fuse which is used for 37-mm. gun target practice has been classified as "plastic alternate standard". This fuse is not being procured as a plastic because the powdered iron component, which is also acceptable, has provided a more inexpensive source. The substitute for this aluminum compound must be capable of meeting with weight, weathering, and temperature requirements. The fuses must be concentric and perform satisfactorily in the gun, in flight, and at the target which may be 4,000 yards from the gun.

"Volume applications" or the use of plastics in ammunition components are definitely limited because of the inadequacy of modern plastics to meet ammunition requirements. In many cases plastic components have cracked badly in loading and feed mechanisms. In other cases, the temperatures of explosion exceed by far the upper limit of plastic temperature range. What is needed is a plastic material capable of withstanding high temperatures and high setback pressures simultaneously for short periods.

The scarcity of aluminum has made necessary a great deal of substitution by the rapidly growing Aviation Ordnance Section. Satisfactory materials are needed for booster cups and bomb detonators. The M-103 bomb fuse, once thought of as a practical application, will probably never become a plastic component because of the "drop safe" requirements which no

[1] Presented before the Division of Paint, Varnish, and Plastics Chemistry at the 103rd Meeting of the AMERICAN CHEMICAL SOCIETY, Memphis, Tenn., April 20 to 23, 1942.

plastic has ever been able to meet. To drop safe is to release a fused bomb in an unarmed condition from an airplane at, for example, an altitude of 8,000 feet. The bomb so dropped is expected to land without detonating, so that allied aviators may release bomb loads over friendly territory if a forced landing becomes necessary. The fabric-filled phenolic booster cup has also failed. This component when dropped 50 feet after 48 hours at −40° F. cracks and shatters.

Chemical bomb burster tubes permit the use of phenolic impregnated paper which is capable of being stored for long periods of time without entering into chemical reaction with the Tetryl burster loading.

This section is responsible for the design, development, and procurement of aircraft signals. A plastic base, which may be molded of high-impact phenolics, has been designed for a complete range of signals.

The Artillery Division is developing a number of fire-control components from plastic materials. Binocular eye- and endpieces for field glasses and telescopes are being molded from medium-impact phenolics. Protractors and range deflection fans are items where transparent plastics capable of retaining their original shape without warping may be used to advantage. The Frankford Arsenal has shown considerable interest in hand wheels and knobs molded with inserts for gun directors, aiming circles, and battery commanders' telescopes. These components also require medium-impact phenolics.

The Tank and Combat Vehicle Division has been investigating the possibility of using high-impact phenolics for elevating and traversing mechanisms on tank guns. These hand wheels will contain steel inserts and, if they are satisfactory with respect to durability, temperature resistance, and physical properties, will be considered for adoption.

There is a definite military requirement for "windshield blisters" on tanks. The required blisters are similar to the transparent domes used on bombardment aircraft and are fit over the tank commander's turret when on reconnaissance missions with the hatch open. The purpose of this windshield or blister is to protect the tank commander from dust, dirt, and gas fumes which may be present in high enough concentration to impair his vision. To be satisfactory for this component, a material must have superior abrasion resistance and ability to withstand tropical and arctic temperatures. It must not become yellow or crazed with age, and must have a light transmission of at least 90 per cent after an accelerated aging test.

The Ordnance Department is enlarging the gage industry to assure an adequate supply of the various gages so essential to the war effort. The American Gage Design Standards employ three types of handles, the taper lock design handle, reversible design handle, and the Bell handle. The handle, that portion of a gage which is employed as supporting means for gage member or members, was formerly made of aluminum. Now thermoplastic compounds capable of meeting Ordnance Department requirements are acceptable as alternate standard materials.

The Ordnance Department has no objection to the use of extenders which will conserve strategic raw materials used in the production of molding compounds, provided use of these extenders does not appreciably lower the physical properties or mar the appearance of the molded piece.

The department does not purchase resins or molding materials for the production of its plastics components. All the plastics applications now standard for manufacture and issue are subcontract items. In all cases the prime contractor is responsible for the manufacture of complete units of ordnance materiel. Molders who are interested in becoming subcontractors for the molding of plastic ordnance components should apply to the various Ordnance Procurement Districts for information concerning the plastic requirements of the prime contractors.

Ordnance Department Paint Developments[1]

E. T. McBRIDE, Office of Chief of Ordnance, War Department, Washington, D. C.

IN ORDER to understand fully the paint problems which the Ordnance Department has undertaken, a knowledge of what is expected of military finishes by the operating divisions is essential.

The Ordnance Department is responsible for the design, development, storage, supply, and maintenance of combat materiel, which includes small arms, artillery, ammunition, tanks, and combat vehicles. The department is organized into four groups, each with a particular function in the successful completion of the ordnance mission. It is the responsibility of the Industrial Service, the group interested in paint products, to design, produce, procure, inspect, and standardize all ordnance materiel. The Industrial Service, through its operating divisions and research engineering staff, conducts tests on experimental materiel, maintains technical liaison, and distributes technical information to the industry, which make it possible for the Ordnance Department successfully to accomplish the manufacturing phase of its mission.

The Small Arms Division, responsible for the design, development, and procurement of pistols, revolvers, pyrotechnic projectors, rifles, machine guns and machine gun mounts (not including those mounts used in combat vehicles), and ammunition for these weapons, presents an interesting field for development to the paint industry. It utilizes the lusterless olive drab enamels of the ES-359 type for the camouflage and protection of metal on machine gun mounts and on wooden ammunition.

The Ammunition Division from time to time has been faced with unique problems which the paint and varnish industry, in cooperation with Ordnance Department operating facilities, has successfully solved. The most remarkable current advancement in artillery ammunition has been aided by industry's development of a baked phenolic varnish for use on steel cartridge cases. When it was apparent that a shortage of brass would delay the production of cartridge cases, the Artillery Ammunition Division investigated the possibility of utilizing a thin gage steel. The development of a steel cartridge case necessitated protecting it against corrosion caused by weathering and the chemical action of the propellant loading. It was found that copper plating the outside of the cartridge case provides adequate protection against external corrosion. It was the inside of the case, therefore, that required the attention of the paint and varnish industry. In cooperation with the Ordnance Office and Frankford Arsenal, the industry developed a straight phenol formaldehyde varnish. This produces a smooth continuous film which does not chip or scale after drying. The dried film, although tough, is elastic and withstands the abrasion of the propellant loading without serious effect.

A varnish to meet the requirements of Frankford Arsenal's specification must be a straight phenol formaldehyde finish, clear and unpigmented. It must resist toluene, acetic acid, ammonium hydroxide, ethyl alcohol, and ethyl ether. The test film must withstand a baking temperature of 50° F. in excess of that recommended by the manufacturer without softening or otherwise deteriorating. When scraped with a sharp blade, the film must not flake or exhibit other evidence of poor adherence.

Another development of the Ammunition Division is the new method of bomb

[1] Presented before the Division of Paint, Varnish, and Plastics Chemistry at the 103rd Meeting of the AMERICAN CHEMICAL SOCIETY, Memphis, Tenn., April 20 to 23, 1942.

painting. In the past, the painting of bombs followed the customary painting of artillery ammunition. For example, the entire bomb was painted to correspond with an artillery shell of the same loading. The present method is to paint the entire bomb a lusterless olive drab and identify the loading by suitable striping. The lusterless olive drab paint used as a protective finish coating of the metal must dry to a dead flat and require no further painting. It must have good color retention and have no tendency to increase in gloss during storage or after application. Inasmuch as bombs are only given one coat of paint, that covering must be complete. The film must be tough and elastic, and must not chip or scale. Bombs, like other ordnance materiel, are often required to lay for some time in field dumps with little or no protection from the elements. In order to meet this requirement, the paint used for bombs must withstand an 18-hour immersion test in cold water without whitening, fading, softening, checking, or failing in other respects.

Artillery shell is still being painted solid colors to indicate shell loading. Paint used for artillery ammunition must withstand weathering and handling without undue chalking or chipping. It is important that the color be maintained and that it be readily distinguished even though splattered with mud. Numerous samples of yellow, for example, have been submitted which are altogether unsatisfactory because the color is not equivalent to the regular chrome pigment specified by the Ordnance Department.

Throughout the entire investigation of the Ordnance Department's paint substitution program, conservation of resins, pigments, oils, and solvents has been given prime consideration. When shortages of the essential raw materials were anticipated early last fall, the Ordnance Department joined forces with the Corps of Engineers, the Quartermaster Corps, and industry to effect satisfactory substitutions in the shortest possible time. A committee was formed by these three supply services of the Army in the Office of the Under Secretary of War, and liaison established with industry and the Protective and Technical Coating Section of the War Production Board. Six months of concentrated effort by the Army and industry team ended in April.

Panels of substitute olive drab finishes which had undergone a six months' exposure in Florida were brought to Washington and carefully inspected by the interested Services of Supply. Very little difference in fading and chalking was noticed between the straight and modified alkyd topcoats.

Many producers of high-grade finishes have sought the advice of the War Production Board on substitute oils for China wood oil, the supply of which is very limited. Specially treated castor or linseed oil may provide a satisfactory substitute. It is impossible at this time, however, to offer the industry definite advice as to acceptable substitutes because service tests have not been completed.

Conservation of chrome pigments has become mandatory. The use of lead chromate is a thing of the past, and the utilization of zinc chromate must definitely be reduced. The addition of organic dyes, lakes, or pigments is not generally considered favorable for use with military equipment owing to poor resistance to weathering. A satisfactory pigment is one which retains its color in the paint film, whether in Arctic or tropical theaters of operation. A pigment formulation based on yellow iron oxide and a minimum of zinc chromate has been investigated as a probable alternate.

Although alternate emergency enamels to replace the ES-474 have been investigated, the Ordnance Department requires enamels used on tanks and combat vehicles to be tough and flexible. Paint must withstand the abrasive action of low-hanging branches, weeds, and bushes without an appreciable scraping off of the top coat when these materiel are actively engaged in the combat area. It would be unreasonable to demand, of course, that the painted surfaces remain wholly intact under cross-country service, but they should withstand rough usage for at least six months. In general, paint has a definite military purpose when it is applied to combat materiel. The lusterless olive drab finish must provide not only corrosion resistance for the metal, but also must provide camouflage properties which enable the materiel when not actually in motion to blend with the surrounding terrain.

Although the substitution program is only six months old, remarkable gains have been made in conservation and in the development of satisfactory finishes for ordnance materiel. These advancements, which will have a decided effect on the successful conclusion of our war effort, are appreciated by the Chief of Ordnance, who wishes to thank the paint industry for its untiring efforts and cooperation.

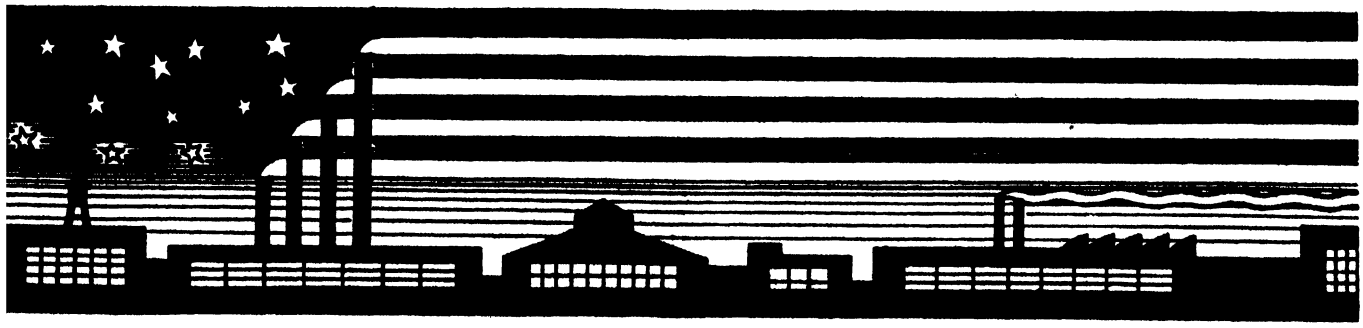
Electrons—Homo Sapiens

Among the various luncheon clubs now active in North America, all marked by highly efficient, somewhat complex organizations and guided by lofty ideals, is one, the Electrons, which is entirely unique. Perhaps its singularity accounts for its healthy, progressive 17-year existence. Or perhaps the Electrons of western New York State have demonstrated that simplicity of organization and a spirit of rousing good fellowship have real social and scientific value.

The Electrons, who meet for luncheon each Wednesday noon in Niagara Falls, N. Y., were founded by eight eminent chemists of the Niagara Frontier on May 12, 1925. They were W. Judson Marsh, V. L. Bohnson, Harvey Gilbert, F. L. Koethen, R. L. Nelson, C. E. Taylor, M. C. Taylor, and J. R. MacMillan.

After about a year the individual members decided to call themselves "Electrons". The purpose of symmetry was secured by giving their chairman the title of "Nucleus", a position first held by Dr. Marsh. Continued growth of the organization made necessary the services of a secretary, appropriately dubbed "Photon". With these two officers and temporary committees for special occasions, the Electrons have continued to function smoothly.

Luncheon is served in one of the hotels in downtown Niagara Falls at 12:15 P. M. every Wednesday. Each member pays for his own lunch. Something less than three quarters of an hour is usually devoted to the "inner man". The speaker is allotted about 30 minutes. A short period of questions usually follows the talk, and the meeting is adjourned





Electron dowsing

soon after 1:30 P. M. The Nucleus presides at the meetings and is responsible for the weekly program. The Photon performs the secretary-treasurer's traditional duties. Finances are as informal as the rest of the organization. The very modest obligations are met by an occasional unannounced "hat-passing" at a regular meeting. Membership is open to all members of the chemical profession employed along the Niagara Frontier and involves only attendance at the meetings. Those regularly attending expect to meet between 25 and 30 of their fellow Electrons each Wednesday. This organization as outlined above is pure tradition. It has never enjoyed a formal written statement.

Early Electron meetings, following a pleasant luncheon, were devoted to the discussion of a recently completed piece of original research by one of the members. As the Electrons became more numerous the scope of the programs broadened. Time, however, proved that weekly discussions soon exhausted this source of programs, fertile as it was. Outside speakers were first invited to discuss only scientific subjects. Eventually topics of general interest appeared on the program. Members are still given ample opportunity to speak, and contribute a substantial proportion of the programs.

Stag attendance is the rule at the weekly meetings. The Electron group was almost five years old before the ladies were noticed in the group's inimitable informal manner. An evening meeting was scheduled with "ladies included", as the announcement stated. The speaker was F. H. Snyder and his subject "Fallacies and Facts about Catalysis". However, this misjudgment of the ladies' interests was corrected on the occasion of the fifth anniversary of the founding of Electrons. A banquet complete with original entertainment and followed by dancing was the first of the now annual "Ladies' Nights" held each year about the middle of May.

Other than the weekly meetings, the Electrons have occasionally indulged in some other functions. Among their early contributions to the A. C. S. was their entertainment at the 82nd meeting of the AMERICAN CHEMICAL SOCIETY in Buffalo, N. Y., in the fall of 1931. On the Wednesday afternoon of that convention, a committee of Electrons headed by R. B. MacMullin and Carl W. Tucker presented an exhibition baseball game in Victoria Park, Niagara Falls, Ontario, for the entertainment of the ladies attending the convention. One team was made up of renowned chemists of the past including Pasteur, Wohler, Lavoissier, Perkins, Priestley, and Mendeléeff, each identified by a large card around his neck. The opponents impersonated well-known living chemists in attendance at the convention and were similarly identified by cards. The ball game was good entertainment, but the garden party that was to follow was marred by rain. The guests were taken into the Clifton House to view, from a vantage point high and dry, the spectacle of Niagara Falls illuminated. With the usual Electron policy of "turn about is fair play", it had been planned to reverse



Electrons entertaining the ladies

the order later in the evening and treat the Falls to the spectacle of the guests illuminated. Accordingly the refreshments supplied by the Electrons included about $150 worth of beverages which could not be obtained legally in the United States at that time. Because of the inclement weather the refreshments were not consumed. Apparently the weather cleared a week or so later, however, because Electrons who were there at that time reveal that a "liquidation party" was held in a boathouse on the Chippewa River.

At the AMERICAN CHEMICAL SOCIETY meeting in Rochester, N. Y., in the fall of 1937 one of the honored guests was N. V. Sedgwick, the world authority on electrons, from Lincoln College, Oxford University, England. Great was Professor Sedgwick's surprise and pleasure at being confronted with 42 real living Electrons at their regular Wednesday meeting held in Rochester for the occasion. This was the first Electron luncheon held in connection with a national A. C. S. meeting.

Later in the fall of 1937 Burrows Morey, an eminent Electron, now an adviser to the Board of Economic Warfare, addressed the Electrons on "dowsing" or the location of underground water supplies with the aid of a forked twig. This subject understandably aroused so much discussion among the Electrons that Electron Paul Magill offered the use of his farm for experimental purposes. An entire Saturday afternoon was devoted to the study of this phenomenon with interesting, if not conclusive, results.

Of all the varied programs the Electrons enjoy, their annual Ladies' Night invariably receives special attention. At the time when there was much talk of food concentrates, Electrons and their wives sat down to the Ladies' Night banquet to find a single large pill in the center of each dinner plate. They were solemnly assured by the committee in charge that the pill represented and included their entire banquet. Howls of anguish from hungry Electrons soon brought a full-course dinner, this time in the usual form.

Another memorable occasion was the Ladies' Night held soon after the manufacture of dry ice was started on a commercial scale. The dessert was served in the form of bowl-shaped blocks of dry ice. Pitchers of a creamy liquid were served. The guests were advised to fill their dry ice bowls with the liquid and stir, thus making their own ice cream. It worked!

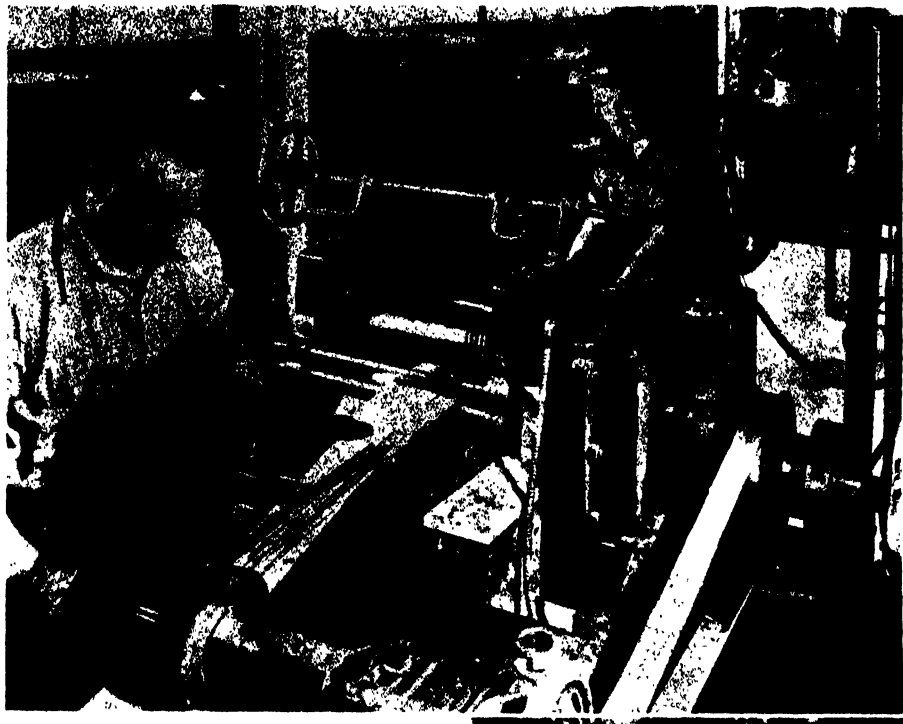
Before national defense prevented groups from visiting manufacturing plants, the Electrons occassionally toured one of the near-by factories. On one occasion they went to the Corning Glass Works in Corning, N. Y., to inspect glassmaking operations. In past summers, picnics followed by softball games on Goat Island in the Niagara River have been enjoyed by the Electrons. They have also acted in an advisory capacity to the Niagara Falls libraries and technical schools. With the exception of the Wednesdays in the Christmas holidays and before each Ladies' Night, there has not been an interruption in weekly meetings since 1928.

The yearly election of officers, held in the early fall, is a time of great acrimony and many harsh words. Candidates chosen by a "fixed" nominating committee are thoroughly maligned by their opposing campaign managers to prevent their election. With the ballot box stuffing that usually ensues, the Electrons are not always certain just how their consistently competent Nuclei and Photons get into office.

C. Vincent-Daviss in 1938 summed up the attitude and spirit of the Electrons most suitably. He said, "Electrons are naturally gregarious. Their natural, keen, enthusiastic interest in things scientific and unscientific is the greatest asset of the organization."

For indispensable help in the preparation of these notes, gratitude is rendered to Electrons R. C. Benner, G. J. Easter, R. R. Ridgway, M. C. Taylor, A. J. Gailey, R. M. Fowler, H. L. Robson, and the present Nucleus and Photon, R. B. Elliott and H. S. Schroeder, respectively.

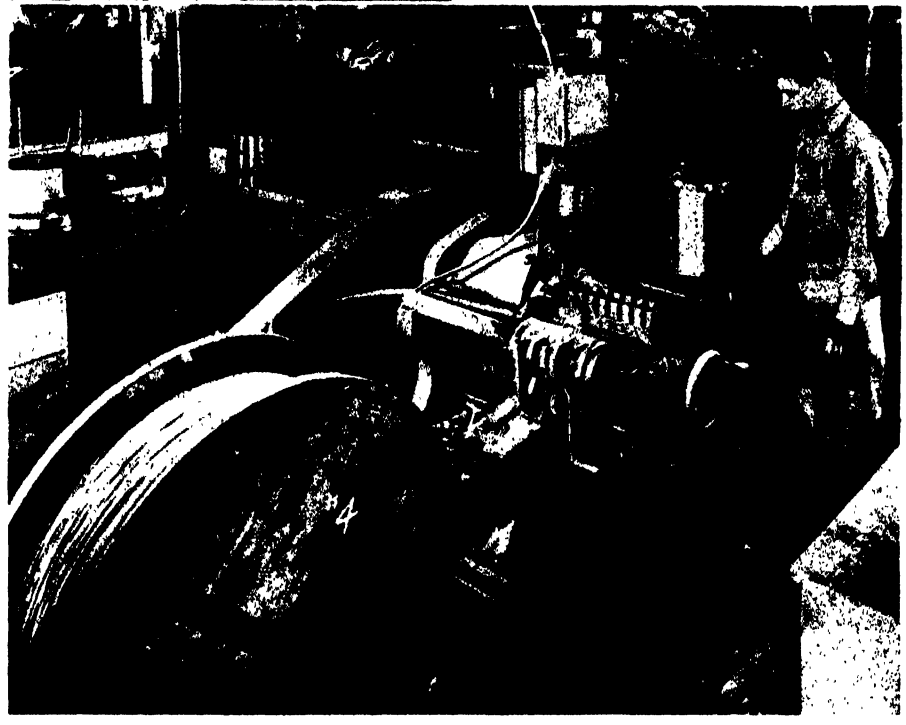
EDGAR F. GUILLOT
THE CARBORUNDUM CO.
NIAGARA FALLS, N. Y.



War Brings New Uses for Silver

Left. These workers at Handy&Harman, New York, are cutting brazing alloy strip from sheets of silver alloy. The strips will be formed into rings and used in pipe fittings on merchant and war ships. *Below.* Silver brazing alloy wire is drawn on a multiple die machine. This wire, 50 per cent silver, is widely used in building war materials.

WIDE WORLD PHOTOS, INC



Allis-Chalmers Opens Plant for Navy

JUST 90 days and a construction technique borrowed from World War I were needed to make ready a new plant for production of Navy material at the Allis-Chalmers Mfg. Co. The plant was the second big Allis-Chalmers war production unit to begin operating within the month. Electrical control equipment will be manufactured in the new building, which will begin to operate as a 100 per cent Navy plant.

The emergency building covers an area of 200,000 feet. Its wood construction was adopted to cut construction time to a minimum and to conserve critical materials. Practically the only metal used in the building are the metal caps, produced in Allis-Chalmers' own foundry, at the ends of timber tresses and columns.

Eire Cement Manufacturer to Augment Fertilizer Shortage

AS PART of a Ministry of Agriculture program to offset a shortage of artificial fertilizers, a cement firm of Eire has agreed to market at nominal cost a potash lime dust by-product of its cement manufacture. The product is valued primarily for its lime content, but contains also from 2 to 3 per cent potash, making it adaptable for tillage crops at a rate of 1 to 2 tons per acre, it is reported.

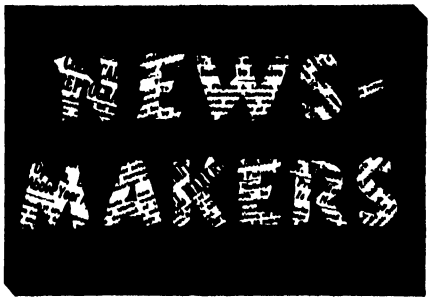
POSSIBILITY of converting phosphate rock, found in quantity in South Africa, into soluble phosphate fertilizer is being studied in that country as part of a general program to develop native base mineral resources.

Chemical Container and Storage Fellowship Established

A MULTIPLE fellowship on chemical containers and storage has been established by Pittsburgh-Des Moines Steel Co. at Mellon Institute of Industrial Research. The senior incumbent of the fellowship is James Bert Garner, best known for his achievements in hydrocarbon chemistry and technology. He is aided by Ludwig Adams, a specialist in engineering materials and welding, and by R. M. Stuchell, a research metallurgist. The Chemical Storage Fellowship will work on all bulk-chemical storage problems in industry, with special current emphasis on hydrocarbons. Of particular urgency at present, it is stated, is the work of the fellowship staff on storage in the synthetic rubber industry, including the basic chemicals, butadiene, styrene, acrylonitrile, and isobutylene.

Process for Nonstaling Baked Goods Patented

ATLAS POWDER CO. is assignee of patent 2,285,065 on nonstaling baked goods, granted to Walter A. Taylor of Tamaqua, Penna. Secret of Mr. Taylor's process is the incorporation of a small amount of sorbitol which is firmly associated with water. Its presence helps keep bread, cake, and other bakery products from drying out.



Richard A. Bardwell, employed in the railroad field service of the National Aluminate Corp., had the degree of chemical engineer conferred upon him at the June commencement exercises of the University of Florida.

E. St. Pierre Bellinger has resigned his position with the Hercules Powder Co., where he was assistant superintendent of the Hercules, Calif., plant, to accept an appointment as captain in the Army Ordnance.



William M. Black

William M. Black has been appointed a vice president of The American Brake Shoe and Foundry Co. He has been president of the company's American Manganese Steel Division, Chicago Heights, Ill., since 1940 and will continue in that capacity.

Gardner H. Chidester, for the past 16 years closely associated with sulfite and semichemical pulping process investigations as a member of the U. S. Forest Products Laboratory's Division of Pulp and Paper, has been appointed chief of that division, succeeding the late **C. E. Curran.** Currently, the division is occupied with wartime research problems, including the development of substitutes from pulp and paper for critical war materials, diversification of species for pulping, and methods for improving pulp yield.

Edward Croft, Jr., has been appointed assistant chemist in the Chemical Warfare Service, where his principal duty will be the preparation of abstracts for the use of the service. Much of this work is of a highly confidential nature.

Milton M. Croom, for the past six years chief chemist for The Springs Cotton Mills, Lancaster, S. C., has been commissioned as lieutenant in the U. S. N. R., and has reported for active duty in Boston, Mass.

J. A. Danner, after more than 25 years' service with the Standard Oil Co. of Indiana, Chicago Division, retired on June 12 under the company's pension plan. His place as industrial sales promoter is being taken by **Harry G. Stiles.**

Arthur R. T. Denues, until recently the engineer in charge of the Explosives Research Unit, Explosives Division, U. S. Bureau of Mines, is now on active duty as a first lieutenant in the Chemical Warfare Service, Edgewood Arsenal, Md.

Charles B. DeWitt is now working as research chemist with Kalunite, Inc., Salt Lake City, Utah. He was formerly associate professor at John Tarleton Agricultural College, Stephenville, Tex.

Mrs. Sarah Vance Dugan, director, Bureau of Food, Drugs, and Hotels, State Department of Health, Kentucky, was elected president of the Association of Food and Drug Officials of the United States at its meeting on June 3. **Hermann C. Lythgoe,** director, Division of Food and Drugs, Massachusetts Department of Public Health, was elected vice president.



Howard N. Eavenson

Howard N. Eavenson, Pittsburgh mining engineer and consultant, has been reelected president of Bituminous Coal Research, Inc., the research agency of the bituminous coal industry and affiliate of the National Coal Association.

Fred W. Elliott has been named a research engineer on the technical staff of Battelle Memorial Institute, Columbus, Ohio, assigned to the Division of Organic Chemistry. Mr. Elliott was previously associated with the By-Products Division of the Jones & Laughlin Steel Co.



Charles L. Faust

Charles L. Faust, chemical engineer, Battelle Memorial Institute, has been named to a five-year term on the board of managers of The Electrochemical Society.

H. B. Feldman has been transferred from Edgewood Arsenal to the War Department Civilian Protection School at Amherst, Mass , where he is an instructor.

Thomas B. Gibb, Jr., Joseph H. Leuner, Walter A. Miller, Robert E. Muller, Richard E. Nicolson, and **Philip F. Wangner, Jr.,** have joined the staff of Bakelite Corp.'s Research and Development Laboratories, Bloomfield, N. J.

John W. Greene is on leave from his position as associate professor of chemical engineering at Kansas State College and is employed as chemical engineer in the Plants Division, Edgewood Arsenal, Md.



Hugh A. Hamilton, Jr.

Hugh A. Hamilton, Jr., chemistry professor at Park College, Parkville, Mo., for the past two years, has moved to Radford, Va., to accept an appointment with

the Hercules Powder Co. In the fall, Mr. Hamilton expects to be transferred to a government plant in Wisconsin, where he will be a supervisor of TNT production.

Major E. R. Harrouff, Chemical Warfare Service, was called to active duty at Edgewood Arsenal, Md., May 15, 1941. After six months' service at Edgewood Arsenal he spent six months in the Manufacturing Department of the Industrial Service Division, Office of the Chief of the Chemical Warfare Service, Washington, D. C. In May 1942 he began a new assignment in the Procurement Department of the Administrative Division at Pine Bluff Arsenal, Chemical Warfare Service, Pine Bluff, Ark.

H. B. Hass, head of the Department of Chemistry, Purdue University, was awarded an honorary doctor of science degree at the recent centennial celebration of his alma mater, Ohio Wesleyan University.

Frank J. Hill has been elected vice president of Greene, Tweed & Co., New York. Mr. Hill has been connected with the company since 1915 and has been sales manager for many years.

J. E. D. McCarty has been appointed director of ignition research of Simmonds Aerocessories, Inc., 10 Rockefeller Plaza, New York, N. Y.

H. Kennedy McCook, wartime priorities specialist, has joined the Washington staff of the National Association of Manufacturers to assist in coordinating activities of the N. A. M. War Committee with those of the government war agencies. Mr. McCook at one time served as head priority specialist of the Materials Division of OPM.

R. B. McKinney has been appointed assistant general manager, Paper Makers Chemical Department, Hercules Powder Co. He joined the Hercules organization in 1913.

William H. McPherson, Jr., 1942 graduate of Syracuse University, received the 1942 Syracuse Section Award of a membership in the AMERICAN CHEMICAL SOCIETY, presented annually to a high ranking senior in one of the colleges in the section's territory. He will pursue graduate work at the Institute of Paper Chemistry, Appleton, Wis.

J. P. Madden has been transferred to the New York office of the Stauffer Chemical Co., where he will handle the sales of industrial chemicals.

Orville E. May, director of the U. S. Department of Agriculture Northern Regional Research Laboratory, Peoria, Ill., has been appointed a research coordinator on the staff of **E. C. Auchter,** agricultural research administrator. **Horace T. Herrick,** assistant chief of the Bureau of Agricultural Chemistry and Engineering, succeeds **Dr. May** and is in turn succeeded by **Carl F. Speh,** who has been giving special attention to the bureau's war research.

George W. Perkins, executive vice president and treasurer of Merck & Co., Inc., Rahway, N. J., has been granted leave of absence to serve as lieutenant colonel in the Chemical Warfare Service, Washington, D. C.

C. F. Pittman, manager of the motor division of the industrial department of General Electric Co., Schenectady, N. Y., has been made assistant to the manager of the industrial department.

Herschel E. Post has been appointed general sales manager, industrial finishes, Pittsburgh Plate Glass Co., Pittsburgh, Penna. He was previously manager of the company's paint factory at Houston, Tex.

Reuben Roseman has been commissioned as first lieutenant in the Sanitary Corps, Army of the United States, and has entered active duty at Fort Jackson, S. C.

At the 55th annual commencement exercises of the Michigan College of Mining and Technology at Houghton on June 1, **Jarvis L. Schwennesen,** Grand Rapids, Mich., the high ranking junior in chemistry or chemical engineering, was awarded a junior membership in the AMERICAN CHEMICAL SOCIETY and a one-year subscription to *Industrial and Engineering Chemistry.* This annual award is sponsored by Chi Epsilon Chi, local honor fraternity in chemistry and chemical engineering.

Recent additions to the research staff of the Pennsylvania Coal Products Co., Petrolia, Penna., include **Rodger D. Spencer,** formerly of the Research Department, Westinghouse Electric & Manufacturing Co.; **Stanley E. Jeppesen,** recent graduate of the University of Idaho; and **Orin D. Cunningham,** formerly of the Reilly Laboratories, Indianapolis, Ind.

The following have recently been added to the chemical staff of the Edwal Laboratories, Inc., Chicago, Ill.: **James W. Watters,** previously with the U. S. Food and Drug Administration; **Richard I. Jackson,** previously with Trinity University, Waxahacie, Tex.; and **Eurilla Herrin,** 1942 graduate of the Central Y. M. C. A. College of Chicago.

Bloede Scholarship Awarded

TO FREDERICK G. SAWYER, a candidate for the Ph.D. degree in the Department of Chemical Engineering at the Polytechnic Institute of Brooklyn, goes the Bloede Scholarship for 1942–43. This award, founded by the late Victor G. Bloede in 1916, is awarded by The Chemists' Club, New York, in alternate years and carries a stipend of $580. Mr. Sawyer received the B.Ch.E. and M.Ch.E. degrees from the institute in 1939 and 1941.

The Hoffmann scholarship, also awarded by The Chemists' Club, has been held by Robert T. Olsen during 1941–42. Mr. Olsen expects to complete work for the Ph.D. degree at Massachusetts Institute of Technology in the Department of Chemistry this fall and will take a position in industry.

Armour Research Foundation Increases Staff

ADDITIONS to the staff of the Chemical Engineering Section, Armour Research Foundation, Chicago, are **John M. MacGregor,** formerly with the Division of Soils, University of Minnesota; **Ibert Mellan,** author of "Industrial Solvents" and "Organic Reagents in Inorganic Analysis"; **E. L. Hill,** recently head of the Department of Chemistry, Carthage College; and **Francis J. Frere,** formerly with the Standard Oil Development Co. of Elizabeth, N. J. Dr. Frere will direct the foundation's analytical laboratory.

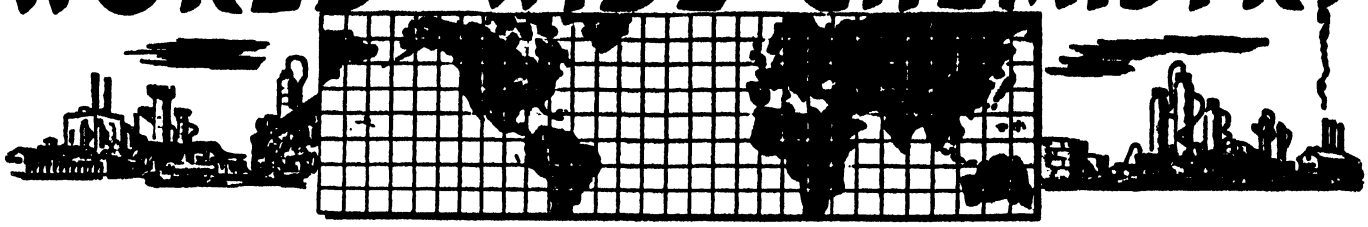
Belgium Tests Fertilizers for Sugar-Beet Cultivation

A MIXED fertilizer in the form of chlorides has emerged as the most satisfactory in sugar-beet cultivation during aseries of tests, conducted in Belgium in the past five years, on mixed fertilizers containing potassium and sodium salts.

Use of sodium chloride alone or of sodium carbonate or sodium sulfate alone, or combined with potash, did not give as good results, it was said, in either sugar content of the beet or the total sugar yield. Soda in the mixed fertilizer tended to increase resistance of the beet to disease, without harmful effect on the soil.

Further tests have indicated that simultaneous application of sodium and potassium compounds in the form of pure salts results in a 12 per cent increased sugar yield, compared with a 7 per cent increase from potash alone. Soda is particularly beneficial in light, sandy soil. Fertilizers containing soda are recommended in the report for sugar-beet districts where leaf yellowing disease is prevalent.

WORLD-WIDE CHEMISTRY



Continental Europe

Germany

Germany's production of potassic and nitrogenous fertilizers normally exceeds local requirements, and such difficulties as have been encountered by farmers in Germany in obtaining these chemical fertilizers were caused mostly by shortcomings in transportation. It is reported that the bulk of demand for potassic and nitrogenous fertilizers has been covered regularly, but the supply of phosphatic fertilizers has been far below demands. Several superphosphate factories in the eastern provinces have been closed down, while consumers in western Germany seem to rely mainly on basic slag from blast furnaces in the Rhineland and Belgium. The lack of phosphatic fertilizers has been felt most severely by sugar-beet growers. Before the war Germany used to import more than 1,000,000 tons of rock phosphates and 400,000 tons of basic slag, and only a small fraction of this tonnage can be obtained today. The fertilizer position in the occupied territories in the east is especially bad, although recently efforts have been made to draw on supplies from local factories where war damages have been repaired.

Recovery of Chemicals in Cellwool Industry Increased

The big expansion of the cellwool industry since the beginning of the war has greatly increased the demand for heavy chemicals. It is reported that the industry now absorbs about 400,000 tons of sulfuric acid and 360,000 tons of sodium hydroxide a year. These chemicals are recovered by continuous electrolytic decomposition from the waste Glauber salt in the spinning baths, of which about 300,000 tons are said to be obtained every year. The chief difficulty in the development of this process was the discovery of a suitable construction material for the plant, as corrosion-resistant alloy steel is in short supply. A process, economical from the viewpoint of apparatus, for the partial recovery of sulfuric acid and sodium hydroxide is reported to be available and to yield the materials in sufficiently high concentration and purity.

Some progress is also said to have been made in the recovery of carbon disulfide, of which about 140,000 tons are used every year. Over 40 per cent of the material is recovered, partly from the spinning baths and partly from the cellwool fiber to which it adheres and from which it is recovered by steam distillation followed by condensation. The resulting saving in imported sulfur is said to be 60,000 tons annually. Disposal of the poisonous waste gases has become much more difficult with increased production. These are now usually carried by ventilators through earthenware pipes to the boiler plant where the sulfurous contents burn to sulfur dioxide without damaging the boiler tubes. It is admitted that other methods of disposal, e. g., recovery in absorption towers or oxidation with ozone or chlorine, would yield valuable by-products, but these alternative methods have been found to be too expensive considering the lack of a suitable outlet for the materials obtained.

Hemicelluloses from Cellwool Factories are to Be Developed

Much attention is being paid to the hemicelluloses which must be eliminated from cellulose material and are usually removed by preparatory hydrolysis, a process which consists of the treatment of wood, straw, and other cellulose materials with a weak acid solution under pressure. It yields a superior kind of cellulose for cellwool manufacture. The hemicelluloses contain xylose, mannose, galactose, and glucose. Xylose is obtained from straw and deciduous trees; coniferous trees yield about 50 per cent of mannose. Furfural for the lacquer and plastics industry can be produced from the xylose, but more interest seems to be given to the manufacture of yeast and protein products. Pentosans obtained by hydrolysis are carefully purified and, after addition of phosphate and ammonium salts, yield on fermentation with *Torula utilis* in a strong air current a yeast rich in vitamin B. Nothing is known about the extent to which industrial use is made of the hemicelluloses at present, but it is claimed that one cellwool factory alone would be able to produce 20,000 tons of yeast with 10,000 tons of protein. Compared with other processes for the biological protein synthesis from cellulose-containing materials after hydrolysis, this method is said to have the advantage of mild operating conditions resulting only in a partial saccharification which leaves the cellulose available for other purposes.

Nitrogenous Fertilizers Raise Protein Content of Cereals

Experiments on increasing the protein contents of cereals have shown that satisfactory results can be obtained with summer and winter barley, oats, and summer and winter wheat, if nitrogenous fertilizers are applied after the corn has eared. These doses are additional to the fertilizers applied before sowing and consist preferably of nitrates. A granular type like nitrate of lime and ammonia, applied immediately after rains, is said to be most suitable. Increases in protein yields by 20 to 50 per cent per acre are claimed to have been obtained by application of additional doses of nitrogenous fertilizers at a cost of 0.20 to 0.30 mark per kilogram of protein. Not only the ears but the straw showed higher protein content, it is reported, so that the feeding value of the straw was increased.

Perlon Fiber in Commercial Production

Perlon fiber, the new fully synthetic fiber developed by I. G. Farbenindustrie, is reported to be in commercial production and available for special purposes where strength is important. For civilian use Perlon fiber will be supplied at first for such articles as shoe laces and toes and heels of socks and stockings. The larger part of the output will be used for industrial and military purposes.

Superpolyamides May Be Used as Leather Substitute

Several grades of Igamid, the I. G. Farbenindustrie brand of superpolyamides, have been studied for possible use in the leather industry. As these mate-

EDITOR'S NOTE. Those interested in further details should address the correspondent whose name and address appear for each country, and enclose sufficient international coupons to prepay the reply. United States stamps should not be sent.

rials have a strength superior to sleeked leather and can be sewn without danger of tearing, they can be used in the same way as most kinds of leather for bags and cases. It is reported that preparations are now under way for the use of Igamid as sole leather. The output, however, is not large enough to replace a substantial part of the leather normally used, and work on other substitutes continues.

Sodium Cellulose Glycolate Substitutes for Agar-Agar

Among substitutes of gum arabic, agar-agar, and tragacanth is sodium cellulose glycolate, made in Germany by six manufacturers who offer about 40 different preparations. Some of these are used for sizing and dressing in the textile industry, others serve as emulsifiers, binding agents in the paint industry, adhesives, etc. It is expected that suitable grades will shortly be available for use in the food industry.

Peat Coke and Peat Tar Prove Useful in Laboratory Experiments

The coal shortage has focused attention on local deposits of peat in various countries of Europe as a fuel material, not only in stationary ovens and furnaces but for mobile gas producer plants. Little attention, however, has so far been paid to its chemical utilization, mainly because of its unsatisfactory physical condition, high water content, and consequent difficulty of handling. In laboratory experiments it was found that a treatment preparatory to carbonization may give satisfactory results. It consisted of the removal of gross impurities and a simple breaking up of the material, followed by mechanical breaking and partial dehydration by pressure or similar means. The product obtained contains 60 to 70 per cent of water and is very plastic. It must be dried without further application of pressure and yields, when carbonized, a very firm coke. Peat cokes obtained by other processes were unsatisfactory because they were prone to disintegrate. The good mechanical properties of this peat coke, its high reactivity and calorific value (7,500 kg.-cal.), low ash content, and absence of sulfur are expected to ensure a satisfactory demand for the material in metallurgy and gas production.

The peat tar obtained by carbonization was found to contain surprisingly little nitrogen. While dried peat contains an average of 36 to 37 per cent of nitrogen, peat tar contains only 7 per cent, as most of the nitrogen enters the carbonization water and gas. Low-temperature carbonization peat was found to be similar in chemical composition to lignite low-temperature carbonization tar, so that it is thought it may prove of interest for hydrogenation. The distillation of peat tar proved most successful when applied with overheated steam and yielded 7.5 per cent of motor spirit distilling below 200° C.; 23.3 per cent of gas oil, between 200° and 350° C.; and 20 per cent of heavy oil, above 350° C. The remainder consisted of 15 per cent of crude paraffins 13.2 per cent of phenols, 3.8 per cent of fatty acids, and 3 per cent of basic constituents—all recovered by various treatments. Neither the motor spirit nor the gas oil, however, is regarded as satisfactory in quality for use in motor engines, although they may be improved by further treatment. Similarly it is believed that the higher distillates of peat tar may yield heavy oils for use in the manufacture of lubricants.

New Methods Developed in Raffination of Benzene

In the raffination of crude benzene, the previous process employing concentrated sulfuric acid of 66° Bé. has been partly abandoned in favor of a selective elimination of diolefins, etc., by use of sulfuric acid of about 60° Bé. or by heating with alkali of benzene washed in diluted acid. This method has the advantage of leaving valuable olefins and unsaturated hydrocarbons in the motor benzene and reducing the loss by washing from 10 or 15 per cent to 5 per cent. The disadvantage is that after prolonged storage the benzene yellows and precipitates resins. To overcome this drawback, the crude benzene is separated by distillation into two fractions, below 135° C. distillation point and 135° to 180° C. The first one only is treated with sulfuric acid of 60° Bé. at 25° to 40° C., while the second fraction is washed with 66° Bé. After neutralization the two fractions are mixed and, although the total loss is only 6 per cent, the content of resinous material is below 1 gram per 10,000 cc.

Separation of crude benzene into two fractions to be treated by different processes is also the solution for production of a motor fuel with a sufficiently high antiknock value from the kerosene fraction of mineral oils. If the latter is blended with benzene, an inclination towards knocking persists because the mixture is highly volatile and of varied composition. It was found to be unsuitable for certain engines. However, the crude benzene can be separated into two fractions, distilling below and above 160° C. The former is refined with sulfuric acid; the latter is subjected to pressure hydrogenation in such a way that impurities (sulfur and oxygen compounds) are eliminated and the other contents are left unaffected. Restriction of pressure hydrogenation to one fraction is said to ensure without great loss in quantity a high yield especially of hydrocarbons distilling at higher temperatures.

New Asbestos Source Reported Opened in Norway

Only small deposits of asbestos minerals are known to exist in Continental Europe, and German supplies are at present limited to small quantities produced in Italy, Czecho-Slovakia, and Finland. A new source is reported to have been opened in Norway, where serpentine has been known to be available for considerable time. No information is available regarding the material, mining of which has now commenced, but the "stone wool" now mined there seems to be a material closely related to asbestos.

Sweden

Ragnar Windbladh, director of the chemical section of the Swedish Industrial Commission, has stated that Sweden's important requirements of chemical raw materials, including those for the rubber industry, normally amounted to 280,000,000 kronor, i. e., more than 60 per cent of production. Since the beginning of the war great efforts have been made to extend the raw material basis of the Swedish chemical industry. Production of sulfuric acid has been increased, and is now sufficient to meet the country's demand. Zinc salts, chromic acid, chromium salts, potassium permanganate, and certain phosphates are being made in Sweden. Output of sodium sulfate, nitric acid, and hydrochloric acid has been greatly enlarged. The big requirements of the cellulose industry have also stimulated electrochemical production. Larger tonnages of chlorine are being produced, and the manufacture of organic chlorine products has also increased.

Two basic industries which have made great progress in Sweden in recent years are wood distillation and mining. The former has been stimulated by the enlarged demands for charcoal for iron smelting and mobile gas producer plant, while the latter has been extended in various directions. Hitherto undeveloped deposits of copper and other metals are being opened up, and sulfur production is likely to be raised as a result of larger supplies from the mining industry.

Swedish Shale Oil Production Expanding

The shale oil plant at Kinnekulle, operated by a 10,000,000 kronor company in which the Swedish Navy is interested, has been in full production for one year. It is said that experience during this time has been fully satisfactory. The shale can be used almost completely as a fuel, and the by-products are utilized with a view to reducing the cost of production to be borne by the shale oil. A sulfur plant is now producing large quantities of sulfur

of very high quality for which the cellulose industry offers a ready outlet. Several new furnaces will be put into operation in the near future to increase the output of shale oil. Large-scale experiments on the treatment of the shale oil have been carried out with good results.

In the meantime progress is also being made with other shale oil plants. The big works at Närke began operations a few months ago, and a plant for the utilization of by-products is being installed. Fredrik Ljungström, who has developed a new process for the extraction of shale oil, received a government grant of 1,200,000 kronor to build an experimental plant at Ekeby where it is intended to treat 2,500 tons of shale a day. Stocks for this new pilot plant have been accumulated in recent months. The works at Ekeby is expected to produce 85 per cent of fuel oil and 15 per cent of a crude oil, which will probably be sent to one of the Swedish mineral oil refineries for further treatment. Experiments have also been made with a view to the use of peat as a fuel for shale distillation.

Small-Scale Mining of Fluorspar Started

Aktiebolaget Brantevíks Gruvor, a company formed not so long ago, has begun mining fluorspar on a small scale. The material is to be used for the manufacture of light metals in a plant at Sundsvall.

Fodder Cellulose Mixed with Reed and Pine Needles

Production of fodder cellulose has made great progress in Sweden as a result of difficulties in importing overseas feeding stuffs and in disposing of cellulose for paper and textile factories. Several more plants have been equipped with machinery for the chemical treatment of cellulose for use as a fodder, and mixed feeding materials have been brought on the market. One of these contains needles of pine trees in addition to fodder cellulose prepared from wood and is given to horses, while another one includes reeds cut into small pieces and is recommended for cattle feeding.

Belgium

Société Anonyme Le Lanital Belge has built a factory for the production of 4 tons daily of casein wool, but it is doubtful whether the plant will be put into operation during the war. The Belgian milk output is needed entirely for feeding the population, and efforts to import casein from other countries have been unsuccessful. The plant capacity can be easily doubled, as provision for a later extension was made when building operations started, but at present it is not expected that use will be made of this possibility.

Denmark

Experiments on the production of alcohol from sugar beets have been carried out by the distillery at Hobro with such satisfactory results that the distillation of sugar beets is to be carried out on a commercial scale this year. It is said that the use of sugar beets is both cheaper and easier than that of potatoes which were formerly used at Hobro. The residues can be used as a feeding material.

France

Compagnie Centrale d'Hydrogenation et de Synthèse has been formed in Paris with a capital of 80,000,000 francs. Prominent among the founders are Banque de Paris et des Pays Bas and Compagnie des Mines de Béthune, the coal mining company which has been operating a hydrogenation plant for several years. The French Minister of Finance has been authorized to take over up to 30 per cent of the shares of the new company, and the government is actively interested in the work of the new company. The first plant will be built at Aix-en-Provence in the Fuveau basin where large deposits of lignite are available. Lignite seems to be the only raw material which will be used at first, but the location of the plant near the Mediterranean should make utilization of mineral oil residues possible should this be desired after the end of the war. The capacity of the new plant will be 25,000 tons of synthetic gasoline and 25,000 tons of methanol a year. The plans are to be drawn up in such a way that the plant can be doubled later. The company has also been authorized to build other plants elsewhere. The process to be used is an adaptation to lignite of the Fischer-Tropsch process and has been developed in France.

The new enterprise is not the only one undertaken in France in recent years. Though there is only one hydrogenation plant based on coal, that of the Compagnie des Mines de Béthune, several projects for the synthetic production of oil from lignite, shale, and oil residues had been worked out before the war, and some of these are to be put into effect now, although in different form. Plans for the establishment of lignite hydrogenation plants in the Départements of Landes and Bouches du Rhône have been announced by the Société de Combustibles et Carburants Nationaux, and the work on a shale distillation plant at Autun has made progress. All these projects suffer, however, from the difficulty of obtaining equipment and materials. Construction work on the new plant of the Compagnie Centrale d'Hydrogenation et de Synthèse is scheduled to last three years.

Switzerland

Following a government decision, Holzverzuckerungs A.-G. of Ems, Graubünden, is preparing for the production of 2,000 tons a year of yeast by the saccharification of wood. The yeast will be used in connection with domestic feeding materials with a view to the replacement of imported feeding stuffs which are now unable to meet the supply.

Swiss Chemical Industry Faces Wartime Problems

Swiss producers of fine chemicals, pharmaceutical preparations, and synthetic dyestuffs report that the export problem has greatly increased of late. Trade with other countries of Continental Europe is governed by clearing and compensation agreements which are generally considered satisfactory as far as the technique of the transfer of payments is concerned, but as it becomes increasingly difficult to replace raw materials used up in manufacture, Swiss chemical manufacturers have in some cases stipulated that the foreign buyer should supply them in return with the raw materials required for their products. Other means to overcome wartime difficulties have been replacement of imported raw materials by domestic ones, changes in manufacturing processes, and introduction of entirely new products. Much ingenuity seems to have been displayed by the leading firms, but great difficulties had to be overcome in the beginning, and it is feared that even greater obstacles will be encountered in the near future. Cooperation in the Swiss dyestuffs industry has made progress as a result of recent changes. It is hoped that in future many intermediates which had to be imported will be made in Switzerland, and research in this direction has been undertaken and shows good results. In overseas markets strong foreign competition was noticed at times. The absence of high-class products has compelled foreign consumers to take what was offered to them, and it is feared that this may have adverse effects on Swiss exports of high-class chemicals and dyestuffs even after the war.

Italy

Istituto per la Riconstruzioni Industriale, the government-owned company originally formed to put Italian banking on a sound basis, has taken a considerable interest in the production of synthetic rubber. Two companies were formed for this purpose jointly with the rubber manufacturing combine Pirelli, and it is reported that the first of these is in a position to begin production. This company is Societa Anonima Industria Gomma Sintetica which has built a plant

capable of an annual production of 6,000 tons of synthetic rubber at Ferrara. The raw material to be used is alcohol. The other IRI subsidiary to engage in synthetic rubber production is Societa per la Produzione della Gomma Sintetica, which is building a factory with a capacity of 12,000 tons a year at Terni for the utilization of lignite by a German process. This plant will not be ready for production before next year. Istituto per la Ricostruzioni Industriale is also interested in the Italian cellulose industry and is cooperating with the paper company Burgo in the erection of several new cellulose factories.

Another Italian company is going to build a plant for the treatment of guayule at Cerignola. Guayule has been planted on an area of 17,500 acres in the province of Apulia. The plant will not be completed until 1944.

Eastern Europe

While some chemical factories in the occupied eastern territories have been taken over by German private companies, in general German policy has been to establish new companies for the management of chemical enterprises in Poland and other countries under the temporary control of the German Army. These companies are divided into two groups—Betreuungsgesellschaften (trust companies) and Betriebsgesellschaften (operating companies). The latter group includes Baltische Oel A. G., Ostöl G. m. b. H., Berg- und Hüttenwerksgesellschaft Ost m. b. H., and Ostfaser G. m. b. H. These firms are concerned with exploitation of local resources of shale oil, mineral oils, minerals, and fibers. The group of trust companies includes Soda- und Aetzalkalien-Ostgesellschaft, Chemie-Ostgesellschaft, Stickstoff-Ostgesellschaft, Superphosphat-Ostgesellschaft, and Seifen- und Waschmittel-Ostgesellschaft. These companies are concerned with the operation of entire industries—soda and caustic alkalies, chemicals, nitrogen compounds, superphosphates, and soaps and washing agents. Their function is mainly to supervise factories in their respective industries and to ensure supplies for the local worker.

Modern Mica Plant Proposed for Bulgaria

A modern plant for the utilization of mica is being erected by German interests in the Prilep district of Macedonia. When completed, it will employ 1,500 men in the mining and treatment of the material which was formerly exploited by primitive methods.

Chile Exports Bark of Quillay Tree to U. S.

The United States is the heaviest foreign purchaser of Chile's soap bark, quillay, which is produced principally in that country. Exports to the United States rose in 1941 to 982.3 tons, compared with 733.3 metric tons the year before. United States imports of this article from Chile were only 120.2 tons for January and February of this year, however, compared with 191.5 tons for the same two months of 1941.

The quillay tree grows wild at an elevation of 2,000 feet on Chile's mountains, its bark rich in saponin. The product has many uses, serving in medicine as a detergent or cleansing agent and as an expectorant in early stages of bronchitis. Industrially it is used as an emulsifying agent in shampoos, ointments, balsams and resins, cosmetic preparations, and fire extinguishers and for producing foam on nonalcoholic carbonated beverages.

The Chilean Government treats the product as a monopoly, requiring written license to export and establishing standards for classifying the product. Owing to laxity in the past and destructive methods of stripping bark, it is estimated more than 250,000 trees are destroyed annually. In spite of various experiments, efforts at propagation of trees from the seeds have never succeeded.

Mexican Lime Oil Plants to Operate at Capacity

Lime oil manufacturing plants in Mexico will operate to capacity this season, it is reported. Substantially increased production of limes, with rising prices stimulating the manufacture of lime oil, have been forecast for the 1942 season in earlier reports. Lime-oil output in the current year is expected to exceed the 1941 figure of 110,000 pounds.

Some changes noted in the current outlook over previous seasons include a new railroad tapping the area south from Uruapan, in Michoacan, expected to save much fruit previously damaged by rough transit. The Colima area is expected to have a larger crop this year because of additional trees coming into bearing, also the recurrence of the fruit-bearing cycle this season. A 25 per cent increase may result.

Should a shortage of packing materials occur, it may cause a drop in exports, but the factories may have difficulty in handling all supplies received for extraction of oil.

Egypt's wheat crop took an estimated 80,000 tons of nitrate in 1942, although some reservations are reported as to how much went for wheat, and whether any was used for barley or reserved for the later cotton crop. It is generally believed that farmyard manure was widely used this year.

Government of India Promises to Protect Postwar Chemical Industry

Rapid growth is reported for India's chemical industry, and the government has given assurances that this will be protected after the war. Not only are old factories expanding, but new ones are appearing, producing chemicals for war needs and commerce. There has been an increased production of toluene and nitric acid for explosives and a large output of naphthalene, glycerol, copper sulfate, aluminum sulfate, magnesium sulfate, zinc chloride, and alum, with sodium and potassium dichromates being manufactured on a smaller scale.

Under local industrialization programs sulfuric acid, sulfates, glucose, starch, casein, and plastics are also to be made. The manufacture of chemicals as by-products of nonchemical plants has developed. In Bengal, for instance, a new steel center is supplying considerable amounts of ammonia, benzene, and tar.

Development of Industries in Iraq under Consideration

Belief is current, it is reported, that Iraq will be a center of many industries, products of which will be used for domestic requirements as well as for export to the Near and Middle East countries. The need is for industries manufacturing cement, paper, glassware, burlap sacks, matches, beer, leather, hosiery, cotton textiles, window glass, toilet soap, and finished bandages. There was under consideration late in the past year the organization of industrial units to produce such articles.

Ireland Plans to Produce Superphosphates Locally

The prospect that Ireland may derive from domestic mining operations at least a fourth of the quantity of superphosphates normally used in the country is reported. Work has been started in County Wicklow on the mining of iron pyrites for producing sulfuric acid, under direction of the Mineral Exploration and Development Co. Together with the output from County Clare phosphate deposits, it is hoped that a portion of domestic requirements will result from such sources.

Mexican Phenol Needs Supplied by Imports

Mexican consumption of phenol approximates 10,100 kg. annually and is supplied by imports, formerly from the United States, Germany, and the Netherlands. Imports have ranged from a low of 5,540 kg. in 1940 to 10,716 during 1935, with 1941 figures at about the annual average. Phenol is used as an antiseptic, in the manufacture of picric acid, and by the plastic and paint industries.

POTOMAC POSTSCRIPTS

WPB Activities

Agar. To prevent any diversion of agar to nondefense purposes, the definition of the material in Conservation Order M-96 has been broadened to include wet as well as dry forms. This is accomplished by Amendment 1, which defines agar to mean "any mucilaginous substance, whether dried or in other form . . . . . ."

Antimalarial Agents. Because large amounts of antimalarial agents will be needed by our armed forces fighting in the tropics, WPB has taken two actions designed to prevent the use of stocks of any such drugs for nonessential purposes. An amendment to Conservation Order M-131 revokes the provision which exempted quinine or totaquine stocks of less than 50 ounces from sales restrictions of the order. A new order, M-131-a, prohibits the sale of any amount of cinchonine or cinchonidine for other than antimalarial purposes, or the sale of quinidine except for antimalarial purposes or treatment of cardiac disorders. All three of these substances are derived from cinchona bark, which this country normally obtains from Java. The United States is now dependent on the stock pile of quinine which had been built up before we entered the war and on the small amounts of bark which we may be able to procure from South America. The existing supply of the three drugs is not definitely known. Production was quite small when quinine was generally available for all purposes, but has recently increased. The present demand for them as antimalarial agents has been slight, but is expected to increase as reserve supplies of quinine are diminished.

Butadiene, basic ingredient for the manufacture of Buna-type synthetic rubber, is placed under allocation in Order M-178. Producers seeking to deliver and persons asking delivery of butadiene are required to make application to the Director of Industry Operations, Reference M-178. They are requested to use Form PD-33, which covers the production and shipment of all chemicals used in the manufacture of synthetic rubber. Producers who make less than 5 tons of butadiene per month are excepted from provisions of the order.

Chrome Chemicals. Restrictions on the use of chrome chemicals, particularly in the manufacture of pigments and printing inks, have been eased. Revisions were made in Orders M-18-b, covering various uses of chrome chemicals, and M-53, which relates to the use of chrome pigments in printing inks. The orders cover chrome chemicals only and have no bearing on metallurgical or refractory grades of chromium. Approximately 12 per cent of the total chromium supply is used for chemicals, of grades not adaptable for other uses.

M-18-b lifts the restriction on the manufacture of chrome pigments from 90 per cent of the base period, the year ending June 30, 1941, to 100 per cent. Use of chrome chemicals in the manufacture of ceramics, soap, and glass, heretofore prohibited, is limited to 100 per cent of the base period. In roofing materials, also prohibited by the original order, 50 per cent of the base period use may be consumed. For leather tanning the restriction is upped from 90 to 100 per cent. M-53 permits the use of chrome pigments in printing inks of 100 per cent of the amount used in 1941, instead of 70 per cent.

Coal and Coke. Chemical producers are permitted to build up inventories of coal and coke by Amendment 2 to Preference Rating Order P-89. The action is part of a nation-wide drive to encourage accumulation of fuel stocks in anticipation of shortages expected to be caused next winter by war demands on transportation facilities. Amendment 2 also makes the order and all amendments to the order effective until revoked. The previous amendment was to have expired on June 30.

Coatings. To enable steel drum manufacturers to use some 150,000 gallons of exterior drum coating that they have on hand, the use of which was forbidden by Conservation Order M-158, an amendment to the order has been issued. The amendment also limits application of the order to drums made of 29 gage or heavier steel, the intention being to exclude from the order such containers as tin cans.

Use of pigmented coatings of any color on either or both ends of drums or upon the sides, where required by Government or underwriters' regulations, and the use of clear as well as black coatings are permitted without restriction. These drum coatings are suitable for no other purpose, the materials in them are not reclaimable, and it is felt that further restrictions on existing stocks would serve no useful purpose.

Ethyl Cellulose is placed under complete allocation control by General Preference Order M-175. By the terms of the order, no person may deliver and no person may accept delivery of ethyl cellulose except by specific authorization of the Director of Industry Operations. Deliveries of 50 pounds by any one person to any one other person in one month are excepted. While production is now larger than ever before, orders carrying preference ratings of A-10 or higher are drawing off stocks for which comparatively plentiful nitrocotton, pitch, tar, or other substitutes are available. This order is issued to prevent use of ethyl cellulose in places where substitutes are adequate.

Plastics. The growing importance of plastics in the war effort is reflected by the action of the Director of Industry Operations in taking control of the distribution of thermoplastics. All other types of plastics already are under various types of control. Order M-154 sets up a ladder of uses to govern distribution of all types of thermoplastics to all users.

War orders are to be filled first and without restrictions, then Class I orders to the extent available. The remaining available supply is to be used to fill Class II orders up to 50 per cent. Any residual supply over 50 per cent is to be divided equally between unfilled Class II orders and Class III orders. Until September 1, Class IV will be considered a part of Class III. After that date the use of thermoplastics in the manufacture of articles in Class IV will be prohibited. The divisions are:

Class I—Essential equipment for transportation, communications, industrial plants and offices, health supplies, food production and distribution, technical and safety uses, and housing.
Class II—Commercial equipment, school and educational supplies, automobile and bicycle parts, household appliances, and essential personal items.
Class III—Less essential commercial, household, and personal items.
Class IV—Articles deemed primarily ornamental or nonessential.

The order covers thermoplastic synthetic resins and cellulose derivatives. Formaldehyde plastics and derivatives are covered by Order M-25 and plastics with elastic qualities are covered by Order M-10, which controls polyvinyl chloride and its derivatives.

Pyrethrum goes under complete allocation and end use control by General Preference Order M-179. The order provides that no pyrethrum may be delivered without express authorization of the Director of Industry Operations. He also may direct the use to which pyrethrum may be put. Rotenone was formerly the chief raw material used in insecticides, but since it was put under allocation by Conservation Order M-133, greater demands have been made on pyrethrum as a substitute. All United States supplies of pyrethrum are imported.

Solvents and Oils. Millions of gallons of valuable chemical solvents and oils which are now being discarded can be reclaimed for further production purposes, according to S. Donald Perlman, salvage director for the chemical and textile indus-

tries, Industrial Salvage Section of the Bureau of Industrial Conservation. Contacts and conferences with business firms engaged in the reclamation and recovery of commercial solvents, said Mr. Perlman, indicate that they have facilities available for increasing by 50 to 75 per cent the amount of solvent reclamation now going on in the country. The same chemicals that are used for solvents are also employed directly or indirectly in the manufacture of munitions and other war material, he pointed out. The principal types of solvents that can be reclaimed are alcohols, chlorinated compounds, esters, ethers, hydrocarbons, and ketones.

An educational campaign has been initiated by the Bureau of Industrial Conservation to make sure that all users of solvents take advantage of the facilities available for reclaiming and recovering them. Recovery of solvents means condensing vaporized solvents as part of the original manufacturing process. About a billion pounds a year are now being saved in this way, stated Mr. Perlman. Reclamation of solvents, on the other hand, he pointed out, means hauling away the sludge and contaminated contents of vats and putting them through a special reclaiming process. Clean chemicals may be obtained by such operations as distilling, centrifuging, filtering, washing, or decanting.

There is an economy side to the picture of reclaiming solvents as well as the presently vital factor of conserving them for war production, Mr. Perlman explained. A solvent that costs 20 cents a gallon, for example, may often be reclaimed for as little as 2 cents a gallon and used again.

Tinplate and Terneplate. Manufacture or use of tinplate or terneplate cans for many chemicals, paints, and other special products is prohibited in a revision of Conservation Order M-81. Among the special products for which tinplate or terneplate cans are not permitted are the following:

All paint and related products. An exception is made in the case of shellac, lacquers, varnish removers, lacquer thinners, and lacquer stains, which may use terneplate but not tinplate cans.

Health supplies except chloroform, ether, and blood plasma for the Armed Services or the Red Cross.

Alcohol; cements, including rubber, linoleum, and radiator; fly spray; lighter fluids; acetone; amyl acetate; oleic acid; sodium silicate; dry cleaners; turpentine; phenols and benzene; and glycerol.

Dyes; graphite; liquid soap; glues and paste; waxes; and polish.

The revision also prohibits the packing in tinplate or terneplate after October 31 of hardened edible oils, hardened or unhardened lard, edible liquid oils, fish filets, crab meat, and shrimp.

The revised order, according to Containers Branch officials, will result in an annual saving of an additional 450 tons of tin. It had been computed that the original M-81 order would reduce annual consumption of tin for cans to 18,000 tons, compared with 40,000 tons used for the same purposes in 1941.

Price Regulations

Antifreezes. American motorists will be able to obtain antifreeze at reasonable levels during the coming winter, Leon Henderson, Price Administrator, has stated in announcing maximum prices for this commodity. The retail price has been established at levels well under the speculative quotations prevalent at the end of last winter, he said. The dollars and cents maximums were established by Maximum Price Regulation 170. The maximum price for permanent antifreeze is the price which prevailed in the month during the six-month period ended March 31, 1942, in which the individual seller sold the greatest amount of antifreeze. In no event, however, may the retail price be higher than $2.65 per gallon or 70 cents a quart.

Magnesite. To ensure an adequate supply of maintenance grade dead-burned grain magnesite for the Vanadium Corp. of America and the Mathieson Alkali Works, Price Administrator Leon Henderson has granted permission to the Westvaco Chlorine Products Corp. to increase its selling price for this commodity to $40.50 per ton in sales to these two consumers. The change in the maximum price, which applies only to these two customers and to shipments from Westvaco's Patterson, Calif., plant, was effected by Amendment 2 to Revised Price Schedule 75.

Under Revised Price Schedule 75 the maximum price for the maintenance grades of domestic dead-burned grain magnesite was established at $22 per ton, f. o. b. cars Chewelah, Wash. However, in recognition of high-cost war production, Westvaco was granted permission to charge a maximum of $32 per ton, f. o. b. cars, Chewelah, Wash., to its regular customers in California. Mr. Henderson explained that, since the present price of $40.50 per ton applies f. o. b. cars, Patterson, Calif., Westvaco will only secure the same realization on sales to Vanadium and Mathieson as previously secured on sales to California steel mills.

Before the war, the United States imported large quantities of dead-burned magnesite. The shutting off of imports, combined with a large demand from war industries, has resulted in demand exceeding supply and has necessitated some high-cost production.

Naval Stores. Wood and gum for naval stores and gum naval stores are excepted from the General Maximum Price Regulation in Amendment 5 to the regulation. Wood naval stores, including pine oil, however, remain under provisions of the General Maximum Price Regulation at all levels of distribution, from manufacturer's distillation to retail. Gum naval stores are excepted from the regulation by Subparagraph 14 of Section 9A of the General Maximum Price Regulation. It has now been determined that gum naval stores are agricultural commodities within the meaning of Section 3 of the Emergency Price Control Act of 1942. Present prices for gum naval stores are lower than the maximums which could be set under Section 3. Wood naval stores, on the contrary, is a heavy industry, with the country's entire output being accounted for by 10 plants. Products of such establishments clearly are industrial commodities, according to OPA.

Synthetic Rubber, Aviation Gasoline, Toluene, and materials essential to their manufacture have been removed from under price ceilings to spur industrial expansion deemed necessary for an increasing volume of these vital war necessities. The action came in Amendment 7 to Supplementary Regulation 1 to the General Maximum Price Regulation, and Amendment 18 to Revised Price Schedule 88, covering petroleum and petroleum products.

Specifically, these amendments except from price regulation:

1. Aviation gasoline of 91-octane rating or higher,
2. Basic materials and components used in its manufacture,
3. Synthetic rubber, including rubber of the butadiene-styrene copolymer, Perbunan, neoprene, Thiokol, butyl, Koroseal, flammenol, and acrysol types,
4. Basic materials and components used in such manufacture,
5. Toluene manufactured from petroleum,
6. Base stocks from which toluene is produced.

These amendments were made after other government agencies had asked for the exemptions to further increased production of the commodities. The price ceilings are removed, Price Administrator Henderson explained, to permit complete price flexibility during the formative stages of industry expansion to meet critical wartime demands.

Zinc Oxides. The maximum price for leaded zinc oxides containing 35 per cent or more lead, which was reduced 1/4 cent per pound by the General Maximum Price Regulation, has been allowed to return to the April 1, 1942, level of 7 cents per pound. This price, which corrects an inadvertent omission, became effective June 22.



Chemical Companies Indicted under Antitrust Laws

INDICTMENTS charging violation of the antitrust laws have been returned by a Federal Grand Jury against a number of chemical companies, the U. S. Department of Justice has announced.

One indictment charges that the defendants have for a period of over eight years conspired to raise chromic acid prices artificially and to fix and maintain such prices at noncompetitive levels throughout the United States. Companies indicted as engaged in the conspiracy are E. I. du Pont de Nemours & Co., Inc., Mutual Chemical Co. of America, Harshaw Chemical Co., and Martin Dennis Co. Eleven individuals were also named.

Another charge concerns an alleged conspiracy to fix, control, and stabilize the price of formic acid sold in the United States. The indictment also charges that the defendants have for a period of six years monopolized the sale of formic acid throughout the United States. Named in the indictment are E. I. du Pont de Nemours & Co., Inc., Victor Chemical Works, General Chemical Co., Innis, Speiden and Co., American Cyanamid and Chemical Corp., and 13 individuals.

Charges of violation of the antitrust laws in the manufacture, sale, and distribution of sulfuric acid were leveled against General Chemical Co., Monsanto Chemical Co., American Cyanamid and Chemical Corp., Dow Chemical Co., Standard Oil Co. of New Jersey, Prior Chemical Corp., E. I. du Pont de Nemours & Co., Inc., Davison Chemical Co., Atlas Powder Co., Mutual Chemical Co. of America, Pennsylvania Salt Manufacturing Co., Southern Agricultural Chemical Corp., F. S. Royster Guano Co., Stauffer Chemical Co., The New Jersey Zinc Sales Co., and 37 individuals.

A fourth indictment charges that the defendants have for a period of over nine years conspired to fix and maintain at noncompetitive levels the prices of bichromates of soda and potash sold throughout the United States. Named in the indictment are Mutual Chemical Co. of America, Prior Chemical Corp., Natural Products Refining Co., The Martin Dennis Co., and 10 individuals.

Four companies and 11 individuals have been indicted on charges of conspiring to stabilize the price of hydrochloric acid by studiously policing the supply of the acid for sale by entering into exchange agreements, by purchasing from each other for resale to others, by prevailing upon small producers to discontinue the acid production, and by using reciprocal relations and discriminations as a means of controlling its sale. The companies are E. I. du Pont de Nemours & Co., Inc., General Chemical Co., Monsanto Chemical Co., and Dow Chemical Co.

An indictment concerning the manufacture, sale, and distribution of oxalic acid charges that the defendants have for a period of years conspired to fix and control prices of oxalic acid by controlling the quantity of oxalic acid produced and the channels of distribution, establishing identical prices, and refraining from raiding each others' customers. A second count charges that the defendants conspired to monopolize the production of oxalic acid. The defendants are Victor Chemical Works, Mutual Chemical Co. of America, Oldbury Electro Chemical Co., General Chemical Co., and 14 individuals.

Additional Properties of Enemy-Owned Nationals Seized

AN ADDITIONAL group of more than 750 enemy-owned patents, among them about 200 patents of I. G. Farbenindustrie not previously vested, have been seized by the Office of the Alien Property Custodian. Included also were a number of patents owned by Japanese, Italian, and Hungarian corporations and individuals. The patents vary widely in nature, covering an automatic drill and riveter for use in aircraft construction, a conveyor already in wide use in this country in coal mines, certain processes in oil refining, and chemicals, including adrenalin compound and chlorinated rubber.

Other vesting orders included seizure of control of J. M. Lehmann Co., Inc., and Adlanco X-Ray Corp., both of New York. The Lehmann company, originally founded by a firm of the same name in Dresden, Germany, manufactures machinery used in the ink and paint industries. Adlanco X-Ray Corp. was a subsidiary of the huge Siemens electrical interests of Germany and acted as American agents for the distribution of Siemens x-ray equipment.

Stock control of the Nirosta Corp., New York, and of the Lingner Corp., Chicago, and five German copyrights and copyright claims, properties of German nationals, have also been taken over by the Custodian's office. The Nirosta Corp., known as Krupp-Nirosta until 1940, is engaged solely in administration and licensing of patents which it acquired from Friedrich Krupp, A.-G., of Essen, Germany. The patents relate to alloy and stainless steel. The Lingner Corp. succeeded by assignment to all trade-marks, patents, secret formulas, and manufacturing processes of Odol Chemical Co., all of which were owned originally by Lingnerwerke, A.-G., of Berlin, Germany.



Alien Property Custodian Requires Reports on Patents

ALL persons claiming any interest in patents or patent applications now or formerly owned by nationals of designated foreign countries are required by Leo T. Crowley, Alien Property Custodian, to report their interest, including any license agreement or claims of ownership, on Form APC-2 by August 15. Purposes of the order, Mr. Crowley said, are to locate and describe enemy-owned patents and interests in patents, to protect the rights of American citizens in foreign-owned patents and in patents which were once foreign owned, and to obtain information which will aid in administration of patents which are seized by the Alien Property Custodian.

For the purpose of the order a "designated foreign national" is a resident of any country other than the American Republics, the British Commonwealth of Nations, and the Union of Soviet Socialist Republics, and includes any person on the blocked list on June 1, 1942. Copies of Form APC-2 and instructions for reporting may be obtained on and after June 29 through offices of the Alien Property Custodian in Washington and Chicago. Completed and sworn reports are to be returned to the Alien Property Custodian, Washington, D. C.

Further provisions of the order require the filing of all agreements to which any resident of any foreign country, not only designated countries, is a party and which have been entered into by the reporter with respect to the patent reported, as well as a list of all United States residents whom the reporter, in turn, has licensed to operate under the patent or patent application reported.

A second order requires the reporting of change of address or citizenship by any person to whom a patent as yet unexpired was issued when the person was a resident of a designated foreign country. This information is required so that patent rights belonging to former residents of enemy countries who are now residents of this or an allied country will not be seized inadvertently by the Custodian.

Distillers to Convert to Industrial Alcohol

GRAIN liquor producers have been told by the War Production Board to convert their plants to the exclusive production of alcohol by November 1. The distillers were told their quota would be upward of 200,000,000 gallons annually. Their total present output of all spirits is about 600,000 monthly. Matthew J. MacNamara, special assistant director of the WPB Materials Division, said machinery and equipment for the conversion have been located and their use authorized. Payment for the shift from liquor to

industrial alcohol will be made by the Defense Plant Corporation. The change from light wines to alcohol, it was said, may be made gradually but must be made as rapidly as possible.

Sales of Liquefied Petroleum Gases Gain

AN UNUSUALLY active market for liquefied petroleum gases prevailing in 1939 and 1940 continued with increased momentum into 1941, when sales of 462,852,000 gallons were reported, a 48 per cent gain over the 1940 total of 313,456,000, according to the U. S. Bureau of Mines. The annual sales have quadrupled in five years, and the 1941 total for each of the several gases under review, with the exception of pentane, is above the combined total for all liquefied gases reported as recently as 1936.

All major demands for liquefied petroleum gases showed important gains in 1941 compared with 1940. Domestic requirements for cooking, water heating, and other household uses were 65 per cent above the 1940 level, compared with a 53 per cent expansion in 1940 over 1939. A 41 per cent increase in deliveries of liquefied petroleum gases for industrial fuel in 1941 compared with a 12 per cent increment in 1940 is largely the reflection of stepped-up war activities. Gains in sales of liquefied petroleum gases to manufactured-gas companies and to chemical manufacturers of 25 and 28 per cent, respectively, are slightly below comparative percentage increases shown for the same industries in 1940.

Chemical Manufacturers' Indexes

REVISED index of the value of chemical manufacturers' shipments for April was 173 compared with 176 in March and 151 in April of last year, taking an average month of 1939 at 100, according to the U. S. Department of Commerce. The department's figures also showed for April that the value of chemical manufacturers' inventories was 158.0 compared with 155.6 in March and 118.9 in April of last year.

High Priority Rating Awarded for Thiokol Plant

A HIGH priority rating will aid construction of facilities for the manufacture of Thiokol, the Dow substitute for rubber, officials of the War Production Board have announced. The new facilities will be a pilot plant capable of turning out only enough of the substitute material for retreading about 500,000 passenger car tires a year. This is about as many tires as now are being retreaded with reclaimed and natural rubber.

Limiting factor in Thiokol manufacture is said to be the supply of ethylene dichloride. If the pilot plant is a success, the supply of this basic raw material will be sufficient to permit manufacture of enough Thiokol to retread about 160,000 passenger car tires monthly. To increase Thiokol production beyond this amount, however, it would be necessary to expand facilities for making ethylene dichloride, and officials indicate that this amount of new construction probably would not be approved by WPB.

Thiokol, manufactured by Dow Chemical Co., Midland, Mich., for the Thiokol Corp., Trenton, N. J., has been made in relatively small amounts—between 500 and 1,000 tons per year—for use as a substitute for rubber, leather, and cork in hose, packing rings, washers, etc. WPB officials say it is not so good as natural rubber for tires, but tires that have been treated with it can be driven up to about 40 miles per hour for at least 5,000 miles.

WANTED Chemical Manufacturers

ONE of the armed services is seeking chemical manufacturers for the manufacturing of sulfur trioxide solution in chlorosulfonic acid (FS) Spec. 96-31-52; titanium tetrachloride (FM) smoke, and chloroacetyl chloride, an ingredient for the manufacturing of chloroacetophenone (CN).

Only manufacturers will be considered; packaging concerns will not be considered. Bona fide chemical manufacturers are requested to address their inquiries in writing (do not call in person or telephone) to Engineer X, Contract Distribution, War Production Board, 122 East 42nd Street, New York, N. Y.

NEGOTIATIONS are reported between the governments of Egypt and Russia for exchange of Egyptian cotton for 50,000 tons of sulfate ammonia. These arrangements were broached prior to the outbreak of the present German invasion of Russia, but have been revived.

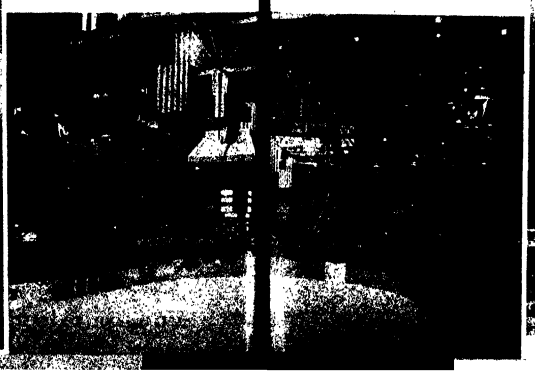


THE CHEMICAL NEWS PARADE

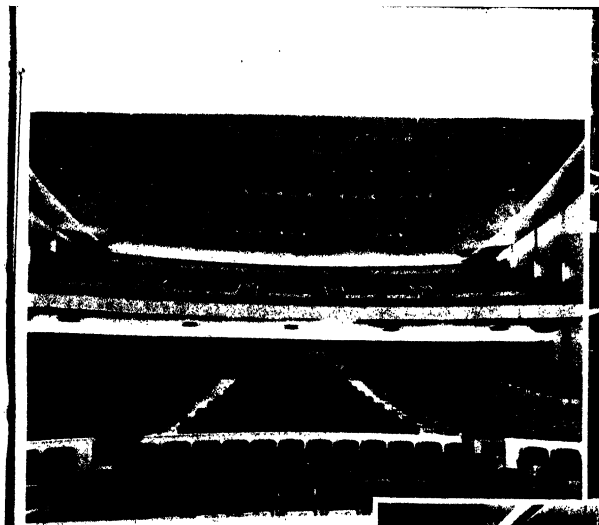


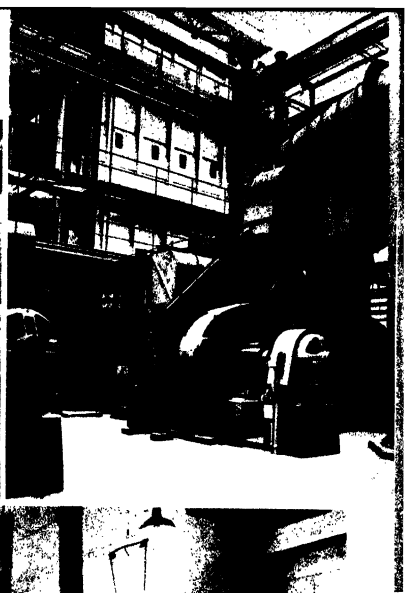




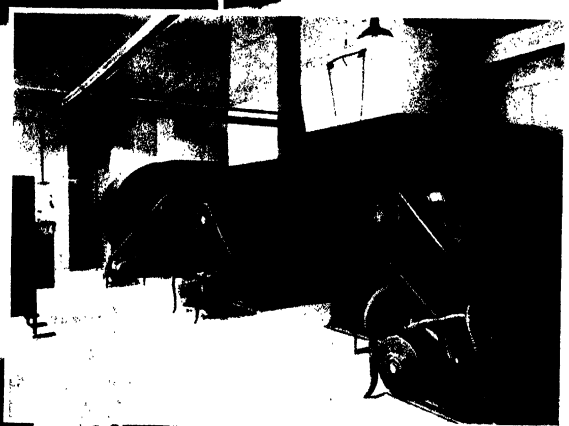


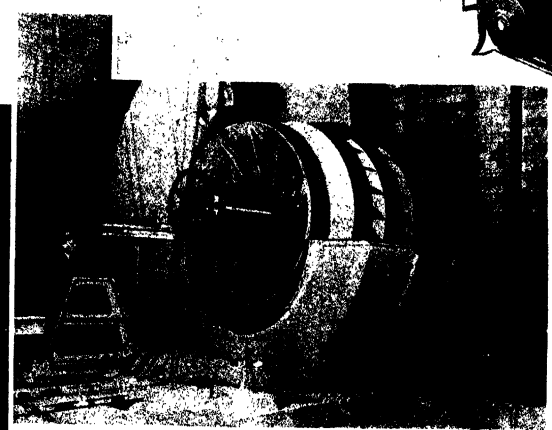
Installations of equipment of the Buffalo Forge Co. and its subsidiaries are pictured on these pages. Described on page 841 are this and other industries of Buffalo, scene of the 104th meeting of the AMERICAN CHEMICAL SOCIETY, September 7 to 11. *Upper left corner.* Squier cane mill in one of the newest United States cane sugar factories showing a succession of rolls crushing the sugar cane entering the far end. This shows the application of water and thin juice on the three last mills to dissolve the film of sugar juices in the cells of the fiber by successive freezings and soakings. The mills are driven by motors and steam engines through gearing on the right, and hydraulic pistons on top of each mill are controlled by air/oil pistons pictured at left. *Left.* Battery of high-speed sugar centrifugals in a refinery. They are the first high-speed heavy-duty units built with air-cooled clutches and brakes to eliminate the troubles of maintaining water-cooled brakes and clutches because of freezing, incrustation, clogging, and consequent overheating. *Left below.* Battery of cane mills designed for high-speed high-pressure work beyond commercial





ranges, installed in Louisiana State University sugar school factory for studying the advantages of cane milling in these new pressure and speed zones. The mill was built in Buffalo by Squier with speed reducers by Falk and complete individual electric drives by General Electric for each of the component units making the horsepower demand, speed, and pressure available by a recording chart for each individual unit. *Below.* Interior of the Memorial Auditorium, air conditioned by the Buffalo Forge Co. *Below right.* Building the housing around the rotor of one of the fresh-air fans used in the ventilation system of Midtown Hudson Tunnel. *Right.* Limit load fans installed for the ventilation of a public building. *Upper right corner.* Combination forced and induced draft fans in an oil refinery. *Above.* Interior view of Kleinhans' Music Hall to show the air-conditioning installation.







American Chemical Society[1]

104TH MEETING. Buffalo, N. Y., September 7 to 11, 1942.

105TH MEETING. Indianapolis, Ind., April 12 to 16, 1943.

106TH MEETING. Minneapolis, Minn., fall of 1943.

NATIONAL CHEMICAL EXPOSITION AND NATIONAL INDUSTRIAL CHEMICAL CONFERENCE. Stevens Hotel, Chicago, Ill., November 17 to 22, 1942.

Other Scientific Societies

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Netherland Plaza Hotel, Cincinnati, Ohio, November 16 to 18. Annual meeting.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Vancouver, B. C., September 9 to 11.

AMERICAN PETROLEUM INSTITUTE. Stevens Hotel, Chicago, Ill., November 9 to 13. Annual meeting.

NATIONAL PETROLEUM ASSOCIATION. Hotel Traymore, Atlantic City, N. J., September 16 to 18. Annual meeting.

NEW ENGLAND ASSOCIATION OF CHEMISTRY TEACHERS. University of New Hamsphire, Durham, N. H., August 11 to 14.

OPTICAL SOCIETY OF AMERICA. Massachusetts Institute of Technology, Cambridge, Mass., July 20 to 22.

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY. Hotel Statler, Boston, Mass., September 29 to October 1.

[1] The list of the SOCIETY's National Officers and Directors, Editors, members of Council, Divisional and Local Section Officers, Committees, and Chapters of Student Affiliates appears in CHEMICAL AND ENGINEERING NEWS three times a year—usually February 10, May 10, and October 10. The latest list is printed on page 601 of the May 10 issue.

Samuel A. Woodruff has been named a research engineer on the technical staff of the Battelle Memorial Institute, Columbus, Ohio, and has been assigned to the division of organic chemistry. He was formerly associated with the North American Rayon Corp., Elizabethton, Tenn.

Twenty Thousand Expected at Chicago Chemical Show

IMPORTANCE of pure and applied chemistry in the solution of many wartime problems will be stressed at the second biennial National Industrial Chemical Conference and Exposition November 17 to 22 at the Stevens Hotel, Chicago. Foremost personalities in the industry will participate, according to committees now contacting eminent speakers.

"This assembly will be in the nature of a forum with leading authorities imparting their latest discoveries and processes in the rapid advancement of applied chemistry", said Victor Conquest, chairman of the Exposition Committee for the Chicago Section of the AMERICAN CHEMICAL SOCIETY, sponsor of the show and conference. "Never in the history of the industry have there been so many new developments brought about, of course, by the exigencies of the war. An exchange of ideas is important at this time with the United Nations leaning heavily on the chemical industry in the prosecution of the war."

Attendance is anticipated of more than 20,000 persons identified with the chemical industry, including research chemists, executives of industrial plants, engineers, purchasing agents, and government specialists. The show this year will be approximately twice as large in floor space as was the first exhibition in 1940. In addition to the Exhibition Hall, the Boulevard Room and connecting area have been pressed into service at the Stevens Hotel. It is reported that more than 75 per cent of the available space is already under contract. Prospective exhibitors are requested to communicate with Marcus W. Hinson, Manager, National Chemical Exposition, 110 North Franklin St., Chicago, Ill.

Steel Castings Production Discussed

WIDENING of the bottleneck in steel castings production and utilization of an untapped source of experienced labor by allowing wider use of steel produced by the cupola-converter method were suggested by C. E. Sims and F. B. Dahle, research metallurgists of Battelle Memorial Institute, Columbus, Ohio, before the annual meeting of the American Society for Testing Materials June 24 at Atlantic City, N. J.

Rapid expansion of side-blow converter steel production to meet the unprecedented demand for steel castings can be achieved by the cupola-converter combination. This method, a modification of the Bessemer process, Mr. Sims pointed out, has the further advantage that many of the cupolas are already available.

Early Bessemer steel was relatively impure and unrefined and therefore inferior in some engineering qualities. By use of the modern cupola with the converter, cast steel can be made to the same chemical composition as acid open hearth or acid electric cast steel. Data presented by Mr. Sims and Mr. Dahle show that properly made converter steel has engineering qualities on a par with steels made by other processes.

Cast steel is being used for airplane landing gears, gun mounts, tanks, and other ordnance material. Much welding and riveting is eliminated, and less metal is required. Cast steel armor plate has stood up well under ballistic tests, Mr. Sims added.

The Sims-Dahle report was based on a research investigation conducted in the laboratories of Battelle Memorial Institute and was sponsored by the Whiting Corp.

Motion Picture on Lubrication

THE Bureau of Mines' latest educational picture in sound, prepared in cooperation with an industrial concern, deals with the need for lubrication and methods of lubricating the great variety of machines that make the materials and supplies of war. Copies of the film, in 16-mm. sound, are available for exhibition by schools, civic, and business organizations, and other interested groups from the Bureau of Mines Experiment Station, 4800 Forbes St., Pittsburgh, Penna. No charge is made, but the exhibitor is expected to pay for transportation and any loss or damage.

Talc in Civilian Defense

ALTHOUGH the Office of Civilian Defense mentions talc for fighting fires caused by incendiary bombs, little stress is laid on its use. It is, however, one substance that is safe for fighting all sorts of bombs and has many special advantages.

First, its covering power, volume for volume, is far better than that of sand. Although it has a tendency to float on air currents, it adheres so firmly to whatever it touches that only a comparatively small volume need be used. Hence, it extinguishes a fire very readily.

Second, it adheres to magnesium particularly well and is very efficient for extinguishing burning magnesium. Obviously it is far safer and more effective than a water spray. It actually extinguishes the bomb instead of merely hastening the burning.

Third, it will extinguish burning oil. Talc will float on kerosene, etc., until it has adsorbed considerable oil. This makes it very superior for oil fires.

Fourth, it will adhere to phosphorous sufficiently to make it safe until it can be properly treated and disposed of.

E. M. PEAVY

THE BUSHWICK HIGH SCHOOL
400 IRVING AVE.
BROOKLYN, N. Y.
June 16, 1942

RESEARCH

EVEN Pollyanna might have difficulty in finding a ray of sunshine in the situation in which many manufacturers have been placed because of present shortages of many materials. Nevertheless the resulting frenzied search for substitutes has often uncovered a hitherto overlooked product which has proven satisfactory or even superior to that formerly used.

Unfortunately, however, it has quite often been found that a new discovery is available in only limited amounts since the producer had not previously received sufficient encouragement to warrant installation of the equipment necessary for large-scale production. Even in such cases the research has not been in vain since with the return of normal conditions the producer will be able to supply the product in adequate amounts, the value of it having been established, and the user will have been awakened to the necessity of investigating all materials which he might use.

There is often a temptation to consider a particular product of manufacture as being entirely satisfactory as regards both quality and cost and to curtail research involving it. Because of present shortages of raw materials and equipment there is also a temptation to curtail research involving new products or new uses for present products.

Chas. Pfizer & Co., Inc. does not subscribe to such views. We believe that when the job now in hand is successfully completed our nation will find itself with a productive capacity greatly in excess of any that it has previously enjoyed and that now is the time to prepare to utilize this. We are increasing our research program, primarily of course in order to help do our share toward finishing this present job as quickly as possible, but also secondarily that new products and new uses for old products may be available for any surplus productive capacity to come.



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Luminous Materials Exhibited

To aid in the evaluation of luminous materials, the Technical Committee of the New York Paint and Varnish Production Club has set up an extensive exhibit at the laboratory of the National Paint, Varnish and Lacquer Association, 1500 Rhode Island Ave., N. W., Washington, D. C. Officials of the Army, Navy, Office of Civilian Defense, and other government organizations are invited to see the exhibit, which will be open daily, except Saturday, from 2:30 to 4:30 P.M. Visitors are asked to phone Mr. Hart or Mr. Sward at Hobart 6272 for appointment.

In the first room, sources of black light are shown—a mercury vapor automobile headlight operated on a 6-volt battery, a mercury vapor lamp operated on low alternating current voltage, and a filament type lamp and ordinary light bulbs coated with phosphorescent paint. This room is completely darkened, and arm bands, signs, charts, plumbing fixtures, phones, fire extinguishers, sand buckets, buttons, outlines of doors, maps, and gadgets coated with luminous materials are seen. The black-light auto lamp is directed on a fluorescent target to show how traffic may be conducted in the dark. A table on which black light is directed from overhead contains many fluorescent articles.

A door marked "Air Raid Shelter" leads to a room with walls and ceiling entirely coated with phosphorescent paint.

By way of darkened winding stairs, the visitor is conducted to the next floor above. Fluorescent and phosphorescent directing signs and steps outlined with phosphorescent paint aid him in this otherwise perilous journey. Other applications of luminous paints and fluorescent dyes are displayed. Continuing to climb the stairs, the visitor arrives at the second floor. On exhibit here is a Mendelsohn black-light lamp that is used in airplanes to illuminate phosphorescent and luminescent instrument dials, charts, and the like.

The concluding item features various degrees of luminosity. Toy automobiles coated with phosphorescent paint represent the elapse of increasing intervals of time after activation. After the observer becomes dark-adapted, the objects are viewed under illumination equivalent to total darkness, a cloudless starlit night, and a bright moonlit night.

Soap Antioxidant Developed

War needs have taken away an ingredient normally used in toilet soaps to prevent rancidity and discoloration, but chemistry has already provided a replacement. The new ingredient, known as an antioxidant, is called SA 326 and was developed by Monsanto Chemical Co., St. Louis. The antioxidant used previously for this purpose has been an organic compound derived from toluene. Now all available toluene is needed for making TNT and other direct war materials. SA 326 is described by Monsanto chemists as an organic amine. It is made from raw materials currently available and not likely to be required in the war effort.

Although a replacement, SA 326 is not a "substitute". Developmental work on it began before the war but has been accelerated during the past few months. With thorough tests now complete, the product is in commercial production in equipment adapted from other processes.



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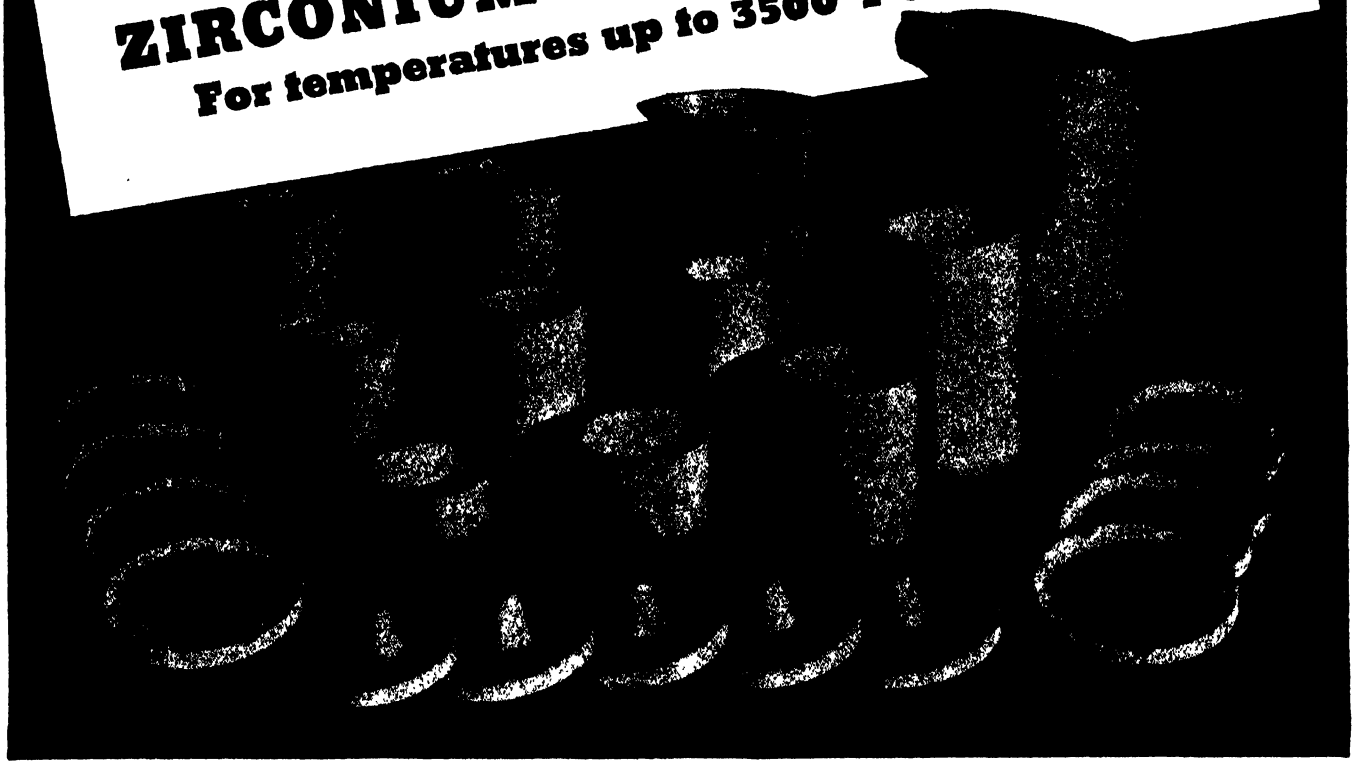


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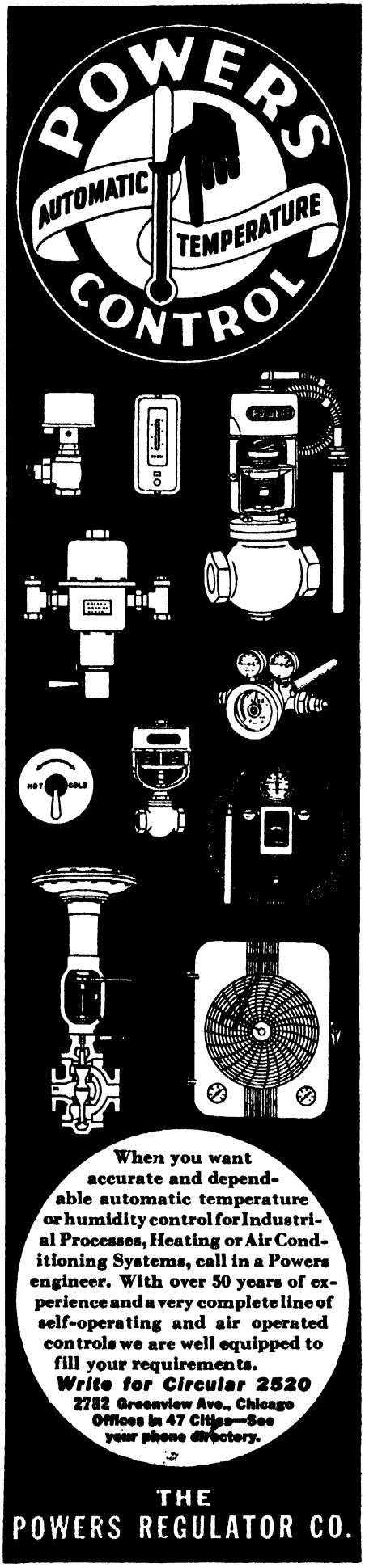
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EMANATIONS

Three Queens

ALICE felt something heavy on her head; and reaching up, she took off what turned out to be a gold crown. On the crown was engraved "Science".

"So I'm Science," thought Alice. "I wonder who the Red Queen and White Queen are."

She managed to glance unobtrusively at the Red Queen's crown, and saw the words "Armed Forces".

"Very appropriate, too," thought Alice, "in view of the damage a fight has done to her face."

The engraving on the White Queen's crown was easier to read. The White Queen was sound asleep with her head in Alice's lap; and her crown said "Civilian Public".

"Now that you're a queen," the Red Queen was saying to Alice, "we expect you to do great things. Can you invent?"

"Certainly," said Alice, glad the first question was right up her alley.

"Invent a death ray," said the Red Queen sharply and pulled out a stopwatch, which she started and then almost immediately stopped.

"Time's up," she said. "Where's the death ray?"

"A death ray," said Alice, rather annoyed at the short time she'd been given, "is hardly a practical idea."

"Of course it's practical," said the Red Queen. "Even comic strips have them."

"Yes, but that's fiction," objected Alice.

"And since truth is stranger than fiction," said the Red Queen triumphantly, "you ought to have invented something even better than a death ray. We'll give you one more chance: Invent an airplane detector. Preferably one the Army will believe." And she rubbed her bruised right eye ruefully.

"Well," said Alice, "if I could have a few pounds of nickel for the preliminary fundamental research and—"

"Nickel!" screamed the Red Queen so loudly the White Queen almost woke up. "Don't you know nickel is used in armor plate? A few pounds of it would treat the steel for a plate on a tank. If we use ordinary steel on that tank, someone might be hurt."

"Without scientific instruments," said Alice, "a great many people are sure to be hurt."

"A wrong can't be corrected by another wrong," snapped the Red Queen. "We must protect our tanks. You can't have any nickel or anything else that requires a priority higher than A-2. Unless, of course, you file a special petition with WPB; and I think I'll have something to say about how *that* turns out, too."

The White Queen turned over in her sleep and half awoke. She patted Alice's knee affectionately.

"Don't let her worry you, dearie," she said sleepily. "If we ever have a war, our Navy will knock off those Japs in its spare time—some lunch hour, probably. The Navy told me so." And she went back to sleep again.

"Although you're a queen," said the Red Queen hurriedly, evidently wishing to change the subject, "I notice you've not yet rented an apartment in the capital."

Alice felt in her pocket and found only a few pieces of silver.

"Having become a queen just this minute," said Alice apologetically, "I've not had a royal allowance; and since I can't have one now, on account of the war, I hardly see how—"

"Where's your patriotism?" demanded the Red Queen. "Besides, isn't the good you do mankind sufficient reward?"

Alice was about to point out that good deeds are seldom accepted as rent money and that even patriotism was a poor reason for incurring bills she couldn't pay, when there was a loud "Caw! caw!" from overhead and the White Queen awoke with a convulsive start.

"The monstrous crow!" she cried. "He'll drop mustard gas on me! Help!"

She snatched both Alice's and the Red Queen's handkerchiefs, soaked them in the brook, and held them over her nose, kicking her heels on the ground and moaning.

"There, there," said Alice soothingly. "The largest crow in the world couldn't carry enough mustard gas to do you any real harm."

But the Red Queen was also looking anxiously skyward.

"You never can tell about that crow," she said. "Besides, he could easily carry enough gas to demoralize her." She turned quickly back to Alice. "In any case, why are you just sitting there instead of being hard at work on some handkerchiefs for me?"

"And an additional dozen for me," mumbled the White Queen.

"There's never been a war," said Alice, "in which you'd listen to me. In the old days, you wouldn't even believe me about ironclad warships and breech-loading cannon. However, I'll do your sewing. It'll only take a few minutes with a needle and thread and—"

"A needle!" screamed the Red Queen. "There you go again! Steel! For something you admit yourself isn't very necessary. I'm beginning to wonder whether you deserve to be a queen. You were a pawn up to a few moments ago, you know."

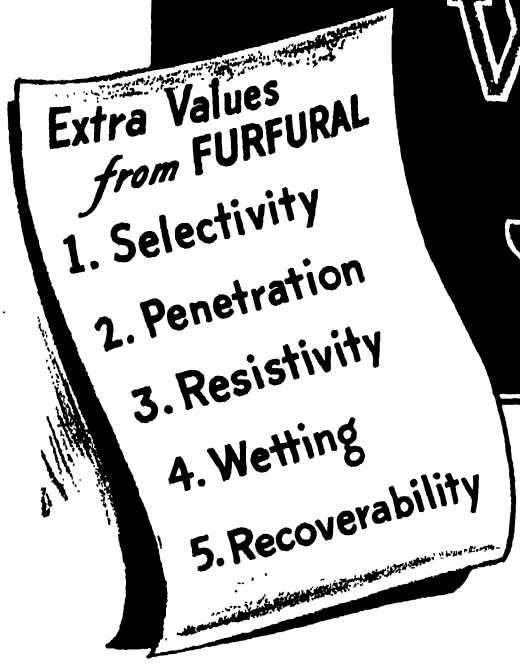
"A fifth-column pawn, probably," added the White Queen.

"Why, you two uppities," said Alice in righteous indignation, "I'm the most permanent reality here. If I could only wake up from this dream, I'd put you both back on the chess board and move you around sensibly—for a change."

"*Your* dream?" said the Red Queen. She pointed to a little man with a funny mustache, asleep on the other side of the brook. "You became a queen at all only because you're part of his dream. Making you a queen wasn't our idea, I'm sure. In fact, you're probably a good deal too friendly with him."

"Nonsense!" said Alice; but the next instant, whether dream or reality, she found herself without her crown sitting with yards and yards of homespun in her lap sewing like mad with a prehistoric bone needle. She was further than ever from being a queen.

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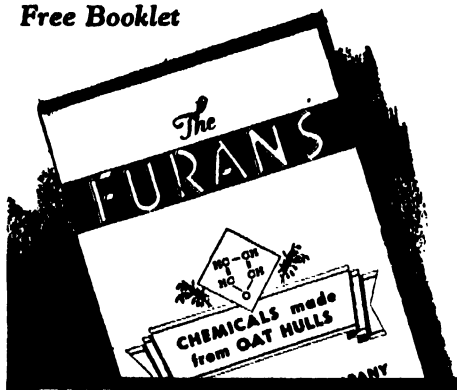
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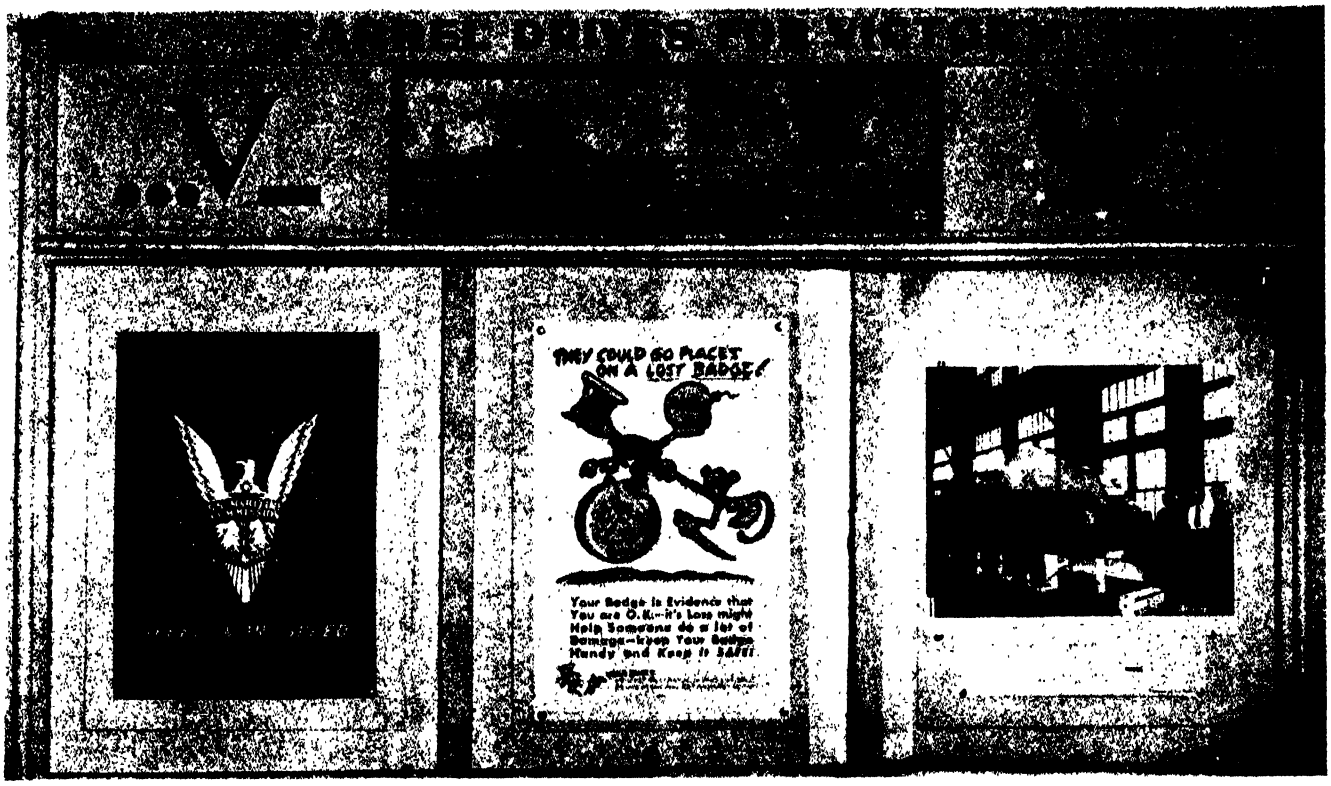
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Farrel-Birmingham Adopts War Production Slogan

In a recent contest in the Ansonia and Derby plants of Farrel-Birmingham Co. a committee of plant employees selected as a wartime slogan "Farrel Drives for Victory", submitted by Jeannette Larson, office secretary. The slogan expresses the thought that in building drives for Navy, Maritime Commission, and other ships these workers contribute to the Nation's drive for victory.

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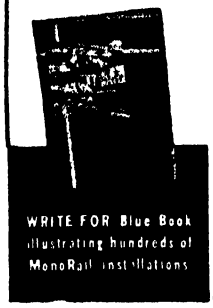
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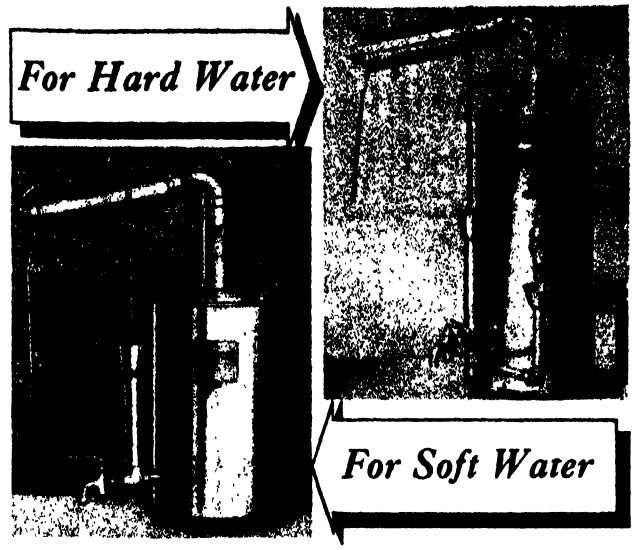
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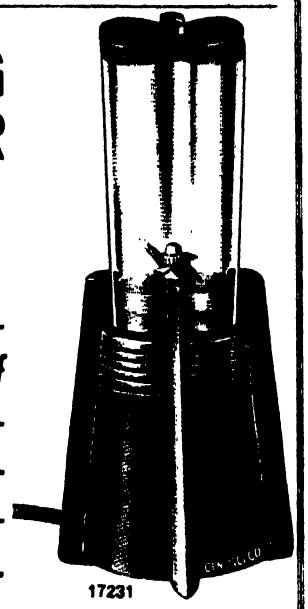
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Acid-Base Catalysis. *R. P. Bell.* 211 pages. Oxford University Press, 114 Fifth Ave., New York, N. Y., 1941. Price, $3.50.

THIS book gives a clear, concise, yet comprehensive survey of the present status of one of the classical sections of classical physical chemistry, the catalysis of a variety of reactions by acids and bases. Those who were schooled in the concepts of hydrogen and hydroxyl ions as well as those more modernly trained in the acid-conjugate base concepts, developed largely by Brönsted, can read this volume with great profit. Every graduate student should know how this important aspect of quantitative physical chemistry has evolved as new measurements were achieved and as new concepts provided the spur to such measuring.

It is understandable that younger authors and workers in this field should fail to appreciate the difficulties and perplexities of those who were trying, prior to the 1914–1918 hiatus in academic science, to unravel the tangled skein of acid-base catalysis and who were using the, as we now know, mistaken concept of Arrhenius that the conductance of strong acids was due to a "degree of dissociation". Debye, Hückel, and Onsager smoothed the pathway of the later workers considerably, removing vital inhibitions. These circumstances might have induced the author to present conclusions reached in 1913–14 in the past tense rather than in the present tense (see pages 50–51); nor should one raise eyebrows excessively if an earlier worker guessed what ultimately proved to be the right form of the relation between catalytic constant and dissociation constant of an acid even when, of *all* the then available data, only four "can be regarded as approximately correct" (page 82). There are inaccuracies in the name index. The reviewer is credited there with several researches he never performed.

The volume reveals how vitally the work carried out in the field of acid-base catalysis has contributed to the dissipation of the mists of uncertainty that surrounded the electrolytic dissociation theory from its very inception and which troubled Arrhenius even to his final years. Today Arrhenius would have great satisfaction could he have this book to read for he would see clearly the formulation of so many difficulties and problems that beset him, and would see more clearly the limitations of his own postulates. The young student approaching this field today, via this book, can learn a more intelligible and comprehensive formulation of acids and bases, in terms of proton donors and acceptors, with quantitative applications in aqueous and nonaqueous solutions. In the final chapters (VII–VIII) he can trace the best ideas as to mechanism of protolytic reactions, what the newer theories of chemical kinetics in terms of the potential energies of the reaction complex and what isotopic reactions have to contribute; finally, whether proton transfer may occur by other than classical collisional methods, whether chemical systems can "tunnel" through energy barriers in the way that radioactive atoms disintegrate or atoms may be disintegrated. Bell discusses this whole field in a critical, balanced, and impartial manner which cannot but help the reader to a more mature knowledge of the whole field of physicochemical science.

HUGH S. TAYLOR



The Technology of Natural Resins. *C. L. Mantell, C. W. Kopf, J. L. Curtis,* and *E. M. Rogers.* 1st ed. 506 pages + vii. John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y.; Chapman & Hall, Ltd., London, 1942. Price, $6.

DR. MANTELL has found an excellent outlet for the voluminous basic data on natural resins which he and his associates have collected in the past years. This data looks much more imposing and is of more distinct value when collected in handbook form than it was when originally presented as individual papers on solubilities and compatabilities.

The book is very timely, being published just when the more commonly used synthetic resins are becoming scarce and resin users must fall back to the use of certain available natural resins. Many of the younger men in industries using resins are

CONTINUED ON PAGE 876

Announcing

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Moisture	0.2%
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Refractive Index @ 20.0°C.	1.4815
Unpolymerized Residue	0.1%
Specific Rotation	+1.0°
Moisture	0.25%
Freezing Point	below -10.0°C.
Flash Point	150.0°F.
Color—Lovibond 500 Amber Series	1.25
200 Red Series	0.25

A. S. T. M. Distillation Range:

5%	196.0°C.
30	204.0
50	210.0
70	216.0
95	222.0

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Beyond the Flyleaf

CONTINUED FROM PAGE 874

of such recent vintage that they haven't the knowledge of the natural resins which the old timers possess. To them this volume will be an excellent source book in which they may find most of the common knowledge of natural resins collected under one cover.

In the terminology of the book, rosin and shellac are excluded from the term "natural resin". This artificial exclusion works as a disadvantage in the latter part of the book. The opening chapters, well illustrated, describe in detail and in an interesting manner the source and general properties of the following classification of natural resins: Accroides, Congo, Damar, The East Indies, Elemi, Kauri, The Manilas, Mastic, and Sandarac.

The chapters dealing with physical properties put in one place the voluminous data resulting from the experiments carried on at the Netherlands Indies Laboratories. These data and the testing methods included in the last two chapters should be of value to have available in a single place.

The chapters dealing with the uses of natural resins in varnishes, paints, water emulsions, etc., suffer greatly because of the exclusive and biased standpoint from which they are written. The exclusion of the synthetic resins, rosin, and shellac make it impossible to give a true or valuable picture of the industries or products involved. The subjects discussed should be studied in a source with a less biased viewpoint. The book would be better if these chapters were eliminated.

Any technologist using natural resins should have a copy of this book in his library.

J. VERNON STEINLE

Nutritive Value of Dried and Dehydrated Fruits and Vegetables. *D. K. Tressler.* Technical Bulletin 262. 44 pages, paper covered. Division of Chemistry, New York State Agricultural Experiment Station, Geneva N. Y. Price, 15 cents.

OWING to the great need for concentrated foods for our armies and those of our allies and for overseas shipment for civilian uses, there is a marked increase in the demand for dehydrated vegetables and fruits. Curtailment of the supplies of tin cans used for canning vegetables and fruits is causing many canners to turn to dehydration as a means of preserving their products.

The dehydrated vegetables produced during World War I not only were lacking in palatability, but also rapidly lost all or nearly all of their content of vitamin C and carotene, the precursor of vitamin A. Much research work on processes of dehydration and nutritive values of dehydrated vegetables has been carried out during the past 25 years. This work has indicated the necessity of inactivating the enzymes of vegetables by scalding, or by some other means, prior to dehydration in order to obtain dehydrated vegetables of good palatability, high vitamin content, and good keeping quality. Recently it has been found that vegetables retain their vitamin C well if stored in the absence of air. It is probable that storage in an inert atmosphere aids also in the retention of carotene.

Dehydrated fruits retain vitamins, particularly carotene and vitamin C, much better than those which are sun dried. Sulfuring of fruits aids in the retention of vitamin C but causes the almost complete destruction of the vitamin B_1 content.

Although these researches indicate that dehydrated vegetables and fruits of much higher quality can now be manufactured, exact information concerning the best means of preparing and storing dehydrated vegetables and fruits of high vitamin content is still lacking. For this reason the Committee on Fats, Vegetables, and Fruits of the Food and Nutrition Board of the National Research Council requested the



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review of the literature on nutritive value of dried and dehydrated fruits and vegetables presented in this bulletin. It is hoped that the bulletin will be useful to all engaged in the study of the dehydration of foods and that it will also call to the attention of nutrition experts, government officials, and food manufacturers the lack of information on proper methods of preparation, dehydration, and storage of vegetables.

Chemistry and Physiology of the Vitamins. *H. R. Rosenberg.* xix + 674 pages. Interscience Publishers, Inc., 215 Fourth Avenue, New York, N. Y., 1942. Price, $12.

THE phenomenal advance of the past few years in the identification, synthesis, and specific physiology of vitamins, particularly in the water-soluble group, has paved the way for a fully comprehensive review of this field. This work by Dr. Rosenberg is a necessary part of the armamentarium of those engaged in vitamin research, whether on the biological or chemical side.

In the chapters on individual vitamins the treatment covers historical development and nomenclature, occurrence, methods of isolation and proof of chemical composition, synthesis including space formulas of the various steps, industrial methods of preparation, biogenesis, methods of estimation and standards, relationships in plant and animal physiology including intervitamin relationships, and results of deficiency or absence. The treatment is fully adequate, and the bibliography complete and conveniently placed as footnotes to the several pages as well as in a separate index of authors. Literature through 1941 is reviewed, and this reader has not been able to detect any significant omissions.

The author has rigidly restricted himself to the function of a reviewer, refraining from allowing his personal feeling to appear in those cases where present state of knowledge is not clear or controversial, as for example in the identity of the chromotricia factor. Following the discussion of individual vitamins, there is a short chapter on nonidentified vitamins in which 17 such are listed and briefly discussed, and an appendix on "vitagens", which the author defines as being protective foods which at the same time act as suppliers of energy or as structural building units; i. e., essential amino acids, essential fatty acids, and essential carbohydrates and related compounds.

In the patent index some 1,000 American, British, French, and German patents are listed and briefly abstracted, the arrangement being chronological under each vitamin.

The work is exceedingly clearly and well written, surprisingly so for one to whom the English language is not native. The reader must search diligently to find even a slight error in idiom. The typography and mechanical workmanship reflect credit on the publishers.

ROE E. REMINGTON

An Outline of Organic Nitrogen Compounds. *Ed. F. Degering.* 381 pages. John S. Swift Co., 5 East Third St., Cincinnati, Ohio, 1942. Price, $6.

THIS book represents a development of ten years in the teaching of the chemistry of organic nitrogen compounds to graduate students. The material is presented in outline form, and is accordingly brief and to the point. The total coverage is, nevertheless, fairly comprehensive. This volume is designed specifically for graduate students, research workers, and specialists in the field of organic nitrogen compounds.

Production of Explosives in the United States. Technical Paper 636. *W. W. Adams, V. E. Wrenn,* and *L. S. Horton.* 30 pages. U. S. Bureau of Mines, Washington, D. C., 1942. For sale by Superintendent of Documents, Washington, D. C. Price, 10 cents.

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SEC Survey on Drugs, Medicines

THE Securities and Exchange Commission has made public the 15th of a new series of industry reports of the Survey of American Listed Corporations. These reports cover the calendar years of 1939 and 1940 and extend earlier reports on the period 1934–39. Balance sheets and profit and loss statements, in both dollars and percentages, as well as surplus statements and financial ratios, are presented for individual companies and for the industry group as a whole in uniform tabular form.

Report No. 15 covers corporations engaged primarily in the manufacture of drugs and medicines which had securities registered under the Securities Exchange Act of 1934 at December 31, 1940. They are Abbott Laboratories, Allied Laboratories, Inc., American Home Products Corp., International Vitamin Corp., Lambert Co., Norwich Pharmacal Co., Parke, Davis & Co., Plough, Inc., Sharp & Dohme, Inc., Frederick Stearns & Co., Sterling Products (Inc.), United Drug, United Drug Co., Inc., Vick Chemical Co., and Zonite Products Corp.

Combined sales reported by the group were $267,000,000 in 1940, compared with $256,000,000 in 1939. Net profits after all charges totaled $32,000,000 in 1940 and 1939, equivalent to 11.9 per cent and 12.6 per cent of sales, respectively. Total dividends paid out were $24,000,000 in each year. Combined assets totaled $244,000,000 at the end of 1940 compared with $231,000,000 at the end of 1939, while surpluses increased from $72,000,000 at the end of 1939 to $78,000,000 at the end of 1940.

Single copies of this report may be secured without charge by request to the Publications Unit of the Securities and Exchange Commission, Philadelphia, Penna. Other reports which are available in the series include No. 6, Chemicals-Fertilizers; No. 7, Oil Refining; No. 8, Non-Ferrous Metals; No. 9, General Industrial Machinery; No. 10, Electrical Supplies and Equipment Other Than Household Appliances; No. 12, Iron and Steel—Assets under $100,000,000 Each; and No. 14, Tires and Other Rubber Products.

Industrial Hygiene Surveys

TO ACQUAINT members with the purpose and procedure of industrial hygiene surveys, the Industrial Hygiene Foundation, Mellon Institute, Pittsburgh, Penna., has issued a booklet entitled "Conserving Manpower in War Industries". The surveys are conducted as a membership service to locate occupational health hazards, if any exist, and to recommend proper control measures.

WPB Booklet on Plant Efficiency

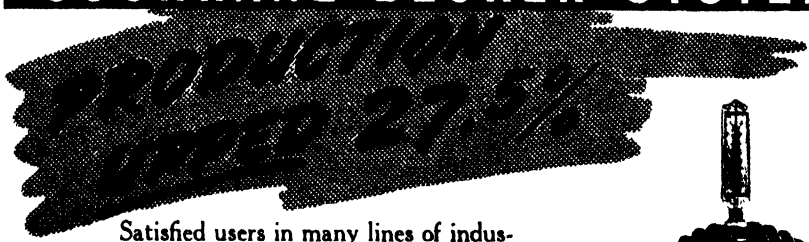
A BOOKLET on plant efficiency has been published by the War Production Board's Division of Information and is available for distribution on request. The title is "Plant Efficiency—Ideas and Suggestions on Increasing Efficiency in Smaller Plants".

Chapters deal with Good Lighting—Better Work; Cutting Down Accidents; Adapting Old Machines to New Jobs; Maintenance and Repair; Longer Life for Cutting Tools; Getting the Most out of Machine Tools; Production Lines Geared for War; Meeting Government Standards; Training Workers Quickly; Swing Shifts; Keeping Track of Orders, Production, and Materials; Plant Protection; Pooling Facilities; A Word on Priorities; and Getting into War Work.

Copies may be obtained from regional and local offices of the War Production Board, located in 120 cities, from local offices of the Division of Information, Office for Emergency Management, or by writing to the Division of Information, Office for Emergency Management, Washington, D. C.

PRODUCTION of 720 tons of kelp between May and July 1941 is announced from Eire, where this substance is important as a fertilizer. During the coming kelp season the amount is expected to be increased to 1,000 tons.

COCHRANE-BECKER SYSTEM

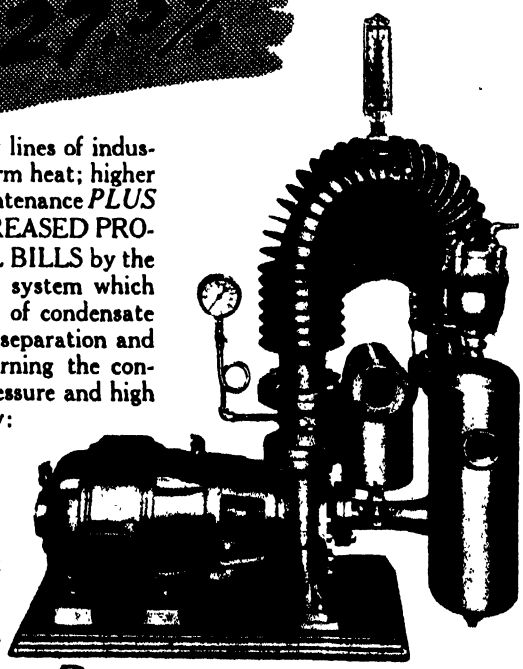


Satisfied users in many lines of industry tell of faster and more uniform heat; higher coil temperatures, and lower maintenance *PLUS lower fuel cost.* This means INCREASED PRODUCTION and LOWER FUEL BILLS by the Cochrane-Becker closed circuit system which speeds up the positive removal of condensate with automatic and continuous separation and removal of entrapped air, returning the condensate to the boilers at high pressure and high temperature. Typical reports say:

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Speeds draining of submerged coils and tubes
Aids drainage of jacketed equipment

Write for Publication No. 3025

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Indiana Standard Pledges War Aid

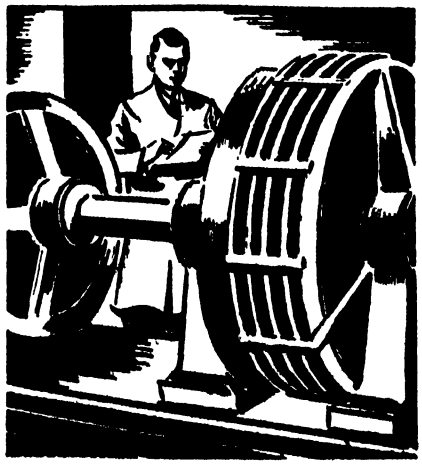
A SPECIAL message, "A Corporation Can't Shoulder a Gun... But Here's What We Are Doing to Help Win the War", has been enclosed with dividend checks to stockholders, monthly statements to customers, and the employee publication to employees in the armed forces by Standard Oil Co. of Indiana, Chicago. The booklet concludes with a pledge—"America no longer talks of defense. Today we talk of attack in every part of the globe where our enemies are found. For that attack there must be more ships, more planes, more tanks, more guns—more fuels and lubricants for those weapons and the plants that make them. Towards producing its full share—and more—Standard of Indiana pledges its main effort and concern."

Coal Coking Properties

CERTAIN coals heretofore considered unsuitable for wartime production of coke and its by-products probably can be used for these purposes, it is revealed in comprehensive tests conducted by the U. S. Bureau of Mines. It is indicated that some of the "borderline" coals can be used with comparative safety if proper measures are observed. Some of several blended coals, also investigated by the technicians, responded favorably to the tests. A copy of the report on the experiments may be obtained by writing the U. S. Bureau of Mines, Department of the Interior, Washington, D. C., for Report of Investigations 3,644, "Expansion of Coal during Coking", by James T. McCartney and Joseph D. Davis.

Zinc in Wartime

THE third in a series of folders on the wartime status of zinc has been issued by The New Jersey Zinc Co., 160 Front St., New York, N. Y. Illustrated and described are some of the applications for zinc as a war material. The folder points out that no war use lacks the zinc it requires.



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Uniform Tests for Derris-Root Rotenone Content Considered

RESULTS of recent experiments in establishing uniform methods of determining derris-root rotenone content have proved very satisfactory, according to the annual report for 1941 of the Imperial Institute of the United Kingdom. Further adjustments are necessary to adapt the tests entirely for tropical use, it is said, while to make the analytical control of derris effective, it will also be necessary to improve present methods of sampling the roots. It is reported experiments in this direction are under way.

Eire Promotes Domestic Production of Drugs

AUTHORITIES of Eire are doing all possible to promote domestic production of drug and medical requirements, according to reports from that country. Anesthetic ether, formalin, glycerol, invert sugar, and lactosum are being produced on a scale said to meet minimum domestic needs. An Irish firm is producing a cod liver oil substitute by adding vitaminated oils, imported from the United States, to domestic vegetable oils. This last output is at present on a very limited scale and not equal to requirements.

Shellac and Jute in Plastics Receives Attention in India

COMBINED use of shellac and jute, India's two major trade items, is receiving much attention by authorities, the U. S. Department of Commerce reports. Jute waste is being used as a filler in shellac plastics, while new developments are the use of both the jute fabric and waste with shellac molding powder in manufacture of cheap laminated boards and the treatment of jute fiber with shellac resins to produce proofed materials.

Shellac molding powder being used in manufacture of technical electrical goods, such as switches, has been improved and the curing time in press is said to be almost equal to that of imported Bakelite powders. Cost has been substantially reduced by cutting proportions of urea-formaldehyde in the composition.

Increase in Chemical Output in Canada

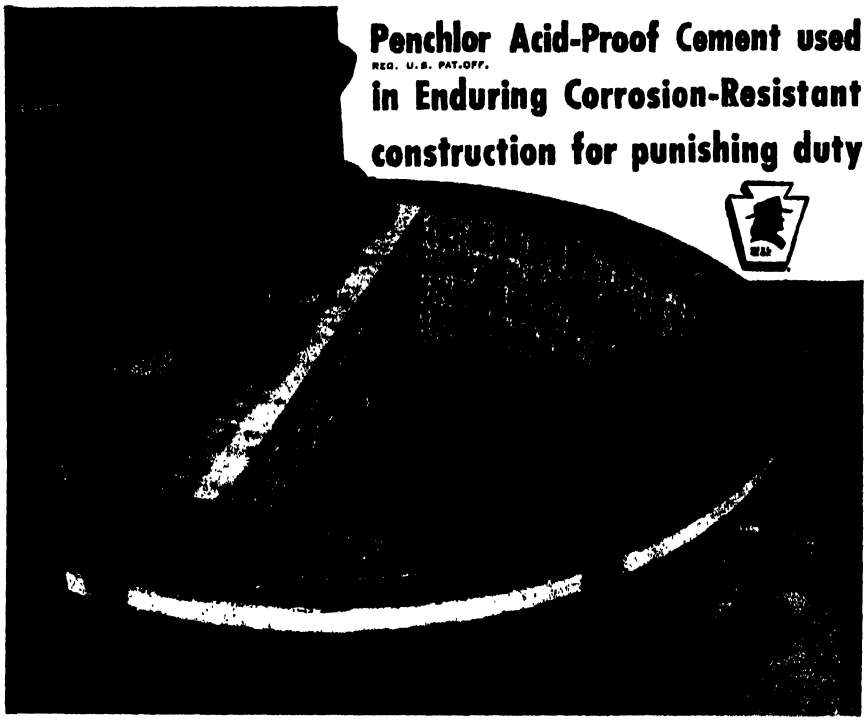
THAT Canada is turning out very large quantities of chemical products is reported by the Department of Mines and Resources at Ottawa. Production of sodium chloride increased from 464,714 tons valued at $2,823,269 in 1940 to 560,827 tons valued at $3,008,281 in 1941. About 46 per cent of the total output in Ontario was used in the production of heavy chemicals. Production of sodium sulfate from Saskatchewan deposits reached a record total of 115,601 tons in 1941, compared with 94,260 tons in 1940.

Denmark to Try Local Production of Morphine

PREWAR attempts to start domestic production of morphine are being revived in Denmark, it is reported. At an earlier period substantial areas were given over to attempted cultivation of opium poppies. This venture was not so profitable as expected and never went beyond the experimental stage. To date Denmark has continued to rely on imports of morphine, but later this summer it is felt that again it will be necessary to intensify the effort to produce opiates locally.

TURKEY is reported to have a vaseline shortage, with the government calling for bids to meet national defense requirements. These average 120 tons annually, the normal annual consumption in Turkey being 500 tons. In 1941 imports amounted to only 105 tons, of which the United States supplied 5 tons and the remainder came from Rumania.

PLANS for a new nitrogen fixation works in Denmark are reported from abroad. Under this program a power plant, coke oven, and a direct ammonia production unit are to be built at a cost of $40,000,000.



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Booklet No. 5 on "Asplit and Causplit Cements"

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Kodak Revises Information on Nitrogen Isotope N^{15}

As announced in January 1942, the nitrogen isotope of atomic weight 15 is now available in the form of ammonium nitrate in which the nitrogen of the ammonium radical has been enriched by the chemical exchange method of H. C. Urey[1]. Effective immediately, N^{15} will be offered in the following concentrations: (1) approximately 14 atom per cent N^{15}, (2) approximately 30 atom per cent N^{15}, and (3) approximately 60 atom per cent N^{15}. The former listing of 7 per cent material is discontinued. The 60 per cent material is now offered for the first time. For purposes requiring only low concentrations of N^{15}, material can usually be supplied on special order at less than the price of 14 per cent N^{15}. Prices will be quoted on request, and depend upon the quantity and concentration required and the supplies available. Distribution is on a direct basis only, and no discounts are given. Standard packaging units are 0.1 gram or multiples thereof.

Orders or communications concerning N^{15} should be sent to Eastman Kodak Co., Research Laboratories, Department WOK, Building 59, Kodak Park Works, Rochester, N. Y.

[1] *J. Chem. Phys.*, 5, 856-68 (1937); 6, 296 (1938); 7, 34-39 (1939).

Du Pont Trade-Marks New Fungicide

A new fungicide, ferric dimethyl dithiocarbamate, has been given the trademark Fermate by E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. Additional experiments and supervised commercial applications this season are expected to lead to greater availability of Fermate for general commercial use another year, provided this year's results are favorable and emergency conditions do not interfere with production.

Who Makes It?

Sources of supply for the following chemicals are wanted by the National Registry of Rare Chemicals, Armour Research Foundation, 33rd, Federal, and Dearborn Streets, Chicago, Ill.:

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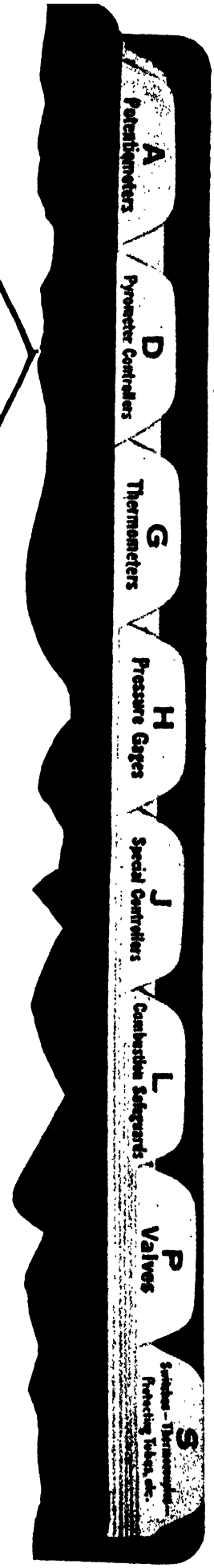
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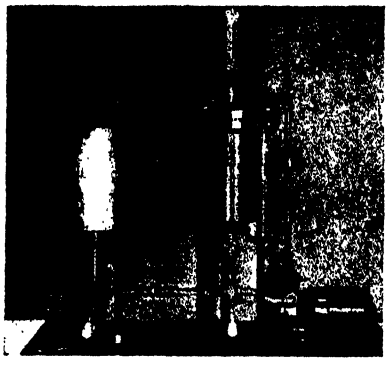
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Vitamin C Staves Off Heat Prostration

Two tablets a day of "beat-the-heat" pills containing vitamin C are keeping heat prostration away from many war-production workers this summer, according to physicians of the du Pont company's Medical Division. They have found the pills a preventive of heat cramps and heat exhaustion, even where the temperature is above 100° and the humidity is oppressively high.

John H. Foulger, director of du Pont's Haskell Laboratory of Industrial Toxicology, at Wilmington, Del., who recently discussed this application of vitamin C at the 20th annual conference of the Milbank Memorial Fund in New York, suggests this measure might well be employed in many other plants, including steel mills, foundries, and shipyards, where high temperatures are encountered. It should also prove valuable, he says, in engine rooms of naval and transport ships and among troops in the tropics.

U. S. D. A. Develops Rubberlike Material

At the Northern Regional Research Laboratory of the U. S. Department of Agriculture, Peoria, Ill., chemists working with such farm products as soybean oil and corn oil have produced materials that look, smell, and feel much like natural rubber. Some of these products will stretch 200 per cent or more and return to their original forms, and show tensile strengths of approximately 500 pounds per square inch. The general run of natural rubber has a 600 per cent stretch and a tensile strength of 3,000 pounds or more. Nevertheless these substitutes are promising for some purposes, say bureau chemists and engineers. Most of the work so far has been on a laboratory scale only, but some of it is being tested in a pilot plant.

Research on Nickel at Mellon Institute

The International Nickel Co., Inc., New York, N. Y., has resumed investigational work at Mellon Institute of Industrial Research, Pittsburgh, Penna., by the establishment of an industrial fellowship that began operation on July 1. This fellowship is concerned with a comprehensive program of scientific research on certain problems in the chemistry and technology of nickel, embracing particularly the preparation, properties, and uses of nickel compounds, especially organic derivatives.



Alginic Acid Textile Fibers

C. H. S. Tupholme, St. Christopher's, Firgrove Hill, Farnham, Surrey, England

It is known that fibers can be made from alginic acid by extruding a solution of sodium alginate from a spinneret into an acid coagulating bath. The spinneret may have any desired number of holes, and the group of filaments is collected as a continuous thread with a revolving bobbin or spinning box. After being washed, the cake of yarn is subjected to hardening agents, such as a solution of alum. Alternatively the coagulating and hardening processes may be combined by extruding a solution of sodium alginate into an acid solution of calcium chloride, for example, when filaments of calcium alginate are obtained.

In practice, it has been difficult to separate the individual filaments within the thread, since they are gelatinous when first spun and adhere to one another during spinning and subsequent treatments. The yarn is strawlike in handling properties and totally unsuitable for textile purposes. A means for keeping the individual filaments separate in the yarn during the spinning and subsequent processes would overcome the difficulty.

A British concern has developed a process which involves, in the spinning of alginic acid and metal alginate yarns, coating of the filaments with oil during or immediately after coagulation before they can adhere. Filaments coated with oil in this way do not stick together during coagulation and remain separate permanently so that the handling properties are not interfered with.

The most convenient method of applying the oil is by dispersion in an emulsified form in the coagulating bath. A second method, which may be used in conjunction with the first, is to pass the filaments through an oil emulsion after leaving the coagulating bath on the way to the winding mechanism.

In a typical example of this process, 5.5 per cent solution of sodium alginate is extruded into a coagulating bath having the following composition: 0.5 *N* sulfuric acid, 2.5 per cent olive oil, and 0.25 per cent of an acid-stable emulsifying agent. The thin film of olive oil keeps the filaments apart and the handling properties of the resulting yarn are greatly improved. If the emulsifying agent employed is cationic in character, a further improvement in handling properties is obtained because of retention of the emulsifying agent by the filaments. Yarn prepared in this manner can be made into hanks and after-treated with hardening agents in the usual way.

If the acid coagulating bath contains emulsified oil, the yarn handles satisfactorily. It is subject, however, to a serious disadvantage on account of the ease with which it is swollen and dissolved by dilute alkalies. This difficulty may to some extent be overcome by after-treating the yarn with hardening solutions of metal salts, such as calcium chloride or potassium aluminum sulfate, or by spinning directly into a bath containing acid and a metal salt such as calcium chloride. The degree of resistance to alkaline attack is, however, insufficient to make the fibers suitable for normal textile usage.

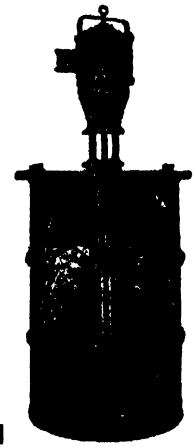
A more satisfactory method involves using salts of metals possessing high coordinating power, e. g., chromium, instead of salts of metals such as calcium and aluminum. Such salts are applied in polymerized form so that a large number of acid side chains of alginic acid are combined with a molecule of the polymer. Metals of high coordinating power, of which chromium is the most common example, are well known. It was previously proposed to coagulate filaments of alginic material with salts of other metals, including zinc and calcium, but none of these has high coordinating power. Metals having high coordinating power form salts in which the radicals are not only united as in simple salts by polar bonds which break up in solution and ionize but also by auxiliary bonds. Consequently, it is the distinguishing feature of this process that the high coordinating power of chromium or other similar metals is utilized to produce nonionizing compounds of alginic acid.

The fibers may be produced first in the form of alginic acid or an alginate and then converted to the combination of a metal of high coordinating power by contact with a solution of a salt of the metal, such as basic chromium acetate. Basic chromium acetate is prepared in the following manner. Chromium hydroxide, freshly precipitated from chrome alum with ammonia, is filtered off, washed free from ammonia, pressed well and, without drying, 1 mole is ground up with 2 moles of cold glacial acetic acid. Sufficient water is added to give a solution containing the same amount of chromium as does a 20 per cent solution of chromium triacetate. The mixture is aged at air temperature for 6 hours, during which time the remaining crystalline solid dissolves. Finally the solution is warmed to 40° C. for 10 minutes.

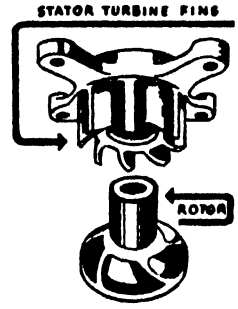
This stock solution is diluted with 20 times its volume of water or dilute acetic acid before use. Hanks of yarn, whether or not treated with a solution of a simple metal salt such as alum or calcium chloride, are immersed in the solution. After 30 minutes the hanks are removed, washed off in water, and dried.

The alkali-resistance of the resulting

S-T-R-E-T-C-H
Man Hours



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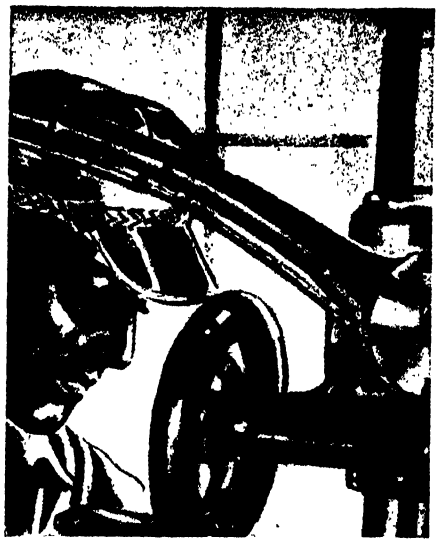


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yarn, which is gray-violet in color, is much greater than with the alum treatment described above. Moreover, it increases with increasing temperature of drying. Yarn dried at room temperature was dissolved by a solution of soap and soda in 14.5 hours. Yarn dried in an oven at 85° to 100° C. was not dissolved in 24 hours. The chromium alginate yarn has the additional advantage of possessing an affinity for chrome mordant dyes.

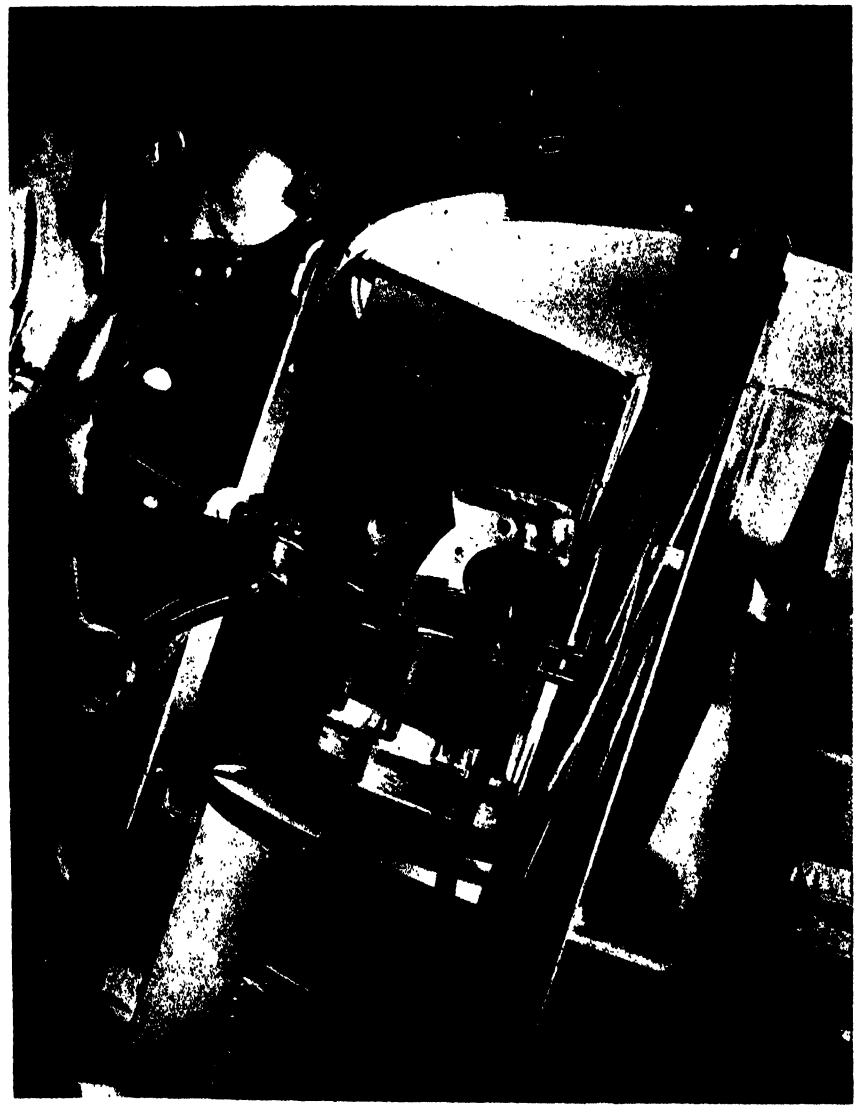
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Sulfadiazine Ointment for Burns Developed

NEW effectiveness in the treatment of burns and skin infections is promised by the use of sulfadiazine, newest of the sulfonamide drugs, in the form of an ointment, according to Lederle Laboratories, Inc., Pearl River, N. Y. Extensive clinical tests have been made in hospitals in Baltimore, Boston, Birmingham, Memphis, Rochester, and elsewhere. Military use of the treatment has been extensive in caring for casualties in our armed forces.

Sulfadiazine treatment of burns was first developed by Kenneth L. Pickrell, of Johns Hopkins Hospital, who employed a solution of sulfadiazine with triethanolamine with excellent results. The solution is not always convenient to use, and at Dr. Pickrell's suggestion a soft, water-soluble ointment having like effectiveness has been developed. Both are available to the medical profession.



ROBERT YARNALL RICHIE

Molten aluminum is sprayed on these aluminum airplane engine castings to improve their resistance to corrosive attack. This photograph is reproduced from the *Aluminum News-Letter* by courtesy of the Aluminum Co. of America in Pittsburgh, Penna.

Business Statistics

We are indebted to the Manufacturing Chemists' Association, 608 Woodward Bldg., Washington, D. C., for the following figures showing business conditions.

Monthly Statistical Report on Business Conditions

	Seasonally Adjusted			Without Adjustment		
	May 1942	April 1942	May 1941	May 1942	April 1942	May 1941
(Base 1935–39 = 100)						
Industrial production[a]	176[b]	173	154	177[b]	171	155
Chemical production	169[b]	164	136	168[b]	167	135
Steel production	218	217	195	218	217	195
Pig iron production[c]	...[d]	...[d]	175	...[d]	...[d]	175
Freight car loadings	143	143	135	138	136	131
(Base 1923–25 = 100)						
Construction contracts, residential	70[b]	82	88	83[b]	96	104
All other	163[b]	165	111	198[b]	185	136
Department store sales, value	107[b]	117	105	107[b]	115	105

	May 1942	April 1942	May 1941
Index of factory employment[e]:			
All manufacturing	137.0[b]	136.1	124.9
Chemicals	192.1[b]	193.2	166.8
Drugs	156.8[b]	156.6	125.2
Fertilizers	123.8[b]	155.1	127.1
Compressed gases	156.6[b]	155.7	138.1
Index of factory pay rolls[e]:			
All manufacturing	192.6[b]	186.6	144.1
Chemicals	297.7[b]	293.2	221.8
Drugs	208.7[b]	203.2	142.8
Fertilizers	147.5[b]	179.8	127.4
Compressed gases	213.1[b]	208.8	180.1
(Base 1926 = 100)			
Wholesale price indexes:			
All products (except farm products and foods)	95.7	95.6[b]	87.4
Chemicals	96.5	96.4	86.8
Drugs and pharmaceuticals	129.1	126.7	98.7
Fertilizer materials	79.0	79.2	71.1
Purchasing power of the dollar:			
All products (except farm products and foods)	$1.045	$1.046	$1.144
Chemicals	1.036	1.037	1.152
Drugs and pharmaceuticals	0.775	0.789	1.014
Fertilizer materials	1.266	1.263	1.408

[a] Source of statistics in first seven items: Federal Reserve Board.
[b] Preliminary figures.
[c] Beginning with the next report, this item will be omitted.
[d] Figures no longer available.
[e] U. S. Department of Labor.

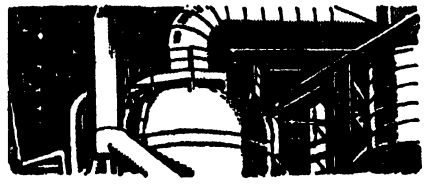
Chemical Industry Raises $46,917 for New York Fund

J. J. Lincoln, Jr., president of Air Reduction Co., Inc., and chairman of the Chemical Division of the Greater New York Fund's 1942 drive, has reported that the group already has reached gifts of $46,917. Mr. Lincoln said he is confident that they will raise more than $50,000 before the campaign is over. Last year the division gave $39,639.

Members of the committee include Howard Berry, Mathieson Alkali Works; Robert W. Boggs, Union Carbide & Carbon Co.; John J. Butler, Jr., Industrial Chemical Sales Co.; W. M. Dennis, American Cyanamid Co.; J. E. Ferris, Niagara Alkali Co.; Howard H. Foster, Air Reduction Co.; Charles L. Gabriel, Commercial Solvents Corp.; Paul Hiller, Innis Speiden & Co.; Milton F. Martin, U. S. Industrial Chemical Co.; Charles F. McKenna, Jr., Commercial Solvents Corp.; Walter J. Schappa, E. I. du Pont de Nemours & Co., Inc.; A. Lucian Walker, Jr., Texas Gulf Sulphur Co.; and Sumner W. White, Jr., Mutual Chemical Co.

Alexander Lowy Fund Established

Mrs. Alexander Lowy has established a fund in memory of her late husband who for over 20 years was professor of chemistry at the University of Pittsburgh. This fund is to help worthy individuals in the course leading to the degree of bachelor of science in chemistry or to the Ph.D., irrespective of race or creed.



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The ILLCO-WAY method of producing water replaces heat distillation *at a fraction of the cost*, and is daily meeting the exacting standards of industrial and technical concerns requiring purified water. The water is not evaporated, so no heat is used in the process!

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LOW COST — The cost of the treated water is amazingly low — *less than a dollar per thousand gallons*, on the average water supply. And when the supply is low in dissolved solids, the cost may be considerably less.

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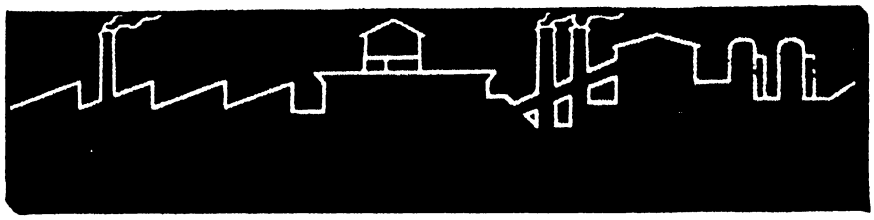
Operation is completely automatic (between periodic regenerations). Pipes will not lime up. Maintenance costs are reduced to a minimum. A unit delivering 300 gallons an hour occupies a space about 4 x 10 feet. Made of finest materials to protect the purity of water. Available in units affording from 120 gallons an hour to 50,000 gallons an hour.

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Cellulose Leather Substitute

THE importance of scientific substitutes in filling gaps caused by diversion of vital war materials is reflected in the introduction of Onco V, a new cellulose product developed by Brown Co., 500 Fifth Ave., New York, N. Y.

The cellulose base for Onco V was originally discovered during research experiments on filter materials for gas masks. First commercial use was as an insole fabric to replace latex-impregnated materials commonly used before the rubber restrictions. It is believed that it may be a logical substitute for leather and cork in other industries.

Reorganization of General Printing Ink Corp.

AS A result of the demands for industrial finishes and other protective coatings made by the war program upon the individual divisions of the General Printing Ink Corp., 100 Sixth Ave., New York, N. Y., it has been decided to pool the facilities of the entire corporation into one division, General Industrial Finishes.

John F. Devine, vice president of the corporation and general manager of the Fuchs & Lang Manufacturing Co. Division, will also act as general manager of the General Industrial Finishes Division. Walter A. McKim, previously director of industrial research for the Pittsburgh Plate Glass Co., will be assistant general manager.

Substitutes for Tin-Base Babbitts

TWO new bearing metals, known as Pyramid and Defender, have been developed by the Magnolia Metal Co., 120 Bayway, Elizabeth, N. J., as substitutes for tin-base babbitts which are now so difficult to secure.

Pyramid metal is suited to applications where bearings must withstand heavy sustained pressures, as in marine reciprocating engines, water turbines, paper mill calendar stacks, and rolling mill machinery.

Defender metal stands shocks without cracking and is suited for use in internal combustion engines, trap rock crushers, and sifter machinery.

THE Seaboard Engineering Co. has opened an office at 29 Church St., Paterson, N. J., under the management of G. J. Zurcher, vice president and general manager.

Chemists and Chemical Engineers Needed in the Production Army

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Buffalo, New York **September 6–11, 1942**

Open only to members and paid student affiliates of the American Chemical Society registered at the meeting

Advance registration accepted until August 26

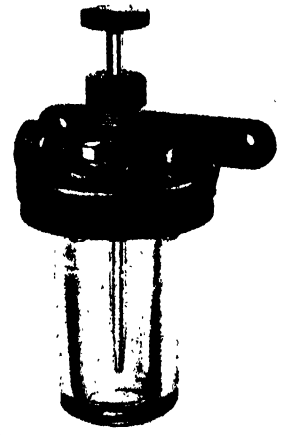
Write to the American Chemical Society,
1155–16th Street, N. W., Washington, D. C.
if you wish forms sent you by mail.

See CHEMICAL AND ENGINEERING NEWS
June 10, page 724

Reichhold Chemicals Receives Navy E Pennant

THE first Navy E pennant to be awarded to a manufacturer of synthetic resins has been received by Reichhold Chemicals, Inc., Detroit, Mich. The pennant was awarded in public recognition of "excellence in industrial production" of materials vital to the Nation's war effort.

Sight Feed Bubbler



THE Meriam Co., Cleveland, Ohio, has developed a sight feed bubbler for the continuous operation of tank liquid level gages. This unit has wide application where a sight indicator is required, to purge lines, to note the presence of harmful or undesirable gases, and to use with flowmeters for the measurement of corrosive materials.

In operation, the bubbler bowl is filled with liquid. The rate of bubbling is adjusted by means of a stainless steel needle valve at the top of the unit. All air or gas passes the needle valve before entering the bubbler tube inside the bubbler bowl.

Chemicals for Rubber Reclaiming

PRODUCTION of solvents and chemicals from southern pine wood is believed sufficient to meet the wartime needs of the rubber reclaiming industry, Charles A. Higgins, president of Hercules Powder Co., has announced.

The company, anticipating a greater demand by reclaimers for its Solvenol, Tarol, and Staybelite used in reprocessing, last year expanded its Brunswick, Ga., and Hattiesburg, Miss., plants to increase the output of these pine wood derivatives.

Reclaim production in the United States last year exceeded 25 per cent of total American rubber consumption. Its volume increased from 210,000 long tons in 1940 to 280,000 long tons, and this year the estimates call for more than 300,000 long tons of regenerated rubber.

Ultra High-Pressure Flowmeter

IN HIGH-PRESSURE process operations in the neighborhood of 5,000 pounds per square inch, flow measurement has been impracticable with mechanical head-type meters employing a stuffing box. Accuracy, freedom from maintenance, and safety are secured by a special adaptation of the ring balance (tilting U-tube) which has no float, stuffing box, or pressure-tight bearing. The unit was developed by the Cochrane Corp., Philadelphia, Penna.

CONTINUED ON PAGE 891

CHEMICAL MARKET PRICES

June 26, 1942

Compiled from weekly current price listings in the *Oil, Paint and Drug Reporter*, with permission of the publisher under its copyright. These prices, unless otherwise specified, are those prevailing in the New York market for technical grades in usual large commercial quantities.

Acetaldehyde, drums, c/l., wks.	lb.	.11
Acetamide, tech., kegs, 500-lb. lots, works	lb.	.30
Acetanilide, tech., powd., bbls.	lb.	.27
Acetic anhydride, drums, c/l., frt. allowed	lb.	.11½
Acetone, C. P., drums, c/l., dlvd.	lb.	.08½
Acetophenetidin, bbls., 1000 lbs.	lb.	1.00
Acetophenone, drums, 100 lbs.	lb.	1.55
Acid, abietic, drums, c/l.	lb.	.08¾
Acetic, 28%, bbls., c/l.	100 lbs.	3.38
56%, bbls., c/l.	100 lbs.	5.58
Glacial, synth., drums, c/l.	100 lbs.	9.15
Glacial, U. S. P., drums, c/l.	100 lbs.	10.95
Acetylsalicylic, U. S. P., bbls.	lb.	.40
Anthranilic, tech., bbls.	lb.	.95
Battery, cbys., c/l., E. wks.	100 lbs.	1.60
Benzoic, tech., bbls.	lb.	.43
Boric, tech., gran., bags	ton	99.00
Butyric (99%), drums, c/l., wks.	lb.	.22
Chloroacetic, mono-, tech., bbls. wks.	lb.	.17
Chlorosulfonic, drums, c/l., wks.	lb.	.03
Chromic, 99%, drums	lb.	.16¼
Cinnamic, bottles	lb.	3.50*
Citric, cryst., bbls., c/l.	lb.	.20
Cresylic, H. B., 210–215°, drums, c/l., wks., frt. equal	gal.	.81
Formic, 90%, cbys., f. o. b. works, c/l.	lb.	.10½
Gallic, tech., bbls.	lb.	1.10
Hydriodic, 57%, 5-lb. bot.	lb.	2.90
Hydrobromic, 34%, cbys.	lb.	.35
Hydrochloric, 20°, tanks, wks.	100 lbs.	1.75
Hydrofluoric, 30%, bbls., wks.	lb.	.06
60%, lead cbys.	lb.	.14
Hydrofluosilicic, 30%, bbls., wks.	lb.	.09
Hypophosphorus, U. S. P., 30%, 5-gal. demis.	lb.	.75
Lactic, dark, 22%, bbls.	100 lbs.	2.90
Light, 22%, bbls., wks.	100 lbs.	3.90
Maleic, powd., drums	lb.	.30
Mixed, tanks, wks.	N unit. lb.	.05
	S unit. lb.	.0085
Naphthenic, 220–230, drums	lb.	.13
Nitric, C. P., cbys.	lb.	.13
36°, cbys., c/l., wks.	100 lbs.	5.00
Oxalic, bbls., wks.	lb.	.11¼
Phosphoric, U. S. P., 50%	lb.	.10½
Picramic, kegs	lb.	.65
Picric, bbls.	lb.	.35
Pyrogallic, tech., bbls.	lb.	1.45
Salicylic, tech., bbls.	lb.	.33
Stearic, distilled, d. p., bags, dlvd.	lb.	.1580
Sulfanilic, tech., 250-lb. bbls.	lb.	.17
Sulfuric, 66°, cbys., c/l., E. wks.	100 lbs.	1.50
66°, tanks, E. wks.	ton	16.50
60°, tanks, E. wks.	ton	13.00
Oleum, 20%, tanks, E. wks.	ton	19.50
Tannic, tech., bbls.	lb.	.71
Tartaric, U. S. P., cryst., bbls.	lb.	.70½
Tungstic, pure, 100-lb. pkg.	lb.	2.86
Alcohol, ethyl, 190 proof, from molasses, drums, c/l.	gal.	3.19
Amyl, from pentane, tanks	lb.	.131
Butyl, normal, tanks, frt. allowed	lb.	.12½
Cinnamic, bottles	lb.	3.00
Denatured, C. D. 14, drums, c/l., wks., E.	gal.	.65
Diacetone, tech., drums, c/l.	lb.	.11
Furfuryl, tech., drums, c/l., wks.	lb.	.20
Isobutyl, ref., drums, works	lb.	.0860
Alcohol, isopropyl, ref., 91%, drums, c/l., f. o. b. dest	gal.	.40½
Wood, *see* Methanol		
Aldol, 95%, drums, c/l., wks.	lb.	.12
Alpha-naphthol, bbls.	lb.	.52
Alpha-naphthylamine, bbls.	lb.	.32
Alum, ammonia, lump, bbls., wks.	100 lbs.	4.25
Chrome, bbls.	lb.	.12½
Potash, lump, bbls., wks.	100 lbs.	4.50
Soda, bbls., wks.	100 lbs.	3.25
Aluminum, metal, 98–99%, drums, c/l.	lb.	.15
Chloride, anhyd., commercial, drums extra, c/l., wks.	lb.	.08
Stearate, bbls., c/l.	lb.	.23
Sulfate, comm'l, bags, c/l., wks., frt. equal	100 lbs.	1.15
Iron-free, bags, wks.	100 lbs.	1.75
Ammonia, anhydrous, fertiliser, f. o. b. wks., frt. equalized	ton	90.00
Pure, cyls.	lb.	.16
Ammonia, aqua, 26°, tanks (on NH_3 content), f. o. b. wks.	lb.	.04
Ammonium bicarbonate, drums	lb.	.0564
Bifluoride, bbls.	lb.	.15½
Bromide, bbls.	lb.	.31
Carbonate, tech., bbls.	lb.	.08¼
Chloride, gray, bbls.	100 lbs.	5.50
U. S. P., gran., bbls.	lb.	.12
Iodide, 25-lb. jars	lb.	3.65
Linoleate, 80%, anhyd., bbls.	lb.	.12
Nitrate, tech., bags, c/l., wks.	100 lbs.	4.35
Oleate, bbls.	lb.	.14
Oxalate, kegs	lb.	.23
Persulfate, cases	lb.	.21
Phosphate, dibasic, tech., bbls.	lb.	.07¼
Sulfate, bulk, c/l., f. o. b. cars, ports contract	ton	29.00
Sulfide, liq. 40–45%, basis 100%, tanks, dlvd.	lb.	.07½
Amyl acetate, from pentane, tanks, frt. allowed	lb.	.14½
Chloride, mixed, tanks, wks.	lb.	.06
Mercaptan, drums, l. c. l., wks.	lb.	1.10
Oleate, drums, l. c. l., wks.	lb.	.31
Stearate, drums, l. c. l., wks.	lb.	.32½
Amylene, tanks, wks.	lb.	.09
Anilin oil, drums	lb.	.15
Anthraquinone, subl., bbls.	lb.	.70
Antimony, chloride, soln., cbys.	lb.	.17
Needle, Bolivian, 67%	lb.	.18½
Oxide, bags, c/l.	lb.	.15
Salts, 65%, bbls.	lb.	.40
Argols, test 75–80%, basis 100%, f. o. b. Spanish ports	100 kilos	105.00
Arsenic, metal, kegs	lb.	No prices
White, c/l., kegs	lb.	.04
Arsenous chloride, cans	lb.	4.85
Barium carbonate, natural, 99%–200 mesh, bags, c/l., wks.	ton	43.00
Chloride, tech., cryst., bgs., c/l.	ton	77.50
Dioxide, drums, wks.	lb.	.10
Hydroxide, bbls., wks.	lb.	.06
Nitrate, casks	lb.	.11
Barytes, floated, 350-lb. bbls., wks.	ton	27.65
Benzaldehyde, tech., drums	lb.	.45
Benzidine base, bbls.	lb.	.70
Benzol, tanks, frt. allowed E. of Omaha	gal.	.15
Benzoyl chloride, carboys	lb.	.23
Benzyl acetate, F. F. C., drums	lb.	.55*
Beta-naphthol, tech., bbls.	lb.	.23
Beta-naphthylamine, tech., kegs	lb.	.51
Bismuth, metal, ton lots	lb.	1.25
Bismuth nitrate, cans	lb.	1.30
Oxychloride, kegs	lb.	3.10
Subnitrate, powd., barrels	lb.	1.20
Blanc fixe, dry, bags, c/l.	ton	60.00
Bleaching powder, drums, wks.	100 lbs.	2.25
Bone black, 4, bbls., c/l., frt. allowed E.	lb.	.11
Borax, tech., gran., bulk, c/l., frt. allowed	ton	41.50
Bordeaux mixture, drums	lb.	.11
Bromine, cases	lb.	.25
Bromoform, cbys.	lb.	1.42
Butyl acetate, drums, c/l., frt. allowed	lb.	.14½
Aldehyde, drums, l. c. l.	lb.	.16½
Lactate, drums	lb.	.26½
Stearate, drums	lb.	.31
Cadmium, metal, ingots, cases	lb.	.90
Bromide, 25-lb. jars	lb.	1.65
Sulfide, boxes	lb.	1.35
Caffeine, 100-lb. drums, 10,000 lbs. or more	lb.	2.60
Calcium acetate, bags	100 lbs.	3.00
Arsenate, bgs., c/l.	lb.	.07
Carbonate, precip., bags, 50 lbs., c/l., wks.	lb.	.03½
Chloride, bags, flake, c/l., dlvd.	ton	18.50
Gluconate, U. S. P., bbls., 150 lbs.	lb.	.52
Phosphate, dibasic, 38–40% P_2O_5, bags, Atlan. pts.	unit-ton	No prices
Tribas., bbls.	lb.	.0635
Calomel, bbls., kegs, 50 lbs. or more	lb.	2.95
Camphor, synthetic, gran., powd., drums, ton lots	lb.	.42
Carbasole, 95%, drums, ton lots, wks.	lb.	.70
Carbon bisulfide, drums, c/l.	lb.	.05
Black, reg., uncomp., bgs., c/l., works	lb.	.03625
Dioxide, liq., cyl.	lb.	.06
Tetrachloride, drums, c/l., frt. allowed	gal.	.73
Casein, dom., 20-30 mesh, bags, c/l.	lb.	.16
Cerium oxalate, bbls., wks.	lb.	.35
Charcoal, willow, powd., bbls.	lb.	.06
China clay, bulk, c/l., wks.	ton	7.60
Chloral hydrate, drums	lb.	.90
Chlorine, liq., c/l., cyl., dlvd.	lb.	.05¼
Tanks, wks., frt. equal	100 lbs.	1.75
Chlorobenzene, mono-, drums	lb.	.07
Chloroform, tech., drums	lb.	.20
Chromium acetate, 24%, powd., bbls.	lb.	.22
Sulfate, pearls, dms.	lb.	.40
Coal tar, crude, bbls., c/l., wks.	bbl.	7.50
Cobalt oxide, black, kegs	lb.	1.84
Copper carbonate, 52–54%, bbls.	lb.	.18
Chloride, bbls.	lb.	.23¼
Cyanide tech., bbls.	lb.	.34
Metal, elec.	lb.	.12
Oxide, black, bbls., tons, wks.	lb.	.19½
Sulfate, bbls., c/l., wks.	100 lbs.	5.15
Copperas, cryst., bulk, c/l., wks.	ton	14.00
Cream of tartar, bbls.	lb.	.57½
Cresol, U. S. P., drums, c/l., wks.	lb.	.11
Crotonaldehyde, 97%, c/l., wks.	lb.	.15
Cyanamide, 22% N, pulvd., dlvd., contracts	Nitrogen unit	No prices
Diamylamine, drums, c/l., wks.	lb.	.61
Diamylene, tanks, wks.	lb.	.09½
Diamyl phthalate, tanks	lb.	.21
Diatomaceous earth, dom., bags, c/l., Pacific Cst.	ton	22.00

Dibutylamine, drums, l. c. l., wks.	lb.	.64
Dibutylphthalate, drums, c/l., dlvd.	lb.	.21
Tartrate, drums	lb.	.92
Dichloroethyl ether, drums, c/l., wks.	lb.	.15
Diethanolamine, drums, c/l., wks.	lb.	.23½
Diethylaniline, drums	lb.	.40
Diethylene glycol, drums, c/l., wks.	lb.	.14
Monobutyl ether, drums, wks.	lb.	.22½
Monoethyl ether, drums, c/l., wks.	lb.	.14½
Diethyl phthalate, drums, c/l.	lb.	.21½
Sulfate, tech., drums, wks.	lb.	.13
Diglycol oleate, light, bbls.	lb.	.17
Dimethylaniline, drums	lb.	.23
Dimethyl phthalate, drums, c/l., dlvd.	lb.	.20
Dinitrobensene, tech., drums	lb.	.18
Dinitrochlorobensene, bbls.	lb.	.14
Dinitronaphthalene, bbls.	lb.	.35
Dinitrophenol, bbls.	lb.	.22
Diphenyl, bbls., c/l., wks.	lb.	.15
Diphenylamine, bbls.	lb.	.25
Diphenylguanidine, bbls.	lb.	.35
Epsom salt, tech., bags	100 lbs.	1.80
Ether, concn., drums	lb.	.11
Nitrous, bots., 100 lbs.	lb.	.93
Ethyl acetate, 85-90%, tanks, frt. allowed	lb.	.11
Acetoacetate, drums, c/l., wks.	lb.	.37½
Bromide, drums	lb.	.50
Chloride, drums	lb.	.18
Formate, drums	lb.	.27½
Methyl ketone, drums	lb.	.09
Ethylene dichloride, drums, c/l., wks., frt. allowed	lb.	.0742
Glycol, drums, c/l.	lb.	.14½
Monobutyl ether, drums, wks.	lb.	.16½
Monoethyl ether, drums, wks.	lb.	.14½
Monoethyl ether acetate, drums, wks.	lb.	.11½
Monomethyl ether, drums, wks.	lb.	.15½
Feldspar, 20 mesh, bulk, wks.	ton	9.75
Film scrap colors, dk., cs., 1,000 lbs., E. wks.	lb.	.14
Fluorspar, 95%, bags, f. o. b. mines	ton	33.00
Formaldehyde, bbls., c/l.	lb.	.05½
Fuller's earth, bags, c/l., mines	ton	8.50
Furfural, tech., drums, contract, works	lb.	.10
Glauber's salt, bbls., c/l.	100 lbs.	1.05
Glycol phthalate, drums	lb.	.38
Stearate, drums	lb.	.26
Hexamethylenetetramine tech., drums	lb.	.32
Hydrogen peroxide, 100 vol., cbys., c/l.	lb.	.16
Hydroquinone, kegs	lb.	.90
Indigo, synth., liq., bbls.	lb.	.16½
Iodine, resubl., jars	lb.	2.00
Iodoform, drums, 100 lbs.	lb.	3.95
Iron acetate, N. F. IV, cbys.	lb.	.15
Iron chloride, tech., cryst., bbls., wks., frt. allowed	lb.	.05
Isopropyl acetate, tanks, frt. allowed	lb.	.07½
Lead acetate, white, broken	lb.	.12¾
Arsenate, bbls.	lb.	.11
Metal, N. Y.	1 lb.	.0650
Oxide, litharge, bbls., 20-ton lots,	lb.	.0790
Peroxide, powd., tech.	lb.	.23
Red, bbls., 20-ton lots	lb.	.09
Sulfate, bbls.	lb.	.0725
White, basic carb., bbls.	lb.	.0825
Lecithin, edible, drums, c/l.	lb.	.34
Tech., dms., c/l.	lb.	.28
Lime, live, chemical, bulk, wks.	ton	7.00
Lime-sulfur, dry, bags, c/l.	lb.	No prices
Lithopone, ordinary, bbls.	lb.	.04½
Magnesite, calcined, dom., bags	ton	80.00
Magnesium carbonate, tech., bags, c/l.	lb.	.06¾
Chloride, drums	ton	32.00
Fluosilicate, cryst., bbls.	lb.	.20
Oxide, light, bbls.	lb.	.26
Manganese chloride, bbls.	lb.	.14*
Dioxide, 85-90%, bbls., c/l., wks.	ton	74.00
Sulfate, anhyd., bbls., wks.	lb.	.10½
Mannitol, commercial, bbls., wks.	lb.	.35
Menthol, nat., cans	lb.	13.00
Mercury bichloride, cryst., drums, 50 lbs. or more	lb.	2.39
Mercury, flasks, 76 lbs., mines	flask	191.00
Meta-phenylenediamine, kegs	lb.	.65
Meta-toluylenediamine, kegs	lb.	.70
Methanol, synthetic, drums, frt. allowed, c/l.	gal.	.34½
Tanks, frt. allowed	gal.	.28
Methyl acetate, 97-99%, tanks	gal.	.09½
Chloride, cylinders	lb.	.32
Formate, l. c. l., drums	lb.	.89
Hexylketone, drums, tech., wks.	lb.	.60
Salicylate, drums	lb.	.35
Monoamylamine, drums, c/l., wks.	lb.	.61
Monobutylamine, drums, l. c. l., wks.	lb.	.51
Monoethanolamine, drums, wks.	lb.	.24
Naphthalene, crude, dom., 74 deg., bags, c/l., wks.	100 lbs.	2.75
Nickel salt, single, bbls.	lb.	.13
Niter cake, bulk	ton	16.00
Nitrobenzene, drums	lb.	.08
Nitrocellulose, alcohol-sol., bbls., wks.	lb.	.28
Nitrogen solution	unit	1.2158
Octanol, normal, drums	lb.	.85
Oil, castor, No. 3, tanks	lb.	.12¾
China wood, dms.	lb.	.40¼*
Coconut, crude, tanks	lb.	No prices
Cod, Newf., bbls.	gal.	.85
Corn, crude, tanks, mills	lb.	.12¾*
Cottonseed, cooking, bbls.	lb.	.16¾
Linseed, raw, tanks	lb.	.1300
Menhaden, crude, tanks, f. o. b. Baltimore	gal.	.6660
Neat's-foot, pure, bbls.	lb.	.19¼
Oiticica, bbls.	lb.	.25¼*
Oleo, No. 1, bbls.	lb.	.13¾
Olive oil, denat., bbls.	gal.	4.20
Edible, Calif., drums	gal.	4.25
Palm, Niger, bbls.	lb.	.0902*
Peanut, crude, tanks	lb.	.13*
Perilla, drums	lb.	.2460
Rapeseed, tax incl., bbls.	gal.	.15½*
Red, bbls.	lb.	.1330
Soy bean, crude, tanks	lb.	.12½*
Sperm, 38°, bbls.	lb.	.1301
Whale, bbls., natural, refined	lb.	.1070*
Ortho-dichlorobensene, drums	lb.	.06
Ortho-nitrochlorobensene, kegs	lb.	.15
Ortho-nitrotoluene, drums	lb.	.09
Ortho-toluidine, bbls.	lb.	.19
Para-dichlorobensene, drums, c/l.	lb.	.11
Para-formaldehyde, drums	lb.	.23
Paraldehyde, tech., drums	lb.	.12
Para-nitraniline, drums	lb.	.45
Para-nitrochlorobensene, drums	lb.	.15
Para-nitrotoluene, bbls.	lb.	.30
Para-phenylenediamine, bbls.	lb.	1.25
Para-toluidine, bbls.	lb.	.48
Paris Green, 250-lb. kegs	lb.	.24
Perchlorethylene, drums, c/l., wks.	lb.	.08
Phenol, drums, c/l., wks.	lb.	.12¾
Phenolphthalein, yellow, drums, ton lots	lb.	.80
Phenylethyl alcohol, bottles	lb.	2.10
Phloroglucinol, tech., tins, wks.	lb.	15.00
c. p., tins, wks.	lb.	20.00
Phosphorus, red, cases	lb.	.40
Oxychloride, 175-lb. cylinders	lb.	.15
Trichloride, cyl.	lb.	.15
Phthalic anhydride, bbls., c/l.	lb.	.14½
Platinum, metal, solid	oz.	36.00
Potash, caustic, solid, drums	lb.	.06¼
Potassium acetate, tech., bbls.	lb.	.28
Bicarbonate, gran., bbls.	lb.	.14
Bichromate, casks, c/l., wks.	lb.	.09½
Bromide, U. S. P., gran., bbls.	lb.	.27
Carbonate, 80-85%, calc., casks.	lb.	.06½
Chlorate, cryst., kegs	lb.	.11*
Chloride, tech., cryst., bgs.	lb.	.08*
Cyanide, drums	lb.	.55
Meta-bisulfite, bbls.	lb.	.18
Muriate, fert., bulk	K_2O unit	.53½
Permanganate, tech., drums	lb.	.19¾
Prussiate, red, casks	lb.	No prices
Yellow, casks	lb.	.17
Pyridine, denat., drums	gal	1.71
Pyrocatechin, c. p., drums	lb.	2.15
Quinine, 100-oz. cans	oz.	.97½
Resorcinol, tech., kegs	lb.	.68
Rochelle salt, powd., bbls.	lb.	.43½
Saccharin, drums	lb.	1.45
Salt cake, bulk, wks.	ton	15.00
Saltpeter, gran., bbls.	100 lbs.	3.20
Silica, amorph., 96%, 325 mesh, bags, c/l., wks.	ton	20.00
Silver nitrate, vials	oz.	.26½
Soda, ash, 58%, light, paper bags, contract, wks.	100 lbs.	1.05
Caustic, 76%, solid, drums, contract, wks.	100 lbs.	2.30
Sodium acetate, flake, 60%, bbls.	lb.	.05
Alginate, drums	lb.	.69
Antimoniate, bbls.	lb.	.15
Benzoate, U. S. P., bbls.	lb.	.46
Bicarbonate, U. S. P., powd., bbls., c/l., wks.	100 lbs.	1.85
Bichromate, c/l., wks.	lb.	.07½
Bisulfite, bbls.	100 lbs.	3.00
Bromide, U. S. P., bbls.	lb.	.27
Chlorate, cryst., bags	lb.	.06¼
Chloride, bags	ton	15.70
Cyanide, 96-98%, dom., drums	lb.	.14
Fluoride, white, 90%, bbls., c/l., frt. alld.	lb.	.08
Metallic, untrimmed bricks, drums, f. o. b. Niagara Falls	lb.	.15½
Metasilicate, gran., bbls.	100 lbs.	2.50
Napthionate, bbls.	lb.	.50
Nitrate, crude, bulk, works	ton	27.00
Nitrite, bbls.	lb.	.06¾
Perborate, bbls.	lb.	.14¾
Phosphate, disodium, cryst., bags, c/l., wks.	100 lbs.	2.55
Phosphate, trisodium, bags, c/l., wks.	100 lbs.	2.70
Picramate, kegs	lb.	.65
Prussiate, yellow, bbls.	lb.	.11
Silicate, drums, c/l., 40°	100 lbs.	.80
Silicofluoride, dom., bbls.	lb.	.09
Stannate, drums	lb.	.33½
Sulfate, anhyd., bags	100 lbs.	1.70
Sulfide, cryst., bbls.	100 lbs.	2.40
Solid, 60%	100 lbs.	3.15
Sulfocyanide, c. p., bbls.	lb.	.55
Thiosulfate, reg., cryst., bgs.,	100 lbs.	2.25
Tungstate, tech., kegs	lb.	No prices
Strontium carbonate, tech., bbls.	lb.	.25*
Nitrate, bbls.	lb.	.07¾
Sulfur, bulk, mines	ton	16.00
Chloride, drums	lb.	.03
Dioxide, commercial, cyl., wks.	lb.	.07
Tetrachloroethane, 50-gal. drums	lb.	.08
Thiocarbanilid, bbls.	lb.	.24
Tin, Straits	lb.	.52
Crystals, bbls.	lb.	.39
Oxide, bbls.	lb.	.55
Tetrachloride, anhydrous, drums, bbls.	lb.	No prices
Titanium dioxide, bags	lb.	.14¾
Toluene, tanks	gal.	.28
Triamylamine, drums, c/l., wks.	lb.	.98
Triamylborate, drums, l. c. l., wks.	lb.	.33
Tributylamine, drums, c/l., wks.	lb.	.78
Trichloroethylene, drums, wks., frt. allowed	lb.	.08
Tricresyl phosphate, tech., drums.	lb.	.25
Triethanolamine, drums, c/l., wks.,	lb.	.19
Triphenyl phosphate, barrels	lb.	.31
Tungsten, tech., powder	lb.	2.60
Urea, dom., 46 + % N., bags, f. o. b. wks. or seaboard	ton	80.00
Vanillin, 25-lb. tins	lb.	2.35
Whiting, comm., dry-grd., bags, c/l., wks.	ton	18.00
Xylene, 10°, tanks	gal.	.30
Xylidine, drums	lb.	.35
Zinc ammonium chloride, bbls.	lb.	.0565
Chloride, tech., fused, drums	lb.	.05
Dust., bbls., c/l.	lb.	.1035
Metal slabs, at N. Y.	lb.	.0865
Oxide, Amer., bags	lb.	.0725
Stearate, tech., bbls.	lb.	.30
Sulfate, cryst., bgs., c/l., wks.	100 lbs.	3.60

* Nominal.

EMPLOYMENT INFORMATION

RATES to be paid in advance. Standard setting 5c a word, minimum charge $2.00 each; include 8 words for box address. Exceptions see ——→ Display, $10.00 per column inch. 2 inches maximum, larger units at regular display unit rates. No discounts or allowances.
SEND advertisements with remittance to INDUSTRIAL AND ENGINEERING CHEMISTRY, 332 West 42nd St., New York, N. Y., to reach there not later than 10:00 A.M. on the 10th and 25th, closing dates for editions of CHEMICAL and ENGINEERING NEWS of the 25th and 10th, respectively. Insertions made in order of receipt provided necessary remittances are complete.
EMPLOYERS are requested to mention in their announcements the section of the country in which the open position is located to ensure replies only from those who are geographically available.
In printing these advertisements the SOCIETY assumes no obligations as to qualifications of prospective employees or responsibility of employers.

UNEMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking employment for themselves are allowed in one calendar year 3 announcements free (one per issue) set in standard style and limited to 50 words each, including 8-word box address, and 3 additional standard announcements at 50% of regular rate. Further announcements and excess words at full rate.

EMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking new positions are permitted 3 standard announcements during the calendar year at 50% of the regular rate—include 8 words for box address.

EMPLOYERS seeking chemists and chemical engineers are permitted 3 standard announcements, not to exceed 50 words each including box address and not more than one per issue, during the calendar year without charge, provided they agree in writing to acknowledge all replies (excess words 5c each), otherwise full rate applies.

The AMERICAN CHEMICAL SOCIETY is vitally interested in the welfare of its members and in seeing that the chemical industry is manned with competent chemists and chemical engineers. These pages are part of our service in that connection. In addition most of the larger sections of the AMERICAN CHEMICAL SOCIETY and several of the smaller ones have active employment committees. Local section secretaries in your area will inform you as to any employment aids that may be available locally.

An Employment Clearinghouse is operated at each national meeting of the SOCIETY for the purpose of bringing together representatives of industry looking for chemists and members and student affiliates in attendance wishing to make such contacts. For further details, consult the preliminary and final programs as printed in the NEWS EDITION prior to each meeting.

In the New York area, special employment facilities are offered by the Employment Bureau of the Chemists' Club, 52 East 41st St., New York, N. Y. In the Chicago area, the Chicago Section maintains an employment service at 413 Stevens Hotel, Chicago, Ill.

Those replying to announcements should be careful to send copies and not original documents. Advertising circulars will not be forwarded and to that end all letters will be opened at the forwarding office.

SITUATIONS OPEN

Those announcements in which the letter "P" is part of the address key have paid in full and are not committed to acknowledge replies. The Society regards acknowledgment by employers of all applications as an act of common courtesy but can assume no responsibility for their failure to do so.

EXECUTIVES, CHEMICAL ENGINEERS AND CHEMISTS with exceptional backgrounds of experience should use our confidential and individual method of contacting responsible employers. No limit to territory. We negotiate all overtures. Established 1915. The National Business Bourse, 20 W. Jackson Blvd., Chicago, Ill.

CHEMICAL ENGINEER, draftsman, experienced in Ethyl Alcohol plant work, to assist in laying out plans and in erecting new plant. Later to continue in production supervision. Write full details and submit photograph.
Box 25–N–6, Ind. & Eng. Chem., Easton, Pa.

WANTED: INORGANIC Chemist, M.Sc. required; and Physical Chemist, M.Sc. required, Ph.D. preferred. Rank and salary dependent upon qualifications. State full qualifications, and salary expected. Write G. C. Brous, Chairman, Department of Chemistry, Hofstra College, Hempstead, New York.

RESEARCH DIRECTOR, Los Angeles independent commercial research laboratory. Ph.D. broad experience, training in biological chemistry particularly foods, nutrition and pharmaceuticals. Good character and personality essential. Married man or mature woman. Give training, experience, nationality, draft status, age and personal data, also recent photo.
Box 94–TP–6, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST. Company in middlewest manufacturing agricultural products and serving National Defense on food industries desires research chemist with fundamental training in chemical and physical sciences. Excellent opportunity for woman or one whose status can be considered permanent. State age, education, experience, salary desired and other pertinent information.
Box 12–N–7, Ind. & Eng. Chem., Easton, Pa.

GRADUATE RESEARCH assistant ($2000) in field of colloids; war effort; academic credit. Transcript of record and testimonials to J. W. McBain, Chemistry Department, Stanford University, Calif.

RESEARCH FELLOWSHIP in physical chemistry available, beginning September 1st, 1942. Eighteen hours course work can be taken per year towards Ph.D. Stipend $70 per month for 11 months. Applicants should have M.S. or equivalent. Submit applications to Thos. De Vries, Dept. of Chemistry, Purdue University, Lafayette, Ind.

ANALYTICAL CHEMIST, to develop methods for new organic chemicals, with manufacturer of fine chemicals in East. Recent Ph.D. or man having industrial experience with newer methods and instruments preferred. Send complete details with first letter, including photograph, draft status, religion, availability, personal data, education, and industrial experience.
Box 19–N–7, Ind. & Eng. Chem., Easton, Pa.

GRADUATE FELLOWSHIPS still available. Large eastern university. Half tuition and $700 00 cash. Recipient may carry nine credit hours of study but must devote half his time to assisting. Young women considered.
Box 22–N–7, Ind. & Eng. Chem., Easton, Pa.

RESIN CHEMIST. Recent graduate preferred. Research work in the field of urea-formaldehyde, phenol-formaldehyde resins. Opportunity for interesting work and advancement. Organic chemistry essential. Practical background helpful but not necessary. Give complete details in application, recent snapshot, salary expected. Location New York state small town.
Box 23–NP–7, Ind. & Eng. Chem., Easton, Pa.

CHEMIST or CHEMICAL engineer for plant development and research work on various chemical problems, principally organic. Opportunity with aggressive organization with excellent possibilities. In replying give particulars regarding training, practical background, draft status, and salary desired. If possible, include snapshot. Location mid-west.
Box 29–N–7, Ind. & Eng. Chem., Easton, Pa.

WANTED: CHEMIST must be competent and graduate of acknowledged school, to handle laboratory work involving the use of rubber extenders, synthetic rubber and synthetic resins. Position requires man with initiative and ambition. Please give complete information together with salary desired and draft status all of which will be treated confidentially. Location, Middle West.
Box 32–NP–7, Ind. & Eng. Chem., Easton, Pa.

WANTED: ORGANIC chemist preferably Ph.D. caliber experienced in proteins, particularly zein. Also chemist experienced in resins or emulsions. Describe full detail training, personal data. Salary of $3500 to $5000 depending upon experience.
Box 39–NP–7, Ind. & Eng. Chem., Easton, Pa.

DEVELOPMENT CHEMISTS AND Chemical engineers wanted for Pilot Plant production, organic field. Openings for experienced men as well as recent graduates. Metropolitan area.
Box 41–NP–7, Ind. & Eng. Chem., Easton, Pa.

WANTED: EXPERIENCED milk chemist for large Southern dairy. Do not apply unless you have milk experience. Irvindale Farms, Inc., Atlanta, Georgia.

CHEMICAL TECHNICIAN for analytical work in hospital. Female preferred. Salary $90 per month to start.
Box 49–N–7, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST for literature work: Wanted by large research laboratory; good training in organic chemistry required, master's or doctor's degree preferred; reading knowledge of French and German. Work involves abstracting, searching and indexing.
Box 55–NP–7, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER. The Research Department of a food organization in the East will welcome applications from chemical engineers of outstanding qualifications. Please submit college record, experience, personal data and photograph.
Box 56–NP–7, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER or chemist with experience in development and manufacture of molding compositions, preferably thermosetting. Location in Midwest. State salary expected and draft status. Give details of education and past experience.
Box 58–NP–7, Ind. & Eng. Chem., Easton, Pa.

SUCCESSFUL SOUTHERN chemical company desires man for original research work in organic chemistry. Individual will be able to work largely on own initiative, and position offers excellent opportunity. Give full particulars, including draft status.
Box 64–NP–7, Ind. & Eng. Chem., Easton, Pa.

ENGINEERS WANTED: Chemical or Mechanical with minimum one year oil refinery plant operation or maintenance experience. Require University Engineering School graduate with basic knowledge principles fluid flow. To work on process flow sheets, equipment selection and general handling oil refinery Defense Contracts as assistant to senior engineers. No aliens or men engaged in Defense work considered. Opportunity up to individual. In reply state experience, education, draft status, slary expected.
Box 70–NP–7, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL ENGINEER wanted by nationally known Food Company. Excellent opportunity for the right man. State experience in detail and salary desired.
Box 71–NP–7, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, man or woman for control and analysis laboratory New York State. Salary $150 per month. State age and qualifications and enclose photograph.
Box 78–NP–7, Ind. & Eng. Chem., Easton, Pa.

RESEARCH ASSISTANTSHIP or graduate student fellowship available at large Eastern Canadian university. New research project. Bachelor degree and preferably one year research experience in organic or biochemistry required. Applications considered from men and women. Give full information, references, and photograph.
Box 80–N–7, Ind. & Eng. Chem., Easton, Pa.

FOOD TECHNOLOGIST. An Eastern food manufacturer is interested in receiving applications from men with exceptionally good records to serve as junior chemists. These positions present prospects for advancement for men of the right qualifications. Information concerning training and experience, personal history and small photo should accompany letter of application.
Box 57–NP–7, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(A.C.S. MEMBERS)

YOUNG CHEMICAL engineer, B.S.Ch.E. '42, desires position connected with defense. Part time and summer work in food, wax paper, and plastic coatings. Undergraduate thesis in petroleum research. High scholastic standing. Available June 2.
Box 17–N–6, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST M.S. Michigan. Single, 41. Twelve years' experience in explosives, rubber, steel, chemicals, paper. One year government explosives inspector. Had charge of two laboratories. Eastern U.S.A. wanted but will consider other locations. Performed research on inorganic problem. Prefer war work.
Box 38–N–6, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 890)

Address communications to the box number indicated and Mail to Easton, Penna.

The American Chemical Society has no information concerning the position advertised, or in regard to those seeking employment.

(Situations Wanted Continued)

PETROLEUM CHEMIST and Technologist, Ph.D. 1931, now employed, available reasonable notice. Age 40, married, two children. Ten years' experience mainly on lubricants; less on gas reactions and motor fuels. Publications. Prefer research and development work.
Box 15-T-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, Ph.D. Unusual varied and sound background. Research, new product development, productions. Now employed. Available on reasonable notice.
Box 24-T-6, Ind. & Eng Chem., Easton, Pa.

CHEMIST, BIOCHEMIST, M.A., Sc D., assistant professor of biochemistry, now employed, wishes research, teaching, or responsible industrial position, reasonably permanent. 10 years of laboratory research and teaching in biochemistry, nutrition. 37 publications. Married, age 36. Status 3-A. Member four national professional societies.
Box 26-T-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, university graduate, twenty years excellent record in research, development, service and sales; publications, patents, sales and advertising literature, new products and new uses; desires active and responsible position; references from all employers: listed in American Men of Science, 3-A draft classification.
Box 30-T-6, Ind. & Eng. Chem., Easton, Pa.

ASSISTANT PROFESSORSHIP in chemistry wanted by chemist, Ph.D., now holding responsible post in industry but who prefers teaching with chance for independent research. Experienced teacher. Well trained in organic, physical and analytical chemistry. Many publications and patents. Sigma Xi. Age 35, married.
Box 38-T-6, Ind. & Eng. Chem., Easton, Pa.

TEACHER, PH.D. Well qualified in physical, analytical, inorganic and industrial chemistry, chemical microscopy, etc. Thirty years' experience, half teaching, half industrial research, consulting, testing. Many publications. Employed. Available summer or fall.
Box 58-T-6, Ind. & Eng. Chem., Easton, Pa.

APPLIED RESEARCH. New trade products for 11 years; developed in food, biological and pharmaceutical laboratory investigations. Experimental process pilots for vitamins, hormones and amino acids also published scientific reports. By-product and food chemicals for market formulae. Control and sales requirements with clinical applications of infant food preparations. Trained (M.S., Ph.D.) and experienced manager seeks active post associated with food institute or industry in New York area. Age 37. Family, 3-A, service waiver not granted.
Box 80-T-6, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Ph.D. 1936, wishes teaching or research position in college or university. Graduate major, biochemistry; minors, general chemistry, bacteriology, physiology. B.S. degree in pharmacy. Five years teaching in medical school. Agr. Exp. Station experience. Publications on metabolism of minerals, and of amino acids, clinical chemistry. Married, age 31. Draft Class 3.
Box 99-T-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, BIOCHEMIST, Teaching position Sc.D. Johns Hopkins; M.S. Chicago, 14 years' experience teaching all phases of chemistry; 6 years as head of departments. Woman with ability to inspire and direct men and women. Seeks a better position.
Box 10-N-7, Ind. & Eng. Chem., Easton, Pa.

RESEARCH DIRECTOR

or Equivalent, Ph.D. Catalysis, Synthesis, Colloid Chemistry. Outstanding experience in Research, Consulting and Industrial Processing. Now industrial executive and consultant. Due to war changes desires connection with progressive organization, or university post combined with consulting activity. Married.

Box 11-NP-7, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL COLLOIDS. M.S. M.I.T. Married. Native Stock. Draft exempt. 12 years' experience in charge of development research with one concern at good salary. Loyal, hard-working, enthusiastic. National reputation. Desires change to laboratory where temperature is less than 120° F. all summer. If you have a somewhat cooler laboratory in the New York-New Jersey area and have problems concerning paper, printing emulsions, aqueous coatings, adhesives, wetting agents, or war products made therefrom, we should get together. Can conduct research; develop products through to plant stage; write, talk; supervise technical reports; relieve busy executive who would like to summer in Maine and winter in Florida. Consulting or part-time position also considered.
Box 14-N-7, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. Eastern University. Fourteen years' diversified fundamental and practical research on cellulosic and synthetic film and filament forming materials on laboratory, semi-works and plant scale. Employed entire period by large manufacturer of chemicals and chemical products Patents. Age, 44, married dependents, Protestant, location immaterial, available on short notice.
Box 15-N-7, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, Ph.D., desires work in research or development. Researches in kinetics, high vacuum, electrochemistry. Now working in radio tube factory, thermionic emission, production development of direct emission filaments. Good background in physics, mathematics. 29, married, English born, American citizen. Phi Lambda Upsilon, publication.
Box 18-N-7, Ind. & Eng. Chem., Easton, Pa.

CHEMIST—Ph.D. Fourteen years' diversified industrial experience in control, development, initiating, planning, conducting, and supervising modern chemical research on resins, textile chemicals, azo dyes, surface-active agents, pharmaceuticals. Patents and publications. Administrative ability. Seeks new permanent, responsible position. Married.
Box 24-N-7, Ind. & Eng. Chem., Easton, Pa.

AGRICULTURAL and MANUFACTURING Chemist M.S. Ch.E. 1936. Research on liquid fertilizers, vitamin and hormone sprays, minor elements. Production of waxes, fungicides, preservatives. Age 27, employed, 3A.
Box 25-N-7, Ind. & Eng. Chem., Easton, Pa.

ORGANIC DEVELOPMENT or elementary laboratory research, from which to advance, desired by unemployed Quaker, 26. Married. 3A. Strong in theoretical organic, inventiveness and business administration. Scholastically high. Untrained in languages, advanced laboratory preparations and analytical. Chemical patent attorney '40-'42. Graduate organic '37-'40.
Box 28-N-7, Ind. & Eng. Chem., Easton, Pa.

TEACHER, RESEARCH worker: Ph.D. Majors: Physical chemistry, chemical engineering. Twelve years' teaching these with inorganic, analytical chemistry, metallurgy, microscopy, etc. Sixteen years' industrial research, consulting, testing. Numerous publications.
Box 31-N-7, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER—M.Ch.E. Three years' of experience in distillation equipment design. Interested in production or research and development in plastics or synthetic rubber. Ability to direct personnel, and create new methods. War work preferred.
Box 33-N-7, Ind. & Eng. Chem., Easton, Pa.

RESEARCH BIOCHEMIST, Ph.D. 7 years' experience in isolation of organic compounds from plant material. Publications. Teaching experience. Can use the polarizing microscope for determination of crystallographic optical properties. Married. Employed but available on short notice. Desires permanent position in isolation and identification of organic compounds.
Box 34-N-7, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL and INORGANIC Chemist, Ph.D. Cornell, with five years of teaching experience in general chemistry and about ten years' of research in insecticides, fertilizers and related subjects, experience in translating and abstracting, with publications and patents, desires teaching or research position.
Box 35-N-7, Ind. & Eng. Chem., Easton, Pa.

PRODUCTION CHEMICAL engineer, exceptional background, Ph.D. 17 years' experience in research plant and organization; Potass Chloride, Sulphate, Magnesium Chloride, Sulphate, Bromine, Cellulose Products, Edeleanu Oil Refining Process, Polishes, Dyes and Lacquers. Speaks four languages. Employed but looking for future advancement. Excellent references.
Box 40-N-7, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, M.S. Six years' of excellent diversified experience in pharmaceutical industry. Research, new product development and formulation, analytical control methods. Particularly interested in colloids, emulsions and surface chemistry. Resourceful, industrious. Prefer Eastern location. Age 30, married, draft deferred.
Box 42-N-7, Ind. & Eng. Chem., Easton, Pa.

Ph.D., ORGANIC, physical, and biological chemistry. Experienced in construction and use of packed columns and molecular stills. Ph.D. research on purification of esters. Desires position on research staff of progressive company or university. Citizen, Gentile, married, age 28.
Box 43-N-7, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., also S.B. in Chemical Engineering, desires position in synthetic rubber field. Five years' experience as rubber chemist, and eight years' as industrial organic chemist in research, process development, and production. Now employed in a non-defense industry, but want to make a change offering greater opportunity. Married.
Box 47-N-7, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, CHEMICAL Engineer. Fully qualified in all phases of refining of edible oils and fats, hydrogenation, fatty acid distillation, synthetic esters, etc. 18 years' experience. Competent to assume full responsibility of production, or to undertake a program of research and development along these lines. Married, Protestant and American citizen.
Box 50-N-7, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., 1941, leading university, Experienced in organic syntheses, micro-analyses, organo-metallic plastics. Graduate assistantships, one year post-doctorate fellowship, Sigma Xi. Single, age 24, draft 2-A. Available immediately.
Box 51-N-7, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Ph.D. August, 1942, M.Sc. organic chemistry. Bacteriology minor. Training in organic and biochemical preparations, microanalysis, spectroscopy. Research in human fat and fat chemistry methods. Teaching experience in photography. Age 25, single, Class 2-A. Desire industrial research or development.
Box 52-N-7, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST. B.S. 1939. Draft deferred (4-F). Available immediately. Three years' research and development work on pigments and organic chemicals. Patent. Pilot plant experience. Excellent background in organic synthesis and analysis. Personable, single, age 25. East preferred.
Box 53-N-7, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S. June 1942, age 22, draft 2-A, enemy alien. Education included general analytical, advanced quantitative and organic qualitative chemistry, advanced organic and physical chemistry; minor in physics and mathematics.
Box 54-N-7, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEERING executive, 12 years' successful experience large petroleum and alcohol companies, synthetic organics. Process design, development engineer, director of engineering. 5 years' top executive and administrative positions. Active member Institute. Available short notice. Married. Minimum salary, permanent position $7500.
Box 59-N-7, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, B.S. 1938, Postgraduate work. Three years' industrial experience in research, photography, textiles. Presently employed, desires work more directly connected with war effort. Age 30, married, draft classification 3-A. Location in or near greater Boston preferred.
Box 62-N-7, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Ph.D. 1942. Vitamins and nutrition. Good foundation in organic, physical, and physiology. Research on B complex and protein requirements. Publications. Five years' teaching biochemistry, general and physical chemistry. Desires research or teaching.
Box 63-N-7, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, Ph.D., 1941, from large midwestern university available for teaching or industrial research position. Experience in teaching of general, organic, and analytical chemistry. Industrial research experience with synthetic resin coatings. Major, physical chemistry; minors, organic and mathematics. Honor Societies. Publication. Available on short notice.
Box 65-N-7, Ind. & Eng. Chem., Easton, Pa.

MIDWEST UNIVERSITY instructor. Also decade of college experience (Dept. head). Specialty, Organic. M.Sc. from eastern university; minor, physical. Trained in chemical microscopy; experienced with pre-med students; some biochemical background; year of recent graduate study; published articles. Available September for research, industry, teaching.
Box 66-N-7 Ind. & Eng. Chem., Easton, Pa.

RESEARCH or TEACHING position wanted by organic and physical chemist. Ph.D. Extensive experience in research and teaching at prominent university (Ass't Professor) and research institutes, teaching graduate courses and directing Ph.D. researches. Numerous publications in organic and physical chemistry. Research involves absorption and emission-spectra, fluorescence, Raman-spectra, polarography, optical activity, calorimetry, etc., and their applications to organic and biological problems. Organic syntheses, qualitative and quantitative organic microanalysis. Administrative ability. First citizenship papers. Age 42, married. Available September 1. Location immaterial.
Box 67-N-7, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST, Ph.G., B.S. graduate work. Nine years experience developing new products in fields of pharmaceuticals, cosmetics, vitamins and food products; supervision and administration. Originality, initiative, imagination justify minimum salary $4200. Age 33, married, child, status 3-A; Native Virginian.
Box 68-N-7, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, BIOCHEMIST, Ph.D. 1942. Major biochemistry, minor physical. Four years' research experience with proteins. Married. Draft deferred. Age 28. Available immediately.
Box 69-N-7, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.S. 1941, desires position in production or research. Draft deferred.
Box 72-N-7, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, EXPERIENCED; products development in oil-gum-resin-pigmentation field, technical sales, coatings. Specialist in resinous fusible inks. Also production supervision and factory maintenance in organic chemicals manufacture. Age 35, American, Protestant. Desire position with reputable firm in defense industry.
Box 74-N-7, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 891)

(Situations Wanted Continued)

BIOCHEMIST, Ph.D. with Chemical Engineering degree. Five years' industrial experience in foods, nutriton, vitamin assays, spectrophotometry, enzymes. Age 30, married, draft deferred. Employed but available on short notice.
Box 75-N-7, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.S., desires research or development position. Experience. Ergosterol, Hydroxynaphthalenes, Amino-acids, Caffeine, Aliphatic Diazo-compounds, Phenolic Condensations. Familiar with organic microtechnique, Micro-Biological work, Electrospectrophotometry, pH control. Publications. Draft deferred.
Box 76-N-7, Ind. & Eng. Chem., Easton, Pa.

ORGANIC MAJOR with minor in physical chemistry, Ph.D., Sigma Xi, Phi Lamda Upsilon. Publications. Have twenty years teaching experience in college and university. Experience in food analysis. Now engaged in teaching, private research and textbook writing. Any good opportunity.
Box 82-N-7, Ind. & Eng. Chem., Easton, Pa.

FOOD and BIOCHEMIST, Ph.D., with 14 years' of industrial plant and laboratory experience in foods, enzymes and fermentation, including research work. Can prove successful management. Desires responsible position in production or research with progressive company. First class references. Married.
Box 83-N-7, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED (NONMEMBERS)

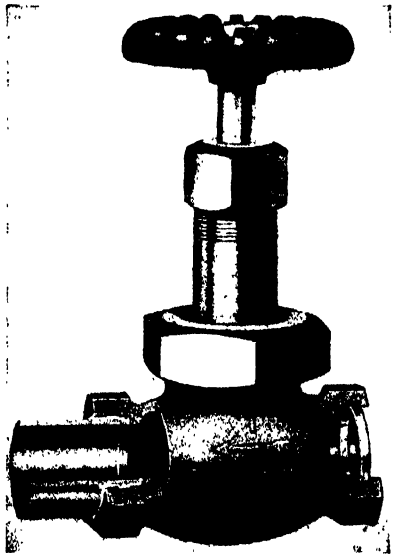
ANALYST SPECTROGRAPHIC: White, male, just completed 16 weeks ESMDT Spectroscopy course, U.S.C., no experience, married, 56, B.S. '09. Location immaterial for war industry. Salary your schedule.
Box 82-T-6, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, B.S., M.I.T., 1937, wants position. Two years' petroleum research and development experience, three years' maintenance engineer. Draft classification 4-F.
Box 37-N-7, Ind. & Eng. Chem., Easton, Pa.

Industrial News

CONTINUED FROM PAGE 886

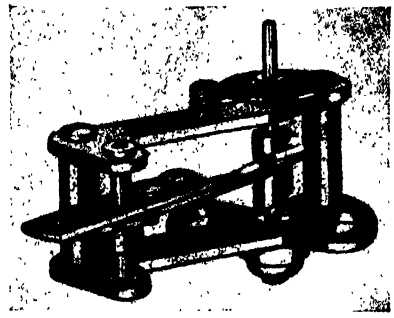
New Type of Valve



THE Fairbanks Co., New York, N. Y., is introducing a line of Faircoseal bronze valves which contain pre-inserted rings of Sil-Fos silver brazing alloy in the port openings instead of threads. With this design, valve and pipe can be easily brazed together into a one-piece piping assembly by the application of an oxyacetylene flame. When valves are connected to brass, copper, or copper-nickel pipe, a "Silbraz" joint is formed.

New Gage

THE Certified Gauge and Instrument Corp., Long Island City, N. Y., has developed, for use in pressure indicating gages, a new and improved type of gearing in the form of a patent cam and roller Movement. The movement employs a sector-shaped driving cam and a driven helical roller. One end of the pivoted cam is linked to the tip of the Bourdon tube, while the other end is aligned with and fits freely into the thread of the roller. A hair-spring limits the pointer of contact between cam and roller to only one side of each element, and prevents backlash. The cam and roller movement provides smooth and constant transmission of motion from Bourdon tube to pointer. As the edge of the cam is in constant contact with the wall of the helical thread, there is no lag nor lost motion between these parts.



Unique with the Certified gages is a recalibrating mechanism by means of which it is possible to reset the pointer to zero to correct any drift or set of the Bourdon tube. Such recalibration disturbs neither the cam and roller movement nor the Bourdon tube—the angularity of the linkage remains unchanged. A turn of the Adjust-a-matic screw merely causes the freely-mounted pointer shaft to rotate sufficiently to return the pointer to the proper position.

Correct recalibration is afforded throughout the dial range, and is ensured when this recalibrating mechanism is incorporated in the Certified gages.

Electrical Testing Panels

STANDARD panels, which provide a speedy and efficient method for production testing of all types of electrical equipment, are available through The Standard Electric Time Co., Springfield, Mass. They provide great flexibility of electrical connections, so necessary in research and development laboratories.

Hercules Detroit Office Moved

THE Detroit, Mich., office of Hercules Powder Co. has been moved to enlarged quarters in the Fisher Building. The office now includes the Cellulose Products Department, the Naval Stores Department, the Synthetics Department, and the Paper Makers Chemical Department.

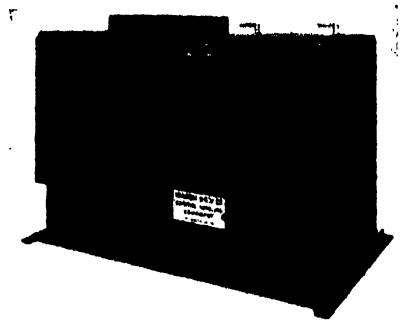
Philip F. Robb was recently transferred to Detroit from Wilmington, Del., to act as manager of the office.

Hyper-Reset

A DEVELOPMENT in the field of control engineering has been announced by The Foxboro Co., Foxboro, Mass., under the name of Hyper-Reset. This is not an instrument or a mechanism, but a control function, available in the newly-designed Model 30 Stabilog Controller for application where process-lag is considerable. Its importance is demonstrated by tests in which Hyper-Reset consistently re-established process stabilization, following an upset, in one quarter of the time and with only one half the upset effect as compared with a similar controller having only the usual reset.

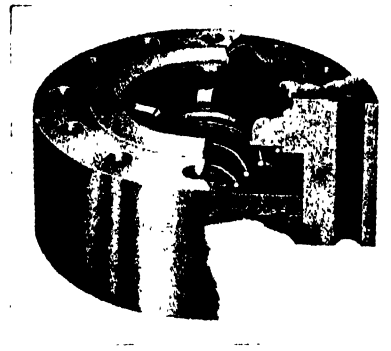
The theory and performance of Hyper-Reset are fully explained in Bulletin A-330, and copies will be sent on request to the company.

Automatic Weighing Scale



AN AUTOMATIC weighing scale designed for rapid and accurate handling of coal and other free-flowing bulk materials is offered by the Beaumont Birch Co., Philadelphia, Penna. An outstanding feature is a vibrating metal feeder deck which conveys the material from feed hopper to weighing hopper, thereby eliminating rubber belts, pulleys, and rotating mechanism.

Check Valves



THE Williams Gauge Co., 2031 Pennsylvania Ave., Pittsburgh, Penna., announces an improved line of check valves which are furnished in a wide variety of metals and sizes. Designated as the Williams-Hager Flanged Silent Check Valves, they are manufactured of bronze, cast iron, steel, stainless and Monel metal for pressures varying from 150 to 2,500 pounds to meet American Standard. Sizes range from 1 to 20 inches, inclusive.

Alkali-Resistant Paint

THE Harrington Paint Co., Inc., 1630 Collamer Ave., East Cleveland, Ohio, has developed a paint said to withstand caustic liquor of 70 and more per cent concentration. The paint, Rust Eeter No. 66, dries in less than an hour and is practically inert chemically. Samples may be obtained from the company.

Fire Extinguisher

A PUMP-TANK fire extinguisher developed by the Buffalo Fire Appliance Corp., 44 Central Ave., Buffalo, N. Y., meets industrial requirements for combating incendiary bombs. It can be supplied in two capacities, 2.5 and 5 gallons.

MISCELLANEOUS

BUSINESS OPPORTUNITIES • FOR SALE • WANTED • ETC.

Five cents a word, minimum charge $2.00; display available at $7.50 per inch; in advance. No discounts or allowances

MICRO-ELEMENTARY ANALYSES: C, H, N, S, P, Halogens, Methoxyl, Mol. wt., etc., U.S.P. and other official tests, Purity tests, Microinorganic assays, Spot tests, Micro-distillations, Toxicological investigations, and typical micro-chemical research work. Dr. Carl Tiedcke, 366 Fifth Avenue, New York, N. Y.

PRIVATE LABORATORY, advisory and research service in enzyme chemistry. General analytical work by competent staff. Box 685, New Brunswick, N. J.

REWARD FOR information leading to the location or return of a Zeiss Microscope, Stand ESB No. 260732, Triple Objective and Cardioid Condenser, taken from our laboratory.
Box 73-N-7, Ind. & Eng. Chem., Easton, Pa.

WANTED TO purchase. Copy of "Methods of the Chemists of the United States Steel Corporation for the Sampling and Analysis of Gases" issued by the Carnegie-Illinois Steel Corporation. State price and condition.
Box 13-N-7, Ind. & Eng. Chem., Easton, Pa.

WANTED: CHEMICAL Abstracts, Volumes 1 to 9, inclusive. Also first decennial index.
Box 27-N-7, Ind. & Eng. Chem., Easton, Pa.

WANTED: Hansen, Max—"Der Aufbau der Zweistofflegierungen." Berlin, Springer, 1936. Quote price and condition. Iowa State College Library, Ames, Iowa.

WE will PLACE orders for special organics and inorganics with competent chemist who has access to equipped laboratory. We need Maleic anhydride, asparagine, tryptophane, glutamic acid, levulose, xylose, boron amorphous, gadolinium oxide, caesium and rubidium chloride.
Box 46-N-7, Ind. & Eng. Chem., Easton, Pa.

WANTED to BUY: Polarimeter in good, usable condition, readable to 0.01 degree circular. Please state make, type, and price.
Box 48-N-7, Ind. & Eng. Chem., Easton, Pa.

WANTED: Water bath and shaking mechanism for Barcraft Washing respirometer, with or without manometers. Department of Bacteriology, College of Medicine, 477 1st Ave., N. Y. C.

WANTED: CRITICAL Laboratory equipment. Not bargains. We are interested to obtain the following critical laboratory equipment at the very best market or regulation price. Do not hesitate to offer us all or one of the many items we list or a complete laboratory no matter how large or where located. We are America's largest used equipment firm specialising in scientific equipment only. We need very urgently for a number of our clients who are doing war work, Abbe Refractometers, Polarimeters, Metal Testing Instruments and Microscopes, Microscopes of all Kinds, Cameras, Binoculars and Accessories, Measuring Instruments, Precision Tools of all types, Engineering Materials, Balances, all Instruments with Bureau of Standards Certificates, Slide Rules, Drawing Sets, Lenses, Weston, L & N and other A-C Voltmeters, Ammeters, Millammeters, Microammeters, Wheatstone Bridges, Potentiometers, Standard Cells, Portable Testing Instruments, etc. Quarts Instruments; or what have you? Write or wire us full information on what is available. The Laboratory Exchange, 24 E. 21st St., N. Y. C.

FOR SALE: J.A.C.S. Vol. 23-Vol. 53 $250. Ind. & Eng. Chem. Vol. 1-Vol. 33 incl. Analytical Ed. Vol. 1-13, $125.00. Chem. Abstracts Vol. 1-Vol. 35 $350. All unbound, excellent condition. Location N. Y. C.
Box 20-N-7, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Journals Society Chemical Industry, 1907-1923; Industrial Engineering Chemistry, 1924-1926; American Phar. Assoc. Year Books, 1912-1933; Proceedings, 1899-1911; Collective Index, 1903-1925; Chemical Engineer (Chemical Age), 1905-1915.
Box 21-N-7, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Drum, revolving steel, 18 feet long, 3 feet 10 inches outside diameter, 3" refractory lining (can be removed). Variable speed drive, drum speed 4 to 14 R.P.M. Automatic feed. Used few hours only. Price $2250.00. Mounted on steel skids. Washburn & Granger, Inc., 53 Park Place, New York.

FOR SALE: Second Decennial Index, bound; Third Decennial Index, unbound. Both in good condition. Make me an offer. Charles N. Ott, Oskaloosa, Iowa, Route 4.
Box 38-N-7, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: All uranium, titanium, vanadium, zirconium, molybdenum, tantalum, tungsten and tellurium salts. All azides, borides, calcides. Gallium, germanium, indium, metals or salts. All optical crystals, bearing sapphires. Fluorescent pigments, iron carbonyl.
Box 45-N-7, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Newly acquired critical laboratory equipment. Ready for immediate delivery, fully guaranteed, priced in strict accordance with government price ceiling or lower where ever possible. Subject to prior sale. (2) Schmidt & Haensch Precision double wedge Saccharimeters for 200 and 400 mm. tubes; (1) Dubosq Precision Polarimeter with 175 mm. circle for tubes to 500 mm. read to 1/100 degree; (3) B & L Dubosq Colorimeters for 500 mm. complete with cups and plungers; (2) Spencer 3 Objective Binocular Microscopes; (5) B & L Microscopes 3 Objectives including oil immersion; (5) C. Becker Fine Analytical balances newly reconditioned; (50) Pulp Balances 150 gr. Capacity 1 mg. sensitivity in fine polished mahogany cases (never used) with drawer, sliding Cointerpoised door of standard American make purchased by us from one of the Government Departments before Dec. 7th ready boxed for immediate shipment specially priced at $27.50. Order as many as you need while we still are able to offer them. (2) Freas 12 × 12 drying ovens, Watson, Stillman 75 Ton Hydraulic Press 12 × 12, Horizontal Steam or gas heated Autoclaves, Incubators, Water Stills, Hanovia Quarts Ultraviolet Lamps, Beckmann Thermometers, Electric hot plates 3 heat, (3) International Centrifuges, Edwards Gas Density Balance and hundreds of other critical laboratory items. Let us help you break the bottleneck on your laboratory needs. Write or wire us your needs. We will quote immediately if available. The Laboratory Exchange, 24 E. 21st Street, N. Y. C. Algonquin 4-38791.

FOR SALE: "American Chemical Journal" (Remsen's): Vols. 1-50 (1879-1913); "American Institute of Chemical Engineers, Transactions": Vols. 1-27, bound; "American Association of Petroleum Geologists, Bulletin": Vols. 1-23 (1917-1939); "Berichte der Deutschen Chemischen Gesellschaft": Vols. 18, 19, 21-24, 32, 35-46; "Chemical Abstracts": complete bound set: Vols. 1-34 (1907-1940), with First and Second Decennial Indexes, bound, splendid. "Journal, Chemical Society of London": 1890-1940. A. Calvert, 221 Seaman Ave., New York, N. Y.

FOR SALE: Chemical Abstracts. 1916-1934, $130; 1917-1934, $120; 1917-1933, $115. Individual years 1917-1921, $12; 1922-1926, $10; 1927-1933, $7. Single copies 1908-1940 available. Decennial Subject Index, 3 volumes, 1917-1926, unbound, $35. N. Klein, 113 Fourth Ave., N. Y.

Durez 11934

A NEW high-impact plastic of the phenolic type was recently announced by Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y. It has a macerated fabric filler and consequently is not readily preformed. It has an impact strength of 2.0 and a specific gravity of 1.44. It is said to have a very good cure cycle for a material of this type and is available in black or brown color.

Oil Well Cased with Fiber Pipe and Concrete

THE world's first oil well cased with fiber pipe and concrete as a substitute for steel is now in successful operation in southern Illinois, and experts in the industry believe it is the beginning of increased oil production in all parts of the United States, especially in the shallow-well fields. The announcement was made by the Fibre Conduit Co., Orangeburg N. Y.

THE Keystone Carbon Co., St. Marys, Penna., manufacturer of precision molded products, is completing a large program of expansion, including plant and production facilities.

Arside Cream

DANGERS arising from the use of arsenic or arsenious compounds and lead or lead compounds, either from contact or from their fumes, have long been a matter of common knowledge. The H. W. Stover Co. of Oakland, Calif., has recently announced the manufacture of Stover Arside Cream, a protective cream compounded especially for protection against these two dangerous elements. The company says the cream has been tested for more than three years under actual working conditions. Like its companion product, Stover Protective Cream, the Arside Cream is applied to all exposed skin surfaces in the form of a thin, invisible film. It is removed with soap and water.

Kem Liquid Glue

KEM Liquid Glue 344 is a liquid animal hide glue for industrial uses. Having properties similar to fish glue, it contains no casein or vegetable or fish glue and is free from objectionable odor.

E. H. SARGENT & Co., Chicago, Ill., has announced the establishment of a Michigan Division in Detroit, with complete sales office and warehouse service.

Conveyor Belt Repair

MANY plants producing war materials are said to be using a new rubber plastic product on conveyor belts, pulleys, and other equipment to keep production lines going. The material, a puttylike substance, made by the So-Lo Works, Cincinnati, Ohio, contains a very small proportion of crude rubber. When spread on a conveyor belt, it repairs holes and worn spots, making it possible for the plant to keep producing without loss of time or replacement of equipment now in service.

Variable Speed Transmission

THE Reeves Pulley Co., Columbus, Ind., offers a special design of the Reeves variable speed transmission, enclosed design, equipped with built-in chain reducer, and with the output shaft in exact alignment with the input shaft. The chain drive operates in a bath of oil.

THE H. K. Porter Co., Pittsburgh, plans to open another plant in Pennsylvania, expanding facilities in the war effort. The company's regular products include locomotives and chemical processing equipment.

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Chemical Detection of War Gases for Civilian Defense

THEODORE F. BRADLEY, Stamford Research Laboratories, American Cyanamid Co., Stamford, Conn.

PROTECTION of civilians against possible enemy attack presents urgent problems in which chemists are vitally interested. Members of the Western Connecticut Section of the AMERICAN CHEMICAL SOCIETY are active in solving chemical aspects of these problems in cooperation with the Stamford, Conn., Auxiliary Police and other local organizations. Having the staffs and facilities of two great research organizations, American Cyanamid Co. and Air Reduction Co., to draw from, as well as other members of the section, we have been able to do more than most communities. In addition to routine drills and small arms practice required of all members of the auxiliary police, the chemists have organized gas drills, classes of instruction, and part-time laboratory projects.

Quick and reliable detection and identification of chemical warfare agents have long concerned military authorities, and today this matter has become of equal concern to those who are charged with civilian defense. "Sniff sets" of the common war gases were prepared and used for instructional purposes. The majority of our group agreed that trained noses are essential for those assigned to gas-sentry duties, but nevertheless we felt it necessary to back up the sense of smell by analysis. Although the human nose is unequaled for sensitivity to many agents, several factors discourage complete reliance on the sense of smell. These are variations of the sense of smell among individuals, lack of odor of some of the war gases, ease of masking or disguising odors by blending agents, and probable use of new or mixed gases. Prompt, accurate identification is vital in selecting protective devices, in applying first aid and medical treatment, and in choosing appropriate decontamination procedures. All of these depend upon the kind of agents encountered.

Detection and identification at the scene of the attack are thus imperative. This precludes the use of elaborate laboratory equipment and methods, and demands the ultimate of simplification without sacrifice of scientific reliability. A major problem indeed!

This analysis of the situation led the chemists affiliated with the Stamford Auxiliary Police to undertake an investigation of suitable methods and equipment for this type of work and to organize detection and identification services for their city. The analytical project was initiated with a survey of the literature and then progressed to an experimental investigation of known methods, selection of the most promising for immediate use, and finally modification and improvement of these for the present purpose where possible. Although this work is still in its early stages and has thus far chiefly utilized known methods, sufficient progress has been made to warrant this preliminary report. Others interested are urged to communicate with the author if they can suggest better methods or otherwise assist in this work.

Literature Survey

From an extensive search of the literature the following references were selected as a recommended study list:

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Lewisite and other arsenicals: Jackson, K. E., and Jackson, M. A., *Ibid.*, **16**, 439 (1935).

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Organization and Equipment of Gas Identification Service

Three chemists were provided with all of the chemical apparatus, reagents, and the portable aspirator described later and were ordered to report to a central station at the first warning of an impending air

raid. In case of a gas alarm, police cars equipped with two-way radios were placed at their disposal for rapid transportation to any affected area. The majority of the chemists were posted during a raid alarm at strategic areas as gas sentries and were provided with test papers 1 to 6, inclusive, one 10-cc. vial of reagent No. 5, and one vial of distilled water, these being conveniently carried in cartridge belts. Only under special circumstances were the gas sentries permitted to call out the mobile first aid and decontamination services, this authority being primarily delegated to the central gas-identification squad.

Owing to the lack of government-issued gas masks and gas-protective clothing the chemists borrowed gas masks from their industrial employers and improvized reasonably satisfactory clothing. Oil-skin jackets with attached hoods and oil-skin trousers, all with drawstring fastenings, were secured from the J. F. Carter Co., Beverly, Mass., and from the Goodall Rubber Co., New York. Heavy rubber boots and gloves were purchased locally.

Portable Aspirator

An aspirator was built to operate without hand pumping or electrical connections and without personal attendance for an appreciable time wherever it might be placed. The aspirator was constructed to handle from one to four tests simultaneously, as required. Provision was made not only to aspirate the general atmosphere but also to permit the air-flow analysis of soil, clothing, and foods. The entire assembly is substantially unbreakable and light enough to be carried by one or two men.

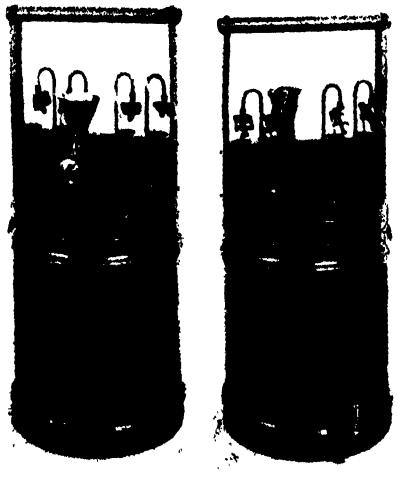


Figure 1. *Left,* Front view of the aspirator. *Right,* Rear view

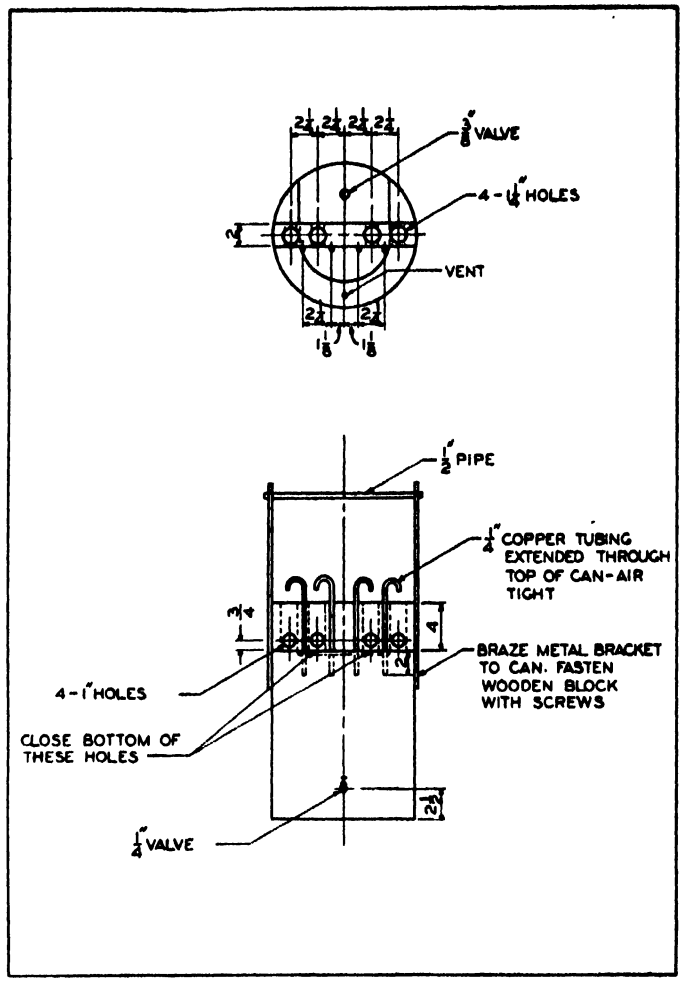


Figure 2

The apparatus is illustrated in Figures 1 and 2. It was easily and cheaply constructed from a 5-gallon solvent pail, an 11-inch length of 2 × 4 inch timber, a 12-inch length of 1-inch pipe, and a few other odds and ends.

Water inlet and air exhaust valves were attached to the top of the pail and a water outlet valve at the bottom as illustrated. The 2 × 4 inch timber was bored to accommodate four wide-mouthed 1-ounce bottles, and peepholes were provided so that the contents could be viewed. Saran flexible plastic tubing with very short rubber connections was used on the exterior to avoid the possibility of breakage. Connections to the air space of the pail were made with short lengths of $^1/_4$-inch copper tubing, as illustrated. Ten cc. of reagent are used in each bottle.

An accessory comprises a 3-foot length of $^3/_{16}$-inch Saran tubing attached to a small tin funnel containing a 100-mesh screen as a filter. This funnel can be placed directly on the ground or held against any object, and it can be heated with an alcohol blow torch to facilitate the volatilization of mustard or other high boiling contaminants (Figure 3). The funnel can also be supported in an upright position on an ordinary laboratory clamp attached to the metal strips of the handle, and in this position samples of soil or of foods can be subjected to air-flow analysis.

Tests have shown that the apparatus will operate for 15 to 60 minutes with one filling of water, pulling air through the test solutions as fast as the water is released from the pail. Consequently it can be left where desired or even lowered by a rope into cellars or other confined spaces, to minimize personal exposure to toxic atmospheres.

The apparatus was sprayed with a khaki paint having the following composition:

30 grams ferrite lemon yellow
21 grams medium chrome yellow
4 grams spirit-soluble nigrosine black
99 grams Asbestine No. 3x

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Figure 3. Machine in actual use by a man wearing gas mask

78 grams Celite No. 110
42 grams barite
278 grams Rezyl resin solution No. 869-1
60 grams Varsol No. 2 solvent
20 grams V. M. & P. naphtha
10 grams 6 per cent cobalt Nuodex drier

This paint was prepared by grinding all of the pigment with 130 grams of the Rezyl resin solution in a laboratory roller mill and then diluting the paste with the balance of the liquids. The paint was reduced 20 per cent with additional solvent for spray application and the coating allowed to dry at room temperature.

On contact with liquid mustard gas the color of this paint changes from khaki to black by reason of the strong solvent action of this fluid on the nigrosine dye contained in the pigment mixture. Prolonged contact with the liquid vesicant causes the paint to blister.

Somewhat larger proportions of the nigrosine black may be used in the above formula to yield olive drab shades of color and increased sensitivity. The replacement of the yellow pigments with white ones enables the production of battleship gray shades. Other paint oils and Rezyl resins may be used in place of Rezyl 869-1.

These paints may be used as vesicant liquid detectors when applied to any desired object.

Chemical Reagents and Equipment

For use with this apparatus or as otherwise desired, following extensive tests in which many suggested reagents were eliminated, these items were assembled in a 14 × 7 × 2 inch plywood rack made to fit within a small canvas bag. The assembly is shown in Figure 4.

Equipment

One Lenk No. 105 high-heat alcohol Blotorch[1]

[1] Blotorch is charged with 250 cc. of 95 per cent ethanol.

One No. 22905 Starkey micro gas generator[2]
One box filter paper (9 cm. No. 1 qualitative)
One 10-cc. graduated cylinder
Two glass stirring rods, 150 × 5 mm.
Two sections of glass tubing, 150 × 5 mm.
One 2-inch glass funnel
Six 10-cc. test tubes

Solvents

One 16-ounce bottle of distilled water
One 4-ounce bottle of 95 per cent ethanol
One 4-ounce bottle of *n*-heptane
One 1-ounce bottle of glacial acetic acid

Reagents and Their Uses

No. 1. One 4-ounce bottle of gold chloride solution prepared by dissolving 1 gram of gold chloride and 1 gram of concentrated hydrochloric acid in 1 liter of distilled water. This solution becomes turbid by precipitation of a gold complex upon reaction with mustard gas. Carbon monoxide on the other hand quickly reduces the gold chloride to deep-purple-colored colloidal gold sol readily distinguished from the mustard gas complex. Hydrogen sulfide produces a black sulfide dispersion, and sulfur dioxide gives a pink color.

No. 2. One 4-ounce bottle of sodium iodoplatinate solution, prepared by dissolving 0.265 gram of sodium iodide in a little water, then adding 0.05 gram of chloroplatinic acid ($H_2PtCl_6.6H_2O$) separately dissolved in 1 or 2 cc. of water and diluting the mixture to 180 cc. This highly colored solution can be further diluted with 5 to 10 times its own volume of distilled water for use in the aspirator.

Mustard, carbon monoxide, sulfur dioxide, and a few other reducing gases quickly discharge the color of this solution. Mustard gas, however, liberates free iodine which can then be detected by starch indicator. Chlorine and nitrous fumes also liberate iodine.

[2] Generator is charged with 12 grams of iron sulfide (20 cc. of 20 per cent sulfuric acid are added prior to use).

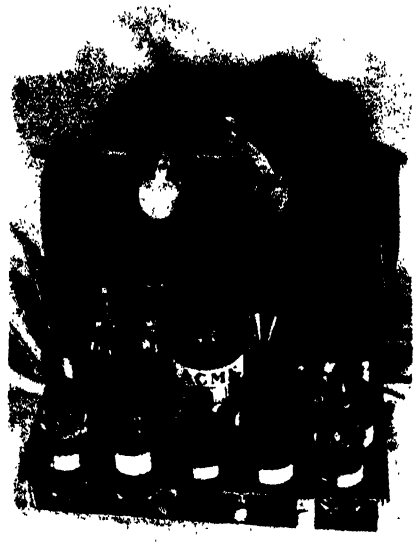


Figure 4. Reagent assembly and carrier

No. 3. One 4-ounce bottle of sodium hydroxide solution containing 20 grams of sodium hydroxide in 80 grams of distilled water. Lewisite is decomposed by this solution with evolution of acetylene, which is detected by freshly prepared cuprous chloride test paper placed in an adjoining, connecting tube.

No. 4. A 1-pound can of chlorinated lime. The violence with which a small pinch of the powder reacts with drops of the liquid mustard constitutes a useful qualitative test. The powder is also useful for first aid and decontamination purposes.

No. 5. A 1-ounce bottle of a new reagent comprising a mixture of 5 grams of selenium dioxide with 20 grams of powdered anhydrous calcium chloride. When the liquid vesicants are brought into contact with this powder and the powder is wetted with a few drops of water, the mixture becomes colored pink to red by reduced selenium. Thiodiglycol and the alkyl chloroarsines also respond to this test. The anhydrous calcium chloride serves to replace the 50 per cent sulfuric acid solution previously thought necessary, while its heat of solution provides the necessary reaction temperature without need of heating appliances. Care must be exercised to avoid the use of excessive amounts of water.

No. 6. A 1-ounce bottle of a solution containing 10 grams of silver nitrate and one gram of concentrated nitric acid in 90 cc. of distilled water. This is of value for the detection of halide ions from easily hydrolyzable gases such as phosgene, diphosgene, and the alkyl chloroarsines.

No. 7. A 1-ounce bottle of 10 per cent ammonium hydroxide solution. A mixture of 3 cc. of this with 6 cc. of reagent No. 6 will form a precipitate of reduced silver when added to silica gel on which has been adsorbed Lewisite, chloroacetophenone, or bromobenzyl cyanide.

No. 8. A 1-ounce bottle of solution containing 3 grams of copper sulfate, 3 grams of ammonium chloride, and 5 grams of hydroxylamine hydrochloride in 88 cc. of distilled water. Nine cc. of this and 1.5 cc. of reagent No. 7 are admixed for saturating the filter paper which is used with the Lewisite reagent No. 3.

No. 9. A 10-cc. vial of 10 per cent barium chloride solution which is of value for detecting sulfate ions formed when dimethyl sulfate, chlorosulfonic acid, or sulfur trioxide fumes are absorbed in water.

No. 10. A 1-ounce bottle of 20 per cent sulfuric acid, used in conjunction with the micro hydrogen sulfide generator for the preparation of the few cubic centimeters of hydrogen sulfide solution which may be used for the detection of the arsine war gases.

No. 11. A 1-ounce bottle of silica gel adsorbent.

No. 12. A 1-ounce bottle of activated charcoal adsorbent.

No. 13. A 10-cc. vial of soluble starch.

Test Papers

Vials of test papers were also included in the kit and, when not commercially available, were prepared by immersion of filter paper in the specified solutions. *The papers were selected to detect not merely certain of the war gases but also other gases which could influence the behavior of any of the reagents.*

1. For chlorine and other oxidizing gases (used moist)
   (*a*) Potassium iodide-starch paper. This paper gives the blue color of the starch-iodine complex in the presence of chlorine, bromine, and nitrous fumes.
   (*b*) Potassium bromide-fluorescein paper. Prepared from a solution of 0.2 gram of fluorescein, 30 grams of potassium bromide, 2 grams of potassium hydroxide, and 2 grams of sodium carbonate in 100 cc. of distilled water. The color change is from yellow to red for chlorine.
   (*c*) *o*-Tolidine paper. Prepared from a solution of 0.1 gram of *o*-tolidine in 100 cc. of 10 per cent sulfuric acid. The color change is from yellow to orange for the oxidizing gases.
2. For phosgene and diphosgene
   Harrison's reagent paper. Prepared from a solution of 1 gram of *p*-dimethylaminobenzaldehyde and 1 gram of diphenylamine in 10 cc. of carbon tetrachloride. The color change is from white or pale lemon yellow to deep orange in the presence of phosgene, diphosgene, chlorine, or hydrogen chloride. Used dry.
3. For chloropicrin
   Dimethylaniline paper. Prepared from a solution containing 10 grams of dimethylaniline in 90 grams of carbon tetrachloride. This changes from white to yellow or brown in the presence of chloropicrin, but the color quickly fades after removal to pure air. Used dry. Methylbenzylaniline may be substituted for dimethylaniline, giving a more permanent test paper because of its reduced volatility. Both reagents, however, give the best results when freshly prepared
4. For general purposes
   "Alkacid" paper. This universal pH indicator paper is very sensitive to ammonia and to all of the hydrolyzable acid gases. Color changes are illustrated on the label of the vial. Used moist.
5. For reducing gases and mustard gas
   Sodium iodoplatinate paper. Prepared from a solution containing 0.265 gram of sodium iodide and 0.05 gram of chloroplatinic acid in 30 cc. of distilled water. This violet-purple-colored paper is used moist and is decolorized by mustard gas, thiodiglycol, hydrogen sulfide, carbon monoxide, and sulfur dioxide.
6. For mustard gas
   Gold chloride paper. Prepared from a solution of 1 gram of gold chloride in 9 grams of water. This pale yellow paper turns reddish brown in contact with the liquid form or concentrated fumes of mustard gas. Used dry and then moistened to accentuate the color change.
7. For hydrogen sulfide
   Lead acetate paper. Ten grams of lead acetate are dissolved in 90 cc. of distilled water. This paper becomes dark or decidedly black in the presence of hydrogen sulfide.

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Bomb Damage to Industrial Plants

C. H. S. TUPHOLME, St. Christopher's Firgrove Hill, Farnham, Surrey, England

Now that the veil has to some extent been lifted on bomb damage to industrial plants in Britain, it is possible to outline the chances of damage to various types of factory construction. Particulars of similar damage in other countries have also become available through various channels. Useful information on this subject has been collected and published in various forms—notably in the Wartime Building Bulletins, 1940, Nos. 1, 4, and 5, issued by H. M. Stationery Office; a "Report on Buildings Damaged by Air Raids and Notes Relative to Reconstruction", issued last year by the Institution of Structural Engineers in London; and a paper on "Proneness to Damage of Plant through Enemy Action", read by Hal Gutteridge before the Institution of Mechanical Engineers early this year.

Mr. Gutteridge considers the kind of damage that results from the dropping of high-explosive and incendiary bombs from aircraft. His paper excludes consideration of damage arising from other kinds of enemy activity.

The extent and severity of damage to the plant depends upon the protection given to it by the building, and the first observations to be made when carrying out a rapid approximate estimation of the damage will concern the building or buildings. The site of the building and its position in relation to any other near-by buildings also affected gives the first general impression of the extent and severity of the damage which may be expected and provides an indication of the work involved in reinstating the damaged plant.

The type of building construction least likely to suffer from the effects of a bomb explosion is that which is sufficiently resilient to recover its former position without strain or disintegration. Momentarily, after the explosion, the structure may have to adjust itself rapidly to very unequal air pressures on different parts which may set up strong forces in its various members. Such stresses require proper continuity of reinforcement, or soundly jointed structures, with beams and columns acting as one unit, a feature which is found only in steel frame buildings or in those of reinforced concrete construction. In all steel frame and other types of construction the design should be such as to localize the effect of the bomb and minimize progressive structural failure.

Walls of a modern factory are not part of the structure. If they are external walls their purpose is mainly to keep out the weather, to allow light and air in the interior, and to preserve air conditions within the factory. If internal, they form the necessary divisions of the area. They may act as protective walls or be used for other nonstructural purposes. If, therefore, in a modern steel-framed building all the walls have been blown out, the danger of collapse need not be anticipated. Protective walls are arranged to divide the factory into a number of "cells" so that the effect of a bomb explosion will be localized. The number of cells depends upon the nature and arrangement of the plant and the operations carried on. It is usually possible in existing works, both engineering and industrial, to arrange the walls so that a high degree of protection is achieved without interference to the work of the factory. In future factory layouts this aspect of protection will be incorporated in the design as a matter of good practice.

Roofs and floors of solid concrete strengthened with filler joists or steel reinforcement give more protection against bombing than floors in which lightness has been obtained by the use of hollow tiles or other means. With floors of the latter type the damage to the plant can be expected to be greater. In single-story buildings of light steel frame or reinforced concrete construction the roofs are not usually designed to be proof against incendiary bombs, and the damage will be of a different character for the bomb will fall directly upon the plant. In this type of factory the division of the floor into cells by protective walls designed to localize the effects of bombs or fire is particularly applicable.

If drainage is not adequate to deal with the abnormal conditions during a fire when large quantities of water may have to be conducted away, the consequent flooding is likely to damage plants which have been submerged. Particularly susceptible in this respect are electric motors and electrical equipment generally.

The five main causes of damage to factory plants consequent upon an enemy attack from the air are:

1. Direct hit from a high-explosive bomb.
2. Blast pressure wave from bomb explosion usually accompanied by flying splinters and debris.
3. Fire caused directly by incendiary bombs or indirectly by high-explosive bombs.
4. Damage from debris falling from above.
5. Flooding or drenching by water.

Each of the causes has a different effect on different types of plant. All plants can be classified in this respect and limits set within which the damage is likely to fall. For example, a blacksmith's anvil is unlikely to suffer any damage from any of the causes mentioned above except in an

extreme set of conditions in which it might be exposed to a direct hit or to intense heat. Such an item would have a minimum proneness to damage. At the other extreme would be some recording control equipment, such as a thermostat, thermograph, or gas composition recorder, which would be severely damaged by any of the above causes if they were near. The proneness to damage of such equipment would be high.

It is convenient to denote this variable proneness to damage by a number which will indicate the percentage of the value of the item (in its condition just before the incident) which has been lost by the damage it has suffered. This might be called the damage proneness number, or d. p. n. The anvil could be given a set of limits, to represent the damage likely to occur in average cases, of between 0 and 5, while the d. p. n. of the control equipment could be expected to fall between 70 and 100. These limits must of necessity refer to average cases, and whether the figure should be towards the higher or the lower limit or whether, in an exceptional case, the figure should be outside the limits must depend on the judgment of the experienced engineer at the inspection.

In seeking to establish these limits the physical characteristics of the item will affect the result in every case, except where extreme conditions have occurred. By this method the limits of probable damage can be narrowed and placed on a firmer basis, as an aid to the trained observer in the rapid approximate estimation of the plant value lost.

Generally factory plants can be classified in terms of damage proneness somewhat as follows: heavy all-metal equipment for the heavy engineering industries, in the form of rolling mills, large presses, steam hammers, etc., will have a low damage proneness number, while in light high-speed machines used in cotton weaving and spinning, packaging machines for tea, margarine, etc., the d. p. n. will have a comparatively high value. The lighter equipment employed in engineering factories, such as lathes, shaping machines, grinding machines, etc., are in average cases likely to suffer damage to parts other than the beds or bases when exposed to blast or fire, and the damage proneness number may be expected to lie between 20 and 50. It may be somewhat higher if the electric motor drive has been exposed to heat or flooding. If efficient dwarf protective walls were provided, the damage proneness number would lie towards the lower limit.

Intricate machines of lighter construction will need a much greater proportion of the replacement value to be expended in repair, in relation to the proportion of actual damage, because of the high cost of assembly. On the other hand, the cost of removal and reinstallation will be considerably less than for plant of a heavier type. Heavy machines of an intricate nature, such as looms, will have high damage proneness numbers, despite their great weight, due to the large number of delicate parts and to the high precision required. The high-speed automatic type of machine constructed of fabricated steel has a greater chance of survival than a machine made of cast iron, for the combination of toughness and malleability of the former is, in these conditions, a superior characteristic to the brittleness of the cast iron. Sheet metal equipment in any form, such as milk pasteurizers, fan casings, and ducts, suffer severely, for they offer a large area ill-supported to resist a suddenly applied pressure followed by an equally sudden subatmospheric pressure. Failure takes place by tearing at rivet holes, followed by general crumpling of the plate. Where exposure to blast, falling debris, or fire has occurred, a damage proneness number between 60 and 90 may be expected.

The proneness to damage is also affected by the extent of the surface of the item exposed to the blast. The blast is resisted by the weight of the item and by any anchorage that it may have to a secure foundation. It is convenient to classify such plants, excluding items held down to their foundations, in terms of the ratio of the weight in pounds to the exposed area in square feet. Application of this criterion assumes a structurally sound item and a rigid surface. Thus, a Lancashire boiler when full of water would have a high ratio of weight to exposed area.

The general practice of attaching service piping to the most convenient point of support has persisted despite the many advantages in accessibility, clean layout, absence of obstruction, and protection from fire or other damage which is realized by placing such piping below the ground floor level in covered channels, with vertical branches only to the points to be supplied. An added reason for such treatment is provided by the threat of air raids, for piping not so arranged is particularly vulnerable to blast, fire, or falling debris. It cannot be too strongly impressed that the supply services carried by such piping are the arteries supplying life blood to the machines, without which they cannot operate. Factory piping should therefore receive the attention which its importance warrants, and improvements should be sought in the following directions:

1. The total length of the service lines should be as short as possible.
2. The piping should be duplicated within reasonable limits, the second line being far enough away from the first to avoid the possibility of one bomb destroying both.
3. Adequate protection should be given by placing the piping underground or disposing it in other ways.

If piping is attached to the structural members and total collapse of the building takes place, the piping will become a total loss with a damage proneness number approaching 100, for none of it except the valves is worth recovering. If, however, the piping has been placed underground, then even with a total collapse of the building, only the vertical "runs"—and these are the less important—will be lost. The damage proneness number may be expected to lie between 40 and 80.

Cables for the supply of electricity, as well as electric motors, switchgear, etc., are particularly vulnerable to blast, fire, falling debris, and flooding especially. As with piping for the various services, the cables should be run in channels, watertight in this case, with vertical leads to the points of consumption. All main supply cables should be duplicated. They should be laid underground, far enough apart to prevent the possibility of one bomb affecting both of them.

Electric motors are particularly susceptible to damage from these causes, but their strong body casing protects them from falling debris. They also offer a high resistance to blast by virtue of their high ratio of weight to exposed area and because of their secure fastening to their bases. Even so, it is a frequent experience to find the feet fractured and the motor dislodged. The coils and windings, although comparatively well protected, are easily damaged by flying debris and flooding. If flooding alone has caused the damage, they can sometimes be reconditioned by drying. A general damage proneness number for all electrical motor equipment, including attendant switchgear but excluding distribution mains, may range from 50 to 80 in average cases. In generating stations protection for the turbine generator set can be provided by building a separate reinforced concrete structure.

From the viewpoint of this survey boilers can be classified into two general classes: Cornish, Lancashire, and fire-tube boilers of that category; and vertical and water-tube boilers. Boilers of the first type are heavy objects when filled with water; they are set low, near the ground, and are well bedded, with sides mostly shrouded with brickwork. They offer a high ratio of weight to exposed area and suffer little damage in themselves, although the steam connections above are likely to receive injury from flying debris. The damage proneness number for the first type of boiler is likely to be between 10 and 30 if the boiler settings have not been disturbed. The second class of boiler is more susceptible to damage than the first, for such boilers are built as comparatively high structures, securely held to their foundations with a high center of gravity. The damage proneness number of this class may be between 40 and 70.

For the rapid approximate estimate of the loss in value of the damaged plant the following order of observations is suggested:

1. A general inspection of all buildings on the site and of the adjacent buildings, to obtain a comprehensive impres-

sion of the extent of the damage likely to have taken place.

2. Inquiries as to the type of bomb which caused the damage, whether the factory received a direct hit and, if fire followed, where and for what period the fire continued.

3. If a fire occurred, whether it burned itself out or was quenched by water.

4. A detailed inspection of the type of building construction, its condition, and whether any collapse took place.

5. A detailed examination, as far as possible, of the whole of the plant, its layout, nature, and the condition of all the items damaged.

6. Ascertainment of the value of all the damaged items, the value to be that immediately before the incident.

7. Preparation of a schedule showing all items or groups of items of damaged plant; the damage proneness number of each in the light of the conditions to which the item was exposed; and the corresponding loss in value. By summing the individual losses the total loss is obtained, which can be expressed as a percentage of the total former value.

An example of a schedule of a possible case is given by Gutteridge. A factory of three floors covering a half acre in one building of load-bearing brick construction with internal joists and columns not soundly joined together received a direct hit from a high-explosive bomb of large caliber. The result, it is supposed, was the total collapse of the factory, with fire breaking out in one part of the building among flammable materials in process of manufacture. The fire, however, did not spread. In such a case the schedule given in Table I might reflect the state of affairs in an approximate estimation of the loss in value of the plant.

Table I. Approximate Estimate for Damage

Item	Value, £	D. P. N.	Loss, £
Processing plant	20,000	50	10,000
Packaging equipment	4,000	75	3,000
Conveyors	1,000	100	1,000
Refrigeration plant	6,000	50	3,000
Electrical equipment	3,000	80	2,400
Service piping	3,000	100	3,000
Boilers	4,000	30	1,200
Motor vehicles	2,000	50	1,000
Miscellaneous	3,000	50	1,500
Total	46,000		26,100

Each of the items in the table will be made up of a number of units of various types and values, each of which would have been given a damage proneness number, so that the actual items shown represent totals for groups of individual items. The total loss for the whole of the factory plant works out at a little over 56.7 per cent of its actual value.

Whether the damage to the plant was extensive or trivial, the same procedure is necessary for reinstatement of the plant. The approximate estimate of the loss in value will have provided the necessary information upon which to base the decision as to the future program in regard to the re-establishment of the plant.

In the case of a totally collapsed building, if it is decided to rebuild upon the same site, the work involved falls into two parts. The first part consists of clearance from the site of debris and the plant and the dispatch of the damaged plant for repair. It is well to note here that much further damage may be done to the plant in taking it down, disentangling it from the debris, and loading it on to the removal vehicles, so this work should be carried out only by competent men. It is usually preferable to return the damaged plant to the makers rather than to other firms.

The second part of the program is repair of the equipment, planning of its subsequent layout, construction of the building to suit the new layout, and reinstatement of the plant leading to the re-establishment of the factory.

A plant sent for repair necessitated by enemy action should be overhauled for normal wear and tear at the same time. The total cost of repairs should be allocated, therefore, to two accounts. The first account would show the cost of repair of damage due to enemy action, including the cost of removal, carriage outwards, dismantling at the repair shops, reassembly, testing and storage until the new building is ready, return carriage, re-erection and testing as a unit. The second account would show the cost of overhaul for normal wear and tear. From these accounts the actual value of the loss on repairable items will be ascertained.

Sets of Abstracts

Sets of abstracts of the Buffalo meeting papers in planographed book form will be supplied by the A. C. S. News Service, 1155 16th St., N. W., Washington, D. C. Sets are not guaranteed to be complete, but contain abstracts from all divisions as submitted by authors. The abstracts will be mailed as soon as possible after receipt of order, beginning about September 2, and will also be on sale at Buffalo, N. Y.

This enterprise is undertaken in a spirit of service and not for profit. Sets are offered on the following terms:

To members of divisions who forward receipt for divisional dues with remittance and order, 50 cents.

To those without receipt for divisional dues, who remit with order, $1.00.

To those who fail to enclose remittance with order, necessitating correspondence, $1.25.

To those who require bills to be rendered, $1.50.

New Dates and Location for National Chemical Exposition

The Chicago Section of the American Chemical Society announces a change of dates for the National Chemical Exposition, which has been moved to November 24 to 29 in place of a week earlier, as originally planned. This has been made necessary because the Stevens Hotel in Chicago, where the exposition was to have been held, has been taken over by the United States Army. The exposition consequently has been transferred to the Sherman Hotel, where the conferences also will be held. The Sherman is conveniently located at Clark and Randolph Streets in Chicago's business center.

No changes are planned in the original program for the exposition and the daily conferences to be addressed by leaders in the chemical industry, educators, and other outstanding authorities will be held. There will also be an interesting display of motion pictures. More than one hundred exhibtors can be accommodated in the available space, which is not so large as that originally at the committee's disposal. Consequently if there are those who have deferred their decision as to making exhibits, they should complete their plans without delay, as it is likely that available space will soon be exhausted.

Duke Station Research Directed toward Agar Supply

The Duke University Marine Station on Piver's Island, Beaufort, N. C., has opened its doors to biologists for the fifth consecutive summer. Classes and research work are in full swing under the leadership of A. S. Pearse, director, assisted by C. G. Bookhout and H. J. Oosting.

Included in the new equipment being used is a boat and residence provided for the newly appointed resident investigator, H. J. Humm, who took up duties on June 1. Mr. Humm, who will be located at the station for three years, is studying the possibilities of making agar and alginic acid from the marine seaweeds of the region and hopes to aid in averting a war-produced shortage of agar. H. L. Blomquist, chairman of the Duke University Botany Department, has recently returned from a 10-month visit as an exchange professor at the University of Puerto Rico, where he investigated tropical seaweeds as sources of agar. Professor Blomquist reports that he has located several types of seaweed from which satisfactory agar-producing materials might be obtained.

At the end of June, **Martin Williams** began work as a research chemist with the Tennessee Copper Co., Copperhill, Tenn. He was previously instructor in chemistry at the University of Alabama.

The Story the Rocks Tell of Niagara Falls

Its Past, Present, and Future

GLENN C. FORRESTER, 334 Buffalo Ave., Niagara Falls, N. Y.

Introduction

Surplus water from rain or melting snows, which falls on a large section of our continent, collects temporarily in the Great Lakes. These reservoirs spill over from one to another oceanward. The spillway from Lake Erie to Lake Ontario is known as the Niagara River.

This river leaves Lake Erie at Buffalo as a wide unhurried stream. It flows in a shallow channel across a flat plain having an elevation of about 600 feet above sea level. Twenty-seven miles to the north the water enters Lake Ontario as a broad quiet river slightly entrenched in a low plain bordering the lake. This plain, however, is less than 300 feet above sea level and more than 300 feet below the first. The placidity of both the source and mouth of the river betrays no sign that midway in its course the waters are lashed to unequaled fury in making the descent in a series of rapids and falls. The one great vertical drop is called "Niagara Falls".

In traveling from the upper to the lower of the two plains, descent must be made over the face of a high precipice or escarpment. However, Niagara River makes the greater part of its descent, not at the escarpment, but at the head of a gorge extending back from that declivity seven miles into the upper plain.

Something of the origin of this gorge and the story of Niagara as revealed in this seven-mile-long manuscript, we hope will be of interest to the chemist attending the 104th national meeting of the American Chemical Society.

The story opens during the Great Ice Age when northeastern America lay buried under an ice sheet two miles thick in the Laurentian Highlands. Its sheer plasticlike mass caused it to push out to the south as far as the Ohio River. Prior to its accumulation the drainage of this region was chiefly to the southwest into the present Mississippi basin, but the glacial flow strongly remodeled the topography over which it moved. It scraped away surface soil, which ages of weathering had formed from resident strata, and even gouged deeply into the bed rock itself. Here it deepened and enlarged preglacial river valleys. Farther along it relinquished its load of debris, damming the valleys and forming the basins now occupied by the Great Lakes. The area to the northeast, underneath the center of the glacier, was depressed, partly by reason of the great weight of the overlying mass of ice. These two processes of filling and depression reversed the drainage of the region from southwest to northeast, and formed a low divide separating this northeasterly basin from the Mississippi Valley.

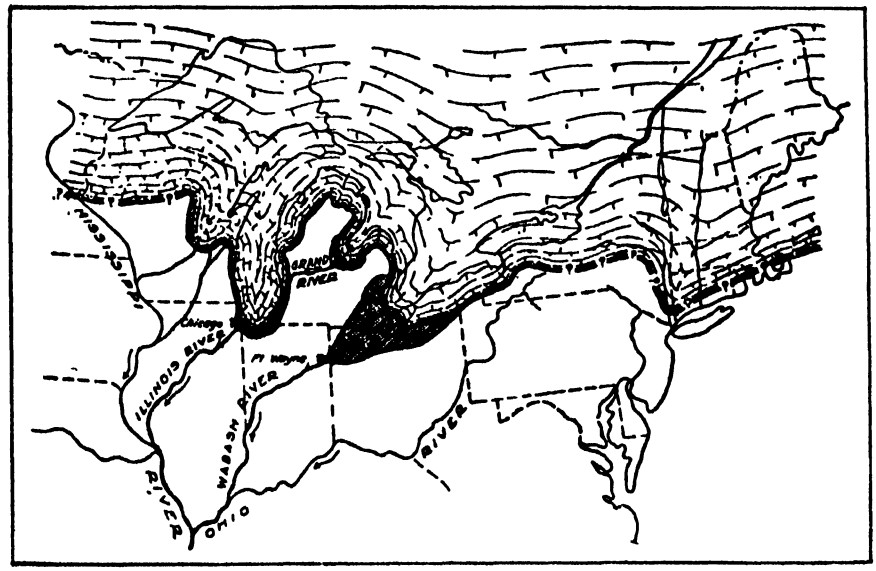
At its greatest extent the ice sheet had pushed out far beyond the boundaries of the St. Lawrence Valley. When winter relented and the onslaught of a milder climate began to beat back the ice front, the first floods of water from the melting glacier flowed off directly to join the Mississippi. However, when the margin of the ice had receded to a position behind or north of the newly formed divide but still obstructing drainage to the northeast, the waters from the melting ice were impounded before the ice front and formed lakes which stood at the levels of low points in the divide through which the overflow escaped to the south and west as before. These lakes were numerous and of varying duration. When one was held at a constant level for a sufficiently long period, well-defined beaches were formed by wave action, many of which are still distinct and well preserved today.

Since Niagara Falls is merely a vertical drop which the overflow from the upper lakes makes in its descent to the ocean, the origin lies far back when these lakes were taking form; and its modern story must properly commence when that discharge first fell over the escarpment at Lewiston.

We can picture the first stage as characterized by long, narrow, crescent-shaped iceberg-studded lakes bordering the ends of the major lobes of the retreating glacier, transient precursors of the corresponding greater lakes of today.

A predecessor of the present cataract had a substantial existence at this time when the melting ice front at the eastern end of Erie uncovered an outlet to the Hudson Valley some 80 feet lower than the Grand River across Michigan which had served up to this time. A fall as high and as great in every way as the present Horseshoe occurred in this course in central New York. For a protracted period the fall was located on what is now Clark Reservation about four miles southeast of Syracuse. It cut a gorge 1,600 feet long, and at its base scoured out a deep pool corresponding to the deep plunge basis at the foot of our Horseshoe Fall. In it now lies the deep Jamesville Lake. The silent brink, the strongly water-scoured channel above, the majestic amphitheater enclosed by the high gorge walls, are exactly what one would see today if the flow of Niagara were stopped. They stand as mute but impressive witnesses to an earlier chapter of Niagara, and well deserve the few minutes' pause required for a visit if journeying on Route 20.

Ultimately, retreat of the ice from central New York opened a still lower outlet for the combined Lake Erie–Ontario into the Mohawk Valley at Rome, N. Y. It was at a level considerably lower than that of the plain on which Buffalo and Niagara Falls now stand so the lake level



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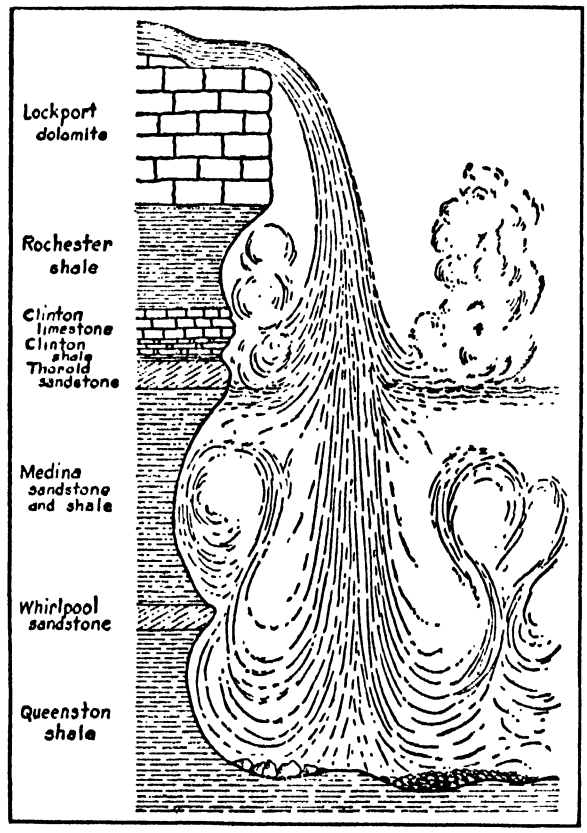
Figure 1. First glacial Great Lakes. The water areas are shaded.

fell, and the subsiding body of water was divided into two lakes corresponding to Erie and Ontario of today. With Erie spilling over the escarpment at Lewiston, Niagara Falls came into being and its modern chapter began.

But this leaves us with a Niagara seven miles from its present site.

The rock strata of this region are nearly horizontal, but do have a slight dip southward of from 20 to 40 feet to the mile. The topmost stratum is the durable Lockport dolomite 80 feet in thickness at the falls. Underneath this layer are several hundred feet of relatively soft shales and sandstones only occasionally interrupted by thin resistant members. The thousands of tons of water which glide over the crest of the falls strike with tremendous force at the base of the cliff far below. Even the most durable strata would be too feeble to withstand such battering action. Armed with blocks of rock which have fallen from above, the swirling currents in the deep plunge basin at the base of the Horseshoe batter the sides, wearing away the softer layers, and undermining the capping dolomite until more great blocks fall from the overhanging ledge for want of support. Thus the brink of the cataract is always an overhanging shelf, projecting beyond the face of the supporting rock wall. Whenever a block falls from the brink it contributes to lengthening the gorge at the top and at the same time supplies a new tool for lengthening it at the bottom. Each fall of rock from the crest attacks with renewed vigor the supporting wall behind the falls. It is now recognized that the whole gorge from Lewiston to the Horseshoe Fall, with the exception of the Whirlpool which has an interesting story of its own, has been excavated by this process of backward, rather than downward, erosion.

From the mechanics of the retreat it is apparent that the fortunes of Niagara must have varied not merely because of one but several factors. Change in height of a cataract like Niagara would alter the vigor of the attack at the base, and also vary the amount of rock material to be removed. The character, thickness, and arrangement of the strata could be important influences for rapid or slow retreat. Distribution of the water over a wide crest would make for ineffective erosion, as is the case in the American Fall today. The system of cracks and fissures in the capping layer determines in advance the size and shape of the blocks which are to fall when undermined. However, of all the qualifying factors, it appears that in the life of the cataract the volume of the river has fluctuated most remarkably and has been of greatest significance.



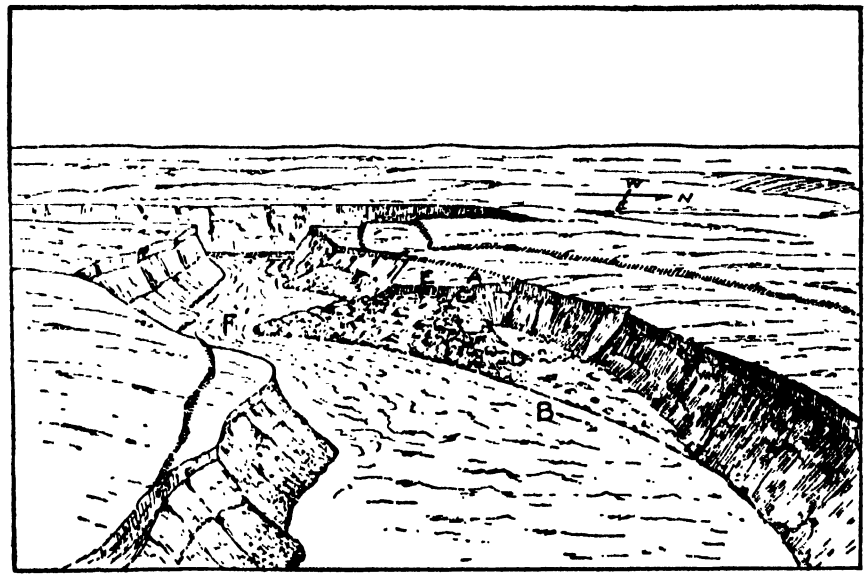
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Figure 2. Sectional view of Horseshoe Fall showing arrangement of strata, depth of water, and mechanics of recession.

Since the volume of the Niagara River is the discharge from the upper Great Lakes by way of Lake Erie, pulsations of Niagara are merely the echoes of events of greater magnitude in the theater of the Great Lakes. A knowledge of Great Lakes history is therefore desirable since it accounts for vicissitudes which the falls appear to have experienced and corroborates in a most remarkable way the interpretation of the history of the gorge, which its character suggests.

Inspection of the northern and eastern borders of the Great Lakes discloses that there are several elevated beaches, which, when followed to the south and west, dip below the levels of the lakes and disappear. These facts and other observations made within the past 60 years reveal that almost the entire Great Lakes region has been tilted toward the south and west. At the southwestern ends of Lakes Superior and Erie the level of the water appears to be rising as much as two feet per century; on the northern and eastern shores it is receding correspondingly. This canting movement was in operation at the time of the last retreat of the glacier and, in fact, was in part caused by it.

These readjustments of the earth's crust, like the accumulation of the stresses which caused them, were not gradual and steady but abrupt and spasmodic. Rapidly melting ice and the partial draining of large lakes incident to the opening of some lower outlet were phenomena of relatively rapid development which greatly disturbed the nicely balanced isostatic forces in the earth's crust and set up, in consequence, stresses to be relieved only by crustal movement. The occasional earth tremors still felt in northeastern United States are probably an aftermath



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Figure 3. View of Niagara Glen looking upstream toward the Whirlpool.



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Figure 4. Aerial view of Whirlpool looking northwest along course of the buried St. Davids Gorge. Outlet of the pool is at the right.

of earlier and much more violent activity, a further easement of the still uncompensated stresses in the architecture of this segment of the earth's crust.

So when the glacier retreated it was still of such magnitude as to weigh down the Laurentian region to such a degree that the overflow from the three upper great lakes found a channel, that of the Mattawa-Ottawa Rivers, lower than their outlet at Port Huron. The latter they promptly deserted and only the overflow from Lake Erie, a volume of water equivalent to about 15 per cent of present Niagara, now passed over the falls.

The consequently enfeebled Niagara of this period leaves its record in the shape of an extremely narrow gorge having a mean width of but 360 feet, and a shallow channel 35 feet in depth. This section is known as the Whirlpool Rapids and extends from the Whirlpool to the railroad bridges, a distance of about three fourths of a mile. It is encumbered with fallen blocks of dolomite which the cataract, like the American Fall today, was unable to move and destroy by grinding.

The head of the rapids opens upon the broad and relatively placid expanse of the upper gorge which is in sharp contrast to the chasm just described. One might suspect that Niagara history was again punctuated by some far-reaching event in upper lake history. This was notably true. Continued withdrawal of the glacier and the consequent continued elevation of the northeastern part of the continent eventually lifted the Ottawa outlet above the level of that at Port Huron and again forced the overflow to seek passage via Lake Erie and over Niagara in its journey to the ocean. This movement has continued. The Ottawa outlet today is 117 feet above the level of Lake Huron.

The Niagara which we know was thus restored to its present greatness and regained the power to excavate a wide and deep gorge. The time which has elapsed since that restoration has been sufficient for the falls to retreat 12,000 feet and, calculated from their recently measured average rate, would amount to more than 3,000 years.

Niagara Glen. This is one of the most delightful places along the gorge. Here stands unequivocal evidence of the existence at one time of a Niagara more than four miles from its present position.

A thousand yards below the Whirlpool on the Canadian side of the gorge is a unique projection in the shape of a roughly triangular platform formerly known as Wintergreen Flat. Its surface is a little below the level of the adjacent upland from which it is separated by a short steep slope, an early river bank. A second side of the shelf is a ledge looking eastward over the glen to the American side of the gorge. The third side faces north and is also a cornicelike ledge capping a precipitous wall. At the base of this cliff is a confusion of huge dolomite boulders like those found at the foot of the American Fall today.

A north sloping dry channel known as Foster Flat, well wooded and littered with more such blocks of Lockport dolomite, leads away from the base of the cliff for one third of a mile to the water's edge. The flat is bordered on the west by the gorge wall. On the east is a low ridge strewn with blocks of dolomite, the remnant of an island which stood in the course of the river. The falls of today, divided by Goat Island, are recapitulating an episode in their history to which Niagara Glen is the interesting witness. When the cataract in its recession from the escarpment at Lewiston had reached point *B*, Figure 3, it was a broad waterfall; above it, occupying the position *C-D* was a narrow island dividing the river as Goat Island now divides it. Upon reaching the island the cataract was separated into two parts corresponding to the present Horseshoe and American Falls. However, in that instance the greater body of water passed on the American side of the island so the American Fall retreated upstream more rapidly. When the Canadian Fall had cut back to the head of the island the American Fall had passed it, allowing part of the sheet of water on Wintergreen Flat to drain eastward into the gorge opened by the latter cataract. The Canadian Fall, through this loss of water, became less active and soon fell out of the race leaving the abandoned brink at *A* to record its defeat. It is evident that the Canadian cataract did not hollow out a deep pool like that below the Horseshoe Fall of today, but was rather comparable in its mode of action to the present American Fall. The slope riverward from Wintergreen

Flat corresponds closely with what would probably be found under the American Fall if the river were stopped and the pool drained. The island was not broad enough to remain standing between the abandoned channel and main gorge. After the cataracts had passed, its pedestal of shale was disintegrated by weathering and the capping dolomite collapsed. It is peculiarly impressive to stand on the silent brink of the old waterfall at *A*, Figure 3, and look down the dry channel. It is no less impressive to descend and wander among the hugh blocks of rock at its base. Here may be found the shells of a species of fresh water mollusk which are alive only on rocks lying in the constant spray of the falls.

The Whirlpool. To the interrogatively minded person this interruption, the Whirlpool, midway in the course of the gorge appears unique. It occupies a roughly circular basin about 1,700 feet in diameter located at a sharp bend in the course of the gorge, a great swollen elbow. There the progress of the stream is most unusual and suggests that some pre-existing influence had had a hand in fashioning it. The turbulent waters rush in from the rapids and are impelled directly past the narrow outlet at the right. Circling to the left along the walls of the basin the current completes the circuit of the pool. It then finds itself separated from the outlet by the inrushing stream. Under this it is forced to dive, boiling to the surface near the outlet through which it slides.

Examination of the rock wall enclosing this basin reveals three breaks in its continuity: the inlet at the southeast, the outlet at the east, and a less well-defined breach on the northwestern side. The rock walls at either side of this break disappear under great banks of earth. As far as the eye can see they do not bound that side of the basin with a continuous rock wall. In fact, a comparatively small creek has cut a ravine to the water's edge, while a creek of equal size on the west side of the pool has been able to cut its channel only to the top of the rock wall over which it plunges more than 250 feet to the surface of the pool below. It would appear that there is a comparatively soft filling. Exploration of the ravine proves that this is true and that the rock walls on either side appear to continue in a north-northwesterly direction. Following this bearing across the upper plain, the Hydraulic Canal is crossed at a point where the concrete flume conducting the water does not lie in a channel blasted out of bed rock, as is the case with all the remainder of the canal, but instead rests on a bed of unconsolidated earth. In this neighborhood a boring was made to the depth of 269 feet without encountering bed rock. A few hundred yards to the east or west, bed rock is but a few feet below the surface. Continuing across country north-northwest for about two miles one reaches the gravel pits at the top of the hill south of St. Davids. There the escarpment, locally known as the Mountain, so precipitous both to the east and to the west, is absent and a much gullied hillside of glacial drift exists in its stead.

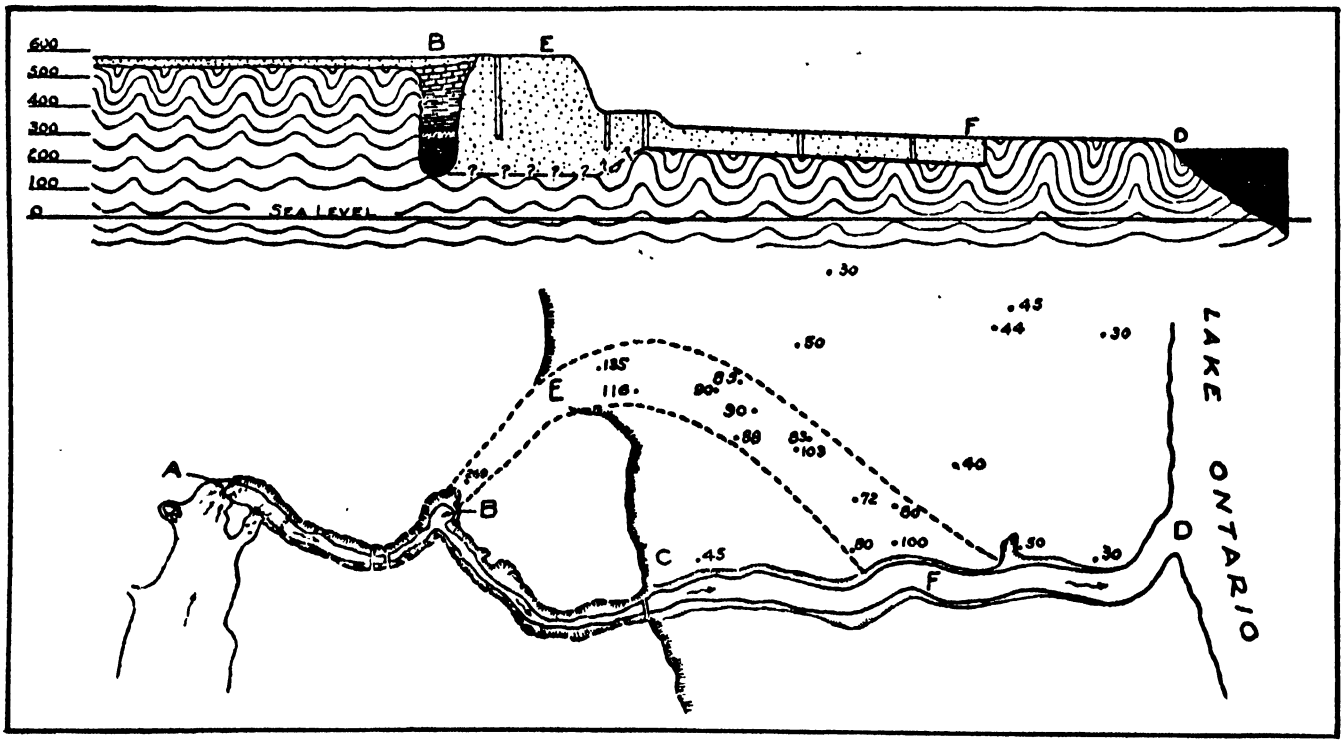
Such facts led geologists to suspect the existence of a buried channel extending from the Whirlpool to the break in the escarpment at St. Davids—a gorge made in some remote time, perhaps related in some way to the present one from the Whirlpool to Lewiston.

From the records of a large number of wells widely distributed between the escarpment and Lake Ontario it appears that the red Queenston shale underlies this plain at an average depth of 45 feet below the surface. There is, however, a strip running northeast from St. Davids in which the well records show boulder clay, quicksand, and gravel to much greater depths before the shale is reached. The width and depth of this channel in the rock are comparable with the width and depth of the present lower Niagara River. The strip intersects the lower Niagara about two miles south of Niagara-on-the-Lake. There the red shale which outcrops nearly everywhere along the river is absent and the river bank consists entirely of glacial drift. This in all probability is the cross section of a buried river channel and the strip characterized by the deep drift, no doubt, defines the course of the river which issued from the mouth of the Whirlpool—St. Davids Gorge.

From examination of such physical evidence the geological story of a region is pieced together. From a study of the dimensions and depth of these buried channels the following story of the Whirlpool has been deduced. It carries us back even beyond our first tentative beginning.

Conclusion

In a period preceding the last advance of the glaciers from the north a predecessor of Lake Erie sent its overflow across the



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Figure 5. Map of the Niagara Gorge and lower river and of the buried St. Davids Gorge and buried lower river. The location and depth to the bed rock of a few of the wells which served to locate the buried channels are indicated. The vertical section is along the buried gorge and the river, which are now filled with glacial drift everywhere except at the Whirlpool.

upper plain to plunge over the escarpment at St. Davids, from whence it flowed northeast to the Ontario basin. During this period the cataract cut back from the escarpment to where the inlet of the Whirlpool now is. The gorge was excavated to a great depth by the plunging falls. From it issued the lower river flowing northeast across the lower plain rasping a channel in the Queenston shale. Later the glacier came on its last advance which carried it as far south as the Ohio River. When the ice melted away it left a mantle of glacial debris covering the region, burying the lower river channel and filling the gorge so that the old water course not only no longer offered a natural avenue for the overflow from the new Lake Erie to reach the Ontario basin, but did not even betray its existence. It was purely an accident of topography that the modern river crossed the upper end of that buried gorge and cascade down the escarpment at Lewiston. Not until the retreat of modern Niagara had reached and broken away the east wall of the theretofore filled Whirlpool basin, and had cleared out much of the drift filling, was the presence of the former gorge revealed. The bend in the course of the river directed the full force of the current against the wall formed by the filling of the old gorge. A great excavation was made down this ancient channel. The finer material was swept downstream, the heavier boulders sank to the bottom and now form the cobble pavement and lining of the pool so well exposed on its northern side. This bed of boulders now tends to retard further rapid enlargement of the basin by the swirling waters although at times scars of landslides from the fill into the pool may be observed.

Grateful Acknowledgment

THE EDITOR takes this occasion publicly to thank the Society of Chemical Industry for the honor which it has conferred upon him by designating him to receive the Chemical Industry Medal for the year 1942. The medal will be accepted at a joint meeting of the American Section of the Society of Chemical Industry and the New York Section of the AMERICAN CHEMICAL SOCIETY in New York, N. Y., on November 6.

Chester A. Snell has been appointed to the research staff of the Aluminum Research Laboratories at the Aluminum Ore Co. plant, East St. Louis, Ill. Prior to this Dr. Snell was a member of the teaching staff of the chemistry department, Polytechnic Institute of Brooklyn.

Data Published on Selective Service

BECAUSE of the wide interest in this subject and the need for obtaining trained men for our Production Army, we give below references to information we have published on occupational deferments, including those of men in training. Future developments will be brought to the attention of our readers.

Chemical and Engineering News

(NEWS EDITION previous to 1942)

Vol. 18 (1940), pages 890, 1127
Vol. 19 (1941), pages 129, 311, 457, 459, 489, 520, 587, 681, 797, 1164, 1412, 1464
Vol. 20 (1942), pages 110, 157, 472, 579–80, 788, 812, 837–39

Industrial and Engineering Chemistry

Vol. 33 (1941), pages 1, 135, 283, 561
Vol. 34 (1942), pages 2, 131, 259, 648

Robert P. Moffett and **Frederick W. Orttung, Jr.**, have been added to the staff of the Research and Development Laboratories, Bakelite Corp., Bloomfield, N. J.



Medal for Achievement in Plastics

The John Wesley Hyatt Award Medal, to be awarded to the individual who makes the most significant achievement in the plastics industry each year, has been completed by Paul Manship, noted artist and sculptor. The medal, to be donated by the Hercules Powder Co., Wilmington, Del., will be cast in gold and awarded annually with $1,000 in cash. *Left.* The obverse of the medal bears a profile relief of John Wesley Hyatt, founder of plastics with his application of nitrocellulose to this use. *Right.* The reverse bears a Grecian urn symbolizing the intellectual achievement of the award winner, wheels symbolizing the mechanical ability necessary to form the plastic in its ultimate shape, a chemical retort to indicate the chemical origin of plastics, and dividers and triangle symbolizing plastics design. The award will be administered by a committee consisting of Richard F. Bach, dean of education, Metropolitan Museum of Art, Lyman J. Briggs, chief, National Bureau of Standards, Karl T. Compton, president, Massachusetts Institute of Technology, Watson Davis, director, Science Service, Harry N. Holmes, President, AMERICAN CHEMICAL SOCIETY, Eric Hodgins, publisher, *Fortune*, and Ronald Kinnear, president, Society of the Plastics Industry.

Science Briefed for Busy People

CARLOS E. CUMMINGS, Director, Buffalo Museum of Science, Buffalo, N. Y.

IN TODAY'S world, which moves on the research and production of science, chemists are part of that group of scientists upon whom an especially heavy burden of responsibility is laid. These responsibilities demand that they keep up to the minute in their own profession, but in spite of other marvels, no one has found how to stretch the 24-hour day. This often precludes much study or even consideration of other fields of science.

Chemists are not alone in this dilemma, and to solve it, at least in part, the Buffalo Museum of Science has planned its exhibits to tell a connected story, succinctly, of the world in which we live and of the plant life, animals, and men who inhabit it. Here, almost at a glance, you can skim the cream of research and knowledge in the various sciences; here, briefed for busy people, is the fascinating story of our world today, yesterday, and the day before, with even a hint of things to come. The museum is large enough to be comprehensive, but small enough to be friendly; we put the latchstring in your hand and invite you most cordially to pull it when the AMERICAN CHEMICAL SOCIETY meets in Buffalo September 7 to 11, 1942.

You're coming? That's splendid, and so that you can use your time to the best advantage and plan which exhibits you most want to see, let us survey some of the high spots.

The museum's exhibits are like a book. In the great Central Hall is an index—some objects illustrative of the different exhibit halls to attract your attention and whet your appetite. The Central Hall acts as a show window and invites you to enter first one hall and then another for more of the same.

Leading off from this hall are 10 smaller exhibit halls, each dedicated to the story of a single science.



Buffalo Museum of Science

Physics and Chemistry

First and fundamental is the magic Hall of Physics and Chemistry where the wonders of electricity are demonstrated. The photoelectric cell operates and yields its mysteries. High-tension electricity gives up its secrets. The wonder of fluorescent minerals under the invisible ultraviolet light compels admiration. Mystification gives way to rational knowledge in all that is spectacular in these basic sciences, and a demonstrator takes the visitor behind the scenes.

Astronomy

Astronomy follows in the next hall. Here the layman learns about that vastly greater space, beyond reach of our most ambitious travelers, which we call "the universe". The worlds of our solar system trace their orbits in orderly procession in the planetaria. The lore of the star gazer, how he works, what he sees, and what he learns are shown in interest-compelling sequence. Partly dark, but like the evening sky on a cloudless night, the hall is illuminated by numberless points of light illustrating constellations and the bodies that swarm the interstellar spaces. Meteors, comets, nebulae, the storm centers on the sun, the majesty and significance of eclipses, are explained in the light of present knowledge.

Earth Science

In the Hall of Earth Science the earth's history and architecture are illustrated with samples from its crust. The forces that work with and upon the surface to modify it, the processes that have made it what it is today and are still at work explain themselves in a series of groups. The building and destruction of features familiar to us today, how they came about, what will become of them after we are no longer interested in this life, are shown.

Life

Logically following, the Hall of Life explains conditions that enable life to evolve and the simpler forms of life. A triple panel illustrates the life zones of today—the woodland and shallow stream, the desert, the ocean, and where land meets sea. The story of how the body is built of individual cells and the nature of the cell occupy further exhibits.

Invertebrates

The next step proceeds to those creatures so low in the scale of existence that they have not yet evolved internal bony frameworks. The Hall of Invertebrates focuses attention upon them, produces

them from every part of the country to round out a conception of their variety and modifications. The visitor cannot but be amazed at the variety of forms animal life has assumed. The sun flits across the bottom sand on a coral reef transported from Bermuda. Here is a garden in which animals as brilliantly colored as ornamental plants provoke admiration. Even the rocky ledges are animals, the waving plumelike fans, the flowerlike ascidians blooming like exotic poker plants; all that appears to be shrubbery and foliage in an underwater garden is animal. Other beautiful groups show that Nature is as prodigal in northern waters as in southern. Further exhibits call attention to the insects, their countless forms, their tremendous numbers. The life in a drop of water from a sluggish stream is modeled in plastics, enormously magnified.

Vertebrates

Across the Central Hall backboned creatures in the Hall of Vertebrates call attention to a different-structured type of life. The odd fishes of the Atlantic Coast are in evidence. Here are some of the more common forms of finny creatures that are sometimes seen locally only as steaks, fillets, or Friday dinner food. Here also are the fabulous monsters of the marine world. Types of animals from the legless lizard to the long-legged, long-necked giraffe demonstrate that all these creatures possess backbones, whether they are covered with scales, hide, hair, or feathers. At the end of the hall full-sized bison rest in a family group on the boundless plains. As far as the eye can see the prairie gently rolls, and more than one visitor has expressed amazement at the illusion of the vast distance.

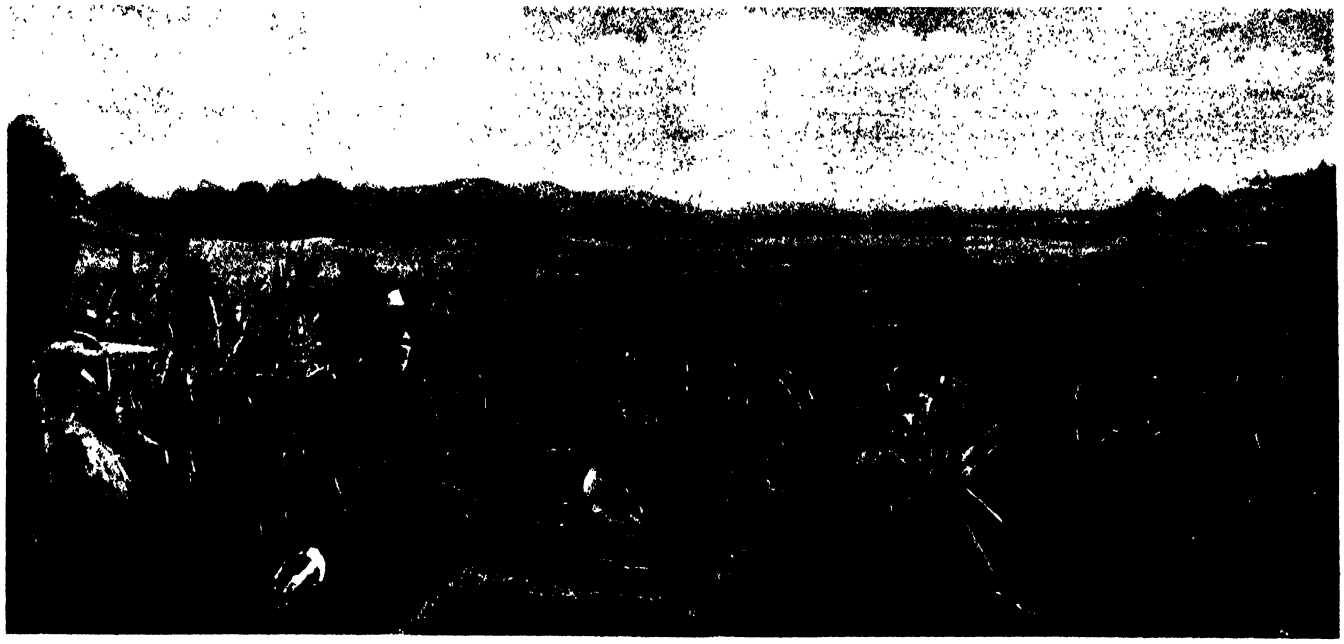
Evolution

The inventiveness of Nature is brought to attention in the Hall of Evolution. Life is a struggle, and each creature has its set of enemies from which it must protect itself if the species is to continue. The adaptability of nature to every condition under which life can exist is the theme of this hall. Those creatures which cannot adapt themselves to changing conditions, whether the change is gradual or sudden, cease to exist. Here the record of the rocks tells a tragic story of forms that could not adapt themselves quickly enough and became extinct. A scene from the era of reptiles, when great beasts prowled the rank jungles of the steaming marshlands millions of years ago brings to life a chapter in the history of the earth that we can now read only from plants and bones preserved in solid rock. The great variety of animal forms is also stressed. At the end of the room three groups reproduce life found in three vastly different environments. A bit of seaweed from the Sargossa Sea floats on a lazy ocean, a teeming community in which live dozens of different animals, protected from their enemies by their close mimicry of the plants among which they live. If you look very closely, you can count 64 different kinds! From a large porthole the visitor next looks out into the blackness of the ocean depths.



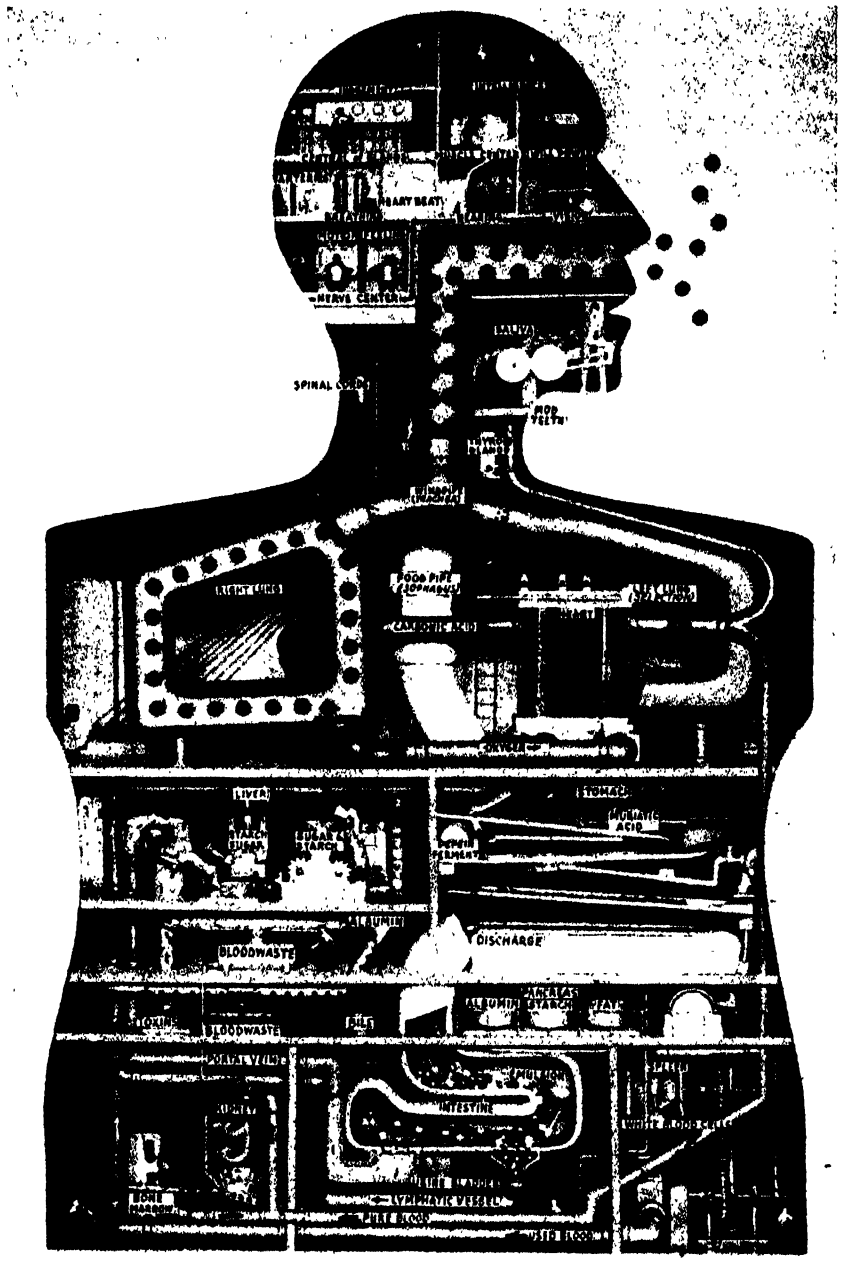
BUFFALO MUSEUM OF SCIENCE

Bog Group, Spaulding Hall of Conservation. Within 50 miles of Buffalo more than 35 kinds of orchids have been found growing wild. Seven kinds are shown here with other characteristic bog plants.



BUFFALO MUSEUM OF SCIENCE

Autumn bird life in the western New York marshes in the Bird Alcove, Hall of the Niagara Frontier



BUFFALO MUSEUM OF SCIENCE

Human Factory, Cabana Hall of Man. This animated model represents, in terms of ordinary factory practice, the various operations essential to maintain life in human beings. Cogs move, pumps operate, and red and blue lights show the course of air.

Press a button, and the denizens of the inky depths begin to come to life. Living in a lightless region they produce their own light. A third group depicts the life of creatures on land in a cave where light never penetrates. A series of buttons flashes beams like those from an electric torch, disclosing ghostly blind fish, crayfish, the little cave salamander, and several species of roosting bats.

Heredity and Environment

The next hall, that of Heredity and Environment, shows among other things how varying factors within the species can give rise to descendants vastly different from the usual form of the group. How man has taken advantage of these factors for variation to improve plants and animals of use to him, to change their forms for special purposes, is well shown. One of the most intriguing exhibits is that series of panels which move on an arranged schedule to present charming baby dolls in a demonstration of the principles of human heredity. We conclude that it behooves us to "fall in love intelligently", but who does?

Man

In the Hall of Man the dominant feature is the Transparent Man. The organs of this superb figure are separately illuminated, enabling the observer to visualize the human anatomy as though possessed of an x-ray eye. The many other exhibits in this hall of health explain in a graphic way the mechanisms and function of the human body and its organs and point the way to longer life and greater efficiency.

Primitive Races

How the extremes of ease and difficulty of living affect the progress of the human race is the theme of the Hall of Primitive Races. Here one sees the methods of life among primitive people in all parts of the world, people who have remained primitive because the conditions under which they live prevent progress. A series of Lilliputian groups depicts the everyday life of primitive peoples from the Arctic Circle to the Tropics and as far south as the southermost tip of South America. Primitive races of the Eastern Hemisphere are contrasted with those of the Western. They have developed no further, in the matter of culture, than the Cro-Magnon man who lived in prehistoric Europe. At the end of the hall these early ancestors of modern races are shown at work in their picture gallery, painting the scenes on the stone walls of caverns by which we know them.

Civilization

The Hall of Civilization near by tells the story of modern progress. The rise of basketry and pottery; the development of tools from bits of chipped stone to steel; the improvements of transportation from back pack to wheels; the simple mechanical principles that underlie our machine age; the use of money; the invention and improvement of the written word; a glimpse of civilizations of other ages; the cultures based upon different types of agriculture; transportation on water and land; modern domestic animals and improved fruits and vegetables—all are treated in striking groups that bring home



BUFFALO MUSEUM OF SCIENCE

Transparent Man in the Cabana Hall of Man

the phases of modern culture and how they have arisen. The story of science culminates in this hall.

Plant Life and Conservation

Three other halls on this main floor are of equal interest. The Hall of Plant Life tells the story of plant development and the world-famous wax models of local wildflowers are so truthful that visitors can scarcely believe they are not still growing. The mushrooms of the region have been modeled in wax with equal artistry. Dominating the hall is a large model which shows by movement the growth of a twig during the period of a year. In the adjacent Hall of Conservation three beautiful life-size groups depict our vanishing wildflowers found in the spring woodland, in a bog, and in the fields during autumn. The world map which covers one entire wall shows the eight regions of the earth which have definite physical and climatic differences and indicates by illumination in rotation their characteristic plant and animal life.

Local Flora and Fauna

In the Hall of the Niagara Frontier is displayed the great variety of life to be found in this locality—birds and animals, fish and reptiles, insects and shells. Several groups recapture the ancient history of the region, bring back to life the days, some millions of years ago, when Buffalo was covered by an inland sea, the climate was that of the Tropics, and coral animals and strange marine creatures were the only inhibitants. An alcove is devoted to the Indians who once roamed the shores of Erie.

And This Is Not All

Two other exhibits must be mentioned, even though briefly. On the second floor the Corridor of Time gives glimpses of art objects through which man has expressed himself and outlines his artistic achievements through 25,000 years. Here the rise and fall of civilizations can be traced from Stone Age days to the recent past. On the third floor the Hall of the South Seas, through artifacts ingeniously contrived, shows the objects used in their every-day affairs by the people who inhabit the South Sea Islands.

The Hall of Aquaria is always a favorite spot, for here life is real, not the result of artistry. Fish, frogs, turtles, and snakes native to western New York live in aquaria and terraria. Even insects, commonly known to the more scientific-minded but puzzling to the average man, pursue their amazing life cycles in special glass-sided cages.

These pages complete a superficial view of the exhibits in the museum and give some idea of how a museum can be brought to life and tell a story. The Buffalo Museum of Science is constantly changing, growing, and, it is hoped, improving. Visitors to the 104th meeting of the AMERICAN CHEMICAL SOCIETY in Buffalo, September 7 to 11, 1942, are cordially invited to be the judges.

Ernest T. Trigg Honored by Paint Industry



BLACKSTONE STUDIOS

Ernest T. Trigg

ERNEST T. TRIGG, president of the National Paint, Varnish and Lacquer Association, was honored June 30 by the Nation's paint industry with a dinner at the Union League, Philadelphia, Penna., in celebration of his 50 years' service to the industry. Three hundred and fifty leading paint manufacturers from all parts of the country and Canada as well as prominent civic and industrial leaders attended. The dinner was sponsored by the Philadelphia Paint, Varnish and Lacquer Association, and Samuel R. Matlack, president of George D. Wetherill & Co., Inc., acted as honorary chairman. Walter A. Gorrell, president of the Philadelphia association and vice president and general manager of John Lucas & Co., was toastmaster, and guest speaker was Allen A. Stockdale of the National Association of Manufacturers. His topic was "Morale for Victory".

Frank L. Sulzberger, president of the Enterprise Paint Manufacturing Co. of Chicago and vice president of the National Paint, Varnish and Lacquer Association, felicitated Mr. Trigg on his half century of devoted service to the paint industry. George A. Martin, chairman of the board, The Sherwin-Williams Co., paid tribute to Mr. Trigg's contributions by pointing out that no man in the history of the paint industry has done so much to establish fair practice and competitive ethics. Howard W. Hock, president of the Hock Paint Co., presented him with an embossed leather book containing testimonial letters from nearly 100 leaders of the industry, and William H. Jarden, president of McCloskey Varnish Co., gave him a handsome grandfather's clock.

Entertainment for the evening was provided by Frances Greer, lyric soprano of the Metropolitan Opera, and Edward Roecker, baritone of radio, stage, and concert fame. Dinner music was provided by Harold Michelin's orchestra.

Mr. Trigg started his career in the paint industry when he began work as an office boy in 1892 with E. C. Haines, a paint manufacturer's representative in Chicago. Subsequently he worked for the Heath & Milligan Manufacturing Co., becoming general sales manager of the company in 1902. He remained at this post until 1908, when he moved to Philadelphia to become general manager of John Lucas and Co. In 1913 Mr. Trigg was elected vice president of the Lucas company, and in 1922 became president. He resigned this position December 1, 1933, to accept the presidency of the National Paint, Varnish and Lacquer Association, with headquarters at Washington, D. C. Since that time, Mr. Trigg has devoted his entire time to the service of the paint industry nationally and has established many new records for trade association work.

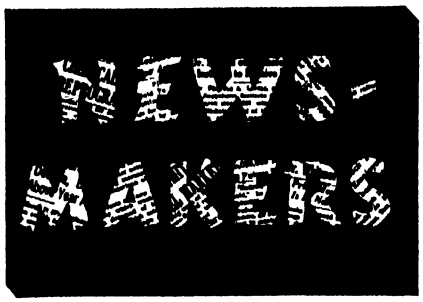
Vassar Graduates Take Technical Positions

STUDENTS of chemistry at Vassar College who received bachelor's degrees in the 1942 class have accepted positions as follows:

Fredericka Berger, medical college.
Betty Jane Cramer, Quaker Chemical Products Co., Conshohocken, Penna.
Marguerite Mellen Dewey, chemical research assistant, Department of Pediatrics, Children's Hospital Research Foundation, Cincinnati, Ohio.
Frances Josephine Edwards, technician, hospital laboratory.
Sarah Snowden Hughes, technician, hospital laboratory.
Jane Power McCollough, medical college.
Barbara Scott Meyer, technical assistant, Bell Telephone Laboratories, New York.
May Orton, Indiana Ordnance Works, Charleston, Ind.
Joan Rothwell, graduate work, Massachusetts Institute of Technology.
Jane St. John, nurses' training school.
Betty Schnee, graduate work.
Argot Stockton, Celanese Corp., Cumberland, Md.
Mary Martin Talmage, Armstrong Cork Co., Lancaster, Penna.
Ruth A. Walker, graduate work, Yale University.

Graduate students are:
Jean Clarke Davidson, Hercules Powder Co., Wilmington, Del.
Mary Elizabeth Saeger, American Cyanamid Co., Stamford, Conn.

Richard Chace Tolman received the doctorate of science on June 16 at the commencement exercises of Princeton University. Dr. Tolman is professor of physical chemistry and mathematical physics at the California Institute of Technology and vice chairman of the National Defense Research Committee.



Recent additions to the staff of Ralph L. Evans Associates, Inc., New York, N. Y., include: **S. A. Bell,** formerly an instructor at Columbia University; **Clifford H. Bundy,** M.S., Princeton University; **Philip Heiberger,** formerly with Colgate-Palmolive-Peet Co.; **John S. McCoy,** New York University; **John F. Mulvaney,** formerly instructor at New York University; and **Florence M. Thein,** B.S., Mt. St. Vincent College.

Edward M. Collins, assistant professor of physical science at Kent State University, Kent, Ohio, has been granted a leave of absence so that he may serve as visiting assistant professor of chemistry at Williams College, Williamstown, Mass.

Charles C. Concannon, U. S. Department of Commerce consultant on chemicals, has been named chief of the Durable Goods and Materials Unit, Bureau of Foreign and Domestic Commerce. Mr. Concannon succeeds **Phillips A. Haywood** who resigned to accept a post in the Navy.

J. B. Davis, chief of the Protective Coatings Section of the War Production Board's Chemicals Branch, has been loaned to Brazil for the development of babassu nut oil in the Amazon area. **E. H. Bucy** replaces Mr. Davis as chief of the section. **Wells Martin** has been appointed assistant chief, and **M. Rea Paul** becomes special technical assistant to Mr. Bucy.

Herman K. Eckert, plant manager of the Nitro, W. Va., plant of the Organic Chemicals Division, Monsanto Chemical Co., has been appointed plant manager of the synthetic rubber raw material plant being constructed by the company for the Rubber Reserve Co. in Texas. **Charles S. Comstock,** production staff of the Merrimac Division, has been appointed production superintendent.

W. C. Fernelius has left Ohio State University to assume a professorship at Purdue University.

Gilbert E. Goheen has resigned his position as chemist in the Experimental Division, Sun Oil Co., and joined the Process Development Department, General Aniline Works Division, General Aniline and Film Corp., New York, N. Y.

Nathan H. Koenig has been transferred to the Green River Ordnance Plant, War Department, in Illinois, as inspector of powder and explosives. He was formerly at the Western Regional Research Laboratory, Albany, Calif.

Charles A. Mabey has been appointed director of the research activities of the Bristol Co., Waterbury, Conn. Mr. Mabey has served the company for several years as physicist.

Robert E. Mason has been appointed representative of The Mixing Equipment Co. for North and South Carolina.

Harvey M. Merker, superintendent of manufacture, Parke, Davis & Co., Detroit, Mich., has been re-elected to the presidency of The Engineering Society of Detroit. Other officers are: **E. C. Balch,** first vice president; **T. A. Boyd,** second vice president; **A. H. Lovell,** secretary; **Glenn Coley,** treasurer; and **George R. Thompson,** assistant treasurer.

Paul L. Munson, who recently completed the requirements for the Ph.D. degree at the University of Chicago, and **Ernest E. Spinner,** who recently received his B.S. from Tri State College, have been added to the staff of the Wm. S. Merrell Research Laboratories, Cincinnati, Ohio.

Grover C. Mutchler, plant superintendent of Mack Printing Co., Easton, Penna., celebrated 40 years of service on June 1. CHEMICAL AND ENGINEERING NEWS wishes to congratulate Mr. Mutchler and thank him for his many services to it.

J. Ernest Nachod, Jr., has been transferred by the Hercules Powder Co. from Hercules, Calif., to the Missouri Ordnance Works. He is operating supervisor in ammonia operations.

James V. O'Leary, central division manager for the Commercial Solvents Corp., has reported for active duty as an officer in the Chemical Warfare Service.

George W. Perkins has been granted a leave of absence by Merck & Co., Inc., to serve as lieutenant colonel in the Chemical Warfare Service, Washington, D. C.

J. T. Power has recently gone to the Ravenna Ordnance Plant, operated by the Atlas Powder Co. in Ohio, where he is acting as general manager.

Laurence L. Quill has been appointed to the headship of the department of chemistry, University of Kentucky, effective in September. He has been at Ohio State University since 1935. **Ralph N. Maxson** has requested to be relieved of his administrative duties as head of the department and to continue his teaching.

Eugene E. Rodabaugh, formerly with the Champion Paper and Fiber Co., Hamilton, Ohio, has accepted a position with the Crossett Lumber Co. Research Laboratory, Crossett, Ark., where he will work in the pulp and paper division.

J. G. Ryan is on military leave from the Wood River, Ill., research laboratories of Shell Oil Co., Inc., serving with the 58th Armored Field Artillery, 5th Armored Division.



E. A. Rykenboer

E. A. Rykenboer, general manager of the Electrochemicals Department of E. I. du Pont de Nemours & Co., Inc., completed 25 years of service with the company on July 2 and was honored at a dinner given at the Hotel Niagara by du Pont's Niagara Falls 25-Year Club. **W. S. Carpenter, Jr.,** president of the company, presented Dr. Rykenboer with his 25-year service pin. More than 300 employees attended the affair.

William J. Weckler has been promoted from first lieutenant to captain and has been transferred from assistant utilities officer to utilities officer, Army Air Forces Technical School.

Earl A. Wellmuenster, who received his Ph.D. from St. Louis University in June, is now doing organic research for Cleveland Industrial Research, Inc., Cleveland, Ohio.

Plan on Buffalo

WHETHER or not a meeting is justified in these days of inadequate transportation and transient housing problems depends much on the type of meeting and what it may accomplish. Our readers will be pleased to know that there has been no serious indication that the annual meeting of the AMERICAN CHEMICAL SOCIETY, scheduled to begin September 7 in Buffalo, N. Y., will need to be postponed or canceled. It will be remembered that during World War I meetings of the SOCIETY were encouraged by the authorities, and it seems now to be recognized that it is helpful to the war effort to bring together the scientists who are always attracted by the opportunity to exchange views with their fellows, to hear discussions, and to make new acquaintances. Those responsible for the meeting are going ahead with their plans and, in addition to developing a program expected to be very helpful to the war effort, and recognized as such, extra interest will be attracted by features now being arranged.

We are able to announce now that a public meeting is being planned for the night of Monday, September 7, at which President Holmes will deliver his presidential address on "National Survival through Science" and C. M. A. Stine, member of the executive committee of E. I. du Pont de Nemours & Co., Inc., will speak on "Molders of a Better Destiny". These will be outstanding addresses to which it is planned to admit the general public. Lieutenant-General William S. Knudsen, in charge of War Department production, will be the principal speaker at the banquet Wednesday evening.

There are many reasons why you should make early reservations, not only for your living accommodations in Buffalo but for your transportation to and return from that city. This is one of those occasions when those who make late decisions are almost certain to find themselves without the pale.

Gas Protection Instruction Offered at Florida

THE University of Florida in cooperation with the State Defense Council has given instruction on chemical warfare gas protection to 1,751 persons in 47 of the 67 counties in the State. Gas instruction is offered as a part of a basic program of training for volunteers in the action groups of defense councils. Programs to reach the remaining 20 counties are being planned.

The main purpose is to develop instructors who can go back to their own communities and tell the people what they need to know to protect themselves in a gas attack. Among those who attend are many with sufficient training in chemistry and allied fields to give gas instruction locally. Teaching aids, such as outlines, objective tests, etc., are given to such potential instructors, and the program is presented in the form in which they are expected to give it to the people back home.

Instructors have been largely drawn from the University of Florida faculty. Fred H. Heath, professor of chemistry and a major in the Chemical Warfare Reserve, has done the greater part of the lecture work. W. H. Beisler, head professor of chemical engineering and a lieutenant colonel in the Chemical Warfare Reserve, and LeRoy D. Edwards, head professor of pharmacognosy and pharmacology, have appeared on several of the programs. Other assistance has been given by R. J. Longstreet, supervising principal of the Daytona Beach Schools, who has had a War Department Training Course at Texas A. & M. Chemical Warfare officers at posts near the instruction centers have assisted by conducting students through the gas chamber exercises and by giving lectures on the use and care of gas masks. Students are furnished gas masks and are directed through the same gas mask drills prescribed for men in the armed services. The officers conduct gas identification drills by using sniff sets and field tests.

Future plans for instructing civilians on chemical warfare agents include special programs for gas casualty station personnel on the decontamination of individuals. Dr. Heath will again handle the major portion of the instruction. He will be assisted by C. R. Hughes and G. Manuel Turner of the General Extension Division staff, who have recently completed the program of training at the War Department Civilian Protection School conducted at the University of Florida. Demonstrations of hypothetical situations will be consistently staged in connection with these programs to enhance their learning value. All the programs are directed by B. C. Riley, coordinator of training for the State Defense Council and dean of the General Extension Division.

Pump for Extinguishing Bombs Uses no Strategic Materials

NO STRATEGIC materials are used in the construction of a patented pump for extinguishing bomb fires, developed by Zadig Patents, research organization of South Norwalk, Conn. Designed to replace stirrup pumps, manufacture of which has been delayed because priority metals are required, the new device is made entirely of wood and fabric. The two lengths of hose used are of fabric.



ELECTROMET REVIEW, ELECTRO METALLURGICAL CO.

Stainless Steel Mercury Condenser System

This installation of stainless steel tubing is used for condensing vaporized mercury extracted from cinnabar and other mercury-bearing ores at the Cordero Mining Co. near McDermitt, Nev. The tubes condense the vaporized mercury that is passed into them from the furnace in which the mercury ores are roasted. The stainless steel, a molybdenum-bearing variety, is said to be the most satisfactory material yet used in the condensing equipment. It combines relatively high heat transmission with excellent resistance to the corroding effect of mercury and acid fumes. The equipment was fabricated by the Grand Metal Products Corp., Portland, Oreg.

POTOMAC POSTSCRIPTS

Price Regulations

Agar. The maximum price for agar produced and sold by the San Diego plant of the American Agar and Chemical Co., sole domestic producer selling the product in commercial quantities, has been established at $3.00 per pound, f.o.b. San Diego, Calif.

The American Agar and Chemical Co. began to manufacture the product at its San Diego plant last April. As neither this seller, the San Diego plant, nor a competitor of the same class sold agar during March, the base period for setting maximum prices under the General Maximum Price Regulation, the ceiling price for it was established under Section 3(b) of the over-all regulation. The price is authorized in Order 18, and was issued under Section 1499.3(b) of the General Maximum Price Regulation.

Bauxite. Increased bauxite production in southern ore fields was forecast by the action of the Director of Industry Operations in placing bauxite and alumina under complete allocation control. The action, taken by issuance of Order M-1-h, was made necessary by the rapid increase in aluminum production and the increasingly serious shipping situation. Purpose of the order is to conserve high-grade bauxite, that containing less than 15 per cent silica, for the manufacture of products needed for war.

Both Arkansas and imported bauxite containing less than 15 per cent silica will be allocated primarily for the manufacture of aluminum, abrasives, and aviation gasoline. Restricted as well as nonrestricted grades mined in Alabama, Georgia, Virginia, Tennessee, Mississippi, and other states from small and scattered deposits will be permitted a more general use, such as the manufacture of chemicals and refractories.

The order, which is effective August 1, gives consumers of restricted bauxite and alumina until September 1 to use up materials on hand, provided the amount used between July 1 and August 31 does not exceed one third of the amount so used during the last six months of 1941. Consumers of bauxite must file requests for allocation on Form PD-567 and alumina users on Form PD-568.

Calcium Hypochlorite. To ensure adequate supplies of high-test calcium hypochlorite and chloride of lime, commonly known as bleaching powder, for civilian defense gas decontamination and for essential uses of the Army and Navy, the entire supply has been put under complete allocation control. In an amendment to the Chlorine Order M-19, high-test calcium hypochlorite and chloride of lime were specifically exempted by changing the definition of products covered. Concurrently, Supplementary Order M-19-a was issued, which states that no high-test calcium hypochlorite or chloride of lime can be delivered by a producer without specific authorization. Each producer must file Form PD-574 with WPB on or before the 10th of each month stating his desired shipments for the following month.

Chromium. M-18-a, the chromium allocation order, has been extended indefinitely. It was due to expire on June 30, and the extension was made retroactive to that date.

Containers. An interpretation of the position of the Office of Price Administration with respect to deposit charges for containers of commodities on which ceiling prices are established under the General Maximum Price Regulation has been made public. Containers to which the interpretation applies include bottles, barrels, drums, kegs, carboys, cloth bags, boxes, and the like. While the interpretation applies directly to containers of commodities sold under the General Maximum Price Regulation, the same general principles apply to charges for containers of commodities covered by other OPA price regulations, but a base level other than March usually will be used.

Where a deposit charge was made for the container in March 1942, the charge may be continued, and may be increased over the amount charged in March provided the amount of the charge is not excessive. Where no deposit was made in March for the container, the seller may not require a deposit charge in addition to the price which was in effect in March unless it was customary for the buyer to return the container to the seller. If the custom existed, the deposit charge which may be made must not be excessive. However, a seller may impose a deposit charge when none was made in March and there was no custom of return, if at the same time he lowers his price, provided the deposit charge is made in good faith for the purpose of obtaining return of the container and the deposit charge is not excessive. If a seller may and does impose a deposit charge under the above conditions, he must deduct from his March price for the container and contents an amount at least equal to the March 1942 value of the container after emptying. Where a deposit charge may be added, it may exceed the deduction in price provided the charge is not excessive. Whether a deposit charge is excessive depends upon the circumstances in each case. A deposit charge will never be excessive if it does not exceed the deposit charged in March, or the seller's reduction in his March price, or the seller's cost of replacing the container. If the container is readily replaceable and is easily destroyed or lost, or if it is sold for shipment out of the country and hence will not be returned, the deposit charge normally may not exceed the highest of these three amounts. If the container is difficult to replace because of a shortage of the material of which it is made or diminution of production, the deposit charge can well be higher than the replacement cost, the reduction in price, or the March charge. If the replacement difficulty is great, the deposit charge can well be much higher than any of these standards, especially if, as will ordinarily be true in such cases, the container is not fragile. In short, the deposit charge must be designed to induce return and must be set at a level fixed with reference to the need for return. It may not be set at a spuriously high level designed to allow seller an extra profit by virtue of inevitable breakage or loss. Because steel drums cannot be replaced with new drums at any cost, a deposit as high as $6.00 on an 18-gage 50- to 58-gallon steel drum is not excessive. The amount of the deposit permissible for steel drums of other sizes and gages may be determined in line with the $6.00 figure.

Graphite. Changes in Order M-61 covering the use of Madagascar flake graphite permit jobbers to acquire crucibles made of this material without application for authorization to do so. Control is retained by WPB because the jobber may not deliver any crucibles without specific authorization. Applicants for crucibles containing Madagascar flake graphite must use, after August 1, Form PD-575 instead of PD-1A. Applicants for this grade of graphite to manufacture crucibles will continue to use PD-303B. The amendment redefines Madagascar flake graphite as that mined in Madagascar of a grade that will stand on a 35-mesh screen.

Iron and Steel. Appeals by manufacturers for relief from restrictions imposed by General Conservation Order M-126, which banned the use of iron and steel in the production of hundreds of common civilian articles, will be passed upon by a new Appeals Branch, set up within the Bureau of Priorities to handle all requests for exceptions to conservation and limitation orders. For the time being, the Appeals Branch will consider only requests from firms affected by M-126. Later, it will take over the handling of appeals from manufacturers covered by certain other conservation and limitation orders, but in the mean-

time queries and requests concerning these should be addressed, as formerly, to the appropriate material or industry branch.

Appeals from terms of General Conservation Order M-126 must continue to be made on Form PD-437 and filed with the nearest WPB field office. After a preliminary processing in the field offices, the appeals will be forwarded to Washington for final decision. Communications concerning M-126, other than the filing of appeals, should be addressed to the Appeals Branch, Bureau of Priorities, War Production Board, Washington, D. C.

Mercury. Maximum prices for mercury established in Revised Price Schedule 93 apply to every grade and kind of mercury sold in 76-pound flasks, and these prices apply pro rata to mercury sold in all containers of more than 25-pound capacity. All kinds and grades of mercury sold in containers of 25-pound capacity or less must be bought and sold for not more than the normal differentials from such maximum prices prevailing between October 1 and October 15, 1941. This was made clear by the issuance of Amendment 1 to the schedule.

Previously the schedule established maximum prices for prime virgin mercury and provided that all other kinds and grades should be sold at their normal differentials from such maximum prices. This was not intended, however, to permit the sale of mercury in 76-pound flasks at a premium on account of any claimed superiority to prime virgin mercury. The maximum prices established were designed to allow a liberal price for the highest quality of mercury sold in 76-pound flasks, and the differentials were to apply only to mercury sold in the smaller containers. Maximum prices remain the same as before the effective date of Amendment 1.

Steel Alloys. Heat-resistant steel alloys have been scaled down to a wartime basis to conserve two critical metals, nickel and chromium. Order M-21-g sets up maximum specifications for heat-resistant alloys used in metallurgical furnaces, oil refineries, synthetic rubber plants, cement mill furnaces, and power plant equipment. The new specifications are designed to use the least possible amount of alloying materials necessary to maintain the effectiveness of the equipment involved. Savings in nickel are expected to be in excess of 10 per cent of the annual consumption. The order does not apply to heat-resistant steels for the armed services where specifications call for more nickel and chromium than the schedules set up in the order.

Toluene. Companies with stocks of toluene on hand and who have been granted authority by the War Production Board to release these stocks to certain producers have been requested to observe a maximum price of 2 cents per gallon plus the delivered cost of the toluene. All stocks of toluene in the hands of persons who would normally have used such stocks as diluents in protective coatings were frozen under General Preference Order M-34 as of February 1, 1942. The Director of Priorities has commenced releasing these stocks to such persons as producers of TNT and DNT. The companies to whom this price request was made and their competitors do not ordinarily sell toluene and had no basis for determining maximum prices under the General Maximum Price Regulation.

WPB Activities

HUNDREDS of thousand of tons of critical materials now frozen in idle inventories will be freed for vital war production by a regulation issued by the War Production Board. The new order, Priorities Regulation 13, affects thousands of business concerns which have in their possession materials which cannot move freely in industrial channels because of existing war regulations. In effect, Regulation 13 sets up new and uniform rules governing the sale of idle inventories of certain kinds and removes such specified sales from the existing regulations which affect the normal flow of material. No specific estimates of the amounts of materials which can be salvaged in this way are available. However, the total is known to be extremely large, and in the case of copper and copper base alloys alone, for example, it is believed that some 250,000 tons of this war metal can be freed by the new step.

An example of the simplified procedure effected by Regulation 13 is afforded by the case of a domestic refrigerator manufacturer who had on hand a large stock of copper tubing when prohibition of any further refrigerator production became effective. The tubing was badly needed by a firm in the same city which was turning out tank assemblies. By the terms of Limitation Order L-5-c, transfer of the critical material could not be made until official approval, obtainable only after application to WPB, had been secured. Under the new order such a sale may be made without formalities of any kind. The seller would not even be required to make a report of it. During the period of emergency conversion to war production, it was necessary at times to immobilize some stocks of scarce material. Now that the conversion program is well under way, the flow of these materials into the war effort can be greatly increased.

Reserved for specified purchasers is "war material", consisting of some 150 materials listed in Schedule A to the Regulation. This material may be sold to the armed services, Maritime Commission, and certain other government agencies. In addition, sales of war material, as defined, may be made to persons who belong to a class listed in Schedule A as eligible to receive it. In general, authorized sales, in addition to those to specified government agencies, are "up-stream" sales, to distributors or manufacturers, or by manufacturing users to producers of raw materials. This serves to restore them to normal distribution channels. Applications for specific sales not covered by the general provisions of Regulation 13 should be filed on Form PD-470 at the nearest WPB field office. Sales of less than $100 may be made to anyone. Materials not listed on Schedule A may be purchased by anyone authorized by existing regulations to receive and make specified uses of them. It is pointed out in the new regulation, however, that its terms do not exempt a purchaser from end-use and quota restrictions. Any purchaser acquiring war materials as a result of a type of sale authorized by Regulation 13 must comply with all inventory, quota, and use restrictions imposed by all other orders and regulations.

War Research Cost Estimated at $57,730,578

THE large amounts being spent by the Office of Scientific Research and Development, Washington, to aid in war production were revealed by Karl T. Compton before the meeting of the American Association of Physics Teachers at Pennsylvania State College June 25.

Dr. Compton, president of Massachusetts Institute of Technology, in charge of the OSRD Division on Detection Controls and Instruments, said that up to May 6, $57,730,578 had been spent for 663 contracts with 94 educational institutions and for 338 contracts with 110 companies. The figures, Dr. Compton added, were authorized for release by Vannevar Bush, chairman of OSRD.

Although it is impossible to say the exact number of scientists engaged on the contracts in educational institutions, Dr. Compton put a reasonable guess at 7,500. The personnel of OSRD, including committee members, technical aids, and consultants, totals 750. Of the 663 contracts, 300 related to chemical investigations.

Allocations to American Republics Announced

THE Department of State, War Production Board, and Board of Economic Warfare have announced the following list of commodities allocated to the other American republics for the third quarter of 1942:

Acetic acid, acetone, aconite, ammonium sulfate, anhydrous ammonia, aniline, ascorbic acid, bauxite, belladonna leaves, belladonna root, beryl and beryllium,

cadmium, camphor, carbon tetrachloride, castor oil, chlorine, citric acid, cobalt, copper, cotton linters, diamond dies, dibutyl phthalate, digitalis, dynamite, carbon and graphite electrodes, ergot, fluorspar, formaldehyde, glycerol, natural amorphous graphite, insulin, ipecac, lead, leather, ferromanganese, mercury, methanol, ferromolybdenum, naphthalene, neat's foot oil, phenol, phosphorus, phthalic anhydride, platinum and allied metals, potassium permanganate, procaine, rayon (filament yarn), red squill, strontium chemicals, sulfaguanidine, sulfanilamide, sulfuric acid, superphosphate, thiamin hydrochloride, toluene, ferrotungsten, uranium salts and compounds, ferrovanadium, and zinc.

Alien Property Custodian Appoints Dyestuff President

LEO T. CROWLEY, Alien Property Custodian, has announced selection of Louis Johnson to serve as president of General Dyestuff Corp., New York. Control of General Dyestuff was seized by the Custodian on July 6. Colonel Johnson, Assistant Secretary of War from 1937 to 1940, has just returned to the United States from India, where he went in his capacity of personal representative of President Roosevelt.

Management of General Dyestuff is linked closely to the war effort, and Colonel Johnson's selection as president was dictated largely by his unique knowledge of Army requirements and of the international ramifications of the present conflict, Mr. Crowley stated. A resident of Clarksburg, W. Va., Colonel Johnson is one of the country's outstanding lawyers and administrators.

Appropriation Speeds Work on Chromium Output

AIDED by a $75,000 appropriation from Congress, the U. S. Bureau of Mines has embarked on more intensive studies of processes developed by its metallurgists to increase the Nation's output of chromium. Two processes, which appear destined to speed the flow of chromium to war plants in unprecedented volume from domestic sources, are a beneficiation process for low-grade ores which has successfully passed all tests made so far and has proved to merit large-scale pilot tests to determine optimum operating conditions for commercial use and an electrolytic method for recovering high-grade chromium metal from domestic ores.

In seeking more effective means of recovering chromium from the extensive deposits of low-grade chromite ores, particularly in western states, the bureau is operating several pilot plants in its laboratories at Boulder City, Nev. Mining engineers of the bureau are engaged in still further explorations of chromite deposits, and this work will take them to Alaska, California, Montana, Oregon, and Washington.

Bureau of Mines Reorganized

REORGANIZATION of the essential operating structure of the U. S. Bureau of Mines to speed the expanded program of providing strategic and critical minerals for the Nation's war needs has been announced. Three regional offices are being established at Salt Lake City, Utah, for the western states, at Rolla, Mo., for the central states, and at College Park, Md., for the eastern and southern states. Each office will be headed by a regional engineer and an assistant regional engineer, whose functions will be to supervise, initiate, and execute approved investigations leading to the more rapid use of mineral resources in the region under their supervision. Under jurisdiction of the regional engineers will be district engineers assigned to states or districts within the respective regions, project engineers, other technologists and scientists, and clerical and laboratory help. The regional engineers, under terms of the order, will take over all the functions and duties in the field previously assigned to the Mining, Metallurgical, and Nonmetals Divisions of the Technologic Branch, which are now abolished. To advise the office of the Director and to perform fact-finding functions and handle reports from the regional engineers, a Resources and Laboratories Service, containing a Mineral Processes Division, a Mining Division, and a Laboratories Planning Division, has been established with a small staff in Washington.

The order also provides for establishment of a Fuel and Explosives Service within the bureau, which will take over the Coal Division, the Petroleum and Natural Gas Division, and the Explosives Division, all of which were part of the abolished Technologic Branch. Operation of the helium plant at Amarillo will be under the jurisdiction of the Petroleum and Natural Gas Division, as formerly. All laboratories working exclusively on petroleum or exclusively on coal will also operate under the chief of the Fuels and Explosives Service, as will sections of other laboratories devoted to petroleum, gas, or coal. Other laboratories are transferred to the appropriate regional offices.

The Health and Safety Service of the bureau remains unchanged and will continue to include the Health, Safety, Coal Mine Inspection, Explosives Control, and Mineral Production Security Divisions.

Trona Deposit Discovered in Wyoming

THE U. S. Bureau of Mines has reported discovery of a large deposit of trona, a natural sodium carbonate plus almost unlimited resources of common salt, in Wyoming. The discovery will help supply the wartime needs for soda ash, particularly on the Pacific Coast. The deposit is 20 miles west of Green River, Wyo.

Bureau of Mines to Build Electrodevelopment Laboratory

A $500,000 electrodevelopment laboratory, where U. S. Bureau of Mines metallurgists plan to study the recovery and processing of minerals from the Pacific Northwest with electrical energy from Bonneville and Grand Coulee Dams, will be established in that region within the near future, it is reported by the bureau. With part of the funds just appropriated by Congress for the Interior Department, the bureau proposes to build and operate the new laboratory somewhere within a reasonable distance of the two government power plants to provide a long term and diversified market for large supplies of energy. As soon as a location is selected—probably within a radius of 200 miles of Bonneville and Grand Coulee Dams on the Columbia River—erection of the laboratory will be started, it is said.

The new station will be known as the Northwest Electro-Development Laboratory and will be staffed by 40 or 50 metallurgists and assistants. It will be equipped with electric furnaces and electrolytic cells of various types, ore-crushing and concentrating machinery, chemical laboratory and machine shop equipment, and other miscellaneous installations. Operation of the completed laboratory will be in charge of R. S. Dean, assistant director of the bureau, with headquarters in Washington, D. C.

Investigations will be directed, among other things, toward improving existing or developing new methods of recovering magnesium metal from magnesite deposits. Production of aluminum from the abundant clays and alunite of that region will be probed thoroughly, as will methods to produce ferroalloys from tungsten, vanadium, manganese, and chromium ores.

Mineral Deposits Located

MINERALOGISTS of the U. S. Bureau of Mines are reported to have uncovered new sources of tungsten, chrome, antimony, and mercury. Drilling indicates the availability of 10,00,000 tons of manganese ore not previously known to exist.

THE expanded 1941 program of national defense plus Lend-Lease aid to nations allied in fighting aggression caused a greater demand for zinc in the United States in 1941 than ever before, with a resultant record-breaking production from both domestic and foreign ores, according to the U. S. Bureau of Mines. Requirements, which were heavy prior to the declaration of war in December, have already increased in 1942 with indications of even further advances for the duration.

NECROLOGY

Bruce G. Baldwin

BRUCE G. BALDWIN, chemist in the research laboratories of the Standard Oil Development Co., Linden, N. J., was injured fatally July 3. He was struck by the heavy door of an Army tank on which he was conducting experimental work, and died shortly after being admitted to St. Elizabeth Hospital. Mr. Baldwin, who was 29 years old, joined the AMERICAN CHEMICAL SOCIETY in 1939.

Adolph E. Bernhard

WORD has been received of the death of Adolph E. Bernhard, for 30 years head of the Chemistry Department at the LaCrosse State Teachers College in Wisconsin. Funeral services were held in Lake Geneva, Wis., June 24. Professor Bernhard received his doctorate at the University of Chicago in 1894 and was a classmate of Woodrow Wilson at the Johns Hopkins University.

Charles E. Caspari

CHARLES E. CASPARI, dean of the St. Louis College of Pharmacy, died June 9 after an illness of several months.

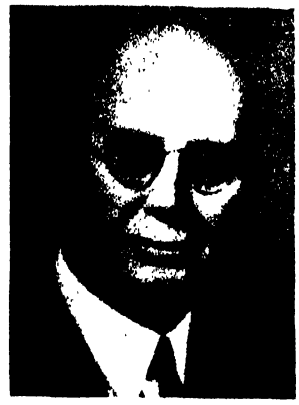
Dr. Caspari was born in Baltimore, Md., in 1875 and received his primary education in Baltimore. He received his A.B. and, in 1900, his Ph.D. degrees from The Johns Hopkins University and in 1900–01 was assistant in organic chemistry at Columbia University. In 1901 he accepted a position as research chemist with the Mallinckrodt Chemical Works in St. Louis and in 1903 became professor of chemistry in the St. Louis College of Pharmacy, where he taught until 1930, then becoming emeritus professor of chemistry. He became dean of the College of Pharmacy in 1926 and held that position until the time of his death. From 1910 to 1940 he served as a member of the Revision Committee of the U. S. Pharmacopoeia. For many years he acted as consulting chemist to large manufacturing firms.

He had been a member of the AMERICAN CHEMICAL SOCIETY since 1904 and also belonged to the American Pharmaceutical Association, American Association for the Advancement of Science, Franklin Institute, and Missouri Pharmaceutical Association.

Richard Morton Cone

ON JUNE 5, Captain Richard Morton Cone was killed in an airplane accident while on active duty in Australia. He was born in Richmond, Va., in 1907 and completed the undergraduate course in chemical engineering at Virginia Polytechnic Institute in 1928. After his graduate career at the University of California, Dr. Cone was for some years head of the Chemical Department of Philip Morris and Co. at Richmond, and subsequently entered the Research Laboratory of the Solvay Process Co., Syracuse, N. Y. Last September he left this position for active service at Edgewood Arsenal, and from there he was ordered to Australia this spring. Dr. Cone had been a member of the AMERICAN CHEMICAL SOCIETY since 1932 and had served as local section secretary.

Henry G. Knight



HENRY G. KNIGHT, head of the Bureau of Agricultural Chemistry and Engineering, U. S. Department of Agriculture, died in Washington, D. C., on July 13 after a short illness. He was 63 years old.

Dr. Knight was born at Bennington, Kans., in 1878 and took his bachelor's and master's degrees at the University of Washington. In 1917 he received a Ph.D. degree in chemistry from the University of Illinois. He also studied at the University of Chicago and at Cornell University. He taught chemistry for several years, then became state chemist of Wyoming. He was later dean of the Oklahoma Agricultural and Mechanical College and dean of the College of Agriculture of West Virginia.

In 1927 he was appointed chief of the Bureau of Chemistry and Soils, Department of Agriculture, now the Bureau of Agricultural Chemistry and Engineering. In the past few years an important part of his work has been organizing and establishing the four Regional Research Laboratories provided for by Congress in 1938.

Dr. Knight had been a member of the AMERICAN CHEMICAL SOCIETY since 1915. He was a past president of the American Institute of Chemists, whose medal he received in 1941 "for noteworthy and outstanding service to the science of chemistry". Secretary Wickard in speaking of his loss praised his work in establishing modern agricultural research centers and in fostering the development of scientific agriculture.

George W. Rolfe

GEORGE W. ROLFE, retired chemist, teacher, and author, and formerly on the faculty of Massachusetts Institute of Technology, died June 21 after a short illness. He was 76 years old. Born in Cambridge, Professor Rolfe was graduated from Harvard in 1885. After serving as a chemist with a Chicago glucose firm, he was appointed submaster of Brookline High School in 1889. He was instructor in chemistry and sugar analysis at M. I. T. from 1895 to 1915, and at several periods in between was employed as a sugar expert by firms in Puerto Rico. Professor Rolfe wrote and collaborated on many scientific papers on engineering and industrial chemistry. He had been a member of the AMERICAN CHEMICAL SOCIETY for 49 years

Victor E. Ruehl

VICTOR E. RUEHL, Merck & Co., Inc., Rahway, N. J., died June 16 at his home in Caldwell, N. J., after an extended illness. A veteran of the Spanish-American War and World War I, Colonel Ruehl had devoted the greater part of the past 10 years to exploration and research in the Far East and Latin American countries for the purpose of increasing the supply of cinchona bark on this hemisphere. Several years ago he was loaned to the Government by Merck to survey cinchona production facilities in Latin America. Under his direction activities were revived in the lands of the Inca and the Maya, from which the quinine-bearing bark was first obtained.

Born in 1881, Colonel Ruehl enlisted as a private in the war against Spain and, while serving in the Philippines, he began to acquire a knowledge of tropical plants. He attended the University of Indiana and graduated from the University of Indiana Law School, served for several years on the editorial staff of the American Law Book Co., and re-enlisted in the Army in 1917. At the end of the war Colonel Ruehl was engaged in special work for the Secretary of War in the Far East, and his recognition of the dependence of the United States on the Far East for supplies of quinine led eventually to his association with Merck.

John Albert Scherrer

JOHN ALBERT SCHERRER, who retired in 1940 as chemist at the National Bureau of Standards, died June 27 at his home in Chevy Chase, Md. He was 71 years old.

Mr. Scherrer was born December 6, 1870, at New Cambria, Mo., and received his education at the University of Nebraska. Previous to his entry into government service, he had been a chemist

for the Union Consolidated Oil Co., Los Angeles, and for the Cockerill Zinc Co. of Kansas. He joined the staff of the National Bureau of Standards in 1911 and retired with the rank of chemist on his 70th birthday. Because of his wealth of analytical chemical experience, he was recalled shortly afterward to assist in national defense research.

Mr. Scherrer's specialty at the bureau was the chemical analysis of nonferrous metals. Although he did not publish extensively, his real attainment lay in his intimate knowledge of how to make analytical separations and in his ability to turn out a large volume of careful work. Slim and wiry, at the age of 70 Mr. Scherrer was still able to demonstrate how to walk on one's hands. His youthful attitude of mind was reflected in his interest in young people. Modest in his accomplishments, retiring in his habits, he was yet warm and friendly, and won the hearts of his associates. On the occasion of his retirement, he was presented with a set of clockmaker's tools, to pursue a hobby inherited through his Swiss ancestry.

He had been a member of the AMERICAN CHEMICAL SOCIETY since 1907 and was also a member of the Washington Academy of Sciences and American Association for the Advancement of Science.

Andrew Stewart

ANDREW STEWART, 73, retired member of the staff of the U. S. Bureau of Mines, died June 29 in Washington, D. C. He had been ill for a year.

At the time of his retirement in 1933 Dr. Stewart was assistant to Mr. Cattell, chief engineer of the Helium Division of the bureau. He was author of various publications, including "About Helium", published by the bureau and considered an authoritative reference work. During his association with the bureau Dr. Stewart served for about 10 years on the Interdepartmental Patent Board. Before entering government service, he established, in association with the late George W. Johnston, a clinical laboratory, said to be the first in Washington. He was born in Washington in 1868, and attended Leipzig University in Germany, where he received the degrees of master of arts and doctor of philosophy.

Dr. Stewart had been a member of the AMERICAN CHEMICAL SOCIETY since 1920 and also belonged to the Washington Academy of Sciences and American Association for the Advancement of Science.



Wanted: Metallurgists and Chemists

IN THE mobilization of manpower for the civilian war service of the Government there is a continuing call for scientifically and technically trained men and women. Among those wanted are metallurgists and chemists. More than 100 metallurgists will be needed during the coming year in the U. S. Bureau of Mines, and the need for chemists in various branches of the Government is constant.

The Civil Service Commission has recently modified the requirements to allow college teaching to be offered as professional experience. The requirements now are a four-year college course leading to a bachelor's degree, with major study in metallurgy, chemistry, or closely allied subjects; for the $2,600 grade, two years of professional experience (which may include college teaching), appropriate graduate study, or a combination of the two in the field for which application is made. Additional experience will be required for the higher grades. Salaries range from $2,600 for the assistant grade to $5,600 for the principal grade. There is no maximum age limit.

Although many of the metallurgical positions require field work, involving outdoor duties for which men will be needed, it is expected that there will also be an opportunity for a number of women. There is an excellent opportunity for women chemists.

Applications for these positions will be received until further notice, but persons who are available and qualified are urged to apply at once. The announcement with the application forms may be obtained at any first- or second-class post office or from the U. S. Civil Service Commission, Washington, D. C.

Potential Power Converted into Electricity

CONSUMPTION of unprecedented quantities of power in war production is placing new emphasis on methods of conserving energy. Before the United States entered the war, engineers of General Electric Co., Schenectady, N. Y. had developed two systems for utilizing potential power which would otherwise be wasted. These systems are pouring millions of kilowatt-hours back into war production.

Enormous power economies already have been effected by the airplane engine recovery method. During the 12 hours usually required to test an airplane engine, great quantities of high-octane gasoline are consumed. One airplane engine factory in the Middle West, for example, tests enough engines to produce kilowatt-hours numbering in the millions per month. This power is more than half the amount necessary to operate the entire plant at maximum capacity. By the G. E. method all of this recovered power is pumped into the plant's power system, and so successful has the method proved that 163 installations have been made, 72 of them by General Electric. Pratt & Whitney Aircraft, Ford, Buick, and Chrysler are among the manufacturers of airplane engines using the units.

General Electric experiments in salvaging this power go back to 1938, when Pratt & Whitney Aircraft requested that company engineers study possibilities of power recovery. The moment an airplane engine is completed it is placed on a testing stand and run at varying speeds for several hours, not only as a test, but to break in the engine. During the testing, the engine is ordinarily connected to a special propeller, and the entire engine output is dissipated in churning the air. The propeller serves merely as a load, a resistive force which the engine must drive. The quantities of high-octane gasoline consumed by today's engines of over 2,000 horsepower are enormous.

General Electric worked out a system whereby an alternating-current generator would replace the propeller as the load on the airplane engine. The power from the engine is stepped down to the relatively slow generator speed by a coupling device, with the result that a high percentage of the power is converted into electrical energy and pumped into the power system. Recently, however, a more flexible power recovery system eliminating the coupling device has been developed. This system incorporates the characteristics of the coupling and the constant-speed generator in one variable-speed unit.

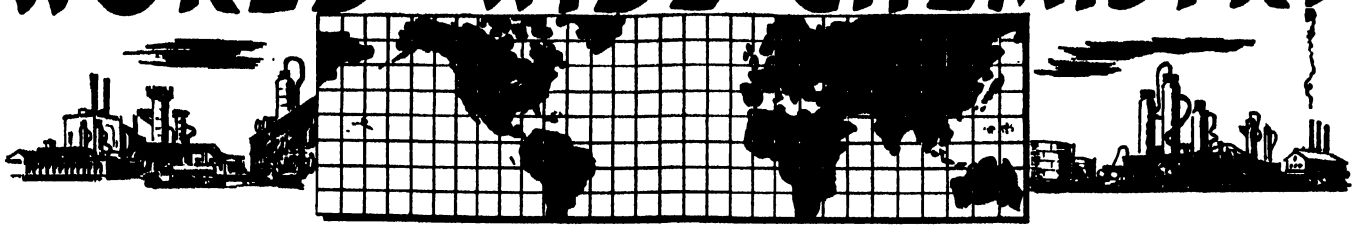
Houdry Method for Producing Butadiene Perfected

IT HAS been reported that after seven months Eugene Houdry has perfected his catalytic cracking process for the commercial production of butadiene from oil. After working for seven years in France on the process, Houdry came to the United States and with the aid of the Sun Oil and Socony-Vacuum Oil companies spent over $10,000,000 in perfecting the process and developing apparatus for operating on a commercial scale.

Procurement Problems Discussed—Correction

CHEMICAL AND ENGINEERING NEWS wishes to correct an error in the news story, "Procurement Problems Discussed", in the June 25 issue. On page 812 the second sentence should read "Plant protection is provided by the Army, not the FBI, Captain Plank revealed, this responsibility having only recently been taken over from the federal bureau", not "Police protection" as originally published.

WORLD-WIDE CHEMISTRY



The turnover in British chemical markets remains at a highly satisfactory level, but new business has been on a somewhat reduced scale, as is usual at this time of the year. The few prices that changed during recent weeks were raised. Exports have dwindled and are limited to overseas countries which require British chemical products for their war effort. Cooperation between chemical manufacturers in Britain and other Allied countries, especially in the British Dominions, is facilitated by existing commercial and financial links. In the home market formaldehyde, barium chloride, and copperas were in brisk demand, as were most products for which English consumers rely on imports—potash compounds, oxalic and tartaric acids, chromium salts, etc. Solvents, in limited supply, are allocated among essential users. Distribution of overseas materials under Ministry of Supply and Ministry of Food direction occupies much of the chemical importers' time. Lend-Lease materials have become available from the United States and appear in the English market to a growing extent.

Government Cooperates with Experts in Chemical Controls

The policy of the British Government has been to use fully the assistance offered by chemical trade organizations in the execution of the controls, and the British Chemical and Dyestuffs Traders' Association reports that the measure of cooperation with government departments has been highly satisfactory. The association expects that many of the controls will operate for a considerable time after the war. In many cases circumstances have permitted a voluntary arrangement between producer and distributor in which provision was made for the allocation of supplies to essential industries on a ration basis.

The Board of Trade has set up an Advisory Committee of five members on the production and supply of toilet preparations under wartime conditions. The Ministry of Supply has appointed the Tin Research Institute as advisers on questions affecting the use of tin, and the institute will also collaborate freely with other government departments and with manufacturers. A Central Committee of Export Groups has been appointed by the president of the Board of Trade as a first step toward rehabilitation of the export trade after the war. It will advise the Board of Trade and the Export Council in matters affecting chemical export industries. It is composed of five members, and the perfumery, plastics, fine chemical, pharmaceutical, and general chemical trades have sent one representative each. A Synthetic Rubber Committee has been appointed by the Ministry of Supply to keep the situation under review. This decision may be regarded as a slight concession to those who advocate the establishment of a synthetic rubber industry in Great Britain, a suggestion which has been turned downed by the government. In the meantime it has been announced that steps have been taken for the production of substantial quantities of a rubber substitute.

Paint Industries Forced to Curtail Output, Close

While other chemical industries have been given "essential industries status", the paint trade will undergo a serious contraction as building operations have declined, restrictions are in force for repairs and renovations, and many paint materials are in short supply and must be conserved. Labor from paint factories has already been moved to more urgent war industries, and paint manufacturers will have to concentrate in the same way as other redundant producers of civilian goods. The production will be carried on in the most efficient plant, and other factories will have to close. Attention is being focused in the paint trade to indigenous materials. This applies equally to pigments, oil vehicles, and solvents. The manufacture of chrome colors has been limited to eight specified shades; this restriction will permit more efficient production methods. For concrete pigments, new specifications have been issued which permit the use of indigenous material of low coloring power. Utility grades of pottery must not be decorated with paints, and similar restrictions on unnecessary use of colors and dyes are in effect for other trades.

New Disinfectant for Hospital Use

A new disinfectant for use in hospitals is cetyl trimethyl ammonium bromide, a cationic detergent, used in 1 per cent solutions in warm water. It was found to reduce materially the number of bacteria on normal skin and to sterilize completely dirty and greasy bowls and baths. If used continuously, however, it seems to make the skin more sensitive to the action of certain chemicals.

Specifications Issued for Disinfectant Powders

British Standard Specifications have been issued for disinfectant powders. Hypochlorite powders consist of a whitish powder having an available chlorine content of not less than 30 per cent at the time of dispatch and, under satisfactory storage conditions, not less than 29 per cent 3 months later. If exported, the powder must have an available chlorine content of not less than 25 per cent 3 months after dispatch. In the case of other disinfectant powders, the germicidal efficiency determined by a modified Rideal-Walker technique must not be less than 0.5.

Uses of Producer Gas Receive Government Support

A Director of Producer Gas Vehicles has been appointed by the Minister of War Transport to encourage the use of producer gas plant for road vehicles. The government has prepared a plan for the manufacture of a first consignment of 10,000 generators for use with trucks and busses, and research institutes of coal and chemical producers have designed an alternative mobile gas producer plant to be used for 50,000 road vehicles. The solid fuels to be employed are soda-activated coke and anthracite, but research is still proceeding and may lead to the development of alternative fuels. Meanwhile experiments are under way with several mixtures of oils and coal deriva-

EDITOR'S NOTE. Those interested in further details should address the correspondent whose name and address appear for each country, and enclose sufficient international coupons to prepay the reply. United States stamps should not be sent.

tives for normal bus engines, but consumption of these blends is insignificant as yet.

Two More Importers' Cooperatives Are Formed

The Lactic Casein Importers' Association and Association of Merchant-Distributors of Beeswax have been formed as companies limited by guarantee to cooperate with the Ministry of Supply or other authorities in the allocation and distribution in the United Kingdom of lactic casein, etc., and of beeswax and other agreed products. These companies, as others of the same type formed earlier, are cooperative associations of firms which have been engaged in import trades and now distribute the goods to English consumers in accordance with government instructions. This method of allocation of supplies has been most satisfactory from the point of view of economy, continuity, and efficiency. Supplies of lactic casein to be distributed are those received from the United States under Lend-Lease arrangements.

Economies Suggested in Use of Soft Solders

War emergency standards for soft solders have been issued, at the request of the Non-Ferrous Metal Control, by the British Standards Institution. Further economies are suggested. Use of solder may be omitted entirely as in automobile body patching, welding may be used to replace soldered joints, and varnish should be used where solder baths serve for protective coverings. Silver-lead solders are being developed for a variety of purposes, and lead solder with a very low tin content is recommended for high-temperature applications. Solder used for dipping baths should contain no more than 20 per cent of tin in place of 50 per cent now frequently adopted. Similar savings are suggested elsewhere by lowering the tin content of solder.

Naphthenic Oils Are Used for Insulated Cables

British practice in the selection of oil for cables insulated with impregnated paper was described to the Institution of Electrical Engineers by S. Peckinsale. Use of naphthenic oils is increasing rapidly because they are better solvents for rosin and oxidized bodies made from rosins than are paraffinic oils. Also oil and refined resin compounds have advantages over compounds containing unrefined gum rosins. All the oils and compounds can be prepared with excellent electrical properties, but the types used are those which reduce the chemical change in the presence of air to a minimum. For voltages up to 66 kilovolts, various oil and resin compounds are used, for higher voltages a thin naphthenic oil is employed for oil-filled cables, and a viscous naphthenic oil for pressure-type cables. Certain aromatic compounds are left in the oil to absorb any gas generated under electrical stress from the more saturated compounds in the oil. Solvent-refined naphthenic fractions have been found suitable for cables, but solvent-refined paraffinic fractions fail to absorb gas and make rosin compounds unstable.

New Essential Oil Resembles Citronella

A new essential oil, investigated by the Imperial Institute, is the oil from the leaves of *Leptospermum citratum*, a shrub or small tree of the Myrtaceae family which occurs in the wild state in New South Wales and Queensland, Australia, and was tried out in cultivation on a Kenya plantation. The oil has a strong lemonlike odor and contains 73.5 per cent by weight of aldehydes, consisting principally of citral and citronellal. It can be used in soaps or lotions of the eau de cologne type, but manufacturers do not believe that it has material advantages over Java citronella oil and Cochin lemongrass oil with which it would have to compete. Nevertheless it is believed by the grower in Kenya that, at least under conditions which existed in 1940, a plantation of trees with a high yield of oil can be worked even in competition with the quick-growing, lower yielding grasses in native hands in Eastern countries.

Hydrolyzed Glue Added to for Electroplating Baths

New addition agents have been tried for ammonium stannous oxalate baths used for electroplating. The best was found to be hydrolyzed glue prepared by boiling 10 grams of glue in 100 cc. of water for 10 hours. It equals peptone in efficiency, costs less, and is less subject to bacterial decomposition than peptone, according to a thesis of F. C. Mathers and P. H. Johnson to the Electrochemical Society. The tin deposits obtained with this addition agent were gray, smooth, adherent, and free from projecting crystals. No change was noticed when corncob glue, furfural, hydroquinone, alpha-naphthol, acetaldehyde, urea, tartaric acid, ammonium naphthalene sulfonate, ammonium benzene sulfonate, pyridine bases, cresol, or clove oil were added to the hydrolyzed glue. The best deposits were obtained from an ammonium stannous oxalate bath containing, in grams per liter, ammonium oxalate 60, stannous oxalate 50, oxalic acid 15, potassium iodide 50, hydrolyzed glue 1, and pyrogallol 1. Potassium sulfocyanate may be substituted for the iodide, but neither this nor the pyrogallol are necessary, although they somewhat improve the tin deposit.

G. ABRAHAMSON
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ENGLAND
June 18, 1942



Since the beginning of war the Brazilian Government has been studying possibilities for the establishment of new plants to produce goods previously imported. Concessions have already been granted for construction of plants to produce newsprint and aluminum and steel products. More recently the government granted a rebate of 50 per cent on duties on plants and equipment for a dry ice factory, the first of its kind in Brazil, and exempted the manufacture of window and plain glass from any federal, state, or municipal tax. The Export and Import Department of the Bank of Brazil has announced that priority preference will be given to Brazilian mining companies and cement factories for purchases of supplies, machinery, etc., essential for the expansion of present plants or the construction of new ones.

Exports of Minerals, Shipped Largely to U. S., Gain in 1941

Output of manganese ore has increased considerably in recent years, placing Brazil third among world producers of this mineral. In 1940 exports amounted to 222,391 metric tons and in 1941, 437,402 metric tons, of which 96 per cent were destined for the United States. However, this high export figure was lower than the 533,000 metric tons shipped in 1917.

Chromite is another mineral which may be exported in large quantities, provided transportation facilities are developed. Chromite exported in 1941 amounted to 4,424 metric tons. Although chrome found in Brazil is of an inferior quality compared with some other deposits throughout the world, it is estimated the country would be able to supply the United States with about 100,000 metric tons yearly if necessary. Reserves in the State of Baía amount to approximately 4,000,000 metric tons.

Exports of iron ores totaled 420,756 metric tons in 1941 against 255,548 tons in 1940. New installations are being built in Victoria, State of Espirito Santo, to permit the shipments of large quantities of iron minerals at more economical costs.

Exports of beryllium ore showed a remarkable progress in 1941, amounting to 1,703 metric tons against 1,472 in 1940 and only 276 metric tons in 1939.

Quartz exports also increased substantially in 1941 as compared with 1940. In

1941 exports totaled 1,980 metric tons of which 1,137 tons were acquired by the United States. In 1940 only 61 tons were shipped to the United States from a total exportation of 1,103 metric tons, the balance being taken by Japan with 447 tons, Great Britain with 522 tons, and other countries with smaller quantities.

Exports of tungsten ore in 1941 were almost five times those of 1937. During the past five years exports of tungsten ores were as follows: 1937, 6,681 kg.; 1938, 2,090 kg.; 1939, 7,900 kg.; 1940, 10,000 kg.; and 1941, 32,460 kg. Japan was the only purchaser of tungsten ores during 1941. Technicians representing American government agencies are visiting several Brazilian states where minerals essential for hemisphere defense are found.

Government Finances Plan for National Defense

The President of the Republic recently signed a decree providing for a special plan of financing public works and national defense equipment. The budget approved by the government estimates the expenditure of 600,000 contos de reis (approximately $30,000,000) during 1942. Notices from the several ministries indicate that a large amount of the budget will be used for exploitation of mineral resources, petroleum, coal, shale, vegetable oils and fats, aluminum and steel industries, rubber, and wood pulp and paper industries, as well as the improvement of present road, railroad, and other transportation facilities.

Plants Opened in Drive for Self-Industrialization

According to press notices several new factories have recently started to operate in the drive for self-industrialization. In the State of São Paulo, the leading producing center of Brazil, plants began to produce special steels, electric motors, bronze and other alloys for structural purposes, paper packages, and toys. In the State of Minas Geraes are new factories for the production of casein, motor car accessories, and portland cement. In the State of Ceará a plant is being built for the manufacture of plastics from the cashew nut, while a textile mill and vegetable oil refinery using coconut as raw material will soon be in operation.

Exportation of Rayon Forbidden Until Domestic Needs Are Filled

The National Economic Defense Committee, having carefully studied the present situation of rayon manufacture in Brazil, has approved the recent proposal made by the Junta Reguladora do Comercio de Fios e Tecidos forbidding the exportation of rayon until the internal market is supplied with the necessary requirements. Another decision issued by the government established ceiling prices for rayon yarns and canceled the previous decree regarding the importation of new machinery for rayon manufacture, which was suspended a few months ago when manufacturers informed the government that actual facilities are enough to supply the internal market.

Scientific Organizations of South America Plan Meetings

The Brazilian Chemical Society (Associação Química do Brasil) will meet in January 1943 in the city of Curitiba, State of Paraná. It will be the second annual meeting of the society, the first having been held in São Paulo. Curitiba means, in idiom, the land of pine trees, one of the most abundant native plants in the State of Paraná. Having a population of about 150,000 people, Curitiba is also known as the city of smiles. Its industrial activity is represented by 331 organizations producing goods in amounts that exceed 100,000 contos de reis per year. The largest number of factories, 30, is found in the furniture industry. However, the match industry tops off the production value. Toothbrushes, candles, metal blades, tanned leather, silk ribbons, leather and wooden goods, and pottery are products manufactured in Curitiba plants. The city is connected to the capitals of neighboring states by excellent railroads, highways, and air routes. The University of Paraná, where the scientific divisions of the Brazilian Chemical Society will meet, is situated in Curitiba. The society will also attend a meeting in Pernambuco at the beginning of next year for the discussion of problems affecting the sugar and alcohol industries.

The Asociación Quimica Argentina is planning to commemorate its 30th anniversary with a scientific meeting in September. The meeting will be sponsored by the asociación and South American countries are being invited to contribute. The Brazilian Standards Association (Associação Brasileira de Normas Técnicas) will hold its annual meeting in the city of Porto Alegre during October. Various committees will present for discussion and approval a large number of testing methods and standardized specifications. Brazilian technical terminology will also be discussed.

Patent and Trade-Mark Regulations Are Modified

The government, considering the situation created by the present war, recently signed a decree modifying the patent and trade-mark laws. The decree suspended, until after the end of the war, various legal periods within which annuities must be paid by inventors, registered trademarks, and patents used in Brazil, priorities guaranteed under conventions, as well as other measures confined to the internal routine work of the Patent Office. The new law also provides other changes in the processing of patents and trademarks in Brazil.

Brazilian Trade Shows Favorable Balance in Value

Despite the world situation, Brazilian foreign trade during the first three months of the current year showed a favorable balance in value exceeding that of the same period of 1941, although in 1942 export tonnage was inferior and import tonnage superior to those in the first three months of 1941. During January to March 1942 Brazil exported 740,449 metric tons of merchandise valued at 1,802,731 contos de reis (1 conto de reis equals about $50), against 794,637 metric tons valued at 1,356,540 contos de reis during the same period of 1941. Imports in the first three months of 1941 were 894,887 metric tons of goods valued at 1,147,529 contos de reis against 1,048,813 metric tons at 1,449,308 contos de reis during the corresponding period of 1942. Thus the favorable balance for the three-month period of 1942 amounts to approximately $17,671,100 against $10,450,550 during the same period of 1941, an increase of about 69 per cent for 1942.

Export Standards Set for Castor Bean, Bee's Honey

The government has approved specifications for the classification and control of exports of castor bean and bee's honey, with a view to their standardization. Exports of these two products have increased in the last months, mainly to the United States. Castor bean oil is being used in steady amounts for the manufacture of varnishes in place of tung oil, previously imported from China, and linseed oil. With the inclusion of castor bean and bee's honey in Brazilian standards regulations for export products, the principal materials exported by Brazil are now protected against complaints from foreign buyers not only in quality but also in uniformity.

Exports of Kapok in 1941 Show Decided Improvement

Exportation of Brazilian kapok, used largely in stuffing mattresses, pillows and cushions, in the manufacture of life preservers, in the insulation of cold chambers, heaters, music halls, airplane cabins, etc., as well as in the manufacture of linoleum,

has been very irregular in the past. However, exports in 1941 amounted to 314,056 kg. against only 66,689 kg. in 1940. Of the total for 1941, the United States took 112,529 kg., Great Britain 72,389 kg., and Argentina 47,832 kg. The remainder was taken by Switzerland, Sweden, and South American countries. The high price paid for this product during 1941 will probably stimulate production in Brazil, which will be able in the coming years to supply a substantial part of the United States requirements, estimated at about 14,000 metric tons a year.

Coal Production Gains but Fails to Fill Requirements

Production of coal in Brazil during 1941 reached the highest figure yet recorded with a total of 1,407,534 metric tons. Of this total 1,066,827 metric tons were produced in the State of Rio Grande do Sul. The output of the Brazilian coal mines during the past five years was as follows: 1936, 662,196 tons; 1937, 762,789; 1938, 907,224; 1939, 1,046,975; and 1940, 1,336,301 tons. In 1930 the total coal production amounted to only 385,148 metric tons. However, the coal produced in Brazil is not sufficient to meet local requirements, although imports decrease from year to year. Imports of coal in Brazil were 1,209,242 tons in 1940 and 1,057,946 in 1941. Brazilian coal is replacing foreign coal for the production of city gas and in all national and government railroad and steamer companies.

New Decrees Extend the Export Restrictions

The government has signed a decree forbidding the exportation of chemical and pharmaceutical products; surgical, optical, photographic, and electrical materials; agricultural machinery; and tools in general without special permission from the Export and Import Department of the Bank of Brazil. Permission will be granted only if local stocks are sufficient to meet national requirements for a long period or if its utilization in Brazil is unnecessary. In any case a special certificate must be obtained by exporters. The decree covers not only local manufactured products but also the products, materials, or machinery imported from other countries previous to the effective date of the law.

Another decree ruled that sales of motor cars and lorries are subject to control. Priority of purchase will be given to essential industries, especially those producing strategic materials for national defense. Exports of cars, assembled in Brazil from parts imported from other countries, are to be permitted to countries on the American Continent which do not possess assembly plants. However, exports of assembled cars are subjected also to the control of the same department of the Bank of Brazil.

Vegetable Oil Exports Show Steady Increases

Since the outbreak of war, exports of Brazilian vegetable oils have shown a steady increase. In 1939 Brazil exported 34,147 metric tons valued at 69,069 contos de reis, while in 1940 the total exportation amounted to 36,094 metric tons valued at 96,916 contos de reis. A further increase was voted in 1941 with 56,370 metric tons at 194,576 contos de reis. The breakdown of total exports in 1941 tonnage shows the following figures:

Export	Tons
Cottonseed oil	33,457
Oiticica oil	16,606
Castor oil	4,507
Ucuhuba tallow	1,055
Coconut oil	175
Murumurú fat	153
Copaiba oil	122
Andiroba oil	53
Babaçú oil	32
Cumarú oil	2

C. E. Nabuco de Araujo, Jr.

Caixa Postal 970
Rio de Janeiro
June 1942

Sweden Regulates Prices, Distribution of Fertilizers

New regulations both as to allotments and prices govern the allocation of artificial fertilizers to Swedish agriculture in the current year, the U. S. Department of Commerce has been advised. In addition to a curtailment in several instances, to 80 or 85 per cent of consumption during the 1940-41 year, limitation of sodium nitrate from Chile, for instance, has resulted in allotment of this fertilizer only to sugar-beet growers. Each such grower who has signed a contract with the Swedish sugar manufacturing monopoly will be allowed to purchase 400 kg. of sodium nitrate from Chile for each 2.47 acres of sugar-beet area under contract.

Farbenindustrie "Purchases" Chemical Company in Poland

The "purchase" by the German I. G. Farbenindustrie A.-G. of the Boruta Chemical Industry Co. of Poland at Lods has been disclosed from abroad. The German "owners" plan to enlarge and modernize the factory, besides extending operations to include textile chemicals in addition to dyestuffs and by-products. The Germans have changed the name of the company to Teerfarbenwerke G. m.-B. H.

Production of Tung Oil in South Africa Promising

Tung oil promises to become a staple product of South Africa, following experiments and development work in that country for the past 20 years. There are now about 60,000 trees in the Union, from which a research station has recently estimated there can be obtained a yield of 581 pounds per acre, with 70 trees to the acre. Present high prices of the oil have led to many farmers becoming interested, and there are many plantings of 2,000 trees each, it is stated.

South Africa Experiments with Utilization of Tannery Wastes

Utilization of waste products from its tanneries and abattoirs which are available in quantity is under study in South Africa. Manufacture of glue, gelatin, and fleshing grease from hide trimmings and fleshings has been found not to require extensive facilities, can use unskilled labor and, coupled with the supply of materials available, is considered a good prospect.

Bolivian Quinine Bark Production Decreases

The fact that quinine bark is obtained from wild trees is blamed for a sharp drop in output from Bolivia during 1941, when the total crop was estimated at less than 600 tons, compared with 724 tons shipped in 1940. Only a few attempts have been made to cultivate the trees from which bark is stripped, and the amount of bark from this source will probably be small for years; hence each year the natives who gather bark from wild trees have to go farther inland.

Shipments for the first nine months of 1941 were reported at only 341 tons. Most of 1940's exports went to Japan.

Woody Remnants from Flax Used in England

A new use for woody remnants from flax treated to make linen has been reported from England. This woody remnant left after flax shives have been treated to make linen was formerly wasted or burned. Now this material is ground to 80 mesh (B. S. S. screen) and used as filler for phenolic Bakelite molding powders, flexible boards, rubber products, linoleum, and other manufactures, for which it has proved a cheap product. Ground to 30 mesh the substance is used to clean tin plate.

Soap and related products, under license for importation by the Swedish Government, may be somewhat curtailed in use by such license order. The licensing order covers soaps, soap substitutes, soft soap, and allied products containing fat, oil, or soap.



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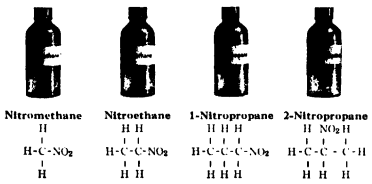
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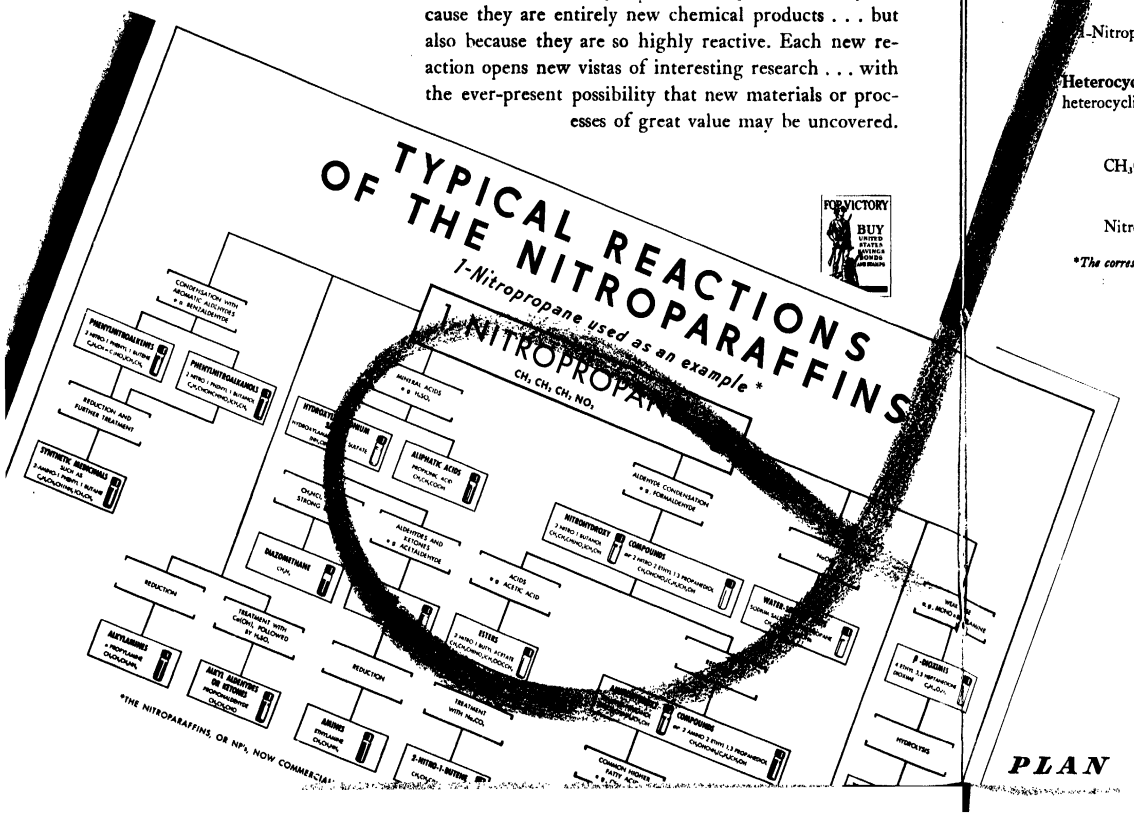
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Nitroparaffin Syntheses

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Nitro Alcohols* are made by condensing an aldehyde with a Nitroparaffin:

$$CH_3CH_2CH_2NO_2 + C_3H_7CHO \longrightarrow CH_3CH_2\underset{\displaystyle NO_2}{\overset{|}{C}}HCHOHC_3H_7$$

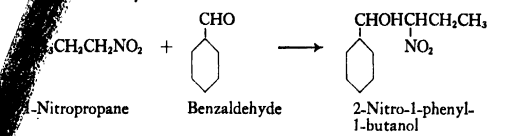
1-Nitropropane — Butyraldehyde — 3-Nitro-4-heptanol

Chlorinated Nitroparaffins are obtained when the NP's are treated with chlorine in aqueous, alkaline solutions:

$$CH_3CH_2NO_2 + 2Cl_2 + 2NaOH \longrightarrow CH_3\underset{\displaystyle Cl}{\overset{|}{C}}NO_2 + 2NaCl + 2H_2O$$

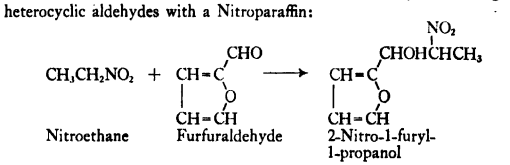
Nitroethane — 1, 1-Dichloro-1-nitroethane

Aromatic Nitrohydroxy* derivatives can be produced by condensing an aromatic aldehyde with an NP:



1-Nitropropane — Benzaldehyde — 2-Nitro-1-phenyl-1-butanol

Heterocyclic Nitrohydroxy* derivatives are made by condensing heterocyclic aldehydes with a Nitroparaffin:



Nitroethane — Furfuraldehyde — 2-Nitro-1-furyl-1-propanol

**The corresponding amine can usually be made by hydrogenating the nitro compound.*

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American Chemical Society[1]

104TH MEETING. Buffalo, N. Y., September 7 to 11, 1942.

105TH MEETING. Indianapolis, Ind., April 12 to 16, 1943.

106TH MEETING. Minneapolis, Minn., fall of 1943.

NATIONAL CHEMICAL EXPOSITION AND NATIONAL INDUSTRIAL CHEMICAL CONFERENCE. Sherman Hotel, Chicago, Ill., November 24 to 29, 1942.

Other Scientific Societies

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Netherland Plaza Hotel, Cincinnati, Ohio, November 16 to 18. Annual meeting.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Vancouver, B. C., September 9 to 11.

AMERICAN OIL CHEMISTS' SOCIETY. Drake Hotel, Chicago, Ill., October 7 to 9.

AMERICAN PETROLEUM INSTITUTE. Stevens Hotel, Chicago, Ill., November 9 to 13. Annual meeting.

NATIONAL LUBRICATING GREASE INSTITUTE. New Orleans, La., October 26 to 28.

NATIONAL PETROLEUM ASSOCIATION. Hotel Traymore, Atlantic City, N. J., September 16 to 18. Annual meeting.

NEW ENGLAND ASSOCIATION OF CHEMISTRY TEACHERS. University of New Hampshire, Durham, N. H., August 11 to 14.

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY. Hotel Statler, Boston, Mass., September 29 to October 1.

[1] The list of the SOCIETY'S National Officers and Directors, Editors, members of Council, Divisional and Local Section Officers, Committees, and Chapters of Student Affiliates appears in CHEMICAL AND ENGINEERING NEWS three times a year—usually February 10, May 10, and October 10. The latest list is printed on page 601 of the May 10 issue.

The Nineteenth Colloid Symposium

Boulder, Colo., June 18 to 20, 1942

IN SPITE of travel problems, more than 100 guests registered for the Nineteenth Colloid Symposium, held on the campus of the University of Colorado, June 18 to 20, 1942. With but a single exception at least one author of every communication was on hand to present his paper.

The symposium was opened Thursday morning by Professor Germann of the Department of Chemistry, University of Colorado. Dr. Beniams of Colorado spoke on a two-path rectilinear electrophoresis cell and Dr. Marton of Stanford surveyed the applications of the electron microscope in colloid chemistry.

The Thursday afternoon session was opened with an inspiring address by President Robert L. Stearns of the University of Colorado, who made a special trip from a business engagement in Denver to welcome the guests of the symposium. The five papers of the afternoon on the general subject "Inorganic Colloid Chemistry" were presented by Shaw and France of Ohio State, Weiser of Rice, Reyerson of Minnesota, and James of Eastman Kodak Co.

The Friday morning session was devoted to five papers under the general subject "Colloidal Electrolytes" given by Marshall of Missouri, McBain and Mrs. McBain of Stanford, Dean of Stanford, and Cassell, consulting chemist, Chicago. The Friday afternoon and Saturday morning sessions were given over to various aspects of "Protein Chemistry". The six papers were presented by Hauser of the Massachusetts Institute of Technology, Norris of Colorado, Hill of the University of Colorado School of Medicine, Abramson of Columbia, Strain of the Carnegie Institution of Washington, and Friedman of Oregon State College. The authors who presented the 18 papers and their associates who collaborated with them in the preparation of the papers are to be congratulated on the quality of the contributions which maintained the interest of the group throughout the five sessions. Through the kind cooperation of Dr. Lind, the papers will be published during the fall in the *Journal of Physical Chemistry*.

The Committee on General Arrangements, with Professor Germann as Chairman, and the Committee on Entertainment for Women, with Mrs. Germann as Chairman, provided for the comfort and entertainment of the guests. On Thursday afternoon the visiting ladies were complimented by a tea at the Germann home and on Friday afternoon were taken to points of interest in the vicinity of Boulder. Thursday evening all the guests were entertained at dinner in the Boulderado Hotel, followed by a musical program, in the Music Room of the university library, contributed by Professors Jones and Wessel of the College of Music of the university. On Friday evening the guests were motored to the picnic grounds atop Flagstaff Mountain for a steak fry. At twilight the group returned to the campus of the university where they were entertained at a square dance.

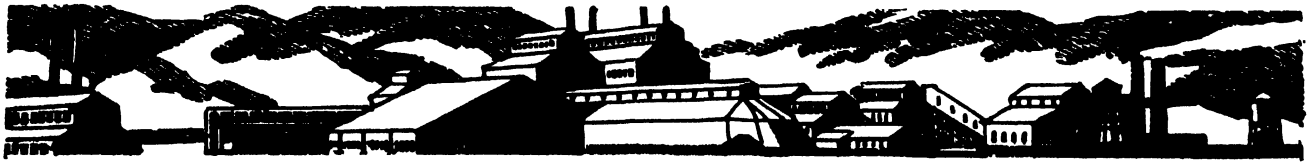
Program of papers, entertainment, and fine weather combined to make the Nineteenth Colloid Symposium a memorable one for all who were fortunate enough to attend.

HARRY B. WEISER, *Chairman*

Alpha Chi Sigma Holds Conclave

HIGHLIGHTS of the 17th biennial conclave of Alpha Chi Sigma, professional chemical fraternity, at the Congress Hotel, Chicago, Ill., June 19 to 22, 1942, were addresses by past presidents William Higburg, sales manager of the Republic Creosote Co., Indianapolis, and H. E. Wiedemann, consulting chemist of St. Louis. The convention was also addressed by member S. D. Kirkpatrick, president of the American Institute of Chemical Engineers and editor of *Chemical and Metallurgical Engineering*. Carl S. Miner, of the Miner Laboratories, was initiated by the fraternity into its Illinois Institute of Technology chapter. The collegiate chapters at the institute and at Northwestern University joined in conducting the ceremony. Although the conclave had been shortened and entertainment features eliminated, all official delegates were present save alumni representatives from Los Angeles, San Francisco, and Philadelphia.

The fraternity will continue to lend its financial sponsoring ($1,000 per year) to the AMERICAN CHEMICAL SOCIETY Award in Pure Chemistry. It will also continue its national grants-in-aid activities whereby money grants are made to collegiate chapters in sponsoring local professional activities of benefit to the chemistry department and the school. The national



safety program, set in operation during the past biennium, will be continued. The fraternity adopted legislation to meet, as best possible, the three-semester plan in some schools. The national office reported a high active membership and a record number of men initiated during 1940–41. A national committee was established to direct the operation of the fraternity in the best interests of national defense.

Walter S. Ritchie retired as president and completed 20 years of active service with the fraternity in national capacities. He was succeeded by Harold P. Gaw, American Rolling Mill Co., Middletown, Ohio. Other members of the executive council elected were: first vice president in charge of professional chapters and groups, A. Watson Chapman, Celotex Corp. of New Orleans; second vice president in charge of collegiate chapters, L. W. Van Doren, Basic Vegetable Products Co., Vacaville, Calif.; national ritualist, Clyde B. Hutchison, Champion Coated Paper Co., Saundersville, Ga. John R. Kuebler (Epsilon), Indianapolis, was appointed national secretary-treasurer and editor of *The Hexagon*, and with this conclave assumed these duties for the fraternity on a full-time basis.

Invitations for subsequent conclaves were submitted: 1944, St. Louis, Mo., and 1946, Cleveland, Ohio, under the sponsorship of the Cleveland–Akron–Case School of Applied Science groups.

Westinghouse Shares Its "Know How"

More than a score of new engineering developments and new ideas that could be put to work to help speed production in almost any war industry were disclosed at the Astor Hotel, New York, to newspaper writers and leading technical magazine editors by the Westinghouse Electric and Manufacturing Co. on June 16.

"We believe this demonstration illustrates the willingness of many big companies to share their specialized 'know how' with all American industry during this national emergency", said A. A. Bates, who directs chemical and metallurgical work at the Westinghouse Research Laboratories, where many of the technical advances were discovered. "The real problem", he continued, "is to provide some means for the common interchange among industries of such ingenious discoveries and new techniques, so they can be put to use in the thousands of small factories which are working day and night on war production."

Devices demonstrated ranged from a simple screwdriverlike cotter pin spreader that any factory worker can use to one requiring elaborate laboratory equipment and skilled technicians for determining by photoelasticity the stresses on huge bolts in turbines. With photoelastic analysis, M. Hetenyi of Westinghouse discovered that a nut with either a tapered thread or tapered lip will increase the effective strength of the fastening as much as 40 per cent, reported Dr. Bates.

Westinghouse electronics research has reduced from 8 hours to 15 minutes the time usually required to determine the grain sizes of metallic powders used by numerous industries in making pressed, molded metal parts. To grade speedily these tiny metal specks—so small they can be seen only with a powerful microscope—P. F. Kalischer, Westinghouse research metallurgist, developed a sorting method that employs a glass tube, a photocell, a light bulb, and a milliammeter. To analyze a powder specimen, Dr. Kalischer mixes 1 gram of the specimen with 100 cc. of acetone and a wetting agent. The mixture is placed in the glass tube mounted between the photocell and the light source. As the particles settle, the liquid clears, permitting more light to pass through the tube to the photocell.

"By reading the milliammeter at regular intervals, Dr. Kalischer plots a curve showing the rate at which the specimen clears", Dr. Bates said. "Comparing this curve with similar curves for standard particles of known size, he can determine both average size and relative quantities of different particles in the test specimen. The usual method of measuring particle size is to float the powder in glycerol and measure the settling time, but such a test does not give accurate information about relative quantities of grains of different sizes. Use of a wetting agent is important, because it helps the acetone to surround each metal grain completely. Without it, the settling rate might be affected by tiny air bubbles surrounding the grains."

Others among 25 examples of Westinghouse "know how" demonstrated or explained by Dr. Bates included the use of electric heaters to tighten big turbine bolts, a technique that avoids torsional strains; use of magnetism to detect under-the-surface flaws in steel; an electronic control to increase production and safeguard the quality of steels treated in atmosphere furnaces; and development of machine-made dies to replace many handmade dies.

Armour Foundation Plans War Policies

To provide for thorough consideration of problems facing the Armour Research Foundation, Chicago, free from pressure of everyday matters, Harold Vagtborg, director, called a week's conference of department heads at a remote point in Wisconsin from June 22 to 27. Among problems discussed at a round table were how the foundation staff of 125 can more effectively serve the war effort and aid industry in preparing for the post-war period, and what new approaches can be made to the major war projects already being studied by the foundation.

Mineral Industries Conference Canceled

The Illinois Mineral Industries Conference, scheduled for Urbana, Ill., October 30 and 31, has been canceled, according to an announcement by M. M. Leighton, chief of the Illinois State Geological Survey. The sponsoring groups, the Illinois Mineral Industries Committee, Engineering Experiment Station of the University of Illinois, and State Geological Survey, have agreed to lend their combined support to the Regional Conference of the American Institute of Mining and Metallurgical Engineers in St. Louis October 1 and 2. The St. Louis meeting will stress problems of the mineral industries of the Mississippi Valley area, with particular reference to war needs, and the purpose of the Illinois conference, as originally planned, will be adequately met.

Science Talent Search Trips

Nine girls and 31 boys were invited to Washington, D. C., July 13 to 15 to compete for 20 Westinghouse science scholarships in the Science Talent Search conducted by the Science Clubs of America and sponsored by Science Service. Winners of the trip were selected by competition in secondary schools of the United States, from more than 10,000 entrants. Twenty will be chosen for scholarships which will allow them to go to any college of their own selection to continue science or engineering training. One boy and one girl will be awarded $2,400 Westinghouse Grand Science Scholarships, while 15 boys and 3 girls will receive $200 Westinghouse Science Scholarships.

Instruments Needed

Research workers seeking instruments required in their work but difficult to find are invited to communicate with D. H. Killeffer, 60 East 42nd St., New York, N. Y., chairman of the newly appointed Committee on the Location of New and Rare Instruments of the National Research Council. The plan of the committee's activity is to assist in locating needed instruments of types not ordinarily available through usual channels.

Assistance is particularly desired from owners and builders of instruments falling within the new or rare categories which might be made available to others through sale or for temporary use under mutually satisfactory conditions.



Introduction to Heat Transfer. *Aubrey I. Brown* and *Salvatore M. Marco.* 1st ed., 232 pages. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York, N. Y., 1942. Price, $2.50.

This book is well titled and is written especially for the mechanical engineering student. It is the most complete elementary textbook on the subject and it is the first text outside the chemical engineering field written with this scope. The treatment of the subject matter is not involved and a knowledge of algebra, elementary calculus, and physics will suffice for background information. The book is up to date, well organized, and the more complicated empirical relations are but briefly discussed. Many references are made to the more detailed and advanced literature. Illustrated problems are numerous and well worked out, and at the end of each chapter there are many problems. This helps to make the text very teachable.

The book is not long and most chapters are quite short, but the fundamental material is adequately presented. The subjects covered are best illustrated by the following chapter headings: Modes of Heat Transfer, Heat Transfer by Conduction, Equations for the Calculation of Heat Transfer by Conduction (Steady State), Radiation, Introduction to the Study of Convection, Forced Convection, Free or Natural Convection, Heat Transfer to Boiling Liquids, Condensing Vapors, Over-all Transfer of Heat, Application of the Principles of Heat Transfer to Design Problems, and Variable Heat Flow. Preceding Chapter I several pages are given over to a discussion and table of nomenclature. The symbols used are standard, but it is unfortunate that the symbol θ is used for temperature difference as well as the more common Δt; both are used in the text.

Radiation, Forced Convection, and Variable Heat Flow are well treated. It should be noted that the illustrations, problems, and references cover many engineering processes. References and problems involving different aspects of heat transfer in air conditioning are especially good and have not heretofore been so completely integrated with the general theory. The chapter on Applications of the Principles of Heat Transfer to Design Problems is excellent, and although short it is a well-rounded illustrated summary of heat transmission.

J. H. Rushton

Analytical Chemistry, Volume II, Quantitative Analysis. Based on the German text of *F. P. Treadwell,* enlarged and revised by *William T. Hall.* 9th English ed. 806 pages. John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y., 1942. Price, $6.00.

For the past 40 years the names Treadwell and Hall have been familiar to every student of chemistry in America. What the average student perhaps has not realized is that Frederick Pearson Treadwell was an American, born at Portsmouth, N. H., on February 5, 1857.

As was the custom many years ago, Treadwell, like other Americans, sought technical education in Europe. A student at Göttingen and Heidelberg from 1875 to 1878, he obtained the degree of doctor of philosophy from the latter institution, and, for the next three years, became an assistant to Bunsen.

Treadwell finally selected Zürich, Switzerland, as the garden spot in which to live. There he settled, married, and, from 1894 until his death on June 24, 1918, taught analytical chemistry at the Eidgenössische Technische Hochschule, a position to which his son, William D. Treadwell, succeeded in 1919.

In 1904 a young instructor at the Massachusetts Institute of Technology, William Thomas Hall, likewise a New Englander, translated the elder Treadwell's "Kurzes Lehrbuch der analytischen Chemie" into English. After the first English edition the book was revised from time to time without paying attention to the new editions of the German text. Thus, the succeeding English editions became more the work of Hall and less that of Treadwell.

As known to the student, "Treadwell-Hall" consists of two volumes; one devoted to qualitative analysis, the other to quantitative. Primarily intended for student use, these texts are found as reference books in practically every chemical laboratory. In this ninth edition the methods of gravimetric analysis have been rearranged to correspond to the order in which the elements are detected in the usual scheme of qualitative analysis. Descriptions of quantitative methods have been brought up to date as nearly as possible; for instance, in the discussion of the platinum metals, the procedure recently developed at the National Bureau of Standards for their separation and determination has been included.

An attempt to give a detailed account of the latest edition to the many who are familiar with the earlier editions would scarcely be justified. Suffice it to say that Professor Hall has done an excellent piece of work. This new volume on quantitative analysis deserves a place on the reference shelf, within easy reach of the analytical chemist.

Raleigh Gilchrist

Introduction to the Microtechnique of Inorganic Analysis. *A. A. Benedetti-Pichler.* 1st ed. vii + 302 pages. John Wiley & Sons, 440 Fourth Ave., New York, N. Y., 1942. $3.50.

This volume replaces the "Introduction to the Microtechnique of Inorganic Qualitative Analysis" by Benedetti-Pichler and Spikes. Numerous details for preparation and manipulation of accessory apparatus for handling small amounts of material are given in the introductory portion and in connection with the various analytical procedures, which are meticulously described in the form of experiments for student use. Some 125 pages are devoted to exercises illustrating the microtechniques of qualitative analysis, including typical spot and bend tests, and the more widely used microscopical precipitation tests, with emphasis on the ions of the copper and arsenic groups. At some length the author discusses methods of handling unknowns containing several ions and working up group precipitates so that specific confirmatory tests can be applied. It is shown that the typical sequences of manipulation and separation common in microqualitative analysis of the above groups can be successfully carried out on a milligram or centigram scale.

The remainder of the book is about equally divided between gravimetric and titrimetric inorganic qualitative analysis. The use of the microbalance, filter stick technique, electrodeposition, and microburet and -pipet are discussed, and directions are given for gravimetric determinations of Na in $Na_2C_2O_4$, H_2O in $CaSO_4 \cdot 2H_2O$, Al_2O_3 in alum, CaO in $CaCO_3$, MgO in $MgSO_4$, CaO, MgO, and SiO_2 in limestone, and Cu and Ni in German silver; titrations of acids and bases, Cu with thiosulfate, and Ag with cyanide are also described. It is to be hoped that in future editions the scope of this portion of the book may be greatly expanded beyond these type experiments, and that the present work may encourage the study and

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Buoyant Type Glass Developed

A NEW type of opaque glass that floats like cork and can be used as the buoyant element in the construction of life boats, life rafts, life preservers, and pontoon bridge supports has been developed by the Pittsburgh Corning Corp., Pittsburgh, Penna. The product, called Foamglas, is under active investigation by certain government agencies as an alternate material for such critical products as cork, balsa wood, cellular rubber, and kapok, which are largely imported. Last year under a certificate of necessity a large factory was built in western Pennsylvania and production already has started.

Pittsburgh Corning Corp. has had this product under development since 1938. The Armstrong Cork Co. is immediately marketing the material in the low-temperature insulation field, where it can be used for cold rooms in meat-packing plants, breweries, dairies, and ice cream plants.

Foamglas weighs only 10 pounds per cubic foot—one fifteenth of ordinary glass—and is odorless, fireproof, and verminproof. It is extremely light in weight, opaque, rigid, and has a cellular structure containing myriad tiny airtight cells which give it buoyancy and valuable insulating properties. The product can be sawed or drilled with ordinary tools. It is available in slabs 12 inches by 18 inches and in thicknesses of 2, 3, 4.5, and 6 inches. Its introduction marks the first time in the history of glassmaking that a "foaming" process has been used in the industry.





Left. Foamglas insulation weighs only one fifteenth as much as does ordinary glass. *Below.* Foamglas can be sawed and worked with ordinary tools. Here a workman saws a block of the new product in a mitre box.

Control of Additional Companies Taken Over

CONTROL of General Dyestuff Corp., Byk, Inc., and Siemens, Inc., all of New York, and Ajax Transportation Co., Nashville, Tenn., has been taken over by the Alien Property Custodian.

General Dyestuff Corp. has been the selling agency for General Aniline and Film Corp. Control of the latter company was vested by the Alien Property Custodian several weeks ago. With assets of $6,000,000, General Dyestuff's 1941 sales exceeded $22,000,000. Byk, Inc., is a subsidiary of a large German pharmaceutical company and manufactures chemicals and drugs in the United States under patents and trade-marks acquired from the parent company. Siemens, Inc., was the United States representative of Siemens and Halske, A.-G., of Germany, one of the largest electrical and radio equipment manufacturers in the world. Siemens also owns a number of patents which it holds by assignment from its parent company and which now come under control of the custodian. Ajax Transportation Co., heretofore owned by Fritz von Opel, is engaged in the transportation of gasoline by tank car.

Quality of Civilian Dyes Remains High

LIMITATIONS in the amount of chemicals available need not result in poorly dyed fabrics, the Office of Price Administration has reassured the interested trades. While a scarcity is admitted in such strategic materials as toluene, naphthalene, aniline, and phenol, this agency continued, the amount of these chemicals required is not less for poorer quality dyes than for fast dyes. Production of good quality fast dyes is essential to the war conservation program, it was emphasized, as from a conservation standpoint it is much better to make high quality fast dyes out of the available basic organic chemicals. Great waste results from use of low quality dyes because they run or fade, shortening the useful life of the garment.

The dye industry, it was reported, has the capacity to meet both military and essential civilian demands without sacrificing the quality of its products. Sufficient preshrinking equipment exists to provide for all essential civilian requirements. The textile conservation program will mean changed types of fabrics for civilian use and fewer nonessential clothes, but dye production, it is believed, can keep up with clothing production in any event.

A. H. Brunner, Jr., has resigned as chairman of the Binghamton Section of the AMERICAN CHEMICAL SOCIETY and is on military furlough from his position as research chemist with the Agfa Ansco Division, General Aniline & Film Corp. At present he is on active duty with the Chemical Warfare Service, Edgewood Arsenal, Md.

War Department Studies Indictment of Chemical Firms

THE possibility that prosecution of some 21 chemical companies and 65 of their officials, indicted for alleged violation of the antitrust laws in production of acids, may be postponed for the duration is indicated by the fact that the War Department is studying the possible effect upon war production of the government proceeding at this time. There was no advance information obtainable on the probable attitude the department would take but it was believed that, if its studies showed that trial of the cases would interfere with production of war materials by the companies, it would request Attorney General Biddle to postpone further action for the duration.

There are several precedents for such action, the latest being in the case of the antitrust action of the Department of Justice against Allied Chemical & Dye Corp. and seven other dyestuffs producers. There is a general understanding between the Department of Justice and the War Department that, if the latter regards any action against a firm under the antitrust laws as likely to delay production of war materials, further proceedings under the indictments are to be held in abeyance. A number of the firms indicted are engaged to a very large extent in producing chemicals for the war program.

John M. Lupton, formerly advertising manager of the Robins Conveying Belt Co., Passaic, N. J., has been appointed advertising manager of the Acheson Colloids Corp., Port Huron, Mich.

Beyond the Flyleaf

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long-needed application of quantitative microanalysis in inorganic fields, as did Pregl's pioneer work in organic microanalysis.

C. W. MASON

Soils and Fertilizers. *Firman E. Bear.* 3rd ed. 374 pages, 58 figures, 165 tables. John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y., 1942. Price, $3.50.

THIS is a third edition of the author's well-known "Soil Management". Because of the increasing importance of lime and fertilizers as aids in the maintenance of the productivity of soils the change in title was made. The book is intended primarily for use in the first course in soils in agricultural colleges. It will also be useful to persons, other than college students, who may be interested in obtaining an elementary discussion of the principles of soils and fertilizers.

The illustrations and tables are well chosen and presented clearly and concisely. A list of pertinent references is given at the end of each chapter. The volume is well written and is an excellent presentation of the elements of soils and fertilizers.

H. R. KRAYBILL

Handbook of Scientific & Technical Societies and Institutions of the United States and Canada. Bulletin No. 106. *Callie Hull* and *Mildred Paddock* (U. S. Section), *S. J. Cook* and *P. A. Howard* (Canadian Section). 4th ed. 389 pages. National Research Council, National Academy of Sciences, Washington, D. C., January, 1942. Price, $4.00.

Volumetric Analysis, Volume I. *I. M. Kolthoff* and *V. A. Stenger.* xv + 309 pages. Interscience Publishers, Inc., 215 Fourth Ave., New York, N. Y., 1942. Price, $4.50.

THE present volume represents a revision of the American edition of this well-known text which appeared in 1928. Although the general character of the book, that of theoretical treatment, remains unchanged, it has undergone a thorough revision and considerable new material has been added. The chapter on Stability of Solutions has been transferred to the forthcoming revision of Volume II. The section on oxidation-reduction indicators has been greatly enlarged and improved, and contains a selected list of indicators with oxidation potentials covering the range of 0.24 to 1.30 volts. The treatment of reaction velocity has been amplified by the inclusion of chain reaction mechanisms. An important addition to the chapter on Adsorption and Coprecipitation Phenomena comprises a detailed consideration of errors caused by mixed crystal formation. The chapters on Volumetric Methods of Organic Analysis and Methods for the Determination of the Equivalence Point have been revised with new data. The latter chapter now contains a discussion of amperometric (polarimetric) titrations. The present edition has been improved in appearance and continuity by the use of smaller type for certain paragraphs dealing with more detailed data and discussion. In its revised form this text should enjoy increased use and reputation.

W. W. RUSSELL

Du Pont—One Hundred and Forty Years. *William S. Dutton.* 396 pages. Charles Scribner's Sons, New York, N. Y., 1942. Price, $3.00.

THIS", says the foreword, "is a story of men and goods, of peace and war, of vision and venture." It is also the story of the growth of a great country and of traditions which are threatened in today's war.

As a saga of the du Pont family, starting in France years before Eleuthère Irenée du Pont de Nemours, refugee from a French dictatorship, established a gunpowder factory near Wilmington, Del., in 1802, the book is an engrossing novel.

As a biography of business in America, it is an answer to critics of capitalism and free enterprise. The development of du Pont, in itself an American tradition, points the corresponding expansion of business in the United States from pioneering single factories to well-backed organizations offering limitless opportunities for new blood and new ideas.

As a history of industrial development "Du Pont—One Hundred and Forty Years" is a convincing defense of research and venture. The book is more than a history of one organization; it is a timely description of the "American way of life".

June Journal of Physical Chemistry

THE *Journal of Physical Chemistry* for June contains the following papers, as well as reviews of new books:

RALPH W. LAWRENCE AND JAMES H. WALTON. Effect of Inhibitors on Rate of Oxidation of Copper by Oxygen in Phosphoric Acid Solutions.

I. M. KOLTHOFF AND F. T. EGGERTSEN. Studies on Aging and Coprecipitation. XXXVI. Mixed-Crystal Formation of Lead Molybdate with Colloidal and Flocculated Lead Chromate.

TERRELL L. HILL. Theory of the Isoelectric Point. III.

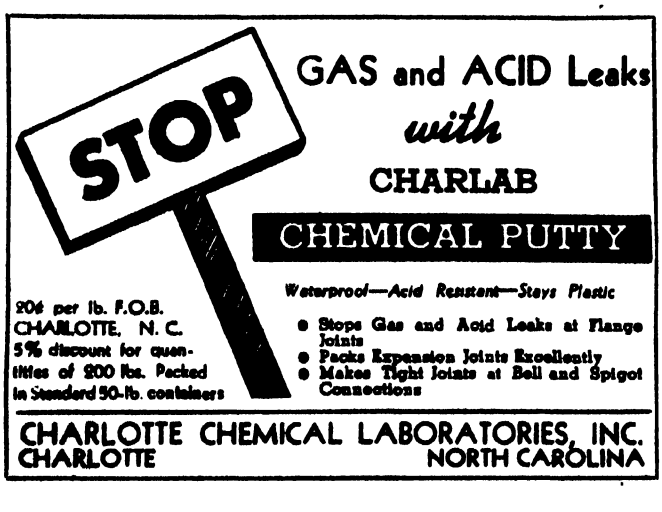
LAWRENCE J. HEIDT. Photosensitive Complexes in Photolysis of Uranyl Oxalate and Their Dissociation Constants.

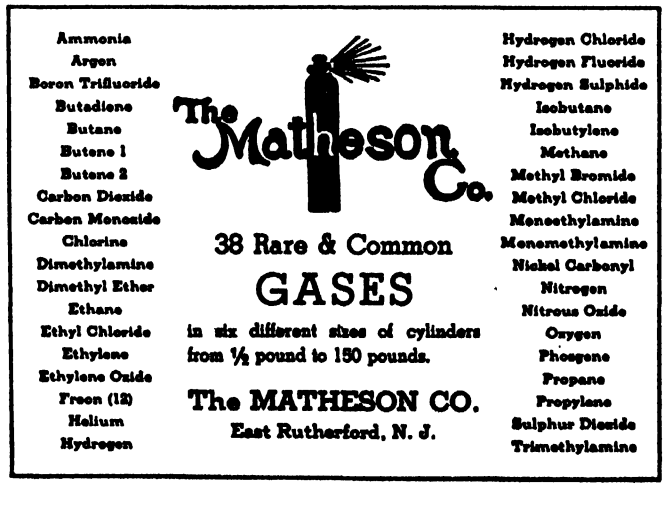
PAUL FUGASSI AND EARL WARRICK. Empirical Correlation of Activation Energies of Gaseous Unimolecular Reactions with Vibrational Frequencies.

J. R. KATZ AND J. SEIBERLICH. Influence of Lyotropic Substances on Specific Rotation of β-Levoglucosan.

J. SHERMAN AND R. B. EWELL. A Six-Place Table of the Einstein Functions.

CONTINUED ON PAGE 928





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Petroleum Ether Insoluble	7
Ash	0.01%
Viscosity—60 percent in toluene (CTS)	20
Density (at $\frac{25°C.}{25°C.}$ against water)	1.0740



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CONTINUED FROM PAGE 926

FREDERICK D. HAFFNER, GARY A. PICCIONE, AND CHARLES ROSENBLUM. Conductances of Solutions of Several Alkyl Sulfates and Sulfosuccinates.

J. L. HENDERSON AND H. A. YOUNG. Some Aspects of the Rate of Reaction of Oleic Acid with Oxygen.

J. P. HOLLIHAN AND DAVID R. BRIGGS. Viscometric Estimation of Particle Dimensions. I. The System Stearic Acid–Carbon Tetrachloride.

H. H. ROWLEY AND W. B. INNES. Relationships between Spreading Pressure, Adsorption, and Wetting.

ERNST A. HAUSER AND MARTIN R. CINES. Sensitization and Surface Charge of Lyophilic Colloids.

S. RUBEN, A. W. FRENKEL, AND M. D. KAMEN. Some Experiments on Chlorophyll and Photosynthesis Using Radioactive Tracers.

MARTIN K. BARNETT. The Temperature Concept.

J. J. BIKERMAN. Electrokinetic Equations for Gels and Absolute Magnitude of Electrokinetic Potentials.

F. H. MACDOUGALL AND MARTIN ALLEN. Solubility of Silver Acetate in Aqueous Solutions of Some Other Acetates. Formation of Diacetato-Argentate Ion.

F. H. MACDOUGALL. Solubility of Silver Acetate in Aqueous Solutions of Silver Nitrate and of Silver Perchlorate.

M. A. BREDIG. Isomorphism and Allotropy in Compounds of the Type A_2XO_4.

WILFRIED HELLER AND GERMAINE QUIMFE. On Reversible Aggregations of Colloidal Particles. II. Isothermal and Reversible Change of Absorption in Thixotropic Iron Oxide Sols.

ROLF LANDSHOFF. Scattering of Light by an Aggregate of Small Dielectric Particles.

June Issue of Chemical Reviews

CONTENTS of *Chemical Reviews* for June include the following papers presented at the Symposium on Physicochemical Methods in Protein Chemistry:

D. A. MACINNES. Introduction to the Symposium.

LEWIS G. LONGSWORTH. Recent Advances in the Study of Proteins by Electrophoresis.

E. G. PICKELS. The Ultracentrifuge. Practical Aspects of Ultracentrifugal Analysis of Proteins.

HANS NEURATH. Investigation of Proteins by Diffusion Measurements.

R. KEITH CANNAN. The Acid-Base Titration of Proteins.

ROGER M. HERRIOTT. Solubility Methods in the Study of Proteins.

STANFORD MOORE, WILLIAM H. STEIN, AND MAX BERGMANN. Protein Constituent Analysis by the Solubility Method.

J. L. ONCLEY. Investigation of Proteins by Dielectric Measurements.

The Composition of the Depot Fats of Aquatic Animals. Special Report No. 51. *J. A. Lovern.* 72 pages. Department of Scientific and Industrial Research, 1942. For sale by British Information Services, 30 Rockefeller Plaza, New York, N. Y. Price, 45 cents.

Collateral Readings in Inorganic Chemistry. Edited by *L. A. Goldblatt.* Second Series. 198 pages. D. Appleton-Century Co., 35 West 32nd St., New York, N. Y., 1942. Price, $1.40.

Refractive Index Bulletin

A SPECIAL bulletin on the determination of the refractive index of transparent and translucent solids has been issued by R. P. Cargille, 118 Liberty St., New York, N. Y. The publication covers the general principles, a review of the materials to which microscopical determination of refractive index can be applied, three methods of judging the relative index of the specimen, the Emmons double variation method, and other sections pertaining to this technique. Occasion for the publication is the announcement for sale of Shillaber's certified index of refraction liquids, a set of 91 certified liquids for use in determining the refractive index of solids. The refraction range from 1.460 to 1.640 is covered by these liquids which increase in range by intervals of 0.002.

Series of Books on Science Proposed

L. B. FISCHER PUBLISHING CORP., 381 Fourth Ave., New York, N. Y., announces a new series of pocket-size books entitled "The Treasury of Science" and priced at $1.25, designed to serve the student and intelligent reader by dealing authoritatively with varied aspects of modern scientific knowledge. The selection of subjects and authors, as well as the approval of the texts, by a board of editors, which now includes Alvin Johnson, director of the New School for Social Research, Harlow Shapley of Harvard University, and Alfred E. Cohn of Rockefeller Institute, promise to establish this series as a major contribution to the educational forces in American life.

The books are not to be texts or to contain a great array of footnotes or references. They will be written by authoritative scholars, abreast of the level of knowledge, and will include as much of the history of the subjects as to make their contemporary position understandable.

Each of the books is to consist of some 200 pages of clear, readable type with adequate illustrations. The size of the books will be uniform, 4.25 × 6.75 inches.

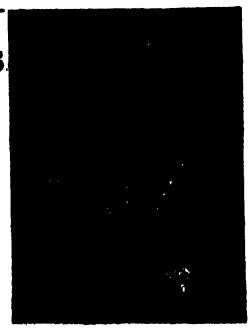
Our readers are invited to communicate with the L. B. Fischer Publishing Corp. with regard to manuscripts which might be suitable for publication in this series.

Merck Report Commended

THE Patriotic Service Cross of the United States Flag Association has been awarded to *The Merck Report* for the best flag cover design among house magazines. The winning cover on the July issue showed an original painting of the flag in full color against a photographic background which included symbols of science and industry. *The Merck Report*, which was established in 1891, is published in the interests of pharmacy and medicine and is edited by Douglas Wakefield

CONTINUED ON PAGE 930

Read AIR VELOCITIES
INSTANTLY DIRECTLY ACCURATELY
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"Alnor" VELOMETER



Ruggedly constructed—expertly calibrated—the "Alnor" indicates air velocities directly on a scale in feet per minute without timing or calculation. This Velometer will also indicate pressures in inches of water when provided with suitable jets. Accuracy within 3% of full scale readings guaranteed. Range includes 15 to 24,000 F.P.M.

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Sure we're bragging, but—when companies like duPont, Socony-Vacuum, Shell Oil and Warner Quinlan use our tachometer we've got a right to be proud. Portable—less than 2 lbs. in weight, Jones Hand Tachometers are ideal for speed and rating checks on revolving platens, generators, turbines and motors of all types.



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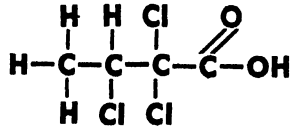
3 CHLORINATED ORGANIC CHEMICALS *developed by* PENN SALT RESEARCH

Hand in hand with manufacturing, Penn Salt carries on unremitting research... seeking new compounds, improvements in present products and better production methods.

Now from our Research Laboratories come three chlorinated organic chemicals with interesting properties and possibilities. One or more of them may aid you in replacing restricted essential materials, help you in developing new products, or suggest important changes in your present processes.

2, 2, 3, TRICHLOROBUTYRIC ACID*

$CH_3 \cdot CHCl \cdot CCl_2 \cdot COOH$



PHYSICAL PROPERTIES:

Appearance—white crystalline solid.
Molecular Weight—191.5.
Melting Point—60° C.
Boiling Point—236° C. with only slight decomposition at the boiling point.
Hygroscopic.
A slightly stronger acid than trichloroacetic acid.
Mild odor.
Soluble in water.
Soluble in organic solvents.

*Available as a white crystalline solid, in 60% aqueous solution, or in other strengths.

SUGGESTED USES:

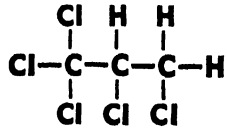
Its similarity to trichloroacetic acid suggests its application where a rather strong organic acid is needed. It appears to have possibilities as a tanning assistant. As an intermediate, it enters into the usual acid reactions forming salts and esters, and in addition it contains reactive halogens greatly increasing its value for the synthesis of further useful compounds.

A full series of aliphatic and other esters have been prepared in our Research Laboratories and are available in research quantities.

Many of these esters are characterized by a fine odor which suggests the possible use of the lower members of the series in soaps, perfumes, and other articles in which fragrance is desirable. The higher aliphatic and polyhydric alcohol esters such as the glycol esters, on the other hand, being practically without odor, but of high viscosity, are potential plasticizers. Formulators will be interested in the penetrant and solvent properties of many of these new materials. Leather, textiles, and paper are a few of the fields suggested for possible use.

1, 1, 1, 2, 3, PENTACHLOROPROPANE

$CCl_3 \cdot CHCl \cdot CH_2Cl$



PHYSICAL PROPERTIES:

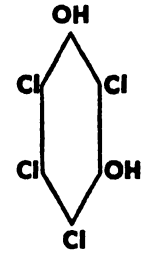
White crystalline solid.
Melting not lower than 178° C. for pure grade, 140° C. for technical grade.
Sublimes.
Has odor of camphor.
Soluble in organic solvents.
Insoluble in water.

SUGGESTED USES:

Its odor suggests its use as an insect repellent. Its compatibility with nitrocellulose and other plastics indicates possible plasticizer value. As an intermediate, it can be dehalogenated, dehydrohalogenated, and enter into other organic halide reactions, producing additional interesting compounds.

TETRACHLORORESORCINOL

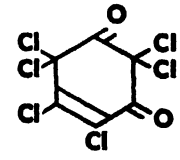
$C_6Cl_4(OH)_2$



PHYSICAL PROPERTIES:

White crystalline solid.
Melting point—141° C.
Faint pleasantly phenolic odor.
Soluble in organic liquids, hot water or dilute alkali—sparingly soluble in cold water.

CHEMICALLY, it is a mild reducing agent, and with chlorine yields* hexachlorocyclohexene-1-dione, 3-5, a quinone of interesting possibilities:



*Beilstein, Vol. VI page 820

SUGGESTED USES:

Condensation of this resorcinol for the preparation of eosin-type derivatives should lead to a series of compounds of possible dyestuff interest. Its antiseptic use is indicated as of probable practical value. In these days of need for phenolics, this compound will probably receive careful evaluation as to uses.

We shall be glad to send samples for investigation and to cooperate with you in working out applications. Probable prices of commercial quantities, when available, supplied on request. Write Dept. CEN.



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Beyond the Flyleaf

CONTINUED FROM PAGE 928

Coutlee. It has a circulation of 75,000 copies and is distributed as part of the professional service program of Merck & Co., Inc., Rahway, N. J.

Bibliography Issued on War Production

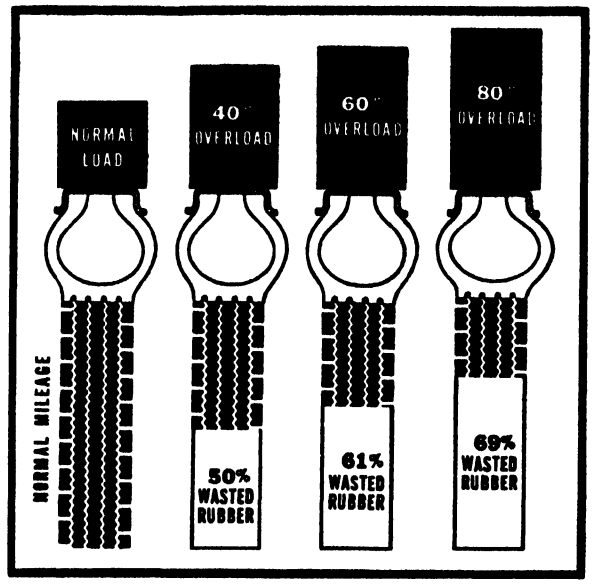
A BIBLIOGRAPHY on war production has been issued by the War Production Board. Prepared by the Legislative Reference Service, Library of Congress, the pamphlet, "Selected Documentation of the Economics of War", cites authoritative books, articles, and other materials for writers, students, public speakers, research workers, and others desiring to appraise the Nation's production effort. The four major parts are The Economics of War, Mobilization of Resources, Fiscal Policy and Consumption Control, and Economic Warfare. Copies are available from the Division of Information, War Production Board, Washington, D. C.

Fire Protection

THE first issue of *High-Pressure*, a new house magazine published by Walter Kidde & Co., Inc., New York, N. Y., has appeared as a successor to the company's 15-year-old paper *Lux-Rich Reports*. *High-Pressure*, an 8-page publication, is a profusely illustrated review of recent developments in fire protection and in the handling of compressed gases.

Mineral Trade Notes Suspended

TO AVOID circulation of information that might be of aid to the enemy, the U. S. Bureau of Mines has suspended publication of *Mineral Trade Notes* for the duration of the war.



Saving the Rubber in Tires

The great waste of rubber which occurs when a truck or bus is loaded beyond the rated weight-carrying capacity of the tires on which it rides is illustrated in this chart, one of many in a pocket-size booklet recently published by The Firestone Tire & Rubber Co., Akron, Ohio. The booklet, "How to Get More Mileage from Your Tires and How to Keep Your Trucks Operating More Economically", is available free of charge on request to the company. Besides the importance of correct tire inflation, the publication covers correct load distribution, the stage at which a tire should be removed for treading, information on the treating of minor cuts, and many other subjects.

Who Makes It?

SOURCES for the following chemicals are wanted by the National Registry of Rare Chemicals, Armour Research Foundation, 33rd, Federal, and Dearborn Streets, Chicago, Ill.:

Tricaprylin (glyceryl tricaprylate); magnesium sulfide; cathepsin; bromelin (pineapple); dysprosium; lutecium; terbium; divinylbenzene; vinyl methyl ether; and vinyl carbasol.

Welding Method Makes All-Magnesium Planes Possible

A WELDING method for magnesium which will make possible all-magnesium airplanes has been perfected by Northrop Aircraft, Inc. The process, called the "heliarc", makes possible the arc welding of magnesium sheets, extrusions, and tubings into structures simpler, lighter, and stiffer than possible in conventional duralumin construction.

Development of the method was revealed by Thomas E. Piper, process engineer of the company, in an address to the American Welding Society June 18. In addition to Mr. Piper, the men chiefly responsible for the advancement are V. H. Pavlecka, chief of research, and Russell Meredith, welding engineer. Full details are being made available to the entire American aircraft industry by Northrop.

Mr. Piper declined to discuss possible gains in speed and range through use of magnesium construction. He said, however, that by doing away with the rivets that go into conventional planes, the process makes available to aircraft manufacturers the same savings in time and cost which have been experienced in welded ship construction.

E. C. Williams, director of General Mills Inc., and vice president in charge of research, has been elected a director of the United States Industrial Alcohol Co.

EDWAL Special Chemicals

Phenyl Mercuric Salts
Semicarbazide HCl
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NOW READY! . . . Edwal's New Catalog No. 36N describing many new chemicals with prices. The above are only a few of the many special items listed. Write for the catalog and for quotations on your requirements.

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Specify Florite Desiccant

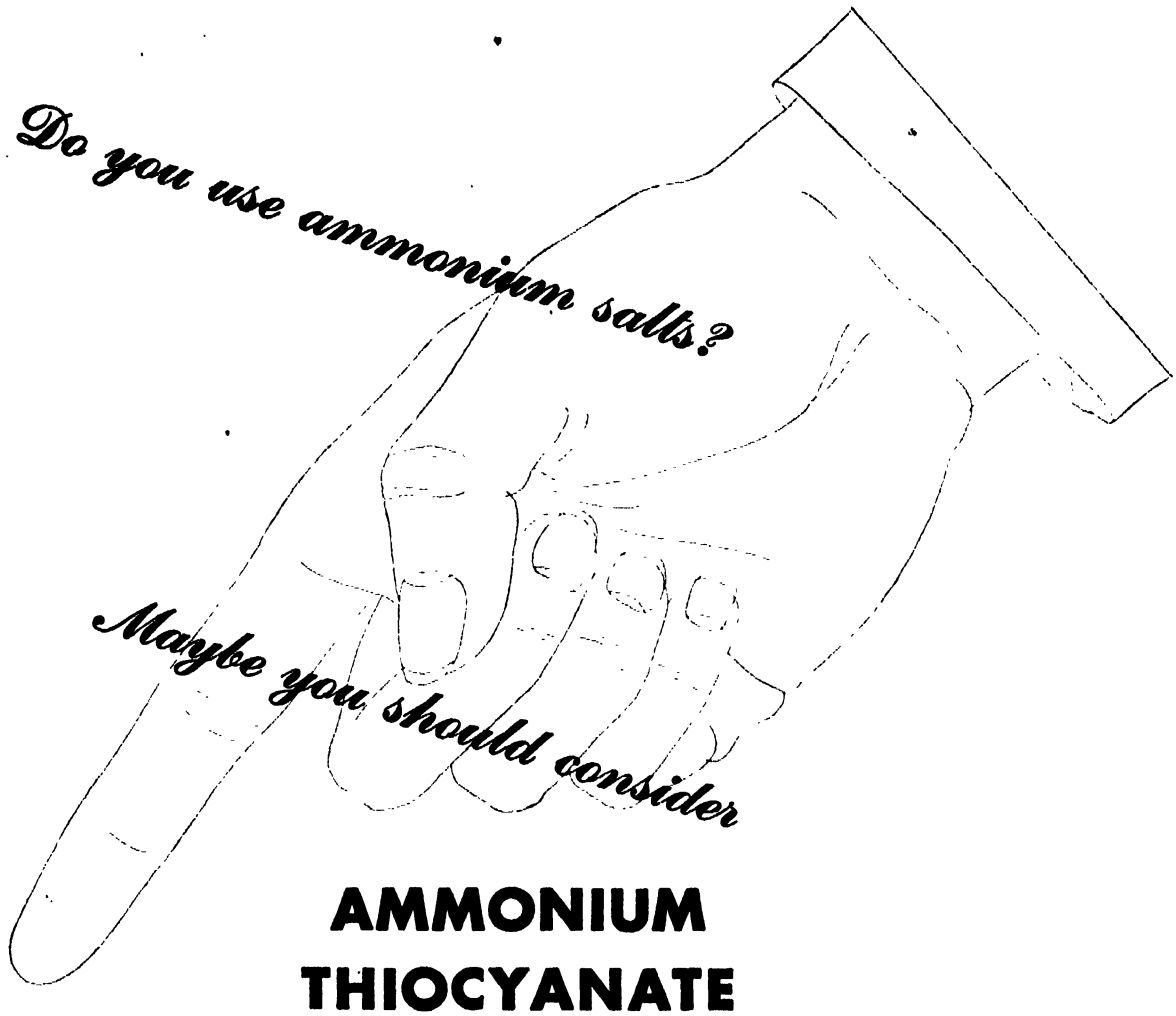


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It selectively adsorbs 4 to 20% of its weight in water, depending upon the particular application, and is regenerated by heating to 300-350°F. FLORITE is hard, stable, non-corrosive, non-poisonous, and is available in a variety of particle size classifications.

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(AMMONIUM SULFOCYANIDE)

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If you are now using an ammonium salt in your processes . . . such as chloride, acetate, oxalate, carbonate or nitrate . . . perhaps you will discover valuable modifications by substituting ammonium thiocyanate.

It is worth testing in your laboratory.

Ammonium thiocyanate has a behavior similar to other ammonium salts, but it also brings you all the variations of the thiocyanate group.

This group is remarkably stable and, in many reactions, resembles the halogens.

Koppers has recently placed in operation a large commercial plant for the production of ammonium thiocyanate crystals and can now offer this chemical in quantity at substantial savings over former costs. Koppers can supply ammonium thiocyanate in crystal form having a minimum purity of 95%.

Test samples, quotations and other information sent on request.

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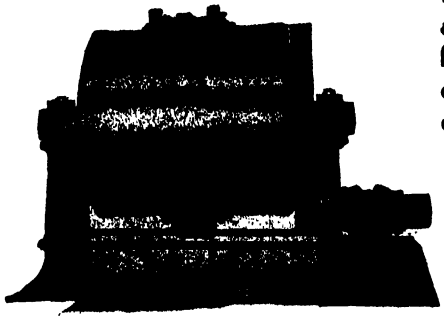
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CONTINUED ON PAGE 934

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[1] Junior member.

Stuart R. Zimmerley has been appointed regional engineer of the regional office of the U. S. Bureau of Mines at Salt Lake City, Utah. He first became connected with the bureau in 1925.

IN THE BOMBER IT'S

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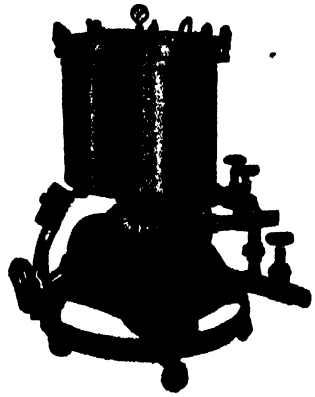
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ISOMERIZATION OF PURE HYDROCARBONS

By

Gustav Egloff, George Hulla, and V. I. Komarewsky

Universal Oil Products Company, Research Laboratories and Illinois Institute of Technology

American Chemical Society Monograph No. 88

To all petroleum chemists, engineers and research workers in fields involving organic chemistry this long-awaited treatise will prove to be one of the most valuable scientific works published in 1942. It covers in the greatest detail the results of thousands of experiments in isomerization — the phenomenon responsible for the present high-octane motor fuels and other miracles of petroleum research. Nearly half the volume consists of exhaustive tabulations of reaction data which can be found nowhere else in chemical literature, and which will save untold hours of time on the part of those using them. The text is profusely illustrated with structural diagrams, and the entire book is characterized by the thoroughness and critical exactness of its authors.

CONTENTS

PREFACE, INTRODUCTION.

CHAPTER I. ALKANES.
Methods Used in the Study of Isomerization; Isomerization of Alkanes; Mechanism; Isomerizations; Aluminum Halides as Catalysts; Butanes; Pentanes; Hexanes; Heptanes; Octanes; Other Catalysts; *n*-Butane; *n*-Pentane; Hexanes; Heptanes; *n*-Octane; *n*-Decane; Conclusions.

CHAPTER II. ALKENES, ALKADIENES, AND ALKAPOLYENES.
Isomerization of Alkenes; Mechanism; Isomerizations; Propene; Butenes; Pentenes; Hexenes; Heptenes; Octenes; Decenes; Hexadecene; Conclusions; Alkadienes; Allenic Alkadienes; Conclusions; Non-Allenic Alkadienes; Conclusions; Alkapolyenes; Isomerizations; Conclusions.

CHAPTER III. ALKYNES, ALKADIYNES, AND ALKAPOLYYNES.
Alkynes; Isomerizations; Alkadiynes and Alkapolyynes; Isomerizations; Conclusions.

CHAPTER IV. CYCLANES, SPIRANES, BICYCLANES, AND POLYCYCLANES.
Cyclanes and Cyclanes with Saturated Side-Chains; Mechanism; Isomerizations; Cyclopropanes; Cyclobutanes; Cyclopentanes; Cyclohexanes; Cycloheptane and Larger Cyclanes; Conclusions; Cyclanes with Unsaturated Side-Chains; Mechanism; Isomerizations; Cyclopropanes; Cyclobutanes; Cyclopentanes; Cyclohexanes; Conclusions; Spiranes; Isomerizations; Bicyclanes and Bicyclanes with Saturated Side-Chains; Mechanism; Isomerizations; Bicycloheptanes; Bicyclooctanes; Bicyclononanes; Bicyclodecanes; Conclusions; Bicyclanes with Unsaturated Side-Chains; Isomerizations; Bicyclohexanes; Bicycloheptanes; Conclusions; Tricyclanes; Isomerizations; Conclusions; Pentacyclanes.

CHAPTER V. CYCLENES, BICYCLENES, AND POLYCYCLENES.
Cyclenes and Cyclenes with Saturated Side-Chains; Isomerizations; Conclusions; Cyclenes with Unsaturated Side-Chains; Isomerizations; Conclusions; Cyclodienes with Saturated Side-Chains; Isomerizations; Cyclodienes with Unsaturated Side-Chains; Isomerizations; Conclusions; Bicyclenes and Bicyclenes with Saturated Side-Chains; Isomerizations; Conclusions; Bicyclenes with Unsaturated Side-Chains; Isomerizations; Conclusions; Bicyclodienes with Saturated Side-Chains; Isomerizations; Tricyclenes and Tricyclenes with Saturated Side-Chains; Isomerizations; Conclusions; Tricyclenes with Unsaturated Side-Chains; Isomerizations; Tetracyclenes; Isomerizations; Pentacyclenes; Isomerizations.

CHAPTER VI. AROMATIC HYDROCARBONS.
Alkyl Benzenes; Mechanism; Isomerizations; Conclusions; Alkenyl Benzenes; Mechanism; Isomerizations; Conclusions; Alkadienyl Benzenes; Allenic Alkadienyl Benzenes; Non-Allenic Alkadienyl Benzenes; Conclusions; Alkapolyenyl Benzenes; Isomerizations; Conclusions; Alkynyl Benzenes; Isomerizations; Conclusions; Condensed Aromatics; Indanes and Indenes; Fluorenes; Naphthalenes; Anthracenes; Phenanthrenes; Naphthacenes; Conclusions; Aromatic-Cyclane Hydrocarbons; Isomerizations; Conclusions; Aromatic-Cyclene Hydrocarbons; Isomerizations; Conclusions; Aromatic-Cyclodiene Hydrocarbons; Isomerizations; Conclusions.

SUMMARY — Tables of Isomerization Data of:
Alkanes; Alkenes; Allenic Alkadienes; Non-Allenic Alkadienes; Alkapolyenes; Alkynes, Alkadiynes, and Alkapolyynes; Cyclanes and Cyclanes with Saturated Side-Chains; Cyclanes with Unsaturated Side-Chains; Spiranes; Bicyclanes and Bicyclanes with Saturated Side-Chains; Bicyclanes with Unsaturated Side-Chains; Tricyclanes; Cyclenes and Cyclenes with Saturated Side-Chains; Cyclenes with Unsaturated Side-Chains; Cyclodienes with Saturated Side-Chains; Cyclodienes with Unsaturated Side-Chains; Bicyclenes and Bicyclenes with Saturated Side-Chains; Bicyclenes with Unsaturated Side-Chains; Bicyclodienes with Saturated Side-Chains; Tricyclenes and Tricyclenes with Saturated Side-Chains; Tricyclenes with Unsaturated Side-Chains; Tetracyclenes; Pentacyclenes; Benzenes with Saturated Side-Chains; Alkenyl Benzenes; Alkadienyl Benzenes; Alkapolyenyl Benzenes; Alkynyl Benzenes; Condensed Aromatics (Indanes, Indenes, Fluorenes, Naphthalenes, Anthracenes, Phenanthrenes, Naphthacenes); Aromatic-Cyclane Hydrocarbons; Aromatic-Cyclene Hydrocarbons; Aromatic-Cyclodiene Hydrocarbons; Possibilities of Hydrocarbon Isomerization as Illustrated by the Known Examples to Date.

APPENDIX I; APPENDIX II; APPENDIX III; BIBLIOGRAPHY; AUTHOR INDEX; SUBJECT INDEX.

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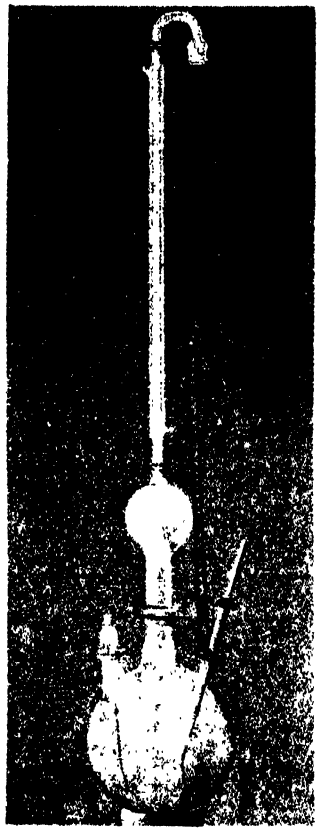
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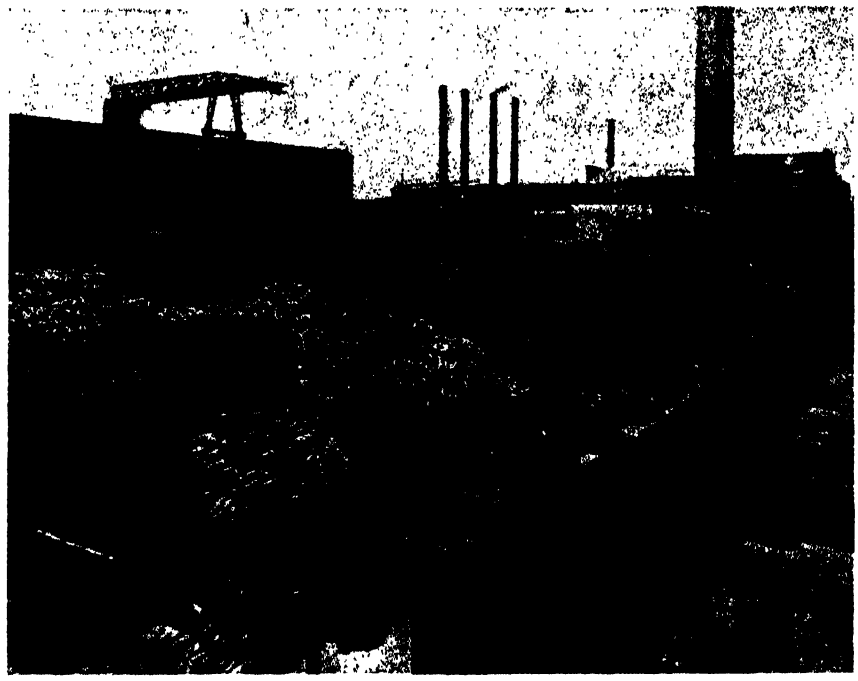
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Rubber for Reclaim

Old tires and inner tubes by the thousands, boots, rubber overshoes, and almost any articles containing rubber are used in making reclaim rubber. Here is a view of the piles of scrap rubber at the Reclaim Division of the B. F. Goodrich Co., Akron, Ohio.

The L. S. O. G. Exchange

Edited by A. A. Ashdown, Ed. F. Degering, J. E. Hawkins, and S. L. Redman

Send items to Ed. F. Degering, Department of Chemistry, Purdue University, Lafayette, Ind.

THE Southeastern Texas Section comprises 17 counties, exceeding in area the State of Maryland. Fortunately for the unity of effort, the membership is not uniformly distributed over this region. About 60 per cent of the members live near Houston, 20 per cent near Port Arthur, and the remainder are about equally divided between Texas City and Freeport. A majority of the members are engaged in the production or refining of petroleum.

The primary concern of the local section is the promotion of fellowship among chemists in this area, with the secondary objective the furtherance of recognition by the public of chemists' work. Fellowship is fostered by a dinner preceding each lecture and by at least one purely social meeting a year, by sending out a News Letter carrying accounts of some of the personal and professional activities of members, and by encouraging participation in the work of the section through several active committees. Qualified nonmember chemists are invited to become associate members, and some of these subsequently become members of the AMERICAN CHEMICAL SOCIETY.

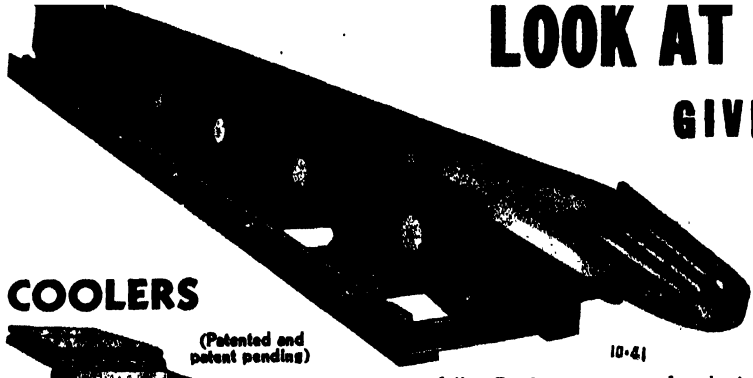
To promote the profession of chemistry, the public is invited through newspaper announcements to hear the outstanding speakers made available by the touring service of the national organization and some additional well-qualified scientists secured by the local program committee. Information on the qualifications of the members is available to the local Civilian Defense Organization. The services of the professional committee are at the disposal of prospective employers and employees.—GEO. R. GRAY, *Southeast Texas Section.*

Western Connecticut Section Elects Officers

THE Western Connecticut Section at its annual meeting elected W. H. Cope *Chairman*, R. J. King *Vice Chairman*, W. C. Moore *Secretary*, T. G. Rochow *Treasurer*, and J. L. Christie, J. A. S. Hammond, and J. T. Thurston *Directors*. Subsequently Mr. Christie resigned, and H. V. Allison was appointed by the Board of Directors of the section to fill the vacancy. These men took office July 1 and will serve for the 1942–43 season. Councilors, elected for the calendar year 1943, are H. L. Fisher, E. C. Sterling, and R. C. Swain.

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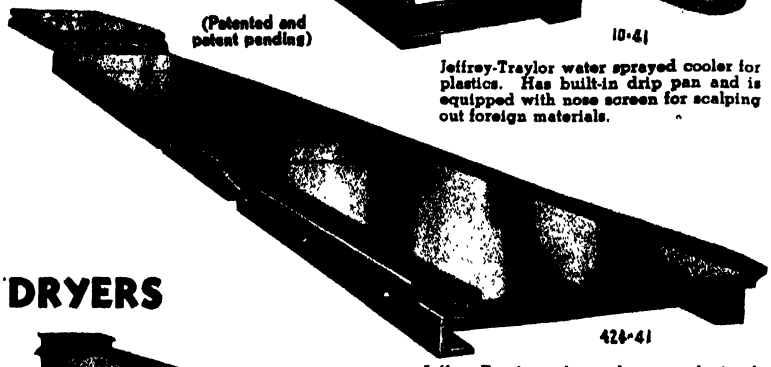


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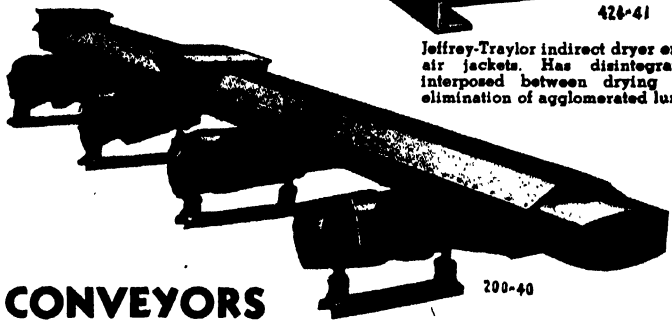
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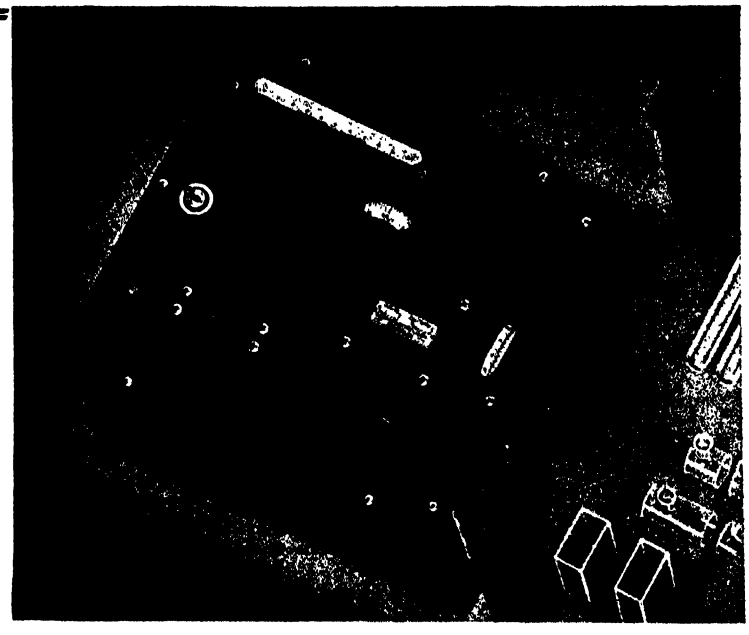
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Process Cuts Wastage of Mercury in Fluorescent Lamps

ENGINEERS of Hygrade Sylvania Corp., Salem, Mass., have developed and patented a method to cut by approximately 50 per cent the amount of mercury used in the manufacture of fluorescent lamps. The new process eliminates the wastage resulting from previous methods. The exact amount of mercury needed for the lamp, down to the last milligram, is enclosed in a tiny metal tube affixed to a support lead of one cathode. When the current is first turned on in the lamp, during the exhaust process, the heat expands the mercury and the tubing explodes, releasing the free mercury.

Electronic Control Guards Furnace Atmosphere

TO INCREASE production and safeguard quality of steels treated in atmosphere furnaces, a special electronic tube, developed by Westinghouse electronic research engineers, provides a continuous check on the purity of the hydrogen gas flowing over the metal. Such scientific control is especially important where the dew point of the treating gas must be maintained in the critical region of −40° to −70° C., or for precise furnace conditions such as required for bright annealing, and for chemical processes, using purified dry hydrogen or similar controlled gases.



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To give the metal proper characteristics, steel is often heated in an atmosphere of highly purified hydrogen, practically free of moisture and oxygen. Ordinarily, to measure moisture in the gas where dew points are less than 0° C., a cooled and polished metal plate is inserted in the gas stream and the temperature noted when condensation of moisture first occurs. Below −40° C. this method becomes largely guess work, and even skilled testers disagree on values of the same gas. The electronic method ensures reliable and accurate determination of moisture and oxygen content in hydrogen, or dissociated ammonia, gas.

New Butadiene Process Reported

A NEW process for making butadiene from grain has been reported by H. F. Willkie, vice president of Joseph E. Seagram & Sons, Inc., Louisville, Ky., which produces about 8 pounds of rubber per bushel, as compared with 6 pounds by other methods. The company has prepared plans for a plant to process 55,000 bushels of grain a day.

W. W. Deschner, formerly in charge of the Department of Chemical Engineering, University of Kansas, has become the new head of the division of chemical design, engineering, and construction at J. F. Pritchard & Co., Kansas City, Mo. The division has been greatly enlarged recently to meet growing requirements of the new petrochemical industry.

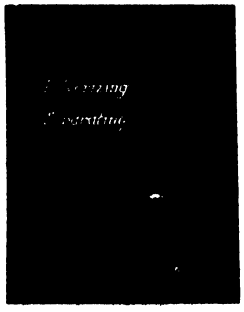


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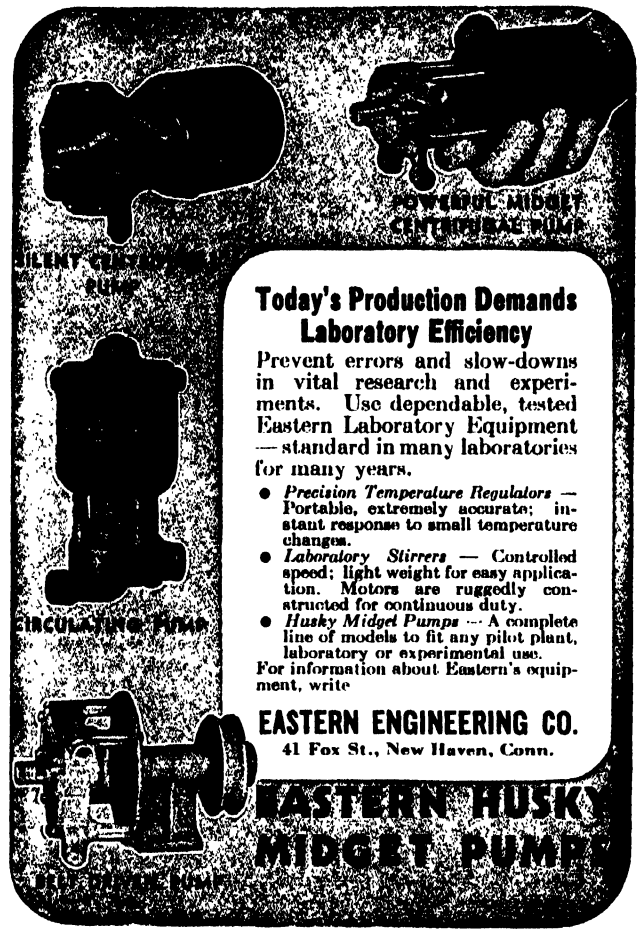
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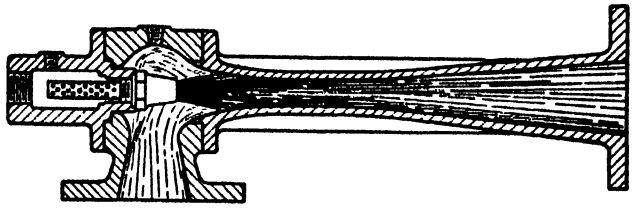
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Devoe & Raynolds Co.	301,768	423,036	..	..
Firestone Tire & Rubber Co.	4,789,165	5,193,024	1.75	1.97
Mathieson Alkali Co.	997,344	556,092	1.10	0.57

The **Celanese Corp. of America** on June 23 filed with the SEC a registration statement covering a new issue of $35,000,000 of 3.5 per cent debentures due July 1, 1962. The purpose of the financing is to refund and consolidate the company's outstanding funded debt, including the retirement of approximately $24,700,000 outstanding 3 per cent debentures and $3,000,000 bank loans and provide additional funds for general corporate purposes. The debentures will constitute the company's only funded obligations.

The **Firestone Tire & Rubber Co.** reports that provision for excess profits taxes for the six months ended April 30 was 8.5 times greater than in the like period in 1941. Sales volume was substantially greater than in 1941, which was at a record level for the fiscal year ended October 31, 1941.

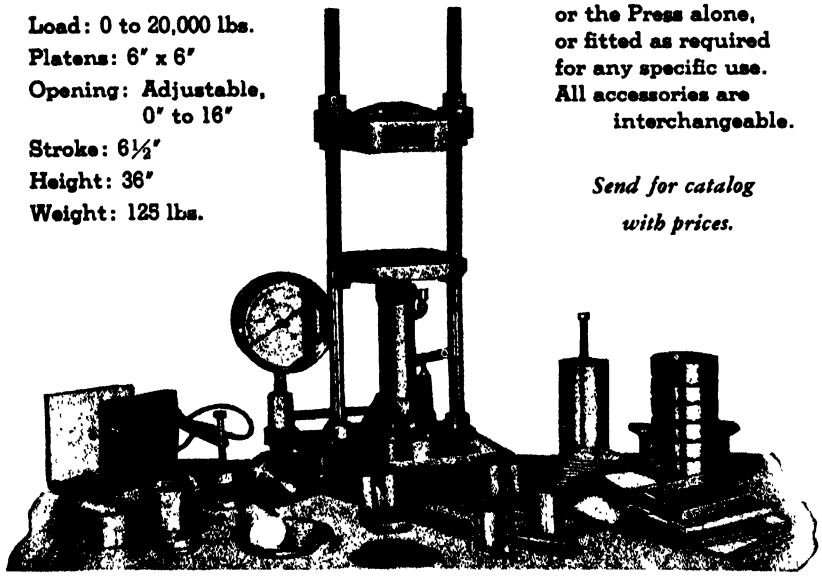
Charles Pfizer & Co., Inc., on June 10 filed with the SEC registration statement covering an offering of 240,000 $1.00 par common shares. The names of 66 firms which will underwrite the offering have been filed in an amendment.

The **U. S. Industrial Alcohol Co.** and subsidiaries have reported a net profit of $1,996,077 for the year ended March 31, after deducting $1,950,000 for federal income taxes and $1,500,000 provision for contingencies. This is equal to $5.30 per share on common and compares with $836,305 or $2.14 a share in the preceding fiscal year. Because of loss of tankers the company has had difficulty in supplying its three East Coast plants with molasses and is consequently converting two plants and part of a third to the use of grain. Much of this alcohol is expected to be used in the rubber program.

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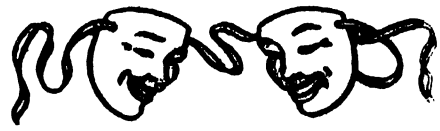
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With polar, Napierian, and Cartesian coordinates.

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For me fact-fumblers fidget
In the awesome presence of the Executive,
Knowing I am only the shadow of a fact.

I am a statistic,
Mangled by millions ministering to desire.
But when the marauders, merchant and martial alike,
Are laid end to end, I alone will remain—
I, the statistic.

Gerald J. Cox

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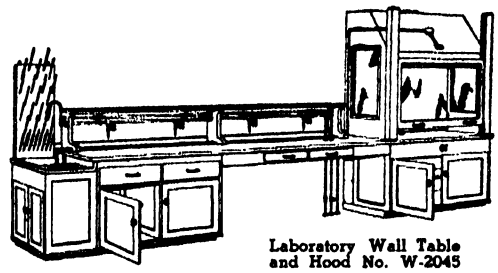


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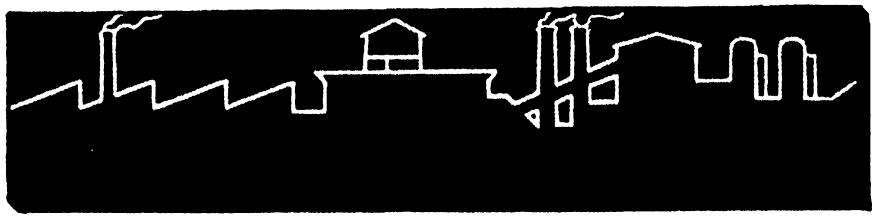
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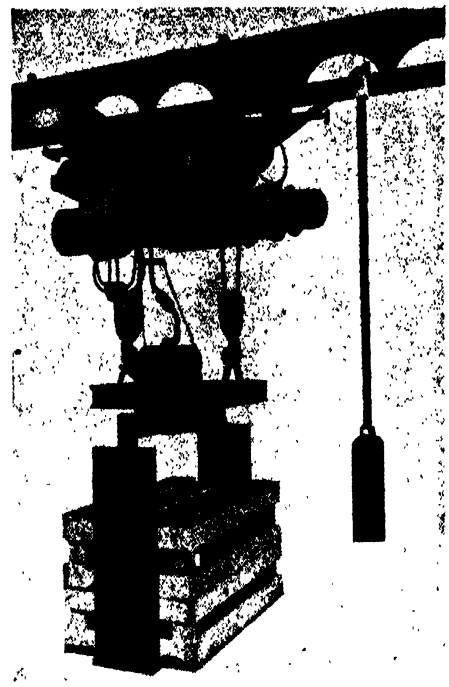
Aluminum Cleaner

When the automobile industry began gearing for the production of aircraft, it tried to cut down the time required to produce the units it was to build. One of these operations was the surface condition of aluminum prior to spot-welding.

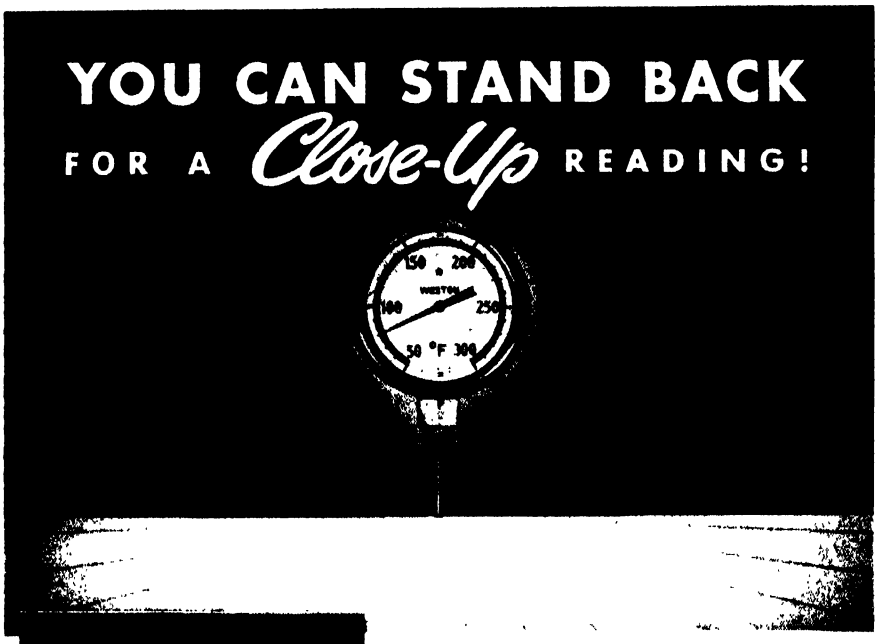
After several months of research the Nielco Laboratories, 19720 Florence Rd., Detroit, Mich., produced an alkali cleaner that reduced the time required to clean a sheet of aluminum to a perfect water-shed without building up an oxide coating.

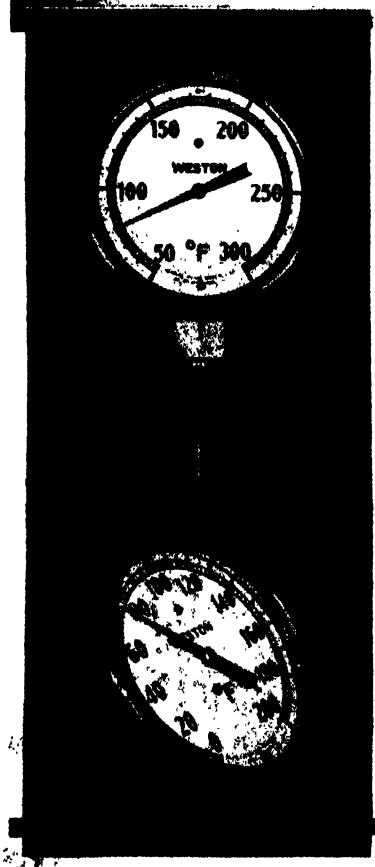
Crate Carrier

One of the newest developments of the Cleveland Tramrail Division of The Cleveland Crane & Engineering Co., Wickliffe, Ohio, is the motor-driven crate grab and carrier especially designed for handling crates and boxes in and out of storage, or from one elevation to another.



YOU CAN STAND BACK
FOR A *Close-Up* READING!





. . all-metal temperature gauges also provide the ruggedness . . the long-life accuracy . . essential in these busy days!

Every step . . . every minute . . . is vital in this battle against time. Which explains why WESTON all-metal Temperature Gauges have been so widely adopted throughout industry. Readily mounted at any angle desired, their large gauge-type dials can be accurately read from a distance. In addition, their simplified all-metal construction . . . without liquids or gases . . . provides unusual ruggedness and eliminates the common sources of thermometer troubles. They stay "on the job" . . . maintaining their high initial accuracies . . . *far longer!* Available in sizes and stem lengths for most needs. Accuracy guaranteed within 1% over entire scale. Literature sent on request. Weston Electrical Instrument Corporation, 660 Frelinghuysen Avenue, Newark, New Jersey.

WESTON
ALL-METAL
temperature Gauges

New Blackout Bulb

A new blackout bulb which can be kept burning for emergency lighting without the need for window shades or blinds has been approved by the War Department and is ready for use in war plants and government buildings, the Lamp Division of Westinghouse, Bloomfield, N. J., has announced. The bulb gives a faint glow of orange light sufficient to distinguish objects in a room but not enough to be visible from the air even though placed directly in line with an open window. Although the bulbs are available only on high priority ratings, the War Production Board may permit civilian use of the new blackout bulbs in sections of the country defined as blackout areas.

The blackout lamp is coated with an outer covering of black except for an orange-red opening through which a narrow beam of light passes. The downward direction of this beam prevents any direct rays of light from being seen by planes. Operated at 15 watts, each bulb will provide emergency lighting for an area of approximately 200 square feet.

Temporary Transparent Coating

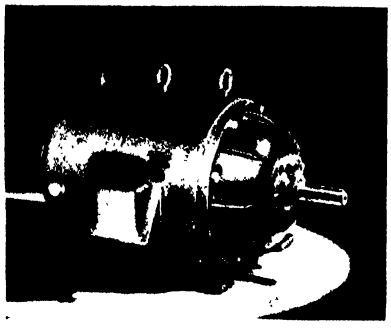
To reduce rejects caused by rust, surface scratches, shop wearing, grease, and dirt, a new protective coating for metal and ceramic surfaces is announced by Ault & Wiborg Corp., Cincinnati, Ohio. Known as Protektol, the material is completely transparent to permit visual inspection of the coated parts.

In application, the liquid is sprayed, brushed, dipped, or roller coated, then air-dried to leave a flexible glass-clear coating of from 0.001 to 0.0015 inch. One gallon, when sprayed to a thickness of 1 mil, will cover approximately 250 square feet of surface. Drying time at 200° F. is 6 to 8 minutes. The coating may be peeled or blown off with an air jet. After being removed, Protektol may be returned and

reduced to liquid form. This process is said to be simple and may be repeated again and again, lowering coating costs to a minimum.

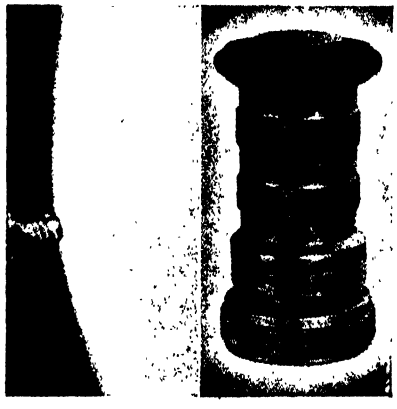
Motors for Magnesium Dust Locations

A NEW line of polyphase induction motors in sizes from 1 to 20 horsepower, NEMA frames 203 to 326 inclusive, suitable for use under magnesium dust conditions has been announced by the General Electric Co., Schenectady, N. Y. Labeled as suitable for Class II, Group E locations, the new line has been developed to meet a need brought about by the extensive use of magnesium and aluminum in war production. In many cases, motors are being subjected to these metals in the form of fine powder, as used in incendiary bombs and for other military purposes, or from castings during grinding or polishing operations. Since these dusts are extremely combustible, they present a hazard classified by the National Electrical Code as Class II, Group E, requiring special motors and control.



The motors are totally enclosed, with a nonventilated construction in the smaller ratings and a fan-cooled construction above 2 horsepower. Simple cast-iron end shields, stator frames, and fan housings make possible dust-tightness without complicating assembly or disassembly.

All-Spray Nozzle



TO MEET the demands for a variable all-spray nozzle, without a straight stream, a new water spray nozzle, the Alfco-spray, has been introduced by the American-LaFrance-Foamite Corp., Elmira, N. Y. It prevents possibility of a solid water stream being applied inadvertently on live electric circuits. The varying cones are excellent for extinguishing of heavy oil fires, and for general cooling purposes.



NATIONAL FOAM!

Wind is fire's best friend—and the worst enemy of most foams! But National Foam is exceptionally *wind-resistant.* It settles down over a fire in a tough smothering blanket of bubbles that *stick!*

The stabilizer responsible for this was developed in National's laboratories—and typifies the research facilities which National can bring to bear on *any* fire-hazard problem!

Yet this is only part of National's service. An experienced engineering staff is ready to study your fire-hazards . . . and design a built-in or portable system to meet them. Recommendations will be made without obligation to you. Write for Bulletin D-3.

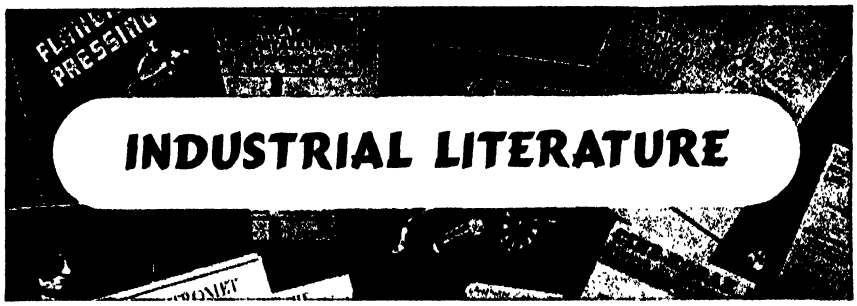
NATIONAL FOAM SYSTEM, INC.

Fire-Protection Specialists in the Chemical and Metallurgical Industries

PHILADELPHIA NEW YORK CHICAGO

★ ★ ★

"EVERY INGREDIENT OF NATIONAL IS AMERICAN"



Listed publications should be requested directly from the company concerned. Use business stationery, mention bulletin numbers, and refer to this journal. Publications will be sent free unless otherwise noted.

Acid Pumps. This 4-page bulletin describes an improved line of centrifugal acid pumps. All parts coming in contact with liquids are fabricated from Ceratherm, a new stoneware offering excellent heat-shock resistance as well as the corrosion-resistance of chemical stoneware. The bulletin gives characteristic performance curves for four different size pumps and specifications. *Bulletin 702 CEN.* United States Stoneware Co., Akron, Ohio.

Automatic Control. A 12-page bulletin gives information concerning the application of automatic control instruments in synthetic rubber processes. *Bulletin 103 CEN.* The Bristol Co., Sales Promotion Dept., Waterbury, Conn.

Automatic Control of Gas Pressure. A 12-page data folder discusses the application of telemetering to the measurement of gas distribution pressures. *Data Sheet 39 CEN.* The Bristol Co., Sales Promotion Dept., Waterbury, Conn.

Automatic Gas Saturation Control. A bulletin on systems of automatic control for regulating gas saturation in natural gas distribution systems contains sketches to show methods of use. *Data Bulletin 43 CEN.* The Bristol Co., Sales Promotion Dept., Waterbury, Conn.

Axiflo Fans. Although United States Navy requirements prevent the offering of these fans to industrial buyers, this bulletin is presented so that industrial engineers can become familiar with their engineering characteristics. The fans, intended primarily for heating, ventilating, and air-conditioning work, are available over a wide range of pressures from 1/2 to 60 inches. Operating characteristics and construction details are given ample illustration in this 8-page book. *Catalog 460 CEN.* B. F. Sturtevant Co., Hyde Park, Boston, Mass.

Carbon and Graphite Corrosion-Resistant Pipe, Tubes, and Fittings. In this 8-page booklet the authors have combined well chosen photographs with drawings in describing this line of fittings. Physical characteristics and a table of chemical resistance show the types of service for which this material may be used. In connection with the heat exchange units, sheets show comparative over-all heat transfer. Types of joints are illustrated and dimension tables round out the bulletin. *Catalog Section M-8800A CEN.* National Carbon Co., Inc., Cleveland, Ohio.

Chemical Proportioner. A concise data page describes the working characteristics of this chemical proportioner. Recent tests are said to give it an accuracy to within 2 per cent at all rates of flow of raw water into treating plants. These units are designed so that they may be located at any distance from the meter or control device. *Bulletin 310 CEN.* Graver Tank & Mfg. Co., Inc., East Chicago, Ind.

Corrective Chemical Feeding. In this 12-page booklet the authors have described a number of units for water treatment. The heart of the unit is an electromagnetic proportioner designed for accurate and automatic proportioning of chemicals needed for water purification. A table of sizes and capacities is included. *Corrective Chemical Feeding Booklet CEN.* American Water Softener Co., Lehigh Ave. and Fourth St., Philadelphia, Penna.

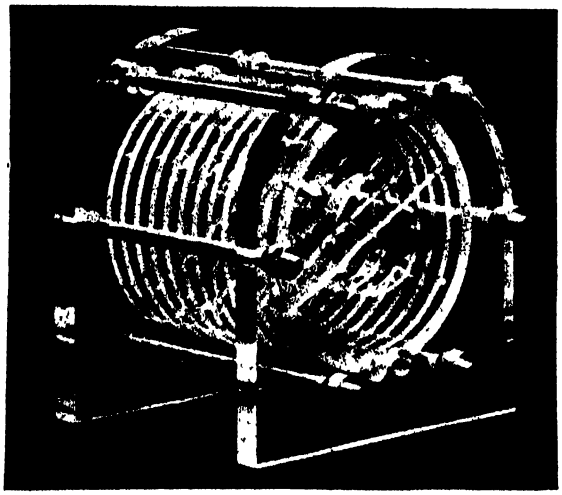
Electronic Control. This bulletin deals with the latest electronic control which automatically regulates feeding rate in accordance with different materials and varying conditions. Operators of pulverizing machines can learn from the bulletin, it is said, how to step up output from 20 to 35 per cent above usual operating capacity. *Automatic Control for Mechanical Feeders on Pulverizing Machines Bulletin CEN.* Max Mosher, 130 West 42nd St., New York, N. Y.

Fire Fighting. A three-color poster shows the correct method of using carbon dioxide, water, and foam and vaporizing liquid fire extinguishers and gives hazards for which each type is suited. *Fire Extinguishers, How to Use Them Poster CEN.* Walter Kidde & Co., 140 Cedar St., New York, N. Y.

Good Operating Practices. Under this title the manufacturer offers a series of suggestions, helpful for wartime conservation, on getting the most service out of packings, insulations, roofings, friction materials, and refractory cements. *Form PP-9A CEN.* Johns-Manville, 22 East 40th St., New York, N. Y.

Heat Dryers. This 8-page bulletin describes a dryer originally designed for handling coal, but now offered for use with similar granular materials. Material to be dried is delivered to a screen

CONTINUED ON PAGE 94



Laboratory Model — Made of DuPont Lucite

A NEW TOOL

"CHOCK FULL OF INFORMATION"

WEBCELL

CONTINUOUS DIALYSER

CONTINUOUS DIALYSIS is a comparatively rapid process and merits investigation for the

RECOVERY OF SOLUBLE SALTS

REMOVAL OF ACIDS

SEPARATION OF COLLOIDAL MATERIALS FROM COLLOIDAL DISPERSIONS

Now in use in Chemical, Food, Pharmaceutical, Research and University Laboratories

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WE ALSO BUILD LARGE PRODUCTION UNITS TO HANDLE YOUR REQUIREMENTS

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Send for descriptive pamphlet

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BROSITES MACHINE COMPANY, Inc.

Chemical and Process Machinery

50 CHURCH STREET, NEW YORK, N. Y.

EMPLOYMENT INFORMATION

RATES to be paid in advance. Standard setting 5c a word, minimum charge $2.00 each; include 8 words for box address. Exceptions see ⟶ Display, $10.00 per column inch. 2 inches maximum, larger units at regular display unit rates. No discounts or allowances.
SEND advertisements with remittance to INDUSTRIAL AND ENGINEERING CHEMISTRY, 332 West 42nd St., New York, N. Y., to reach there not later than 10:00 A.M. on the 10th and 25th, closing dates for editions of CHEMICAL and ENGINEERING NEWS of the 25th and 10th, respectively. Insertions made in order of receipt provided necessary remittances are complete.
EMPLOYERS are requested to mention in their announcements the section of the country in which the open position is located to ensure replies only from those who are geographically available.
In printing these advertisements the SOCIETY assumes no obligations as to qualifications of prospective employees or responsibility of employers.

UNEMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking employment for themselves are allowed in one calendar year 3 announcements free (one per issue) set in standard style and limited to 50 words each, including 8-word box address, and 3 additional standard announcements at 50% of regular rate. Further announcements and excess words at full rate.

EMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking new positions are permitted 3 standard announcements during the calendar year at 50% of the regular rate—include 8 words for box address.

EMPLOYERS seeking chemists and chemical engineers are permitted 3 standard announcements, not to exceed 50 words each including box address and not more than one per issue, during the calendar year without charge, provided they agree in writing to acknowledge all replies (excess words 5c each), otherwise full rate applies.

The AMERICAN CHEMICAL SOCIETY is vitally interested in the welfare of its members and in seeing that the chemical industry is manned with competent chemists and chemical engineers. These pages are part of our service in that connection. In addition most of the larger sections of the AMERICAN CHEMICAL SOCIETY and several of the smaller ones have active employment committees. Local section secretaries in your area will inform you as to any employment aids that may be available locally.

An Employment Clearinghouse is operated at each national meeting of the SOCIETY for the purpose of bringing together representatives of industry looking for chemists and members and student affiliates in attendance wishing to make such contacts. For further details, consult the preliminary and final programs as printed in the NEWS EDITION prior to each meeting.

In the New York area, special employment facilities are offered by the Employment Bureau of the Chemists' Club, 52 East 41st St., New York, N. Y. In the Chicago area, the Chicago Section maintains an employment service at 413 Stevens Hotel, Chicago, Ill.

Those replying to announcements should be careful to send copies and not original documents. Advertising circulars will not be forwarded and to that end all letters will be opened at the forwarding office.

SITUATIONS OPEN

Those announcements in which the letter "P" is part of the address key have paid in full and are not committed to acknowledge replies. The Society regards acknowledgment by employers of all applications as an act of common courtesy but can assume no responsibility for their failure to do so.

GRADUATE RESEARCH assistant ($2000) in field of colloids; war effort; academic credit. Transcript of record and testimonials to J. W. McBain, Chemistry Department, Stanford University, Calif.

ANALYTICAL CHEMIST, to develop methods for new organic chemicals, with manufacturer of fine chemicals in East. Recent Ph.D. or man having industrial experience with newer methods and instruments preferred. Send complete details with first letter, including photograph, draft status, religion, availability, personal data, education, and industrial experience.
Box 19-N-7, Ind. & Eng. Chem., Easton, Pa.

GRADUATE FELLOWSHIPS still available. Large eastern university. Half tuition and $700.00 cash. Recipient may carry nine credit hours of study but must devote half his time to assisting. Young women considered.
Box 22-N-7, Ind. & Eng. Chem., Easton, Pa.

RESIN CHEMIST. Recent graduate preferred. Research work in the field of urea-formaldehyde, phenol-formaldehyde resins. Opportunity for interesting work and advancement. Organic chemistry essential. Practical background helpful but not necessary. Give complete details in application, recent snapshot, salary expected. Location New York state small town.
Box 23-NP-7, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER or chemist with experience in development and manufacture of molding compositions, preferably thermosetting. Location in Midwest. State salary expected and draft status. Give details of education and past experience.
Box 58-NP-7, Ind. & Eng. Chem., Easton, Pa.

SUCCESSFUL SOUTHERN chemical company desires man for original research work in organic chemistry. Individual will be able to work largely on own initiative, and position offers excellent opportunity. Give full particulars, including draft status.
Box 64-NP-7, Ind. & Eng. Chem., Easton, Pa.

RESEARCH ASSISTANTSHIP or graduate student fellowship available at large Eastern Canadian university. New research project. Bachelor degree and preferably one year research experience in organic or biochemistry required. Applications considered from men and women. Give full information, references, and photograph.
Box 80-N-7, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER or individual thoroughly conversant with processes of powdering magnesium. Only experienced practical man need apply. Write giving full details. Also outline methods familiar with.
Box 13-T-7, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST for pharmaceutical house. 3 to 5 years' experience in analytical chemistry. Able to develop analytical methods for newly synthesised organic compounds. Must be familiar with micro-analytical methods. Control on manufactured products. Competent to take charge of laboratory. Give full information. Plant located near New York City.
Box 14-TP-7, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, M.S. or preferably Ph.D. for research literature searches and library work in Midwest industrial research laboratory. Reading knowledge of French and German desirable.
Box 18-T-7, Ind. & Eng. Chem., Easton, Pa.

TEACHER of CHEMICAL engineering desired by Southern agricultural and mechanical college, to begin September 1. Instructor, $1800 for twelve months, M.S. Degree in Chemical Engineering and some teaching experience preferred. Give full details of training and experience.
Box 19-T-7, Ind. & Eng. Chem., Easton, Pa.

ANALYST for RESEARCH laboratory in wood chemistry, Pacific Coast University, experience in wood chemistry desirable but not essential. Wood, organic, or biochemistry background preferred. Women eligible. $1800-$2000.
Box 20-TP-7, Ind. & Eng. Chem., Easton, Pa.

POST-DOCTORATE research fellowship in physical chemistry at large eastern university. Microcalorimetry of solutions; opportunity for other types of physico-chemical measurements applied to biochemistry. Fellowship renewable. Give details of education, experience, references, etc. $2400 per annum minimum.
Box 28-T-7, Ind. & Eng. Chem., Easton, Pa.

WANTED: RECENT graduate, chemist, with rubber laboratory experience. Class three draft status. Akron district.
Box 39-TP-7, Ind. & Eng. Chem., Easton, Pa.

CHEMISTS—ANALYTICAL and research for established laboratories in the fermentation and beverage field in New York area. Submit details of training, experience, references and draft status if male.
Box 41-TP-7, Ind. & Eng. Chem , Easton, Pa.

INSTRUCTORSHIP, General Chemistry, perhaps also assist in Biochemistry. Start in September, position open for duration of war. Ph.D. desired, man or woman. First letter must give education, experience, personal data, recent photograph, references, lowest salary. Write Gilbert H. Ayres, Chairman Chemistry Department, Smith College, Northampton, Mass.

WANTED: METALLURGIST capable of overseeing the production of straight carbon and alloy steel castings, acid electric furnace, steel foundry located in eastern Pennsylvania. In reply state age, experience and salary desired.
Box 57-T-7, Ind. & Eng. Chem., Easton, Pa.

RESEARCH FELLOWSHIP in organic research or analysis, available in September. Work for advanced degree, majoring in analytical or organic chemistry. Qualifications: B.S. or M.S. with a good grounding in analytical or organic chemistry. Stipend $770 yearly. Send applications to H. B. Hass, Dept. of Chemistry, Purdue University, Lafayette, Ind.

CHEMICAL ENGINEER with a few years' chemical manufacturing experience, as assistant to Superintendent of chemical manufacturing plant. Location southern New Jersey. Apply by letter, stating qualifications and salary desired.
Box 73-T-7, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER excellent opportunity for man of outstanding qualifications in research division of food organization located in the East. Applicant should submit college record, experience, accomplishments, and small photo.
Box 75-TP-7, Ind. & Eng. Chem., Easton, Pa.

UNUSUAL OPPORTUNITY for capable chemist experienced in thermoplastic coating materials and formulations. Will consider part-time arrangement if you have permanent connection. State experience, age, past connections, etc. Application confidential.
Box 80-T-7, Ind. & Eng. Chem., Easton, Pa.

HERE IS A RARE OPPORTUNITY FOR A YOUNG SALES ENGINEER

We are probably the fastest-growing manufacturer of chemical and process equipment in the country. There is an opening in our New York Office, involving general sales work on items like piping, tanks, valves, linings, synthetics, etc. A technical engineering background would be desirable but a good sales personality will weigh more with us.

Can you fill the bill? Tell us your age, qualifications, previous history and any other information about yourself that will aid us in sizing you up. We'll make the salary worth while.

Box 38-TP-7, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER with thorough training in engineering and chemical principles; also with some experience in research, testing, and practical commercial problems related to chemical engineering materials and equipment, for position on research and development staff of established organization pre-eminent in its field. Location New York City. Apply by letter, stating qualifications and salary desired.
Box 74-TP-7, Ind. & Eng. Chem., Easton, Pa.

FOOD TECHNOLOGIST. Applications will be welcomed from men with outstanding records to serve as junior chemists in eastern Research Laboratory. Prospects for advancement excellent for men of right qualifications. Please submit record of training and experience, personal history and recent small photo.
Box 76-TP-7, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(A.C.S. MEMBERS)

SPECIAL LIBRARIES ASSOCIATION will recommend trained chemical and technical men and women librarians at no cost to employer or member. Competent persons are now available. Write to the Executive Office, 31 East Tenth Street, New York, New York, for additional information.

(Continued on page 946)

Address communications to the box number indicated and Mail to Easton, Penna.

The American Chemical Society has no information concerning the position advertised, or in regard to those seeking employment.

(Situations Wanted Continued)

CHEMIST and BIOCHEMIST, Ph.D., Major Organic. Fifteen years' of research in synthetic organic, enzymes, proteins, carbohydrates, chemistry and physiology of bacteria, mechanism of drug action, immunochemistry. Forty publications, patents. Also several years' research in Europe. Now engaged in biochemical research in a large Eastern University. Desires a change to a responsible position with a progressive group. Imaginative, resourceful. Age 45. Gentile. Please give details in first letter.
Box 41-T-5, Ind. & Eng. Chem., Easton, Pa.

COLLEGE TEACHER desires to obtain position teaching chemistry only. Nine years' successful experience teaching general, qualitative and organic in college and engineering school. Now teaching chemistry and other sciences. Present position permanent. Would be pleased to have opportunity to do research while teaching. Good recommendations. Ph.D. 1935. Major, organic; minor, general chemistry. Good background in other sciences. Publications. Membership: Sigma Xi, Phi Lambda Upsilon. Protestant, family.
Box 46-T-5, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL RESEARCH, development position wanted by Ph.D., physical chemistry, 1941 Doctoral research in precision calorimetry. Publications. Year experience in plastics. Phi Beta Kappa, Sigma Xi. Age 25. Married. 3-A draft classification. Willing locate anywhere.
Box 54-T-5, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. Teaching and 3 years' industrial research and development experience (pharmaceuticals), desires permanent position in the East. Employed but available within reasonable notice.
Box 16-T-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, BIOCHEMIST, M.A., Sc.D., assistant professor of biochemistry, now employed, wishes research, teaching, or responsible industrial position, reasonably permanent. 10 years of laboratory research and teaching in biochemistry, nutrition. 37 publications. Married, age 36. Status 3-A. Member four national professional societies.
Box 26-T-6, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, university graduate, twenty years excellent record in research, development, service and sales; publications, patents, sales and advertising literature, new products and new uses; desires active and responsible position; references from all employers; listed in American Men of Science; 3-A draft classification.
Box 30-T-6, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, Ph.D., desires industrial research, or teaching in institution offering opportunity for research. Doctorate in electrochemistry, strong background in physics. Publication. Sigma Xi, Phi Lambda Upsilon. Now university research associate; available September. Age 28, married, dependents.
Box 41-T-6, Ind. & Eng. Chem., Easton, Pa.

TEACHER, PH.D. Well qualified in physical, analytical, inorganic and industrial chemistry, chemical microscopy, etc. Thirty years' experience, half teaching, half industrial research, consulting, testing. Many publications. Employed. Available summer or fall.
Box 58-T-6, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Ph.D. 1936, wishes teaching or research position in college or university. Graduate major, biochemistry; minors, general chemistry, bacteriology, physiology. B.S. degree in pharmacy. Five years teaching in medical school. Agr. Exp. Station experience. Publications on metabolism of minerals, and of amino acids, clinical chemistry. Married, age 31. Draft Class 3.
Box 99-T-6, Ind. & Eng. Chem., Easton, Pa.

ORGANIC DEVELOPMENT or elementary laboratory research, from which to advance, desired by unemployed Quaker, 26. Married. 3A. Strong in theoretical organic, inventiveness and business administration. Scholastically high. Untrained in languages, advanced laboratory preparations and analytical. Chemical patent attorney '40-'42. Graduate organic '37-'40.
Box 28-N-7, Ind. & Eng. Chem., Easton, Pa.

TEACHER, RESEARCH worker: Ph.D. Majors: Physical chemistry, chemical engineering. Twelve years' teaching these with inorganic, analytical chemistry, metallurgy, microscopy, etc. Sixteen years' industrial research, consulting, testing. Numerous publications.
Box 31-N-7, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, CHEMICAL Engineer. Fully qualified in all phases of refining of edible oils and fats, hydrogenation, fatty acid distillation, synthetic esters, etc. 18 years' experience. Competent to assume full responsibility of production, or to undertake a program of research and development along these lines. Married, Protestant and American citizen.
Box 50-N-7, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., 1941, leading university. Experienced in organic syntheses, micro-analyses, organo-metallic plastics. Graduate assistantships, one year post-doctorate fellowship, Sigma Xi. Single, age 24, draft 2-A. Available immediately.
Box 51-N-7, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Ph.D. August, 1942, M.Sc. organic chemistry. Bacteriology minor. Training in organic and biochemical preparations, microanalysis, spectroscopy. Research in human fat and fat chemistry methods. Teaching experience in photography. Age 25, single, Class 2-A. Desire industrial research or development.
Box 52-N-7, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST. B.S. 1939. Draft deferred (4-F). Available immediately. Three years' research and development work on pigments and organic chemicals. Patent. Pilot plant experience. Excellent background in organic synthesis and analysis. Personable, single, age 25. East preferred.
Box 53-N-7, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Ph.D. 1942. Vitamins and nutrition. Good foundation in organic, physical, and physiology. Research on B complex and protein requirements. Publications. Five years' teaching biochemistry, general and physical chemistry. Desires research or teaching.
Box 63-N-7, Ind. & Eng. Chem., Easton, Pa.

MIDWEST UNIVERSITY instructor. Also decade of college experience (Dept. head). Specialty, Organic. M.Sc. from eastern university; minor, physical. Trained in chemical microscopy; experienced with pre-med students; some biochemical background; year of recent graduate study; published articles. Available September for research, industry, teaching.
Box 66-N-7 Ind. & Eng. Chem., Easton, Pa.

ASSISTANT PROFESSORSHIP in organic or physical desired by young chemist, Ph.D. Six years' successful experience in direction of large industrial research laboratory. Prefer academic position combining teaching and research. Proven background in research direction, lecturing aptitude. Married.
Box 11-T-7, Ind. & Eng. Chem., Easton, Pa.

EMPLOYERS LOOKING for a young chemical engineer B.S., Ch.E., 1942, who is industrious, adaptable, conscientious, cooperative, and anxious to learn? Am single, 22, temporary 2-B, high scholastic record, good appearance, desire position in vital defense industry. Location immaterial, available immediately.
Box 12-T-7, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL PHYSICIST, M.E. and Ph.D. with varied commercial and research achievements including items now in production. Desires responsible position requiring initiative, imagination, and sound judgment. Will solve annoying problems incident to the application of new materials or devices in the war effort.
Box 16-T-7, Ind. & Eng. Chem., Easton, Pa.

YOUNG RESEARCH chemist, honor graduate of midwestern university; native of Poland, first papers, final papers soon; two years' varied industrial (plastics and inorganic) experience, some teaching; English, German, French perfect; draft deferred.
Box 23-T-7, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S. in chemistry. Minor in chemical engineering. 1941 graduate from A.C.S. accredited engineering college. Excellent experience in public relations. One year experience in development and research. Prefers job in organic production. Must be in defense. Presently employed, but available after short notice. Single. Willing to travel anywhere. Phi Lambda Upsilon.
Box 24-T-7, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, Ph.D. inorganics and pharmaceuticals, 38 years, married. 12 years' varied experience, research, plant and control. Available now.
Box 25-T-7, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, chemist, M.Ch.E., 27, single. Courses in analytic, organic, inorganic, dyes, physics, textile-chemistry, technology, engineering, ESMDT course fuel lubricants. Desire to start as assistant with chance for advancement. Preferably N.Y.C. or vicinity but consider anywhere. Available on short notice.
Box 27-T-7, Ind. & Eng. Chem., Easton, Pa.

PH.D. Twenty years' experience in industrial research and development. Some teaching experience. Wish to return to teaching with opportunity for pure research. Excellent record of applied research in colloid chemistry, nutrition and organic chemistry.
Box 29-T-7, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, eleven years' experience including teaching chemical engineering, chemist in control laboratory, pulp research, gas absorption, waste liquor evaporation and combustion and process engineer in munitions plant, desires responsibility and hard work in the West. Age 37, married, two children.
Box 30-T-7, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, M.A., seventeen years' experience; equipment design, plant operation, research director. Experienced with production cyanides, salt, soda ash, potash, salt cake, borax, magnesium metal. Desire executive position production or construction. Boulder City, Nevada.
Box 31-T-7, Ind. & Eng. Chem., Easton, Pa.

FOOD, BIOCHEMIST, now employed, Ph.D., 36 years, 3A draft, Protestant, many publications, industrial, academic, and contact experience. Seeks responsible position in such fields, member many organizations, excellent references.
Box 33-T-7, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, Texas A & M, 10 years' experience in control, plant, and research laboratories of petroleum refineries. Also 10 years' experience in charge of plant operations including vapor phase cracking and the manufacture of gums, resins, solvents, toluol, benzol, and naphthalene from petroleum oils.
Box 34-T-7, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST. Ph.D., several years' of industrial experience in surface chemistry, electrochemistry, and pigment technology. Desires position more closely related to the war effort. Publications and patents. Draft deferred.
Box 36-T-7, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, M.S., 30, married, one child. Organic major; analytical, physical, industrial minors. Eight years' teaching. Last five in State College, research during spare time. Desire employment essential for defense. Available immediately.
Box 37-T-7, Ind. & Eng. Chem., Easton, Pa.

CHEMIST B.S., M.S. 1942. A. C. S. accredited college. Organic and Biochemistry. Some industrial experience. Single. Favorable draft status. Position in essential industry desired. Available immediately.
Box 42-T-7, Ind. & Eng. Chem., Easton, Pa.

COLLEGE-TEACHING. Ph.D. 1935. Employed. Desires change in position where opportunities in teaching and research are available. Prefer analytical or inorganic. Also physical, organic, chemical microscopy, X-ray crystallography and metallurgy. Nine years' teaching experience. Age 37. Family.
Box 43-T-7, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, B.A., 1940, Biology and Chemistry Major; two years' graduate work in organic chemistry and biochemistry. Synthetic organic work preferred but am willing to try almost any laboratory work. Single, Protestant, age 24. Eastern states preferred but will consider other locations.
Box 45-T-7, Ind. & Eng. Chem., Easton, Pa.

FOOD CHEMIST 6 years' experience in Foods and Vitamin Analysis, Research, Development, Production, consulting; vitamin stability in enriched breads. Desires development or research position in vitamin production. B.S., 1936 University of Chicago; age 27, married, draft deferred.
Box 46-T-7, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST. M.S. 1940. Unusually thorough training in general inorganic, organic fields. Capable of independent research. Three years of industrial experience. Married, Protestant, 29 years of age, 3-A draft Prefer Southwest or Mountain area, but will consider anything in Western Hemisphere. Available after A. C. S. meeting in Buffalo.
Box 47-T-7, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, young with mature judgment. Well trained industrially for research, development, or general plant work. Degrees in chemical engineering and chemistry. Desires change to a war industry where his training and abilities could be more fully utilized. A metropolitan area is preferred.
Box 52-T-7, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, M.S. Ch.E. 1939 with three years' experience in heavy chemical industry, desires change to defense work. Would prefer design, production, process development or research work connected with either synthetic rubber, magnesium, aircraft or similar defense industry.
Box 53-T-7, Ind. & Eng. Chem., Easton, Pa.

CARBOHYDRATE and MEDICINAL research chemist Ph.D. Age 43. Married. Four years teaching and 15 years in industrial research, developing products from laboratory to large-scale plant. Specialties: Medicinal products, carbohydrates and dextrines, zymochemistry. Experienced in contacting clinicians and supervising clinical tests.
Box 54-T-7, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST Ph.D., successful industrial research, Sigma Xi, Phi Lambda Upsilon, Publications, seeking part-time employment in defense plant or teaching defense courses, Metropolitan New York.
Box 55-T-7, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER. M.S. Pet. Eng. 1941. 3 yrs. rubber production, 5 yrs. petroleum engineering research. Patents. Desire development or production position in synthetic rubber program. Employed. Age 28. Married. Draft 3-A. Location immaterial.
Box 61-T-7, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, YOUNG, M.S. Michigan. Two years' experience, currently employed, draft classification 2-B. Position with professional status desired. Development or control work. Now in East but willing to accept position elsewhere.
Box 69-T-7, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 947)

(Situations Wanted Continued)

CHEMIST, B.S. and M.A. from two middle western state universities. Research in gas-phase catalysis. Work in battery construction and practical electrochemistry. Age 23; 2-B draft classification. Desires position with industry engaged in defense work. Location immaterial. Available Sept. 1.
Box 79-T-7, Ind. & Eng. Chem., Easton, Pa.

RECENT B.A. Physiological chemistry: Well-grounded biochemistry, bio-assays, applied physiology, medical, x-ray technology, bacteriology, chemical microscopy, colloids, etc. Prefer to work, learn pharmaceutical-type laboratory or plant but consider others. Excellent personal references. Immediately available. Age 23. 2-A continued if chemist.
Box 78-T-7, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER active member A.I.Ch.E., thoroughly trained and experienced, now employed in administrative and instructional position. Would like industrial position as test engineer or technical assistant to executive. Specialties large scale plant tests, technical reports, economic studies. 3-A draft. Minimum salary considered $450 per month. Location immaterial; domestic or foreign.
Box 81-T-7, Ind. & Eng. Chem., Easton, Pa.

SPECIALIST for TEXTILE, leather and similar fine chemicals. 16 years' experience in development and production of sulfonated oils, anion, non- and cationactive finishes, wetting agents and detergents, starch products, resin finishes, water, flame and crease proofing, synthans, etc., at present employed with a well known concern. Desires responsible position where his broad experience could be utilised.
Box 83-T-7, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Sc.D. Age 33. Married. Nine years' experience in biochemical research and direction, specialising in vitamins. Broad biological training, including bio-assay. Research publications. Employed. Desires new position with active food or pharmaceutical organisation. Draft deferred.
Box 85-T-7, Ind. & Eng. Chem., Easton, Pa.

REGISTERED PATENT agent, 4 years' corporation experience ex parte prosecution, validity, infringement on process, chemical and mechanical cases. Previous experience in industrial chemical research. Presently employed. 3-A draft status. Include approximate starting salary in responding.
Box 87-T-7, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(NONMEMBERS)

ASSISTANT PHARMACOLOGIST and chemist. Bio-assays, research, biochemistry, 6 years' experience in medical school and pharmaceutical house, graduate chemistry, 3-A in draft.
Box 10-T-7, Ind. & Eng. Chem., Easton, Pa.

FOOD CHEMIST. Desire chief chemists' position in factory manufacturing food products of superior quality. Experience: 3 years' graduate. 5 years' manufacturing. Diplomatic. Co-operative but expect full say within delegated authority. Married, 2 children, American, Protestant, 30 years, class 3-A. Prefer East or mid-West. Salary range $5000.
Box 17-T-7, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S., M.S., 3 yrs. work toward Ph.D. Organic, pharmaceutical, and agricultural biochemistry. Wants position with future in Indiana, Illinois, or western Ohio. Should be connected with war work. Now located in central Indiana. Gentile, 27, draft 3, married. Versatile, adapted to quick training for specific work. Will consider contract effective late this year.
Box 32-T-7, Ind. & Eng. Chem., Easton, Pa.

YOUNG CHEMICAL engineer with master's degree from Harvard graduate school of business administration is interested in position where experience in both administration and chemical plant operation would be used to greatest advantage. No chemical research.
Box 35-T-7, Ind. & Eng. Chem., Easton, Pa.

SCIENTIFIC BOOKMAN-Librarian exceptionally experienced along scientific lines wishes connection.
Box 59-T-7, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, 12 years' experience organic chemical plant planning, layout, equipment design, piping, specifications, equipment selection, supervising plant operations, etc. Capable taking complete charge of projects, or supervising production. Good practical knowledge of process operations. Desire permanent connection with responsibility. American. Protestant. Married. Age 37.
Box 66-T-7, Ind. & Eng. Chem., Easton, Pa.

RESEARCH PHYSICAL chemist Ph.D. leading eastern university securely employed. Desire change to position with better advancement prospects. War work wanted specialised experience in industrial X-ray crystal structure work, publications, Phi Beta Kappa, Sigma Xi, Phi Lambda Epsilon. Age 27, single, dependency, draft deferred.
Box 67-T-7, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, age 27. B.S. large midwestern university. 2½ yrs. experience in research, pilot-plant, and production. Desires industrial research or development, preferably in essential defense industry. Mid-west preferred. Draft status 2-B.
Box 71-T-7, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, 28, B.Ch.E. 1938, M.S. 1939. Unmarried. Two years' experience in petroleum refinery operations, process development and pilot plant work. Thermal alkylation, hydrogenation, polymerisation, motor fuel. Middle West or North Eastern location preferred. 2-B draft. Only defense work considered.
Box 77-T-7, Ind. & Eng. Chem., Easton, Pa.

PHARMACEUTICAL CHEMIST B.S. Chem. graduate work. 8 years' experience, production, research, control and development. Desires position with progressive Drug or Cosmetic house. Capable assuming duties of Production Manager, charge of laboratory development.
Box 84-T-7, Ind. & Eng. Chem., Easton, Pa.

TEACHING POSITION wanted, College or University. B.S. in Chemistry, also major in Biological Sciences, Masters degree in Education, University of Pittsburgh. Experience: Two years' teaching, seven years in industrial laboratory. Married, 32 years of age, draft status, 3-A.
Box 86-T-7, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, M.S., 12 years' practical experience in the analysis of foods, fuels and lubricants, metals, paint, detergents, rubber, and general chemical analyses. Experience in research and metallography. Specialist in ASTM and Federal specifications tests. Age 35, draft 3-A.
Box 88-T-7, Ind. & Eng. Chem., Easton, Pa.

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Can You Afford

TO MISS THE EMPLOYMENT CLEARING HOUSE BUFFALO

SEPT. 6–11, 1942

In April, at Memphis, Tennessee, 1,721 interviews were completed in 3½ days.

EMPLOYERS needing chemists and chemical engineers - - - - - - - -

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Industrial Literature

CONTINUED FROM PAGE 944

composed of two balanced tandem decks, suspended from the dryer framework by inclined flexible hangers and actuated in opposition through flexible pitmans from a common eccentric shaft. Moisture is removed by passing hot furnace gases, tempered with atmospheric air, downward through the bed of material as it travels along the screen. *Bulletin 242 CEN.* McNALLY PITTSBURGH MFG. CORP., 307 North Michigan Ave., Chicago, Ill.

High-Speed Steel. A 12-page booklet describes Jessop TCM high-speed steel, with information regarding performance and typical applications. *Booklet CEN.* JESSOP STEEL CO., 534 Green St., Washington, Penna.

Hypochlorite Producing Unit. This bulletin covers an electrolytic unit for inexpensive production of hypochlorite. It is offered in two models. Model I-V, with a single cell, is designed to produce 15 gallons of hypochlorite per hour (0.5 per cent NaOCl). Model H-V operates with two cells to deliver 30 gallons of hypochlorite per hour. *Make Your Own. Hypochlorite Bulletin CEN.* VALHALLA CO., 231 South LaSalle St., Chicago, Ill.

Laboratory Apparatus. A 16-page bulletin brings the reader up to date on new developments in this line of laboratory apparatus. The bulletin illustrates a wide variety of equipment useful for many different laboratory jobs. *Bulletin 542 CEN.* ARTHUR S. LaPINE AND CO., 121 West Hubbard St., Chicago, Ill.

Liquid Density Recorders. This instrument offers the advantage of continuous, direct measurement of liquid flow. If automatic control of density is required, the equipment may be hooked up with a density controller. Charts are available reading to small units and may be had in specific gravity, Baumé, Brix, or other recognized scales. *Bulletin A-264 CEN.* THE FOXBORO CO., Foxboro, Mass.

Liquid Processing Equipment. This line of mixers, filters, and portable tanks is described, with all recent improvements listed. The bulletin also carries descriptions of asbestos filter disks, vacuum bottle fillers, screw capping machines, and label pasting machines. *Catalog 941 CEN.* ALSOP ENGINEERING CORP., Milldale, Conn.

Manganese Steel for Crusher, Grinding Mill, and Pulverizer Parts. This well-illustrated bulletin pictures a wide variety of parts for grinders and pulverizers. Charts and dimensions are given in many cases. *Bulletin 642-C CEN.* AMERICAN MANGANESE STEEL DIV., AMERICAN BRAKE SHOE & FOUNDRY CO., 389 East 14th St., Chicago Heights, Ill.

Measuring and Control Instruments. In this 16-page bulletin the authors describe and illustrate unit construction of temperature controllers and discuss an electronic principle for effecting control without contact between the measuring and control functions of the instrument.

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REWARD FOR information leading to the location or return of a Zeiss Microscope, Stand ESB No. 260732, Triple Objective and Cardioid Condenser, taken from our laboratory. Wilmot & Cassidy, Inc., 108 Provost Street, Brooklyn, N. Y.

For Sale

CRESYLIC ACID

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FOR SALE: Drum, revolving steel, 18 feet long, 3 feet 10 inches outside diameter, 3" refractory lining (can be removed). Variable speed drive, drum speed 4 to 14 R.P.M. Automatic feed. Used few hours only. Price $2250.00. Mounted on steel skids. Washburn & Granger, Inc., 53 Park Place, New York.

FOR SALE: Jourl. Amer. Chem. Soc. bound 1910–1913, unbound 1914–1941; Ind. & Eng. Chem., bound 1910–1913, unbound 1914–1941; Analytical edition unbound 1929–1941; Chem. Abstracts bound 1910–1913, unbound 1914–1941; Canadian Jourl. Research unbound 1929–1941; Canadian Chem. Jourl. unbound 1918–1941. Together or separately. J. W. Shipley, 11050 90th Ave., Edmonton, Alta., Canada.

FOR SALE: Chemisches Zentralblatt 1915–23 and 1924 vol. I/II unbound; Zeitschrift fuer Elektrochemie und angewandte physikalische Chemie vol. 35–45 (1929–1939) unbound. Box 21–T–7, Ind. & Eng. Chem., Easton, Pa.

OFFERED for SALE to highest bid if satisfactory: 1. Frits Ullmann: Ensyklopaedie der technischen Chemie. Second edition, Berlin, Wien 1928–1932. Vol. I–IX and index. 2. Berl & Lunge: Chemisch-technische Untersuchungsmethoden. Eighth edition, Berlin 1931–1934. Vol. I–V, 6 volumes. Box 22–T–7, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Glassware from a steel laboratory largely Pyrex, cost over one hundred dollars, will sell for fifty. Seen by appointment. M. L. Rogers, Earlville, N. Y.

WE OFFER: 100 lbs. Sodium Cacodylate, 25 lbs. Iron Cacodylate, 25 lbs. Cacodylic Acid; also Cystine, Calcium Levulinate, Creatine, Digitonin, Methionine, Proline, Phloridsin-d-Ribose; Acids, Barbituric, Galacturonic, Glutamic, Levulinic, Sebacic; Caesium Chloride. Box 48–T–7, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Tungsten Metal Cubes 99.99% pure, Vanadium Metal Lumps 96% pure; Boron, Caesium, Gallium, Germanium, Indium, Titanium, Uranium, Zirconium Metals in quantity; Iron Carbonyl, Hafnium Oxide, Yttrium Oxide, Naphthoresorcinol. Box 49–T–7, Ind. & Eng. Chem., Easton, Pa.

FOR SALE complete or half interest: Active commercial laboratory business long successful in industrial area. Present activities: chiefly metallurgical and inorganic analysis. Opportunity for expansion into agricultural work, for which also equipped. Box 51–T–7, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Journal Royal Society Arts 1910 to 1939, Journal Society Chemical Industry 1905 to 1938, Beilstein, Handbuch organischen Chemie 3 Ed. cplt. Schultz, Farbstofftabellen, 7 Ed. cplt. Zeitschrift anorganische Chemie vols. 38 to 87. 118. 120 to 138. 217 to 235. Box 60–T–7, Ind. & Eng. Chem., Easton, Pa.

FOR SALE used equipment does not require priority. We are constantly offering fully guaranteed standard laboratory equipment. Immediate delivery. Priced in strict conformance with government regulations. Now available Spencer and other types of microscopes, Microscopic accessories, Schmidt & Haensch Saccharimeters double wedge for tubes to 400 mm., Zeiss Sugar Refractometers, Universal Viscosimeter, Analytical Balances, Torsion and Pulp scales, Centrifuges, Ovens, Incubators, Mullen Jumbo tester, Perkins Tensile tester, Suter Tensile Tester, Scott Testers, Hydraulic presses, Hanovia Quarts Lamps, B & L Duboscq Colorimeters, meters, bridges, sterilising autoclaves, water stills, and hundreds of other standard laboratory instruments too numerous to mention. Write us your needs. We will quote or search for you the equipment needed. We purchase laboratory equipment for cash. The Laboratory Exchange, 24 East 21st Street, New York City.

FOR SALE: New laboratory, drying ovens, three sizes single wall with Thermostatic Controls, new laboratory hydraulic presses, 6 x 6 self contained, with 10 ton gauge, electric hot plates, test molds, 3 heat laboratory hot plates, 7" and 8" heavy duty, disc shaped cast top for distillations, extractions, etc., new $8.75 and $10.75 available for immediate delivery. Subject to prior sale. Write for full information. The Laboratory Exchange 24 East 21st Street, New York City.

FOR SALE: While they last, balance, pulp, for use in weighing ores, pulp, sugar, etc., a very fine general laboratory balance to use in between an analytical and course, 150 gr. capacity, 1 mg. sensitivity, fine polished mahogany case with glass sides, sliding counterpoised door, leveling screws, drawer for weight ready for immediate delivery. Specially priced at $27.50 subject to prior sale. Order immediately if you need these as we are selling these very rapidly. These are unused purchased from a Government Department as surplus to their needs many months ago. F. O. B., N. Y. C. The Laboratory Exchange, 24 E. 21st St., N. Y. C.

FOR SALE: Rights to patented process for converting an abundant raw material into excellent synthetic waxes. Raw material not restricted by priorities regulations. Box 72–T–7, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Chemical Abstracts, single issues June 20, 1924, Aug. 20, 1924, Sept. 20, 1925. Also 1926 except December issues; 1927 except for Jan. and Apr. 20 issues; and 1928, 1929, 1930, 1931, 1932 and 1933 complete. Transactions American Electrochemical Society, Vols. 7–14 inclusive; 49–62 inclusive; 67–70 inclusive and 73–74 inclusive. Herman H. Kahlenberg, Box 1888, Sarasota, Fla.

WANTED TO purchase. Copy of "Methods of the Chemists of the United States Steel Corporation for the Sampling and Analysis of Gases" issued by the Carnegie-Illinois Steel Corporation. State price and condition. Box 13–N–7, Ind. & Eng. Chem., Easton, Pa.

WANTED: Water bath and shaking mechanism for Barcroft Warburg respirometer, with or without manometers. Department of Bacteriology, New York University College of Medicine, 477 1st Ave., N. Y. C.

WANTED to BUY: Burgess-Parr or Amenco high pressure hydrogenation equipment with shaker mechanism also Polarimeter, electrically heated Barnstead water still, fractional distillation column for vacuum. Box 38–T–7, Ind. & Eng. Chem., Easton, Pa.

WANTED: AMERICAN Chemical Society Publications especially before 1915 and 1934 to date. Decennial Indexes of Chemical Abstracts wanted. P. Borgstrom, 1506—23rd St., S. E., Washington, D. C.

WANTED: BEILSTEIN, Handbuch Der Organischen Chemie, 4th ed., complete set. Will pay top price. Box 44–T–7, Ind. & Eng. Chem., Easton, Pa.

WANTED: 250 lbs. Sodium Cacodylate, 1000 lbs. Sodium Glutamate, 20 lbs. Asparagine; also wanted Edestine, Xylose, Orcinol, Thallium Sulfate, Theophyllin, Histamine di phosphate, Histidine mono HCL. Box 50–T–7, Ind. & Eng. Chem., Easton, Pa.

WANTED to BUY: We are urgently in need of additional laboratory equipment. We have a tremendous demand for used laboratory equipment. Instruments, accessories and supplies. Offer us your surplus equipment now while we have such a splendid market and government regulations permit us to pay a fair percentage of their original cost. All purchases are on a cash basis immediately upon arrival. We need hundreds of microscopes, Abbe refractometers, polarimeters, Vacuum pumps, lenses, microscopic accessories, vacuum ovens, autoclaves, analytical balances, testing machines, equipment and instruments for metallurgical testing, small lathes and tool room machines, cameras, binoculars, Greenough microscopes, comparators, dividing machines, in fact everything used in testing laboratories, research, etc. We are America's largest purchasers of used equipment. Write, wire or telephone us your offerings for immediate purchase. The Laboratory Exchange, 24 E. 21st St., N. Y. C. Phone Algonquin 4–3879.

WANTED: "Berichte der Deutschen Chemischen Gesellschaft": Vol. 2 (1869) paying $30, Vol. 3 (1870) $25, Vol. 5 (1872) $15, Vol. 6 (1873) $13, "Journal of Physical Chemistry": Vol. 1 paying $25, Vol. 5, $15, Vol. 6, $12. Dr. G. H. Fransius, 201 East 82nd Street, New York, N. Y.

WILL PURCHASE new or used spray drying equipment. Or will consider arrangement for drying of our material. Box 82–T–7, Ind. & Eng. Chem., Easton, Pa.

Remote controllers, combustion safeguard equipment, and other instruments are covered. The bulletin gives prices and lists numbers of catalog selections. *Bulletin Z6000 CEN.* WHEELCO INSTRUMENTS Co., Harrison and Peoria Sts., Chicago, Ill.

Metallurgical Laboratories. Laboratory aids for use in iron and steel laboratories and suggestions of apparatus and chemicals for analysis of iron, steel, and nonferrous metals are described in a 4-page, 2-color folder and a 9-page mimeographed list. *Bulletin 75 and List MET CEN.* CENTRAL SCIENTIFIC Co., 1700 Irving Park Road, Chicago, Ill.

Mixing Operations. A new type of mixing operations data sheet provides a simplified and accurate breakdown of the specifications of the tank in which the mixer is to be used; available electrical current supply; type of motor required and plant conditions under which it must be used; detailed analyses of the mixing operation, mixing cycle, and the materials to be mixed. *Confidential Mixing Operations Data Sheet CEN.* MIXING EQUIPMENT Co., INC., Rochester, N. Y.

Oil or Water Lubricated Pumps. In addition to descriptive data on this line of pumps, cut-section two-color illustrations show working characteristics. The vertical hollow-shaft type of construction is said to offer an advantage in the positioning and lubrication of pump head bearings. The bulletin carries a series of engineering tables that will be of importance to any engineer dealing with pumping problems. *Catalog 127A CEN.* PEERLESS PUMP DIV., FOOD MACHINERY CORP., 217 West Julian St., San Jose, Calif.

Pump Data Sheets. A set of data sheets covers selection, installation, operation, and maintenance of industrial pumps. The range of data sheets includes some of a more elementary character designed to be of assistance to new and inexperienced employees. The file containing these data sheets also carries an 18-page book entitled "Pump Fundamentals". *Pump Data Sheets CEN.* GOULDS PUMPS, INC., Seneca Falls, N. Y.

Research Assistance. Two bulletins describe the services and chemicals offered by this company's Manufacturing Division and the functioning of the Research and Consulting Division. *Services and Chemicals* and *How the Independent Chemist Can Help You Bulletins CEN.* EDWAL LABORATORIES, INC., 732 Federal St., Chicago, Ill.

CHEMICAL AND ENGINEERING NEWS
HARRISON E. HOWE, Editor
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VOLUME 20 AUGUST 10, 1942 NUMBER 15

On This We Build

The Foundations of the Chemical Industry in Western New York

FREDERICK L. KOETHEN
American Lubricants, Inc., Buffalo, N. Y.

THE area surrounding Buffalo, scene of the next national meeting of the AMERICAN CHEMICAL SOCIETY, September 7 to 11, 1942, has a very extensive and well-established chemical industry, producing many unusual products and having to its credit many "firsts" in manufacture. This Niagara Frontier is one of the Nation's important munitions-producing centers, the products of which include not only Cobras and Warhawks but many fundamental materials upon which most of the other industries of the country depend, such as ferroalloys, abrasives, chlorine, reclaimed rubber, and a myriad of special chemicals.

Such an industry did not develop overnight. The circumstances and economic causes which form the background of this development constitute an illuminating story of human progress.

It is interesting to picture the eastern part of our country as it was before the white man started to change it. The most noticeable feature was that trees covered it so thickly that long journeys on land were very difficult. To build a mile of road was a major logging operation. Traffic moved by water. From the time of the earliest trapper and voyageur, the Niagara River was of great importance because it was the cheapest and easiest route to the interior of the continent. North America in those days was a huge treasure sack with only one opening—through the St. Lawrence and the Great Lakes. The Mississippi route was not attractive because of tropical diseases and hostile Indians. All other routes to the interior passed over thickly wooded mountains.

The route up the St. Lawrence or the Hudson-Mohawk-Oswego Rivers was the only one that provided water travel nearly all the way. The portage at Niagara, difficult though it seemed, was very easy compared with the Cumberland Gap or the Allegheny Mountains between the Juniata and the Conemaugh. Up the Niagara came the voyageurs who traded furs and sugar between New Orleans and Montreal. This was the route of Rogers in his search for the Northwest Passage. The Niagara portage was an important bone of contention in the French and Indian War between Britain and France. After the American Revolution, Britain held onto the Niagara portage by every subterfuge and the ill feeling brought about by this holdover period was a minor but contributory cause of the War of 1812. The ownership of the land settled, the village of Lewiston, N. Y., became a thriving and important freight-handling port and continued to be for many years until the coming of a new era snuffed out this traffic completely.

Clinton's Big Ditch

Many events which greatly change the course of human lives may be properly described as acts of God, but the most important date in the history of western New York (except 1492 and 1776) was made significant by the actions of a group of men headed by De Witt Clinton. In 1825 the Erie Canal was completed to Buffalo from the Hudson, a project which made an enormous reduction in freight rates between the seaboard and the interior of the continent. This resulted in the growth of a chain of prosperous cities across New York State and enabled New York City completely to outdistance her commercial rivals, Philadelphia and Baltimore. The Conestoga wagon could not compete with the canal boat. So serious was the effect on Philadelphia that a near panic ensued, and later the Pennsylvania Portage Railroad was organized as a public project. Philadelphians subscribed to the stock as a patriotic duty in the hope of bringing back the trade.

Evidence of the great influence which the Erie Canal had on the prosperity of New York is the story, told and retold in many different ways during the middle of the last century, that if anyone shouted "low bridge" in any gathering of wealthy and prominent people in New York City more than half of the men and some of the women would duck their heads, indicating their humble beginning on canal boats. Chester A. Arthur, 21st President of the United States, is a prominent example of a man who had made his start as a mule driver on Clinton's Big Ditch.

The coming of the railroad in 1835 did not affect this situation as much as would be supposed because people at first thought of the railroad as too expensive for freight, just as we think of the airplane today.

Such were the events which caused large numbers of settlers to come to western New York. Those not engaged in transportation busied themselves with clearing the land and farming. Certain primitive industries developed almost at once. Associated with the clearing of the land was the leaching of potash from the ashes of the ever-obstructing trees. A central leaching plant operating on ashes bought from the settlers was probably the first chemical industry in this area. From it pearl ash was shipped to the seaboard. Sawmills and gristmills operated by small water wheels, lime-burning, tanning, and brewing industries were also established. Natural cement rock was discovered at Akron, N. Y., and quarried as early as 1839, and the burning of plaster of Paris was begun the next year. Landreth's iron foundry, the blowers of which were operated by Niagara Rapids power, was established in 1836. Pratt and Letchworth in 1840 built in Buffalo the first iron rolling mill in the area. Both these plants operated on pig iron brought from the Adirondacks.

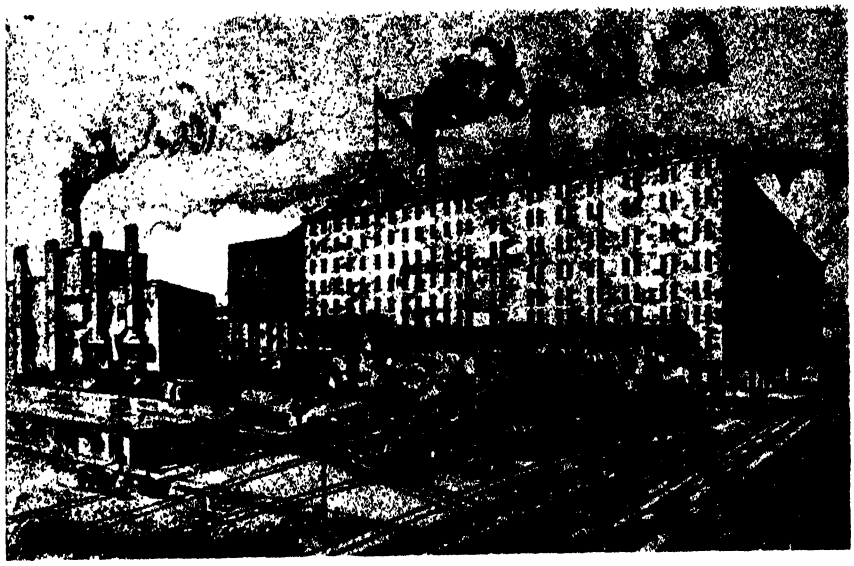


Figure 1. American Glucose plant in 1888

In 1857 Henry Dopp began the production of soapmakers' machinery. The fame of his cast iron kettles soon spread to the entire country. This same establishment, now the Sowers Manufacturing Co., today operates a business of international scope. Other makers of chemical engineering equipment have developed here—Buffalo Forge, 1878, Bell Iron Works, Buffalo Foundry and Machine, Niagara Blower, Spencer Lens, Taber, Lobee and Buffalo Pumps, Crandall Can Fillers, Linde Air liquid air machines, Ross heaters, Buffalo Wire Works (screens), and refractories by Carborundum, Lapp, Exolon, General Abrasives, and Norton.

When patent white flour became available to the civilized world as the height of luxury and good taste, all the first roller mills which made it and which pushed the buhrstone mills into the discard were made in Buffalo by the John T. Noye Co., owners of the patent. Later, when this same white flour fell into disrepute with dieticians, a Buffalo firm took the lead in distributing the vitamins which are now added to flour. More flour is milled in Buffalo than in any other city in the world.

Corn Sugar

In 1871 America's first plant for making glucose and corn sirup, the Fox and Williams Grape Sugar Co., later the American Glucose Co. (Figure 1), was started in Buffalo. The previous supply had all been imported from Germany. Under the leadership of Cicero J. Hamlin from 1875 to 1895, the plant prospered and became the forerunner of a large American industry. Other plants built later followed the movement of the corn belt and now carry on under the name of Corn Products Refining Co.

Aniline Dyes

The first successful aniline dye works in America was started in Buffalo in 1879 by Jacob Schoellkopf, who previously had established tanneries in Buffalo and who later became well known as the business head of the Niagara power industry. The dye factory had a hard struggle against German competition for many years but managed to hold on until World War I when its success became assured. It is now the National Aniline Division of the Allied Chemical and Dye Corp.

Methanol and Formaldehyde

The destructive distillation of wood in cast iron retorts to produce by-products was carried on at a very early date in the southern tier of New York State counties, and after 1880 the crude spirits were sent to Buffalo for refining by E. B. Stevens acting as the Buffalo Alcholine Works. In 1892 Mr. Stevens discovered an improved process for distillation in the presence of added water vapor. This enabled him to reduce the amount of acetone and other impurities to a very low figure, thus making a purer methanol than any commercial product previously possible. This was exhibited at Chicago in 1893 and christened "Columbian Spirits", a name which soon became well known.

What was probably the first formaldehyde made commercially in the United States was produced by Pierce and Stevens in 1901. This department was sold out to Heyden Chemical in 1903.

These are only a few examples of the steps by which the industries of western



Figure 2. Upper Rapids, Niagara River, in 1881. Joncaire's first mill, 1757, and all succeeding mills until 1875 used water from the Upper Rapids. The photograph shows the paddle wheel era at its height, viewed from Bath (now Green) Island. The buildings are: (1) Cataract Hotel power laundry, (2) International Hotel stables, (3) Clark's furniture factory, (4) Phillip's planing mill, (5) Joe George's planing mill, (6) Burdick's machine shop, later Philpott & Leuppie, (7) Miss Woods' Variety Store, (8) Landreth's foundry, and (9) Cascade House, near the entrance to Prospect Park.

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New York developed. Before the advent of Niagara electric power, Buffalo had become a large thriving city serving as the center of an active manufacturing district. The reservoir of skilled workmen, financial and managing ability thus built up helped in the utilization of Niagara power.

The Electrochemical Period

The development of alternating-current electric power at Niagara Falls in 1895 was an event of far-reaching importance. It was the first large-scale use of water to develop alternating-current electricity, and it showed the way which all large water power plants since have followed. Never before had such a vast amount of power been available in any one spot in the entire world or so cheaply. Never before had any large amount of power been in a form which could be so easily transported, subdivided, and turned on or off.

Paddle Wheels

Mills of various kinds had been driven by Niagara water power for many years, starting with Joncaire's original sawmill on the Upper Rapids in 1757.

Each of the early mills had to straddle its water wheel. Since the power could not be transported any distance, the number of mills was limited to those which could find a place at the water's edge. All the mills which derived power from Niagara prior to 1875 were simple paddle wheels utilizing only a few feet of head on the Upper Rapids. As the number of



Figure 3. Gaskill Mill, 1875, also the unused water from Hydraulic Canal. View from Canadian side.

mills increased, a millrace parallel with the upper river was built extending down to Prospect Point. The various mills took water from this race and discharged into the river above the Falls. The last water wheel on the raceway operated an elevator to take tourists down to the foot of the Falls.

When the Niagara State Reservation was set up in 1883, all these unsightly mills were purchased and torn down. Figure 2 shows this milling district in 1881.

Low-Pressure Turbines

Construction of the present Hydraulic Canal was started in 1852 and completed in 1861, but no use of the water was made until 1875 when the Gaskill Flour Mill was built (Figure 3). Others followed, mostly flour mills and paper mills, until by 1885 practically all the available space near the mouth of the power canal was occupied, thus preventing further growth. Until a more satisfactory means of transmitting power than by shafts, belts, or ropes was devised, a big waterfall had no advantage over a smaller one. Figure 4, taken in 1895, shows this stage in water power history at its peak.

A 250-horsepower electric generator, operating 16 arc lights, and a silver-plating plant were installed in 1881 in the Quigley Mill by Brush. This was direct current, used within a very short radius of the generator. Not all the necessary devices for using alternating current were available until 1888. Edison's bipolar dynamo was ready in 1878, Brush's compound wound generator in 1881, Stanley's transformer in 1886, and Tesla's induction motor in 1888.

Alternating Current

The first commercial alternating-current electric installation was made in Adam Meldrum and Anderson's store in Buffalo in 1886 for lighting purposes. The Niagara Falls Power Co.'s first plant, located about a mile above the Falls and discharging its waste water into a long tunnel under the city, was completed and started generating 15,000 alternating-current horsepower in 1895. Its success astounded the world and made power plant history. It inaugurated a new era in which water power units could be as large as required. The story of this power plant is ably told in two large volumes by

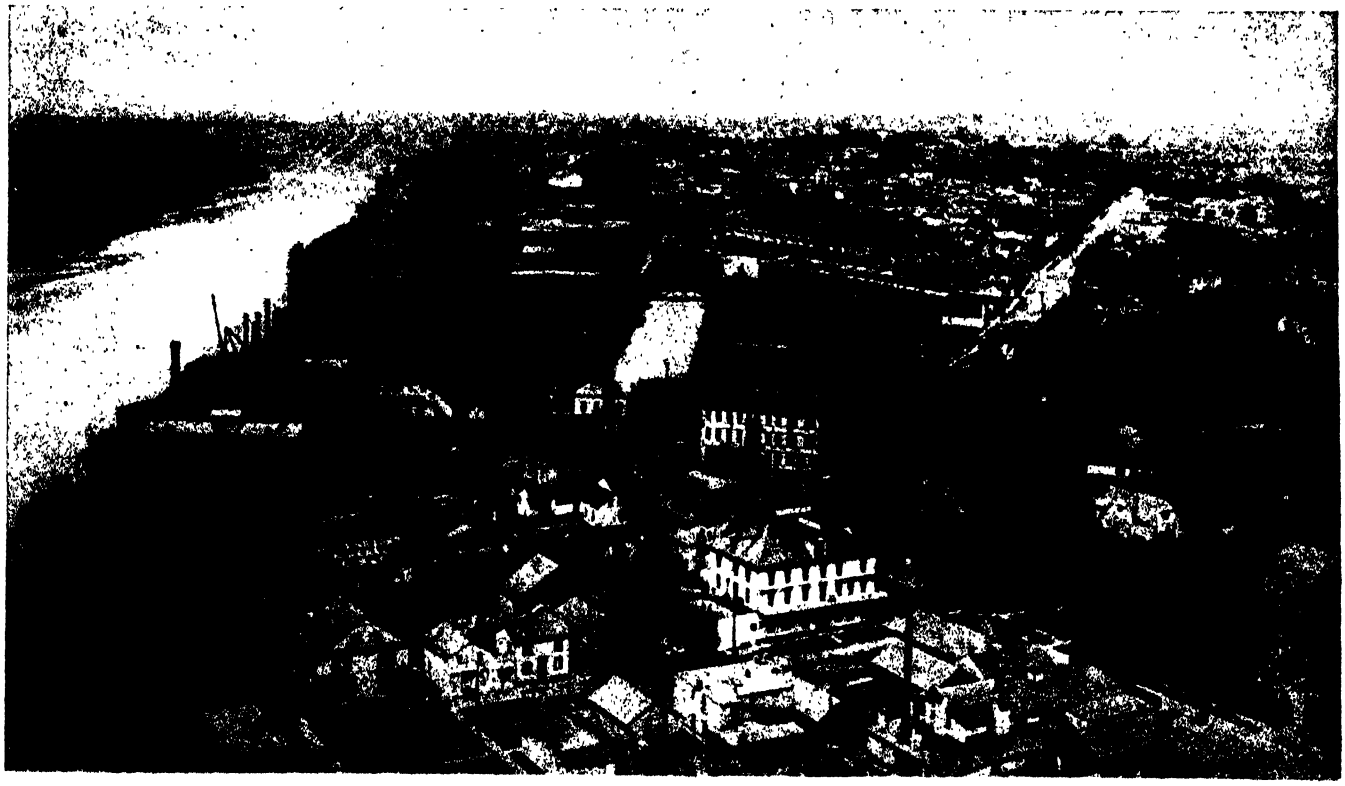


Figure 4. Niagara's lower milling district in 1895



Figure 5. Cutting the wheel pit at Niagara's first alternating-current plant

Edward Dean Adams. Figure 5 gives an idea of the difficulties of constructing this plant, now named the "Edward Dean Adams Plant".

The Hydraulic Power Co. followed shortly afterwards with a large alternating-current installation at the end of the Hydraulic Canal. A waiting list of various new electrochemical processes which had been invented the previous decade were thus enabled to move forward in a big way because for the first time electric power was available in large blocks at low rates.

The first power used from the Adams plant was on August 26, 1895, for the manufacture of aluminum metal by a process invented in 1886 by Charles M. Hall. Edward G. Acheson became a close second with his Carborundum process, invented in 1891 in Monongahela City, Penna. The third customer, Acetylene Light and Mfg Co. (later Union Carbide Co.) manufactured calcium carbide invented in 1892 by Thomas L. Willson at Spray, N. C.

The electrolytic alkali industry in this area started in December 1896 when the Mathieson Alkali Works began operation of the Castner rocking mercury cathode cell, on which they had made previous runs at Saltville, Va. The Niagara Electrochemical Co. began operating the Castner cell for making metallic sodium from fused caustic very shortly afterwards, and the Oldbury Chemical Co. brought from England the new process for making phosphorus in an electric furnace.

Each of these plants was the start of a large industry. Not all the new industries found it easy going, however. Some processes failed utterly, some proved to be scientifically possible but unprofitable. The story of these industries which now are gone, including such names as Acker, Bradley and Lovejoy, William T. Love, Pedro Salom, Ozone Vanillin, Electrolytic Iron, etc., is an interesting tale in itself. But most of the plants prospered greatly, many others followed, and Niagara Falls became Electrochemistry's Capital.

Electric Power in Buffalo

Niagara power was first delivered for use in Buffalo in 1896, just as plans for the Pan-American Exposition were being formulated. The Electric Tower covered with electric lights was the sensational feature of this exposition, and for the first time the public became conscious of the possibilities of electricity. The advertising power of the electric current was as great as its mechanical equivalent and a tremendous stimulation of manufacturing resulted.

Buffalo today has many electrothermic and electrolytic processes, but its principal use of Niagara power is to drive innumerable machine tools, presses, and mills. All these machines use the labor of more men per horsepower than do the electrochemical industries, thus making jobs for the population of a large city.

In addition to Niagara power a large quantity of power is generated from steam in Buffalo at the Huntley Station of the Niagara Hudson System. Both plants are tied in with the entire Niagara Hudson System. The Lackawanna plant of the Bethlehem Steel Co. also generates a large amount of power from steam in addition to the hydroelectric power it buys.

The Future

Notwithstanding that the original advantages caused by the canal and cheap power have been more or less leveled off by the railroads and by the building of large hydroelectric plants elsewhere, industry of the Niagara Frontier, and especially the chemical industry, is growing constantly. Its chemical heritage, large supply of skilled workers, and natural advantages enable it to face the future with confidence.

Sets of Abstracts

Sets of abstracts of the Buffalo meeting papers in planographed book form will be supplied by the A. C. S. News Service, 1155 16th St., N. W., Washington, D. C. Sets are not guaranteed to be complete, but contain abstracts from all divisions as submitted by authors. The abstracts will be mailed as soon as possible after receipt of order, beginning about September 2, and will also be on sale at the Buffalo meeting of the American Chemical Society, September 7 to 11, 1942.

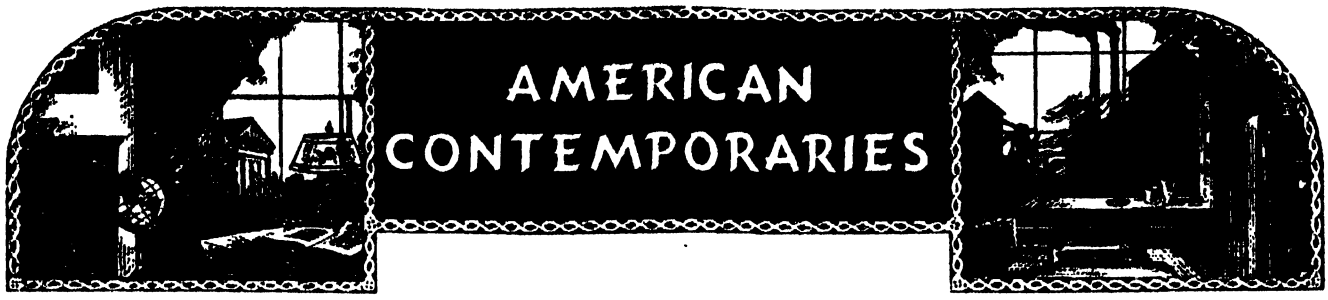
This enterprise is undertaken in a spirit of service and not for profit. Sets are offered on the following terms:

To members of divisions who forward receipt for divisional dues with remittance and order, 50 cents.

To those without receipt for divisional dues, who remit with order, $1.00.

To those who fail to enclose remittance with order, necessitating correspondence, $1.25.

To those who require bills to be rendered, $1.50.



E. D. Kingsley



BLANK & STOLLER

LIFE may begin for many people at 40, as Walter Pitkin has it, but for Ned Kingsley the real beginning was postponed until 46. At that age we find him not very well satisfied as silk buyer of McCreery's department store in New York. What happened to him before that time is largely lost in a haze of Yankee reticence which has seldom been penetrated.

At least we know that he was born a New Englander, that his father failed to survive the Civil War, and that Ned had only a sister. Presumably he was somewhat of an amateur athlete, and it is related that his career at Yale ended abruptly after an argument with the elder Camp led to Ned's physical defeat by the great coach. Later he appears in New York's East 23rd Street as the roommate of Francis P. Garvan, then a struggling young attorney who also was later to have profound influence on the development of American chemistry.

But at 46, Ned Kingsley, gifted with imagination and optimism, was a supreme practical psychologist in an age when salesmen were still drummers, a master of meticulous detail, a discontented buyer in a department store, and the uncle of his sister's daughter who held the place in his affections that would have been occupied by children of his own. Each of these attributes was vital to what followed.

Among the observations made by the department store buyer which became important to the chemical company president was the undependability of bleaching processes applied to white goods in the naughty-naughts. Frequently beautiful table cloths and sheets developed unseemly weaknesses and brought troubles to their seller. Often goods had to be rejected for this cause, and the weakness seemed to be inherent in the bleaching process.

Now Caroline, Kingsley's niece, had married a young man from Michigan, Bernard C. Hesse, who belonged to the then strange cult of chemists. Hesse, quite understandably, shared the place of his wife in Kingsley's affections. Indeed, his unique relation with our subject was somewhat that of a son and equally that of a younger brother. Thus it is not strange that the two should have discussed in some detail the problem of the tender napery. Hesse had recently returned from Germany where he beheld and had learned to perform many wonders while chemist in the great Badische Anilin und Soda Fabrik, then one of the greatest of Germany's chemical companies.

Considering the weakness of bleached goods, Hesse concluded its cause to be the action of lime in bleaching powder. In Germany he had seen liquid chlorine, as yet unknown in America, used to produce whiteness without weakening. What happened from that time on is largely the result of the intimate relations between the clever chemist and the supreme salesman, both looking for new fields. It is quite impossible to follow these reactions between two intimates in any detail, but soon we find experiments in progress in a small plant in Germantown looking to the liquefaction of chlorine gas, which incidentally had been imported from Germany in liquid form for the purpose. Failure of any available compressors to handle the job sent Kingsley to Germany to secure some that would function.

That was the beginning of liquid chlorine as an industry in America. The Electro Bleaching Gas Co. was formed after the German machine worked and a small plant was built beside that of the Roberts Chemical Co., makers of chlorine, at Niagara Falls.

Ned Kingsley, armed with a rope end as his principal sales argument, set out to sell the first liquid chlorine to a textile mill. Half of the rope was bleached white with chlorine but was no less strong than the other unbleached half. That seemed convincing enough for any one, but it did not stir New England textile managers out of their accustomed rut. The dapper New Yorker failed to arouse the slightest interest with all his charm and persuasion. After one complete and final rejection, he looked out of the window of a mill in Somersworth, N. H., onto the spring landscape and observed how good it was to be back in New England again. That brought on more talk with the prospect which revealed warm mutual friends. The mill manager, now an interested listener, insisted on hearing again the whole of Kingsley's story. Success of the liquid chlorine venture dated from that repeat performance for troubles with tendering of fabrics ceased at that mill when chlorine replaced bleaching powder in its operations.

That was in 1909. Three years later chlorination of drinking water was tried at Kingsley's urging by his friend, Harry Huy, then superintendent of the water works of Niagara Falls. No better test could have been devised, for Niagara Falls in 1912 held an unenviable record, one of the highest death rates from typhoid fever in the country. When chlorine came in, typhoid went out, and soon Niagara Falls was the envy of other cities and a pattern for them to follow.

The use of chlorine by the German Army with such disastrous effect at Ypres in 1915 had a serious repercussion on the American chlorine industry. It is related that early in 1915 one of the most conservative of American textile mills decided to install a tank of substantial size to store chlorine by the ton and save handling the many cylinders previous practice had required. Everything was progressing well with the enterprise until news of Ypres arrived. That was too much for the plant manager and he, fearing the dread effects of leakage of so much chlorine on a populous countryside, ordered the whole project abandoned.

In the later phenomenal growth of the chlorine industry through widespread use of the yellow gas in innumerable ways, Ned Kingsley played an important part until his retirement a few years ago. Always his winning personality lit up his surroundings. Perhaps because he had no

sons of his own, he has been constantly on the alert to help and encourage young men. That has been an outstanding characteristic of the man. In The Chemists' Club he has found an outlet for his gregarious instincts and scarcely a day passes that his cordial smile is not seen in its precincts. There his convivial spirit revels in pleasant companionship. Now, somewhat quelled by the burden of more than four score years, it still finds solace there among hosts of friends, who respect and love the man whose life began at 46.

D. H. K.

Richard Willstätter



RICHARD WILLSTÄTTER, honorary member of the AMERICAN CHEMICAL SOCIETY, Nobel prize winner for chemistry in 1915, recipient of the Willard Gibbs Medal in 1933 and of an honorary degree from Oxford University, will celebrate his 70th birthday on August 13, 1942. American chemists send best congratulations to this great scientist.

Richard Willstätter was born in Karlsruhe, South Germany. He studied chemistry under Adolf Baeyer in Munich. Very soon he distinguished himself in the field of alkaloids. When 26 years old, he explained the constitution of tropine, atropine, and cocaine, and at 29 carried out the synthesis of tropine, tropilidene, and tropane. The important synthesis of cocaine was made in 1924. Research in the field of natural products has occupied the whole life of this great scientist.

In 1907 the first paper on chlorophyll was published. This work on chlorophyll and its derivatives was distinguished by the Nobel prize in 1915. Those who, like the writer, had the privilege of knowing Willstätter when he carried out his studies with very capable collaborators at the Technical University of Zurich, where he became professor in 1905 succeeding Eugene Bamberger, remember very well not only the enthusiasm of his collaborators, his colleagues, and the younger chemists, but also the great sensation which these studies aroused in the entire scientific world. Without the work of Willstätter and his collaborators in this most important field of chlorophyll and hemin dyestuffs, Hans Fischer, also of Munich, would never have accomplished his excellent work in the synthesis of those extremely important natural products.

At the same time fundamental studies were carried out with Zechmeister concerning the degradation of cellulose and its conversion into lower carbohydrates. Those studies afterward were continued by Zechmeister alone and led to the isolation of crystallized polyoses, among them crystallized hexaose. The so-called Bergius process for the saccharification of wood cellulose should be named the "Willstätter process". Important studies on ring compounds and fundamental research work in the field of hydrogenation, especially in the presence of oxygen, were also conducted.

Willstätter left Zurich in 1912 and became director of the Kaiser Wilhelm Institute for Chemistry in Berlin. This stay in Berlin lasted until 1915 when he succeeded his great teacher, Adolf Baeyer, in Munich. With Elmer K. Bolton, now chemical director of the du Pont company in Wilmington, and other collaborators, the constitution of the dyestuffs of plants, especially dyestuffs of blossoms and fruits, was explained.

Afterwards Willstätter concentrated the greater part of his research activity on the studies of enzymes. Here great progress was made. The use of hydrates and hydrogels for adsorption purposes opened new ways in the research of enzymes. Willstätter's investigations of fermentation processes brought new light in this very important field.

Besides these fundamental investigations, Willstätter found time to work in the fields of chinones, aniline black, and lignin. New pharmaceuticals, among them the tribromo alcohol and its combination with urea chloride as voluntal, were synthesized.

With Haber new and fundamental viewpoints on the importance of radical chains and the mechanism of organic enzyme processes were developed. Results of these most important investigations in the field of chlorophyll, assimilation, enzymes, and chlorophyllase were published in part in book form with his very gifted collaborator, Stoll.

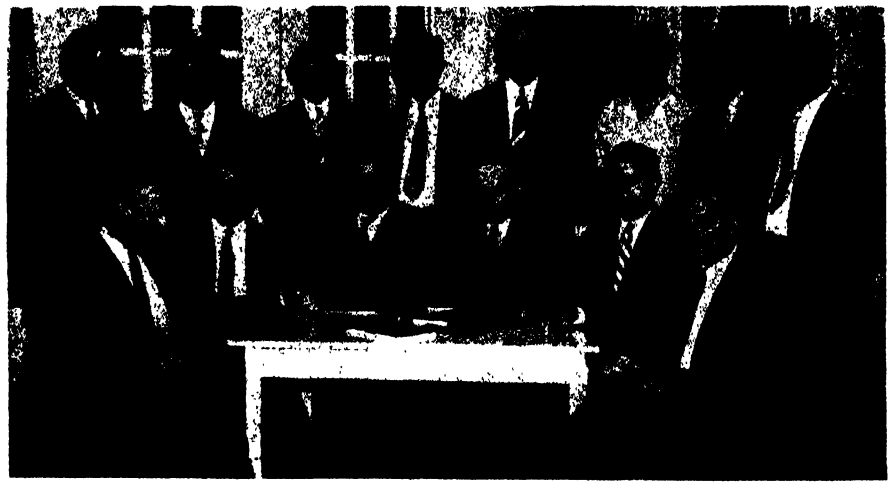
In Zurich and afterwards in Munich, Willstätter was a most inspiring teacher. Many chemists who have since contributed to science and industry owe important stimulation to Willstätter. Stoll, Isler, Kraut, Kalb, Waldschmidt-Leitz, and, in this country, Roger Adams, E. K. Bolton, Ivan Gubelman, Jean Piccard, and L. Zechmeister were his collaborators.

The events which afterwards led to the present situation in Germany forced Willstätter to give up his academic position in Munich in 1925. With only a few collaborators he continued his scientific work until he was forced to leave Germany and to settle in the southern part of Switzerland.

Great sorrows in the loss of his wife and only son have darkened the life of the great scientist, but he has always kept the torch of science burning. He has given the world the fruits of his genius.

E. BERL
CARNEGIE INSTITUTE OF TECHNOLOGY
PITTSBURGH, PENNA.

Editor's Note. **As CHEMICAL AND ENGINEERING NEWS goes to press, the daily papers announce the death on August 3 of this eminent scientist.**



Mid-West Cooperating Sections

Representatives of the Mid-West Cooperating Sections of the AMERICAN CHEMICAL SOCIETY recently held a meeting at the Meridian Hills Country Club in Indianapolis, Ind., to plan their touring service for 1942–43. *Left to right, first row:* Ed. F. Degering, A. W. Downes, G. L. Corley, T. E. Field, E. T. McBee, R. C. Stillman. *Second row:* W. W. Hilty, W. C. Gangloff, A. N. Stevens, C. L. Shrewsbury, F. D. Martin, J. H. Sample, F. J. Allen, and J. A. Leighty. Officers for the 1942–43 season are secretary, Dr. Degering, and assistant secretaries, C. E. Waring and Dr. Shrewsbury.

On to Buffalo and the 104th A. C. S. Meeting

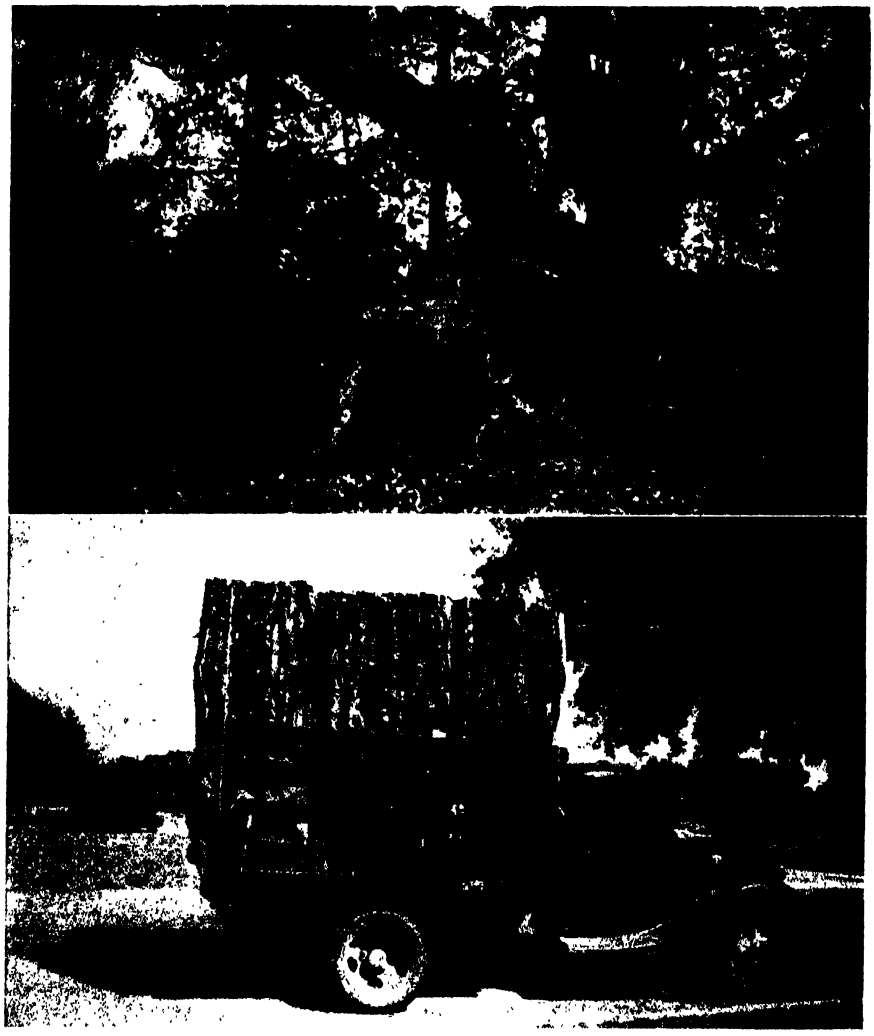


Make Your Reservations NOW for September 7 to 11 in Buffalo

Toward Self-Sufficiency in Cork[1]

GILES B. COOKE

Research Department, The Crown Cork and Seal Co., Baltimore, Md.



WOODBRIDGE METCALF

Above. This tree yielded 151.5 pounds of stripped corkwood. *Below.* Baled corkwood, from Chico Forestry Station, which was removed in 1940 from trees planted in 1904.

DOMESTIC cork is equal to the Mediterranean product and may be used interchangeably with the imported material, experiments on California cork in the past year show. The project to establish a domestic supply of cork is sponsored by Charles E. McManus, president of The Crown Cork and Seal Co.

Complete and exhaustive tests were conducted on California cork stripped from some of the older cork trees in 1940. Factory grinding tests with 1-ton batches showed a yield of 60 per cent of usable cork. Cork compositions manufactured from this grinding proved equal to similar compositions prepared from imported cork. While preliminary examination had indicated the California cork was of good quality, actual proof that it is the equal of Mediterranean cork has greatly stimulated the rapidly expanding cork-growing program.

In July and August 1941 cork was removed from large trees in Calvaras and Los Angeles counties. From one large tree at Camp Seco, which had been systematically stripped 30 years previously, 330 pounds of second-growth cork were obtained. Almost 2 tons of cork were removed from the trees in these counties. Its general appearance and incomplete tests indicate this cork is of the same quality as that collected in the Sacramento Valley region in 1940.

The planting of young cork trees continued to expand during the past year, and applications for seedlings far outnumbered the available plants. More than 21,000 cork seedlings were set out in California and Arizona, and many acorns were planted in forest ranges to produce trees for 1942.

Because of the progress in California, Mr. McManus decided in 1941 to extend the cork-growing project into other states. A survey of the southern states showed that large healthy cork oak trees were growing in Virginia, North Carolina, South Carolina, Georgia, and Alabama. Agricultural directors and forestry specialists in these states and Florida, Arkansas, Mississippi, Louisiana, and Texas promised cooperation. Already more than 800 young cork trees have been planted in sections of these states, and 1,000 more seedlings that developed late are being held for distribution in October. Many additional cork plants will be available for planting in the South by fall.

Most of the cork seedlings distributed throughout the South grew from acorns from California cork oaks. All available acorns in the South will be collected this year to supplement the California acorns. While cork on the southern oaks appears to be of excellent quality, arrangements have been made with many owners for stripping the trees this summer so that sufficient cork can be obtained to prove this conjecture.

Plans for 1942 include planting over 50,000 trees in California, stripping additional California and southern cork trees, collecting and sprouting many acorns in the South for planting in the spring of



WOODBRIDGE METCALF

Tools which are used in stripping shown with a cork tree growing at McGill Ranch

[1] Dr. Cooke's first article for CHEMICAL AND ENGINEERING NEWS, published March 10, 1941, page 256, dealt with establishment of the cork-growing project in California.



Cork Oak at Ocean View, Va., often called two trees because the trunk is divided into two large sections near the ground

1943, and conducting some very interesting experiments on cork growing.

Enthusiastic support to the domestic cork project has been given by the extension directors and foresters in the cooperating states. These silvicultural specialists have located and photographed cork trees and helped in collecting and sprouting acorns and in distributing and planting seedlings. Their generous aid and splendid cooperation has resulted in much progress in a short time.

Added Feature at Buffalo

THE AMERICAN CHEMICAL SOCIETY has been fortunate to be able to arrange a special symposium for the afternoon of Wednesday, September 9, in connection with the Buffalo meeting of the SOCIETY. The symposium will be devoted to a discussion of synthetic rubber. E. R. Weidlein, technical consultant will speak on "Progress of Synthetic Rubber Production", Albert L. Elder, Materials Division, War Production Board, on "Progress of Butadiene Production", and William H. Dow, president, Dow Chemical Co. on "Progress of Styrene Production".

Fellowships in Medicine and Public Health Offered

THE Commonwealth Fund of New York, 41 East 57th St., New York, N. Y., is offering through the Pan American Sanitary Bureau 15 fellowships for one year's study of public health subjects or postgraduate medical courses. Each fellowship will provide living allowances while the holder is in the United States, travel costs, and tuition.

Conservation of Critical Materials by Use of Alternates[1]

JOHN HORN

Engineering General Department, General Electric Co., Schenectady, N. Y.

FULFILLMENT of the war production program depends in large measure upon industry's ability to find and adopt alternates for a major portion of materials formerly available in ample quantities. It may be interesting to trace the procedure adopted in the General Electric Co.

When conservation orders from Washington are received, they are interpreted first in terms of the company at large and second as they affect particular plants and departments. In cases where the orders involve particular hardships which cannot be overcome immediately, the departmental representatives prepare appeals in accordance with the regulations of the order. The appeals are reviewed from the viewpoint of the common interest of the specific plant and then of the company as a whole.

Our experience has definitely indicated that it is essential both to us and to WPB to handle conservation orders and matters connected with them in a comprehensive fashion.

With materials commonly used throughout the manufacturing units as a whole, the actual conservation effort is usually organized under one or more specialists from the metallurgical staff or under one of the existing metallurgical and material committees which have been operating over a period of years as advisory and standardizing groups. These individuals or committees survey the general situation as regards a particular material or procurable alternate materials and collect all the available information. Tests and experiments are initiated wherever necessary to try out new or modified materials with special emphasis on their adaptability in existing designs with available manufacturing equipment. As soon as the required basic information is obtained, the central coordinator goes over local problems on location, compares notes with his collaborators, and promotes decisions for those changes that hold the best promise. Then follows the initial introduction of the material selected. This sometimes requires execution on a trial basis before a complete switch-over is made.

In general, conservation may be resolved into several distinct classes:

1. By straight substitution involving a direct change from one material to another without any significant modifications in design or application.
2. By reducing the quantity of material used. The problem is often largely one of finding new ways of using and fabricating the material in question.
3. By changing to alternates with a consequent need for changes in design and most likely in manufacturing also.

The latest compilation of the relative availability of materials as issued by the Conservation and Substitution Branch of WPB April 17 shows the following 15 materials in the group of some 67 materials which are designated as those most vitally needed for war purposes and not generally available for other needs. These 15 are alloy steel, including a number of the most prominent alloying constituents of same; aluminum, including scrap; chromium; copper, including scrap; magnesium; nickel, including scrap; tin, including tinplate and terneplate; tungsten, including tungsten carbide; formaldehyde; phenol-formaldehyde resins and plastics; shellac; toluene; tung oil; mica splittings; and rubber, including crude, latex, chlorinated, and synthetic.

All these have a conspicuous place on the long list of materials which have been used freely heretofore in G. E. design and production. Some are more easily replaced than others, especially those used for



The author, John Horn, with samples of armature connections made with low-tin content solders and a motor bearing with lead-base babbitt. General Electric is saving about 200,000 pounds of tin a year by such substitutions.

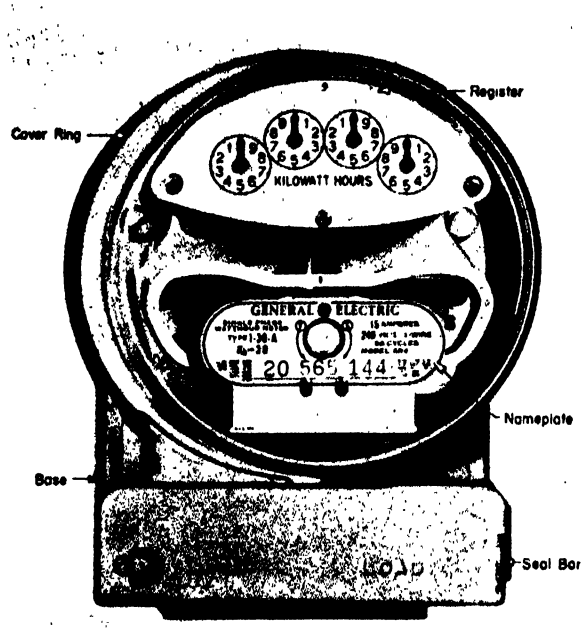
[1] Abstract of paper presented before Northeastern District Meeting, American Institute of Electrical Engineers, Schenectady, N. Y., April 30, 1942.

structural purposes as contrasted with operational functions. The conservation effort has been most effective in eliminating or reducing the consumption of these structural materials.

Aluminum

Use of aluminum in structural parts is largely predicated upon its light weight, its corrosion resistance, and the relative ease with which it can be formed or cast. For most of its structural uses in sheet form or rolled shapes the commonly applicable substitute is steel. For die castings, zinc is taking more and more of aluminum's place although bronze also figures as its substitute.

The largest reduction in the General Electric Co., in the effort to make substitutions for aluminum, covers some 5,000,000 pounds of aluminum which were eliminated in one year's time prior to December 1941 from the production of household refrigerators, a now extinct line. Other yearly reductions in aluminum consumption include 1,300,000 pounds in meter production, 550,000 pounds in industrial control gear, 360,000 pounds in street-lighting equipment, 200,000 pounds in lightning protective devices, and 165,000 pounds in switchgear construction.



In the watthour meter steel replaces punched and stamped aluminum parts for the cover ring, register, seal bar, and bayonet clips. Replacing aluminum are fiber used for the nameplate and die-cast zinc employed for the base.

Tin

Tin comes next to aluminum in respect to quantities consumed for structural use. Most progress has been made in reducing tin consumption in babbitts and solders, although the field of tin-base bronzes offers a promising opportunity for sizeable over-all savings. The principal reason for the less extensive progress with reduction of tin in bronzes appears to be a lack of broad foundry experience with most of the low-tin and tin-free compositions which can be used as alternates. Also the "zinc shakes" encountered in casting zinc-containing alloys figure as obstructions that can be overcome only by improved ventilating provisions which are not always readily installable.

The composition used in the G. E. standard babbitt for rotating apparatus bearings over a period of years is one based largely on tin. The conclusion from investigations and tests to find a lead-base composition to replace this former tin-base alloy is that a lead-base babbitt containing lead, antimony, arsenic, tin, and copper is a satisfactory alternate for use in centrifugally cast sleeve bearings. The resultant saving of tin is about 200,000 pounds a year at the present production rate. Stationary-cast bearings, cast-iron shells with dovetail anchorage, involve a problem of proper pretinning for the use of this same babbitt composition. Active work on this problem and some trial production are in progress.

Solders

For general purpose soldering 40 per cent tin, 60 per cent lead has been the popular composition throughout the company in the past. Some of the alternates such as 20 per cent tin, 1 per cent silver, 79 per cent lead, have been found adoptable with but minor changes in technique, temperatures, and operating schedules. Others, such as the 97.5 per cent lead, 2.5 per cent silver composition, have not proved immediately applicable. To gain further experience, however, a number of compositions between the 20 per cent tin solder down to the no-tin materials have been placed in operation for a final selection of specific varieties to meet the particular requirements of each operation. As an indication of the progress, 10,000 pounds of the 20 per cent tin, 1 per cent silver, 79 per cent lead composition in both rosin-core and solid form have recently been stocked at one of the company's works for replacement of the 40-60 composition.

For electrical joints, particularly those involving reasonably heavy conductors for which 100 per cent tin has been used in the past as a standard to produce strong reliable connections, changes have been made to the use of silver brazing with the exclusion of tin. In the use of soldering pots for hot dipping, good results have been obtained with 90 per cent lead, 10 per cent tin. With but a few exceptions, changes have been made from all other solders of tin contents that exceed the 30 per cent tin limit to low-tin compositions which are being tried out in various uses to establish the lowest limits for regular production.

In soldering leads to high-speed commutators pure tin, however, appears to be the only material that will give safe joints under the temperatures reached in actual operation. Further, there are several sealing operations on two or three different products which we have not as yet been able to produce with solders of less than 60 per cent tin. Wiping of cable joints represents another operation for which a definite alternate for the 40-60 solder used in the past has not yet been found, and indications are that tin solders with less than 38 per cent tin cannot be worked in a practical way to produce reliable nonporous wipes. Certain tinless solders are being explored.

Substitutions that have been made and those that will be made in the very near future account for tin savings of more than 50 per cent of all the tin that would be required if these alternates were not in the picture.

Alloy Steel and Copper

Alloy steel and copper are both very large-usage materials in the company. Alloy steels can hardly be discussed in a general review of substitution of the present character because the varieties are too numerous and any of these may in turn be replaceable by several other compositions.

Wherever copper serves as a conductor it can be replaced in rare instances only. Any conservation effort on copper reduces itself almost entirely to a search for the most economical utilization of the very smallest quantity of copper that will do the job. A good many former applications of copper for nonconductor uses have been taken over by steel, malleable iron, terneplate, brass, bronze, and zinc. There are also a number of applications of copper and copper alloys in connection with transformer, oil circuit bushings, and the like where it is used because of its nonmagnetic properties to avoid stray currents and objectionable local heating. To conserve copper in such uses, parts have been moved far enough away from the electrical conductors to prevent the undesirable effect. In several instances, however, this remedy has proved to increase the size of the complete apparatus to such an extent that the over-all quantity of copper and other critical materials consumed would be increased.

The statement in the foregoing that copper for conducting purposes can be replaced only in rare instances may shortly

need to be modified. Transformers are on order in which 150,000 pounds of silver will be used in place of the copper. The experience with these units and with silver bus bar installations in certain industrial plants may disclose interesting possibilities.

Chromium and Nickel

Chromium and nickel have a special importance in their combination as an electrical resistance material used extensively in control-device resistors and heaters. In some cases where the resistor forms an external part of the device and where sufficient space is available, nichrome wire can be conserved by a change to cast-iron grid resistors. Many applications remain where the resistor or the heating unit forms a compact element which in turn is a component part of a complete assembly. For elements of this nature the search has not yielded a practical alternate material.

Nonmetals

The nonmetallic materials selected from the WPB grouping of scarce critical materials are all components of electrical insulations used extensively in G. E. products. No substitute has been found for formaldehyde, which is required for the manufacture of coil-treating varnishes and allied materials.

Toluene is an ingredient of many varnishes of fast-drying characteristics serving as stickers, binders, or adhesive agents, for instance in built-up mica, and treating materials. Between 100 and 150 such formulations required toluene prior to 1941, but total consumption is now down to less than 50 per cent of the quantity formerly used. The principal substitute is the petroleum derivative known as Solvesso 1.

Tung oil is also one of the important ingredients in certain insulating varnishes. Oiticica oil, a preferred substitute for tung oil, is also scarce. A number of other oils have also been found practical, and synthetic varnishes which do not require tung oil have been developed. The net reduction in the requirement for tung oil is about 35 per cent.

Shellac

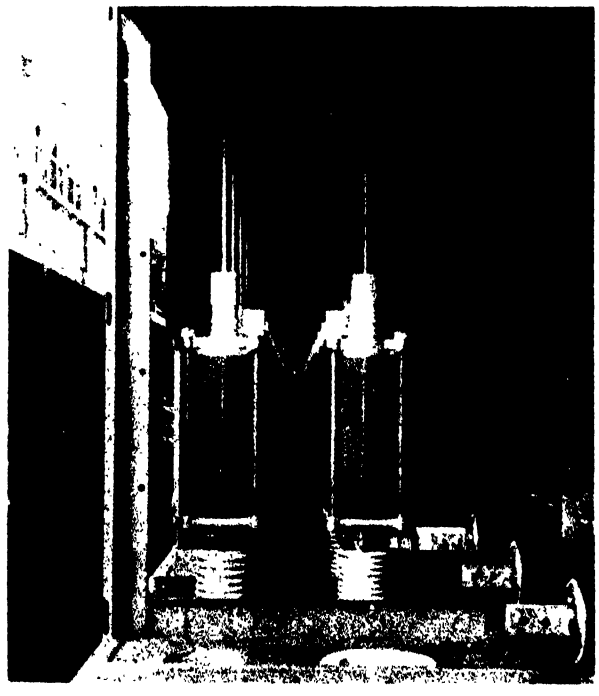
Shellac remains the only known material that forms a satisfactory binder in high-class, built-up mica and in high-voltage insulating cylinders. For the latter, phenolic resins have proved applicable in place of shellac, but with the present shortage of such resins other materials are needed. In a variety of other applications where shellac has formerly been used, synthetic materials are being introduced.

Mica

Mica is still an unmatched material for certain insulation uses in electrical apparatus construction where its outstanding characteristics are actually needed. The grades generally suitable are the imported varieties from India and Madagascar, but considerable quantities from deposits in both North and South America are finding use. The principal problem is in obtaining satisfactory machine splittings as compared with the hand-split imported grades. Wherever possible, mica from deposits on the American continent is used to reserve the imported grades for higher requirements. Otherwise, mica is being conserved through use of improved manufacturing methods, both in production and application, and by reducing the thicknesses of mica to the amounts actually needed where formerly greater thicknesses may have been used as an additional safeguard. In one application such a change from 0.03 to 0.02 inch produced a saving of 3,800 pounds a year.

Rubber

The largest usage of rubber in G. E. products is in insulated wires and cables. After much work in recent years a stage has been reached where reclaimed rubber may be applied in practically the same manner as crude rubber for most insulated wire applications. Work is continually being done to facilitate use of the various synthetic grades. The wall thickness of the rubber insulation is decreased wherever possible.



Cast or fabricated steel replacing aluminum alloy for crossheads (top center) of oil circuit breakers like these conserves about 75,000 pounds of aluminum yearly.

Method to Stamp Garment Out of Nylon Fabric Patented

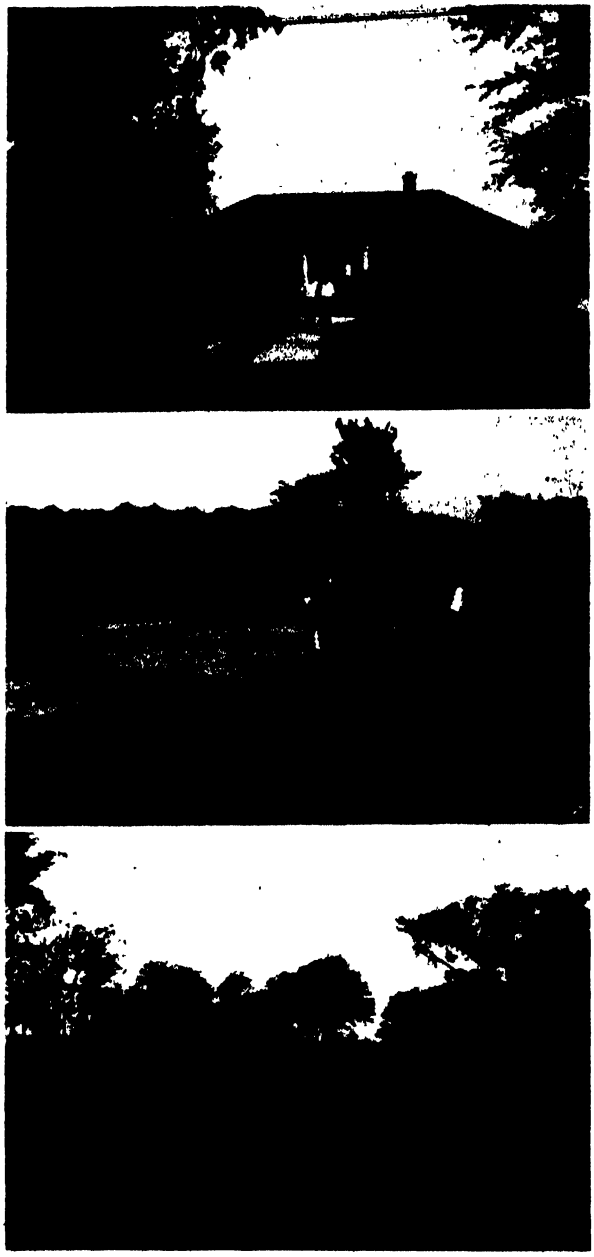
THE process of producing garments from nylon fabric would be speeded and cheapened by a new way of cold-drawing these products, or stamping them out of flat pieces of nylon fabric, according to Patent 2,285,967, granted to Vernal R. Hardy and assigned to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

In making nylon fabrics, the yarns before weaving generally are cold-drawn or stretched to increase strength and fineness. In the new method nylon fabric is used composed of yarns which have not been cold-drawn or only partly. The fabric blank is put into a cold-drawing apparatus, comprising two plates which can be clamped together. One plate carries the fabric, the other a die or mold of the article to be stamped out. The plates are pressed together, and the die molds the fabric to the shape of the garment being formed. Pressure causes the fabric to be cold-drawn into the desired three-dimensional shape, which is permanently set by treatment with hot fluids or steam.

Work on Dried Meats Progresses

WORK expected to save at least half and possibly three fourths of the space in refrigerated bottoms necessary to provide a minimum meat ration for Great Britain at present and, it is believed, most of Europe and Asia after the war is being conducted by the U. S. Bureau of Animal Industry at Beltsville, Md. The bureau is cooperating closely with larger meat packing companies and the scientific laboratory of the American Meat Institute.

At least three fourths of all lean meat and a somewhat smaller percentage of fat meat is water. A score of new products have been devised, but it is admitted that when all the water is removed from the meat, the resulting product is wrinkled, brown, and bad smelling. When water is added, however, it becomes almost indistinguishable from the original meat. The present plan is to take out only about 75 per cent of the water, which results in a product more like the types of semidried meat already accepted by the American people.



Top. The club's Caddy House. *Center.* On the green of the 11th hole. *Bottom.* The 12th hole pictured from the green.

SCIENCE SPEAKS !

SEPTEMBER 7–11
BUFFALO
·A·C·S·

Golf at Buffalo A. C. S. Convention

September 7 to 11, 1942

EVERY chemist attending the meeting of the A. C. S. at Buffalo needs some diversion for relaxation. Those who enjoy a round of golf will find the layout of the three courses made available to AMERICAN CHEMICAL SOCIETY members and their friends both interesting and scenic. The Niagara Falls Golf and Country Club, where the regular A. C. S. Golf Tournament will be held, offers not only an interesting 18 holes of golf, but a 19th hole where you can forget the number of times you shot out the sand trap. No golfing chemist should miss the opportunity to get his quota of ultraviolet and vitamin B.



Top. At the tee of the 16th hole, breastworks from the War of 1812 can be seen at right of the stake in the foreground. *Center.* R. L. Murray, president of Niagara Falls Country Club and member of A. C. S. Golf Committee, putts it out on the 18th green with J. S. Reichert holding the pin and W. Klabunde, vice chairman of Golf Committee, an interested observer. *Bottom.* Niagara Falls Country Club.



Paul Allen, Jr., professor of chemistry at Lynchburg College, Lynchburg, Va., will join the Chemistry Department of the Stevens Institute of Technology, Hoboken, N. J., on September 1.

J. B. Ambler has been appointed district representative of the Pittsburgh Lectrodryer Corp., with offices in Denver, Colo.

Holger C. Andersen, who received his Ph.D. from Harvard in June is now engaged in research in the Vacuum Equipment Department of Distillation Products, Inc., Rochester, N. Y.

S. J. Averill has received an assistantship in chemistry at Williams College, Williamstown, Mass.

Raymond C. Bender has been appointed to the technical staff of the Food Research Laboratories, Inc., Long Island City, N. Y., as nutritionist in charge of the bioassay laboratories. **Mona Oser** will continue in an administrative capacity. Dr. Bender was formerly connected with the Harris Laboratories, Inc., Tuckahoe, N. Y.



Julius A. Berninghaus

Julius A. Berninghaus, general manager of sales of the Organic Chemicals Division, Monsanto Chemical Co., has been appointed general manager of the division. Mr. Berninghaus has been with the company since 1926.

Oliver Bowles has been named chief of the Nonmetal Economics Division, U. S. Bureau of Mines, Washington, D. C., succeeding **Paul M. Tyler** who has joined the Board of Economic Warfare. Dr. Bowles has been with the bureau since 1914.

Captain Max A. Bradshaw, F. A., U. S. A. formerly of the Eastern Regional Research Laboratory, Philadelphia, Penna., reported for active duty at Camp Lee, Va., on June 15. He is assistant plans and training officer on the staff of **Major General James E. Edmonds.**

Rex H. Bradt, consulting chemist in process development work, formerly of Battle Creek, Mich., has been appointed head chemist of the Midland Ordnance Foundation, in Illinois.

William T. Caldwell, chairman of the Department of Chemistry and dean-elect of the College of Liberal Arts and Sciences of Temple University, Philadelphia, Penna., is one of 13 members of the undergraduate departments to participate in a $10,000 research fund established three months ago by the president. He is making an exhaustive study of the sulfa drugs.

Ernest Campaigne left his position as research associate at Northwestern University on June 1 to accept the position of instructor in preventive medicine and public health at the University of Texas Medical Branch, Galveston, Tex.

H. I. Cramer, Sharples Chemicals, Inc., Philadelphia, Penna., addressed the 25th annual Canadian Chemical Convention at McMaster University, Hamilton, Ontario, Canada, June 2, on "Synthetic Rubber". On July 15 he presented a popular lecture on synthetic rubber at Harvard University under the joint auspices of the Harvard Summer School and the Boston and Cambridge Branch of the American Association of Scientific Workers.

Charles Fournier, at the expiration of his contract with the Urbana Wine Co., Hammondsport, N. Y., has been retained as chemist and production manager.

James H. Fry has given up his position with the Celanese Corp., where he was employed as chemist, to become supervisor at the Chickasaw Ordnance Works in Tennessee.

James L. Gabbard, assistant professor of chemistry, Michigan State Normal College, Ypsilanti, Mich., has accepted a temporary appointment for the summer months with the U. S. Bureau of Mines and is now working in the Electrochemical Laboratory at Norris, Tenn.

Charles L. Gabriel for 22 years connected with the Commercial Solvents Corp., has joined the Publicker Commercial Alcohol Co., Philadelphia, in a technical executive capacity in the development, production, and distribution of chemical products.

Eugene D. Gardner, supervising engineer of the Southwest Experiment Station of the U. S. Bureau of Mines, has been appointed regional engineer in charge of the newly organized Central States Office of the bureau at Rolla, Mo., which will expedite the exploration and development of strategic war minerals.

Francis W. Godwin, assistant director of the Armour Research Foundation, Chicago, Ill., and **John A. Shellenberger,** agricultural biochemist on the foundation staff, are engaged in making an industrial survey of Argentina. They were recently made members of the Asociación Química Argentina. Dr. Godwin recently addressed the British Empire Service Club and the Asociación de Tecnólogos del Rio de La Plata, Buenos Aires, on the subject of "New Methods of Industrial Research".

Grafton B. Hale has been transferred from the Sales Service Laboratory of Penick & Ford, Ltd., Inc., Cedar Rapids, Iowa, to the new Sales Service Laboratory in Atlanta, Ga., as chemist in charge.

C. J. Huelsman, formerly chief chemist for the Hilton-Hawley Co., is now going through a training period at the Procter & Gamble Defense Corp.'s plant in Tennessee, after which he will be a supervisor in the Planning Department at the company's plant at Aberdeen, Miss.



Thomas J. Knapp

Thomas J. Knapp, former traffic manager and assistant sales manager of the Freeport Sulphur Co., has been elected assistant vice president. He was also made assistant vice president of the Freeport subsidiaries, Cuban-American Manganese Corp. and Nicaro Nickel Co., and will supervise the shipment of materials and supplies to Cuba for the

$20,000,000 nickel plant and facilities now being built there.

B. E. Lauer has been on active duty with the Chemical Warfare Service since January 28 and is now assigned to the Rocky Mountain Arsenal in Colorado.



Victor H. Lawrence

Victor H. Lawrence has been appointed general superintendent of the Otis Works of the Jones & Laughlin Steel Corp., Cleveland, Ohio.

Irvin Levin is now associated with the Chemistry Department of the Elec tronics Section of the Radar Laboratories, Signal Corps in New Jersey. He was formerly with the Research Laboratories of Sealtest, Inc., Baltimore, Md.



John W. Livingston

John W. Livingston has been released to the Rubber Reserve Co. as consulting engineer by the Monsanto Chemical Co., and will have headquarters in Washington, D. C. Mr. Livingston has submitted his resignation as vice president and member of the board of Monsanto and general manager of its Organic Chemicals Division.

J. Perry Morgan, formerly assistant professor of chemistry at the Stevens Institute of Technology, Hoboken, N. J., received the Ph.D. degree in chemical engineering at Columbia University in June. He has joined the Development Division, Esso Laboratories, Standard Oil Development Co., Linden, N. J.



David J. Beaver, R. L. Sibley, and Harry A. Merkle

R. L. Sibley, director of research of the Rubber Service Department, Organic Chemicals Division of Monsanto Chemical Co., has been appointed general manager of manufacturing in charge of all production and research activities at Nitro, W. Va. **David J. Beaver** becomes research director of the Rubber Service Department, and **Harry A. Merkle,** production superintendent of the Nitro plant, succeeds **Herman K. Eckert** as plant manager. Mr. Eckert has been named plant manager of Monsanto's synthetic rubber chemicals plant in Texas.

Alamjit D. Singh, a member of the Experimental Engineering staff of the University of Illinois, has been appointed associate chemical engineer at the Armour Research Foundation, Chicago, Ill. He is also technical adviser on chemical obscuration in civil areas for the organization on techniques for the Chicago Office of Civilian Defense.

John T. Staker has been made manager of the recently formed Tire Conservation Department of the B. F. Goodrich Co., Akron, Ohio, and **James E. Carhart** has been appointed as his assistant.

Charles W. C. Stein, who received his Ph.D. at the University of Pennsylvania, has joined the chemical research staff of the General Aniline and Film Corp., Grasselli, N. J. Dr. Stein was formerly employed as an assistant instructor in chemistry at Drexel Institute.

Herman W. Steinkraus has been elected president and general manager of the Bridgeport Brass Co., Bridgeport, Conn.

Walter J. Stewart, formerly chemical engineer at the Williams Mfg. Co., Portsmouth, Ohio, is now assistant superintendent at the Republic Plant of the Vulcan Detinning Co., Pittsburgh, Pa.

J. Edward Todd has been appointed assistant to the dean of the Institute of Paper Chemistry, Appleton, Wis.

Robert S. Weisz has recently received the Ph.D. degree from Cornell University and is now working on electrical porcelain on a Westinghouse research fellowship in the Westinghouse Research Laboratory, East Pittsburgh, Penna.

V. E. Wellman has been appointed manager of the recently created chemical and pigments department of the purchasing division of the B. F. Goodrich Co., Akron, Ohio.

E. C. Williams, vice president and director of research of General Mills, Inc., has joined the board of the General Aniline and Film Corp., New York, N. Y., where he will be responsible for all research and technical developments.

Data Published on Selective Service

BECAUSE of the wide interest in this subject and the need for obtaining trained men for our Production Army, we give below references to information we have published on occupational deferments, including those of men in training. Future developments will be brought to the attention of our readers.

Chemical and Engineering News

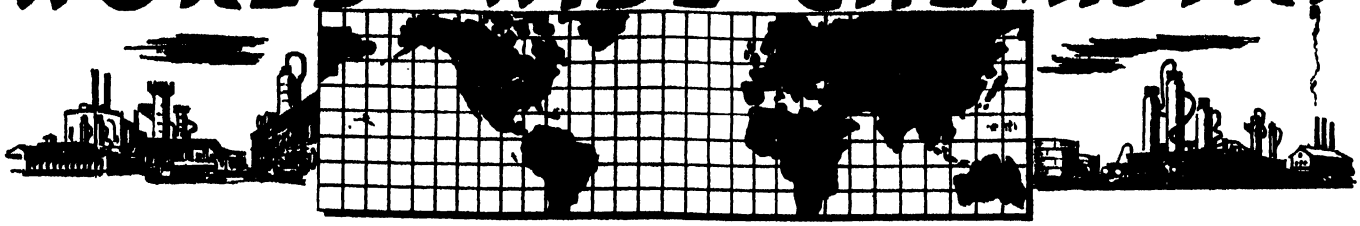
(NEWS EDITION previous to 1942)

Vol. 18 (1940), pages 890, 1127
Vol. 19 (1941), pages 129, 311, 457, 459, 489, 520, 587, 681, 797, 1164, 1412, 1464
Vol. 20 (1942), pages 110, 157, 472, 579–80, 788, 812, 837–39

Industrial and Engineering Chemistry

Vol. 33 (1941), pages 1, 135, 283, 561
Vol. 34 (1942), pages 2, 131, 259, 648

WORLD-WIDE CHEMISTRY



Direct taxation on incomes and profits, and indirect taxation on commodities and services without striking at the necessities of life featured Canada's 1942 budget presented June 23, 1942, by the Minister of Finance, J. L. Ilsley.

The budget was noticeably indifferent to sources of revenue which in past years have featured tax increases, such as tea, coffee, gasoline, motor cars, and other commodities now under rigid wartime control.

New Taxes Are Imposed

The following tariff changes of chemical interest, however, were made: The tariff is eliminated on crude cottonseed oil for canning fish and on magnesium scrap fit only for remelting, fuel injection pumps and nozzles for Diesel and semi-Diesel engines, wick for the manufacture of wax candles or tapers, net floats of aluminum, glass, canvas, cork, rubber, or cellulose acetate, and on resin or rosin.

Under a new item, duty-free entry is provided from all countries for machinery, apparatus, and parts for use in producing oil from shales, for operating oil sands by mining, and for extracting oil from such sands.

Amendments are made to the items covering prepared or preserved vegetables, orange juice, grapefruit juice, and silicate of soda, to facilitate administration.

Industrial Waters of Canada Are Studied

The Dominion Bureau of Mines in a recent publication has reported analyses of Canadian natural and treated waters, begun in 1934. The investigations constitute a systematic study of the various waters of Canada in use, or available for use, either domestic or industrial. Information has been collected and correlated about the water needed by industries on the one hand and the quality of Canadian waters on the other. Complete chemical analyses of surface waters are given; also partial analyses of civic water supplies.

Industrial problems confronting large users of water are discussed and a water-hardness map of Canada is included.

Gasoline Rations Are Further Reduced

Gasoline rationing regulations have been further tightened. Tourists entering Canada are now given only four ration coupons; each permits the purchase of four imperial gallons of gasoline.

Ontario Research Foundation at Toronto Aiding War Effort

More closely allied to the Mellon Institute type of research institution than any other in Canada, the Ontario Research Foundation at Toronto is financed by income from its original endowment and by fees which it charges for services. The Province of Ontario contributed dollar for dollar with industry to create the main fund. The investment account of the foundation now totals $3,564,484.

The Director of Research reports that the foundation has become increasingly concerned with problems associated with the war. Much work has been done for the Inspector General, chiefly on gages. In biochemistry it has been confirmed that vegetable-tanned leathers which have a high acidity in the finished state deteriorate more rapidly than similar leathers in which the acidity has been kept within certain limits. Work is proceeding on abrasion tests in relation to wear of leather. Production of organic acids from sugar by chemical and biological methods has been continued. Foodstuffs, including bread, have been studied for vitamin content.

Pathological, entomological, and soil studies of interest to farmers have been carried on in the agricultural laboratories. In the textile laboratories it has been possible to maintain a reasonable balance between testing, short-term problems, and more fundamental research. Cooperative work with industry has been done on silk problems. Mineral oil substitutes for more expensive vegetable oils have been tried in the processing of wool.

In chemistry, service problems for industry predominate, and vary from steaming of horizontal retorts, in a gas plant, to investigation of defects in dinnerware. Facilities of the metallurgical laboratories have been used for gage-testing, heat-treatment, physical testing, and metallography. Long-term research programs have been halted for the present.

Medal Awards Made for Research

The Royal Society of Canada has awarded the Flavelle Medal for original research of special and conspicuous merit to J. H. Craigie, head of the Dominion Rust Research Laboratory at Winnipeg, Man. The work which won him the medal was in connection with the control of wheat rust, which has cost the farmers of western Canada an average annual loss of $30,000,000.

L. M. Pidgeon, National Research Laboratories, Ottawa, has been made a Fellow of the Royal Society of Canada for his development of a method now in commercial use for the reduction of metallic magnesium from its ores. W. D. Macfarlane, head of the department of chemistry at Macdonald College, McGill University, has also been named a fellow.

The Society of Chemical Industry (Canada) Medal has been given to R. A. Witherspoon for his outstanding achievements in the electrochemical field with Shawinigan Chemicals Limited, at Shawinigan Falls, Que.

Expansion Noted in Chemical Industries

Official figures for 1941 recently published show a production value of chemicals and allied products of $268,500,000, as compared with $193,900,000 in 1940. Some 23 new units for the manufacture of explosives and intermediate chemicals were brought into operation during the year. Practically every branch of the chemical industries showed an advance and some reached new record outputs.

EDITOR'S NOTE. Those interested in further details should address the correspondent whose name and address appear for each country, and enclose sufficient international coupons to prepay the reply. United States stamps should not be sent.

Heavy chemicals increased about 59 per cent, coke production 5 per cent, artificial abrasives 48 per cent, soaps 23 per cent, paints 27 per cent, petroleum refining 45 per cent.

Striking increases were recorded in 1941 for both imports and exports of chemicals and allied products. Imports at $65,400,000 were $13,600,000 higher than in 1940, with the principal increases being in acids, inorganic chemicals, dyeing and tanning materials, and in paints and pigments. About 82 per cent of all purchases came from the United States and 14 per cent from Great Britain.

The value of exports at $58,700,000 was almost double the corresponding figure for 1940. This marked a threefold gain in exports to the United Kingdom and a 50 per cent gain in exports to the United States.

New Chemicals Controller Appointed

The Minister of Munitions and Supply has appointed Edward T. Sterne, general manager of Sternson Laboratories, Brantford, Ont., as Chemicals Controller, in succession to J. D. Lorimer, resigned. Mr. Sterne has been with Allied War Supplies since its inception in July 1940. Prior to that he was with the explosives and chemicals production branch of the Department of Munitions and Supply. During World War I he was chief chemist of the Imperial Munitions Board explosives plant at Trenton, Ont., and later went to England as foreign technical representative of the Shawinigan Water and Power Co.

S. J. Cook

140 Broadway Ave.
Ottawa, Canada
July 16, 1942

Continental Europe

Germany

I. D. Riedel–E. de Haen A.-G., reports that employment in its pharmaceutical works was maintained during 1941. Sales in the home market increased, and exports to continental countries were also higher. P. Beiersdorf & Co. A.-G., reports for 1941 that several cosmetic products were made in small quantities only, but the total of sales was unchanged owing to larger demands for pharmaceutical specialties. Word from other German pharmaceutical manufacturers indicates an increasing demand for synthetic products that can replace imported drugs, especially from other European countries which now, having exhausted their prewar or preoccupation stocks of imported drugs, require additional supplies of medicines. The manufacture of cosmetics has been reduced, and the public has been disappointed by some of the substitutes offered to them.

War Stimulates Demand for Flavoring Essences

Production of flavoring essences for foodstuffs and drinks has greatly increased during the past decade and particularly since the beginning of war. The present output has been estimated at over 80,000,000 marks. Although about 500 firms are engaged in the manufacture of flavors and aromas of different kinds, half the production is provided by the 15 largest firms. The 400 small firms in the trade produce only 10 per cent of the output. The flavoring industry has undergone a considerable expansion since the liquor distillers have had to change over to the manufacture of nonalcoholic hot and cold drinks. A large demand also exists for aromas suitable for bakers and pastry cooks, and more than one third of the total production is used for making sweets. The flavors were so bad in many cases that they had to be put under control on January 15. Since then many products seem to have disappeared from the market, but the demand for genuine articles remains very large.

Vitaminized Jams Provide Market for Yeast Products

To replace vitamins destroyed in the normal process of jam making, German factories have followed government instructions and included synthetic vitamin products in their preserves. This outlet is reported to provide a valuable market for vitamin B obtained in the form of yeast products from wood by saccharification. In cooperation with the Supreme Army Command, a new process has been developed for the manufacture of dry pulps for jam making which, it is claimed, allows conservation of the natural vitamin A and C contents during prolonged storage.

Substitutes Sought to Alleviate Fat Shortage

The extreme shortage of animal and vegetable fats has caused German chemical manufacturers to look for possibilities of saving fats. Even the comparatively small quantities of fats and oils required for the pharmaceutical industry are to be reduced by increased application of aqueous emulsions, mucilage, jellies, colloidal silicic acid, and aluminum hydroxide paste. These replace fats and greases in cosmetics.

The soap industry, which before the war absorbed something like 200,000 tons of vegetable and animal fat products, has been hit by the necessity to make full use of edible fats for the manufacture of margarine. Output of waste fats has declined consequently, with the result that increased use must be made of cleaning powders. These do not in general contain more than 3 per cent of fat, and this small percentage is made up of synthetic products derived from paraffin or naphthalene. Chestnut flour and other vegetable materials are added to the powders to facilitate formation of a lather, while the remainder of the cleaning powders usually consists of soda or silicate and kaolin, pumice, or other abrasive fillers. Many hundred preparations of this kind are on the market.

Devices for Saving Oil Suggested In Paint Trade

The paint trade, normally the third of the large consumers of vegetable oils, following margarine and soap factories, has been using increased quantities of synthetic resins. It is thought that important savings in the use of oils in the paint trade can be obtained by technical changes. Thus drying power may be increased by dehydration or separation of glycerides into a drying and a nondrying part, while another proposed device for saving oil is an increase in molecular size of the pigments to reduce the amount of oil required to make the paint film impermeable.

Area under Oil-Yielding Plants Is to Be Increased

Great efforts are being made to increase the acreage under linseed, rape, poppy, safflower, and other oil-yielding plants in Germany as well as in countries of southeastern Europe under German influence. In Germany next year 750,000 acres are to be planted with rape and 125,000 acres with poppy. This year 500,000 acres have been set aside for rape, and production of flax is to reach 50,000 tons. A catalytic process has been developed to speed up the removal of wood constituents surrounding the flax fiber. It is hoped to produce a special type of linseed which gives a short but strong fiber and at the same time yields large quantities of oil, but at present agricultural research stations are far from producing a satisfactory plant.

Salzdetfurth, Potash Firm, Reports on 1941 Activities

Salzdetfurth, second largest potash producer in Germany, reports for 1941 that potash production again increased, but sales were somewhat smaller than in 1940. While average prices for potash salts were slightly better, there was a change in the direction of demand towards the higher priced products. Last year

Salzdetfurth invested 10,800,000 marks, as compared with 7,800,000 marks in 1940, for the extension of production facilities. Part of this was probably caused by increasing demand for manufactured products, but the chief reason for the large new investments in the German potash industry is found in the desire to make more use of mechanical processes for handling and manufacturing potash salts. A new salt mine was opened this year, while existing salt mines had, owing to special reasons, to reduce output and sales but worked satisfactorily. Salzdetfurth holds important interests in the German copper mining industry as well as in lignite mining and metal manufacture where output figures were generally higher in 1941. The metal mining operations have been extended to other European countries, but nothing is known about the profitability of these activities. Accounts of the Salzdetfurth combine are usually made to fit with dividend proposals and do not say much about the financial side of the company's operations.

I. G. and Rütgers Join in Forming Fluorspar Company

Demand for fluorspar has risen greatly since the beginning of the war. In Thuringia, where the district of Ilmenau is now the largest fluorspar producer in the country, a valuable colorless material has been found which is used for the manufacture of optical lenses in the place of foreign fluorspar imported before the war. I. G. Farbenindustrie and Rütgers, two chemical companies with considerable interests in fluorspar mining, have formed a new joint company, Flusspatwerke G. m. b. H., with a capital of 800,000 marks. This company is to take over the fluorspar properties of the two founders and to engage in mining and manufacture not only in Germany but in other European countries and in non-European territories dependent on European states. In the present circumstances this seems to refer to French North Africa.

Chemistry of Furs Investigated at Munich

A Fur Chemical Laboratory has been established at Munich by the Reich Center for Research on Fur-Bearing Animals and Furs. It is to investigate the efficiency of chemical and other products used by furriers and advise the industry on merits of different products.

Cellulose Factories Form Research Company

Forschungsgesellschaft für Faserrohstoffe, m. b. H. (Research Company for Fiber Raw Materials, Ltd.) has been formed by about 50 firms with interests in the cellulose, paper, and cellwool industry for the investigation of raw materials not yet in industrial use. The new company is reported to be especially interested in utilization of the large reed banks in the delta of the Danube River.

Low-Temperature Carbonization for Gasworks and Power Stations

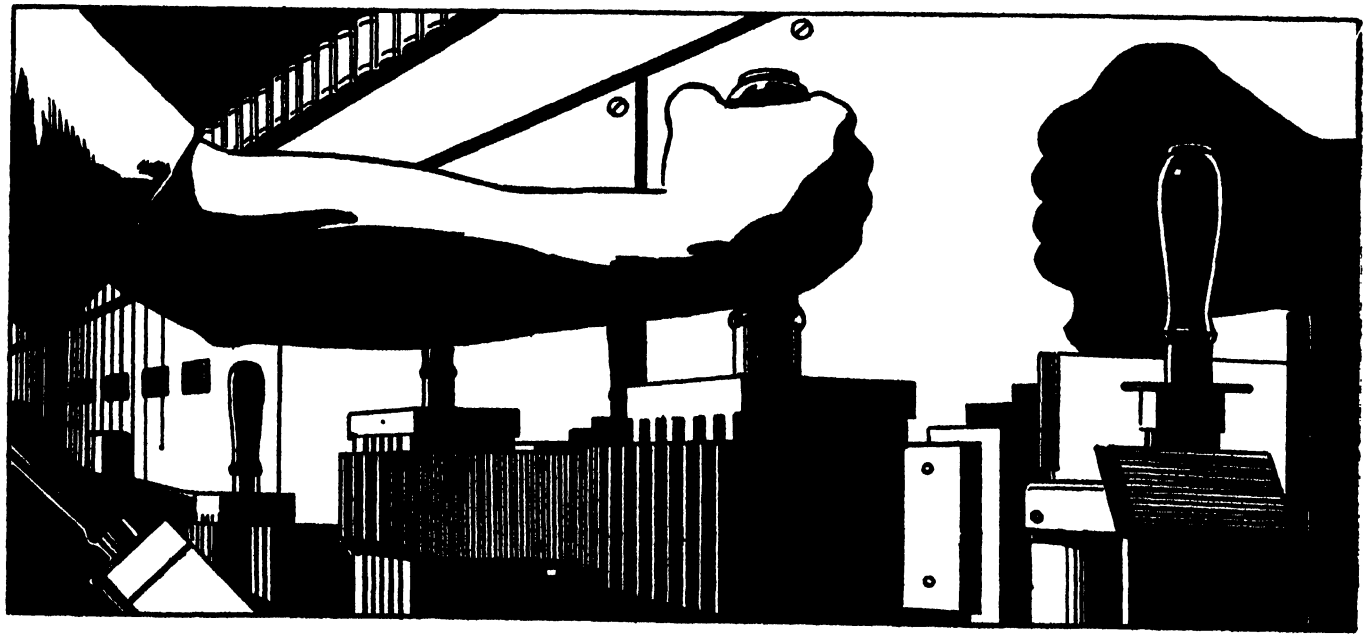
Low-temperature carbonization has been encouraged in Germany because of the larger output of liquid fuels compared with high-temperature carbonization, with the result that new outlets had to be developed for low-temperature carbonization coke and gas. They are used for the production of energy, and experiments are under way for a more general application of low-temperature carbonization to coal and lignite before they are burned in power stations. Increased use in gasworks has been hindered by the fact that the optimum size of a low-temperature carbonization plant is at least 1,000 to 2,000 tons of coal a day, so that smaller gasworks cannot make advantageous use of it unless they are grouped together in larger regional units. The combination of gasworks as producers of low-temperature carbonization coke and electricity stations as consumers may open new possibilities.

Southeastern Europe Provides Magnesium Sources for Germany

Germany has two sources of raw materials for the production of metallic magnesium at her disposal—the magnesium salts from the potash mines in Hanover and Saxony and the magnesite deposits in Bavaria and Austria. The Austrian magnesite deposits in particular provide a valuable raw material, not only for the magnesium industry but also for the manufacture of refractories and other industrial products. The companies interested in magnesite mining in Austria have been cooperating for some time by the formation of a research company. A new enterprise, Südost-Magnesit-Gesellschaft, now has been formed with a capital of 1,000,000 marks. Several magnesite producers are interested in the new company which is to buy, rent, and operate magnesite mines, apparently not only in Austria but also in the adjoining territories of Yugoslavia and possibly even in Greece.

Yugoslavia

Dynamit Nobel, the important chemical producer at Bratislava, Czecho-Slovakia,



which is now under the control of German interests has formed a subsidiary, Dynamit Nobel, Belgrade, with a capital of 5,000,000 dinar for the sale in Serbia of chemicals, lacquers, explosives, and fertilizers. The new company is also to advise farmers about the advantages of chemical fertilizers.

Czecho-Slovakia

Prager Chemischer Verein, one of the leading producers of chemicals in the Protectorate of Bohemia and Moravia, reports for 1941 a 30 per cent increase in sales. Production and sales of inorganic chemicals were slightly better than in 1940, while output of organic products has been greatly increased through the opening of a new plant where pharmaceutical preparations are being made. Production of paper and cellulose has been regulated by agreement, and sales of pharmaceuticals increased owing to the marketing of several new specialties. The department for the manufacture of substitute products met wartime requirements. Several important export contracts were received, and subsidiaries in other countries worked well, with the exception of the plant in Yugoslavia. The chemical industry in Czecho-Slovakia appears from other reports to have benefited from the movement of the industrial plant to the eastern provinces of Germany. Efforts have been made by the German authorities to make full use of producing facilities in the Protectorate.

Rumania

The Rumanian Company for the Production of Romacol has been formed with a capital of 40,000,000 lei by Creditul Minier, the Rumanian Chemical Works, and the Rumanian Wire Industry Co. The new company, which will manufacture synthetic rubber from by-products of the Rumanian petroleum industry, is to erect two factories and has been authorized to ask the Minister of Finance for credits up to a total of 100,000,000 lei. The Minister of Finance is to receive 12,000,000 lei of founders' shares. The government credit is to be repaid within three years after the beginning of production.

Hungary

Great efforts have been made in recent years to build up a large aluminum industry in Hungary using the local bauxite deposits, but these plans have made slow progress because of the difficulty of procuring construction materials and the lack of fuel and electric power. Since the return of the northern part of Transylvania to Hungary, plans have been prepared for the generation of electricity in the Carpathians. The Hungarian Bauxite Mines Co., which was formed in 1937 and has been producing bauxite since 1939, is building an alumina plant with a capacity of 20,000 tons and an aluminum refinery for 10,000 tons a year. The company has the technical, and apparently financial, support of Dürener Metallwerke, the German light metal firm, well-known for the development of duralumin.

The first alumina plant in Hungary was built by the Bauxite Industry Co., a subsidiary of the Swiss Bauxit-Trust A.-G., which supplies the material to the aluminum refinery at Csepel, now reported to be capable of an annual output of 3,000 tons, and the smelter of Hungarian General Coal Mining Co. at Tatabanya, credited with a yearly capacity of 2,000 tons. Another alumina plant is to be built by Danube Valley Alumina Industry Co., another subsidiary of Bauxit-Trust A.-G., which was formed only last year.

Total investments for the extension of the Hungarian light metal industry are stated to be 24,000,000 pengö. Bauxite production in 1940 was reported to be 564,000 metric tons and an increase by about 50 per cent was said to have been reached in 1941, but most of this tonnage was exported to Germany. The alumina and aluminum plants now being built will use only a small portion of the Hungarian bauxite output.

Finland

Great efforts have been made in Finland to increase the output of nonferrous metals and, since the recovery of the part of Karelia ceded to Russia in 1939–40, Finnish and German engineers have been active on the repair and expansion of mines in that region. Although little detailed news is available about the progress of the metal mining activities in this and other parts of the country, it is reported that a plant being erected by Outukumpu O. Y. at Pori, which is the first of its kind in Finland, will supply 400 tons of nickel a year after its completion. Meanwhile the company is producing copper-nickel ore at the rate of 18,000 tons annually, but most of this at present is probably sent to German refineries.

Finnish Charcoal Plant to Produce Turpentine, Methanol

A large charcoal plant capable of an annual output of 30,000 cubic meters of charcoal is to be built in Finland, and special attention is to be paid to the recovery of by-products such as wood tar, turpentine, and methanol. Production of charcoal in the Finnish forest regions has made considerable progress because of the shortage of imported fuels, and charcoal is being used on an increasing scale as a gas generator fuel for motor vehicles and coastal vessels.

Government Organizes Exploitation of Peat Bogs

The large-scale exploitation of peat from the vast bogs in various parts of the country is to be undertaken under directions by the Finnish Government. A semiofficial company is to be formed by the government to carry out all industrial activity in connection with the utilization of the peat. Research conducted in other countries of Continental Europe has been investigated, and it is thought possible that peat products will provide Finland with some of the fuels for ordinary furnaces and generators which can no longer be imported. Attention has been paid to the production of peat coke and peat tar, and the Finnish Council of State has authorized the Ministry of Supplies to spend 350,000 Finnish marks on experiments for the manufacture of lubricating oils from peat. This has not yet been attempted in other countries, although it is known that in experiments in Germany liquid or viscous products have been obtained by low- and high-temperature carbonization of peat. This opens up the possibility of producing a lubricant substitute from peat.

Sweden

Increasing difficulties in importing foreign raw materials for use in Swedish industries, which have been noted ever since the occupation of Norway and have become especially noticeable in the past six months, have given rise to the development of several local substitutes. Glycerol is being produced in a cellulose plant in Norrland from ethylene glycol. Pine oil used for the flotation of copper concentrates has been replaced by a product called "pinol" which is prepared from turpentine sulfate. A pine oil of Swedish origin, on the other hand, is being used instead of oleum for the treatment of apatite slick as used in the manufacture of phosphatic fertilizers, since imported rock phosphates are no longer available.

Big Increase in Swedish Fodder Cellulose Production

Under an agreement concluded between the Industrial Commission acting for the Swedish Government and the association of cellulose producers, the production of fodder cellulose is to be raised to 550,000 tons in the year ending May 1943. This means that the output reached in 1941–42 will have to be nearly doubled in the next 12 months and substantial extensions to existing plant will be necessary, as the

wood pulp requires special preparation before its chemical treatment for feeding purposes. Prices have been left unchanged, but may be altered in the future. Meanwhile it is announced that several manufacturers have begun to manufacture compound feeding stuffs with a basis of fodder cellulose to which organic or inorganic substances are added to give a more or less balanced diet.

The Netherlands

Allgemeene Kunstzijde Unie, the Dutch rayon producer who maintains intimate connections with the leading German rayon and cellwool combine, reports that the output in 1941 was slightly higher than in the preceding year, but most of it was sold in Holland and exports seem to be of less significance than before the war because of the lack of natural fibers in the local market. Staple fiber rayon has been marketed as a substitute of wool and cotton. Output of casein wool has been considerably increased; the experimental station at Arnhem was closed before the end of 1941 as the new factory at Ede had been opened. The structural foundation has been laid for the new cellwool factory, and it is expected that the production of cellwool will begin in the autumn of 1942, provided the machinery is supplied in time. The production of straw cellulose which is to provide the raw material for the cellwool factory will not, however, commence this year, so that at the beginning other raw materials will have to be used.

Belgium

Rayon production in Belgium was about 5,500 tons in 1941, and since imported fibers become even more difficult to procure, great efforts are being made to increase the output. By utilization of all available plants and extensive rationalization measures the output capacity could be increased by about 20 per cent over 1941. Cellwool production was at a rate of 3,200 tons annually early this year, but a new plant which will produce 750 tons per month by the end of this year is reported to be ready for production. Even then Belgium will be unable to produce more than a fraction of the normal consumption of textiles. Development of the casein wool production has been held up by raw material difficulties.

France

Since the Armistice French commercial and industrial enterprises have generally drawn upon available stocks to the maximum extent, with the result that most raw materials are difficult to supply while industrial companies are in possession of large amounts of liquid funds for which new outlets must be found. In the French chemical industry this trend has been accelerated by the transfer of fixed assets to German control (as, for instance, by the sale of French dyestuffs factories to the I. G. Farbenindustrie-controlled Francolor company) and by the liquidation of French holdings in eastern European industries. The balance sheets recently published by leading chemical producers show a satisfactory degree of liquidity, but the dividend policy remains cautious.

Most producers prefer to use their funds for investments in new enterprises for the utilization of local raw materials. Chemical producers play a leading role in the development of new deposits of coal, lignite, shale, peat, potash, sulfur, etc. They have engaged to a growing extent in the production of synthetic fuels, artificial rubber, and synthetic fibers, mostly under variations of German patents, and much interest is also being shown for plastics which can take the place of imported metals, vegetable oils, etc.

Great capital requirements have been reported by companies with interests in the light metal industry which has received large orders from Germany. Pyrites and iron sulfides in southern France are to be exploited by St. Gobain. Production of cellulose from reed and sugar cane has been begun by the new Société Française de la Cellulose, Marseilles. Output of most synthetic products, however, is still rather small, as expansion has been delayed by the lack of construction materials. The more ambitious enterprises in the field of synthetic production will not be completed before 1944 or 1945. In the field of synthetic fibers, however, substantial progress is anticipated for the current year. According to plans, the output of rayon is to be raised from 31,000 tons in 1941 to 45,000 tons in 1942, while that of cellwool is to be increased from 21,000 tons in 1941 to 40,000 tons in 1942. The casein wool factory at Wasquehal is reported to produce 40 tons a month at present. There is a possibility that the production of nylon, which has been carried on for some time, will be followed by production of other fully synthetic fibers of German type.

Spain

Sociedad Iberica del Nitrogeno, the Spanish company which was formed by the iron producer Duro Felguera, the Union Espanola de Explosivas, Solvay & Co., and several Spanish financial institutes, according to recent reports, will increase its capital to 70,000,000 pesetas. All the available funds will be used for the extension of the plant now in course of erection at La Felguera so that the production can be raised to 10,000 tons of ammonium sulfate by next summer. The company has concluded an agreement with Air Liquide, the French owner of the Claude patents, and Société Chimique de la Grande Paroisse, a subsidiary of Air Liquide, for the supply of equipment. The exact date on which production will begin depends largely on delivery of the machinery by the French firms. Sociedad Iberica del Nitrogeno will also build a plant for utilization of waste gases from the smelters of Duro Felguera, and special attention is to be paid to the recovery of valuable by-products.

Plant to Manufacture Chromates to Be Built

Societa Electroquimica de Flix has been authorized by the Spanish Government to erect a plant for the manufacture of chromates and dichromates. Local raw materials are to be used in the new factory.

Italy

Azienda Nazionale Idrogenazione Combustibili, the Italian hydrogenation company that uses chiefly crude oil from Albania which cannot be refined by the ordinary methods, reports in its annual statement that it is producing lubricating oils, transformer oil, and paraffin wax in addition to aviation and motor fuels, gas and fuel oil, and butane, so that the average proceeds in hydrogenation works now amount to 90 per cent of the raw material intake. Conditions of production are described as satisfactory, but raw material prices and costs have been rising, and the company has been compelled to draw upon credits granted by Banca d'Italia. In the future no more credits are to be used as the Italian Government has decided to give subsidies to oil companies.

New Methane Gas Company Formed in Italy

Societa Italiana per il Gas (Italgas), the large company which supplies the towns of Rome, Genoa, Turin, Florence, and Leghorn with gas, reports that a new company, Societa Mineraria Rosolina, has been formed for development of methane gas sources at Rosolino d'Adda. The daily production capacity is 8,500 cubic meters.

Egyptian Beeswax Imports Gain 150 Per Cent in 1941

ACTIVE demand for Egyptian beeswax led exports in 1941 to a total of 4,393,500 pounds, compared to 1940 shipments of 1,749,320 pounds, an increase of 150 per cent. At the close of 1941 and during early 1942 pure beeswax was quoted at $790 per ton f. o. b. Egyptian ports.

United Kingdom Committee Ponders on Postwar Problems

APPOINTMENT of a central committee, representing export groups, to anticipate postwar trade problems has been announced from abroad on the part of the president of the United Kingdom's Board of Trade. Chemical and allied industrial groups are strongly represented in the committee.

The chemical trade of the United Kingdom, along with other groups, has felt the losses of the recent war years very heavily. Many markets have been entirely closed, and others cut off by shipping priorities. The United States Lend-Lease Act has directly affected the export situation of England's trade in this field, and a virtually complete reorientation of export policy has followed from this and other factors.

Among outstanding problems of postwar importance, it is said, are establishment of a coordinated export trade program among nations and concentration of the United Kingdom's export trade on such products as promise to represent an essential phase of world markets in the postwar period. It is foreseen in this connection that fine chemicals, plastics, and similar materials may assume a larger place, with less emphasis on the heavy chemicals.

Sulfur Surveys Fail to Benefit India Greatly

VARIOUS obstacles, patents, lack of plants, have acted to deprive India of any great commercial benefit to date on the extensive surveys and other activities which have been conducted there on sulfur, through the interest of the Indian Board of Scientific and Industrial Research. Lack of interest on the part of industries producing waste gas has been a factor in the situation also.

India's Geological Survey located sulfur deposits capable of producing half a million tons, whereas it had always been the belief that India had no such deposits. A shortage in this supply might stimulate activity, it was felt.

Fertilizer Costs Fixed by Egyptian Government

THE Egyptian Government has fixed prices and averaged transportation costs to assure uniform regulation for the whole country. To reduce costs to the farmer, a sum was taken from the accumulated profits of the nitrate pool and applied to the cost of the fertilizers to be sold. Fertilizers are restricted by regulation to the following crops: maize and millet, potatoes and vegetables, sugar cane and rice. In the case of sugar cane, distribution of fertilizers earmarked for that use will be restricted to areas leased to the General Sugar and Refinery Association of Egypt.

Gum Exports in Sudan Decline

THE Anglo-Egyptian Sudan, imperiled by the present turn of the war in the Mediterranean area, is an important source of gum arabic, and this product shares with cotton as the Sudan's principal export.

War conditions leading to a loss of foreign markets has decreased total exports reported for 1941 to 16,000 tons for all three varieties, as compared with 22,000 tons total in the preceding year. A rise in prices for all varieties, the largest increase being for bleached gum, was reported for 1941. Exporters in the Sudan at the close of the year quoted gum arabic at about $11 per 100 pounds c. f. New York.

Annual exports normally are reported at 20,000 to 25,000 metric tons, the bulk being made up of hashab, collected by tapping gum trees over vast tracts of wild country. An inferior type, talha gum, grows in the eastern Sudan and is exported in smaller amounts. Most gum is sold at public auction in small local markets.

Exports from Brazil for War Use Increase in 1941

BRAZILIAN chemical exports for war use increased during 1941, and imports of such raw materials decreased in volume but rose in value, the U. S. Department of Commerce reports. Principal chemical products exported during the year were offset by imports which included mineral salts, caustic soda, and other inorganic chemical products totaling 85,306 tons, compared with a previous figure of 93,333 tons; pharmaceutical and organic chemical products, 42,420 tons against a previous 45,627 tons; aniline dyes, essences, and other primary synthetic materials, 6,682 tons, a gain over the former 4,773 tons.

Britain Expects Controls to Continue after the War

FORMAL government controls over Britain's chemical industry are anticipated for some time after the war, it is indicated in expressions from the industry in the United Kingdom. Operation of such controls at present is dealt with in reports following the 19th annual meeting of the British Chemical and Dyestuffs Traders' Association, held in May.

To facilitate the work of the association a cross-sectional group was established for each of the main chemicals, with a standing committee for each such group to work closely with the government control office. These industrial groups have acted at the request of the authorities in distribution of a number of chemicals imported under Lend-Lease, supplying also, under voluntary arrangement between producer and distributor, essential industries on a rationed basis.

Although the export volume has suffered, it is reported a fair amount has gone out for approved destinations and for essential requirements. At home the resourcefulness of the trade in finding or adapting substitutes for scarce materials has been noteworthy.

Chilean Sodium Sulfide Output Reduced by Decree

FORMAL decree that sodium sulfide is being overproduced has been announced in Chile. Two plants engaged in this production are barred from increasing their output, while other factories may not make the substance at all without special government authorization. Principal importers from Chile in this field are Argentina, Brazil, and Peru.

Lime Production in Mexican State Gains

CHIEF lime-producing center of Mexico, itself the leading producer in this hemisphere, and second probably only to Egypt in world-wide output, is the small state of Colima, about two thirds of the way down Mexico's west coast. Its area of 12,009 square miles and population of 61,923 accounts for 20 per cent of Mexico's lime-producing trees, stimulated by a humid tropical climate, volcanic soil, and other factors. Lime production in that area outranks sugar, coquito nuts, coconuts, rice, and other crops in importance. Dating from 1900, lime cultivation in Colima has attained an average of 25,000 tree plantings annually since 1936, and in 1941 about 40,000. It is estimated the state now has 200,000 to 250,000 trees.

Sulfur-Bearing Rock Found in Baluchistan

DEPOSITS aggregating 85,000 tons of sulfur-bearing rock averaging about 60 per cent sulfur content, have been discovered in Baluchistan by the Geological Survey of India.

An additional 300,000 to 400,000 tons averaging 35 per cent sulfur content can be obtained by mining at another locality, it is believed. Importance attaches to the report of these discoveries as sulfuric acid can be manufactured directly from sulfur of 60 per cent content, and pure sulfur can be extracted from this rock sulfur by a simple process.

Use of Paints in Australia Curtailed

AUSTRALIAN authorities have limited use of paints containing imported white or chrome pigments, synthetic resins and solvents, or mineral turpentine to defense purposes, both as to manufacture and supply. Other paints manufactured for civilian use have been curtailed 50 per cent of normal production.

POTOMAC POSTSCRIPTS

WPB Activities

To salvage approximately 100 million pounds of essential chemicals, WPB has asked manufacturers of war equipment to start immediately programs for the recovery and reclamation of wasted spray paints. Most of the things that come off war industries assembly lines must be mass-painted by spray-painting processes. This is where waste, usually called "overspray", occurs. It is known that about 30 per cent of the paint and finishings used in these processes can be recovered by tested and effective measures according to S. Donald Pearlman, director of the Chemical and Textile Units of the Conservation Division. Among materials which can be salvaged through widespread adoption of reclamation measures are pigments, phthalic anhydride, glycerol, oils, zinc yellow, glycerol phthalate resin, phenol formaldehyde, damar gum, alkyd resins, chlorinated rubber, ethyl cellulose, nitrocellulose, and plasticizers.

On the basis of available information, it is believed that a saving of approximately 100,000,000 pounds of these essential chemicals could be realized in the next year and a half through adoption of a salvage program. It is estimated that available facilities for reclamation of wasted spray paints are sufficient to handle all of the present requirements. Fourteen major paint and other companies have facilities available.

Aniline. Control of the distribution of aniline is taken under Order M-184. Consumers must file requests on Form PD-583 and producers and distributors must report monthly on Form PD-584. Restrictions of the order do not apply to use by the armed services of aniline produced by them, or to the use by any person of less than 500 pounds of aniline in a month.

Antimony. Control over antimony is revised in amended General Preference Order M-112. Supplies of antimony have become relatively more plentiful, and the order as amended will encourage the substitution of antimony for tin. Chemical derivatives with the exception of antimony oxide and sulfide, which are the result of primary processing, are removed from control of the order. Frit is included in the items covered, by definition. To encourage the fullest production of domestic ores, the amended order frees from restriction deliveries up to 50 tons per month of ores or concentrates by United States mines. Deliveries of 25 pounds or less of contained antimony are permitted to any one person in one month without an allocation. Nonceramic coatings may use up to 2 per cent antimony, and antimony may now be used in ceramic coatings only when they are designed to be acid-resistant.

Arsenic. Procedure by which users of arsenic in quantities of less than 500 pounds per calendar quarter may place purchase orders is simplified by Amendment 1 to General Preference Order M-152. The supply or control situation is not changed by this amendment, but simply the procedure.

Blackplate. Use of blackplate for cans is limited to a small list of essential products in Conservation Order M-136, which follows closely the pattern of Order M-81 concerning cans made from tinplate or terneplate. The first of two classes of products permitted to be packed in blackplate consists of products necessary for various military and civilian operations. Blackplate cans for these products are limited to 100 per cent of the combined area of tinplate, terneplate, and blackplate used in the calendar year 1940. The other group includes those products permitted to be packed under the terms of Order M-81, limitations for which are also specified. The new order, together with Order M-81, will result in an annual saving of about 1,000,000 tons of steel compared with 1941 consumption.

Cotton Linters. Delivery of cotton linters and hull fiber, essential raw materials used in making chemical cotton pulp for explosives and plastics, is forbidden except to designated makers of chemical cotton pulp by General Preference Order M-12 as amended July 22. The previous order, which expired on August 1, controlled only 80 per cent of the production of cotton linters. No person now may use cotton linters or hull fiber produced after July 31 for any purpose other than the manufacture of chemical cotton pulp.

Under the amended order, all producers of cotton linters must accept all orders from pulp manufacturers and must fill them in order of receipt without regard for preference ratings. Importers of linters are likewise covered in the same manner as producers. The Director General for Operations may specify how linter producers' mills shall be operated, so that each producer will turn out the maximum amount of the type of linters and fiber most urgently needed in chemical cotton pulp manufacture. Producers of cotton linters, hull fiber, and motes are required to file Form PD-110 (revised August 1, 1942) with WPB on September 5 and the fifth of each month thereafter.

Lithium Compounds. A complete allocation system for lithium compounds will be instituted, starting September 1. Order M-191 provides for monthly requests for lithium compounds on Form PD-585 and reports from producers on PD-586. Deliveries of 25 pounds or less in any month are exempted from restrictions of the order.

Xylol and xylol range aromatic materials derived from coal tar are brought under control of General Preference Order M-150 by Amendment 1. The original order, restricting sale and delivery of xylol and xylol aromatic materials to orders bearing preference ratings of A-2 or higher, originally defined these products as ". . . of petroleum origin". To remove the resulting commercial inequalities that arose between the petroleum and coal-tar producers, the definition of aromatic petroleum solvents in the original order is changed by this amendment to include the xylol and xylol range aromatic materials made from coal tar as well as the petroleum derivatives.

Price Regulations

Antifreezes. A separate maximum retail price of $1.00 per gallon for Zerone, an antifreeze liquid manufactured by E. I. du Pont de Nemours & Co., Inc., has been established by the Office of Price Administration in Amendment 1 to Maximum Price Regulation 170. The amendment also broadens the definition of type P antifreeze as contained in the regulation. The regulation limited this type, which is permanent, to antifreeze containing at least 85 per cent of ethylene glycol. The amendment permits the type P designation to be applied where part of the ethylene glycol is replaced by ethylene glycol homologs or polyethylene glycols, so long as the ethylene content is not less than 60 per cent by weight. Certain posting and marking requirements are also changed.

Color Pigments. Maximum prices for chrome yellow, chrome green, molybdate orange, and zinc yellow color pigments, which were reduced by amounts varying from 0.25 to 0.5 cent per pound by the General Maximum Price Regulation, have been allowed to return to the levels of April 1, 1942, in Maximum Price Regulation 180.

Core Oil, a binding component in sand molds used for making castings, is excepted from provisions of the General Maximum Price Regulation in Amendment 17 to Supplementary Regulation 1. Manufacturers were finding it difficult to continue under the price ceiling on core oil, and the product is an absolute essential to the war effort. Major ingredients of core oil—linseed oil (50 per cent) and naval stores (25 per cent)—are already excepted from price control. Thus, core oil manufacturers have found it increasingly

difficult to continue operation under the maximum prices.

Fats and Oils. In a sweeping revision of the fats and oils price structure, Price Administrator Leon Henderson has taken four steps to facilitate orderly and normal marketing of imported vegetable oils, tallows and greases, and marine animal oils and for adjustments in contracts with the United States or any of its agencies. This establishment of dollars-and-cents ceilings will not affect the consumer level on fats and oils.

The four steps were as follows:

(1) Fixed specific maximum prices on 19 different imported vegetable oils.
(2) Adjusted price differentials between various grades of tallow and greases; then "rolled back" these newly adjusted prices on inedible tallow and greases about 1 cent per pound to relieve the raw material squeeze on soap manufacturers, who previously had voluntarily cut their soap prices.
(3) Set dollars-and-cents maximum prices on six different marine animal oils and one processed marine animal oil.
(4) In order not to impede the war program, made provisions for adjustments in maximums established by Revised Price Schedule 53, where contracts with the United States, or any agency thereof, or a subcontract under such contract, are involved.

These changes are made in Amendment 6 to Revised Price Schedule 53. Previously, imported vegetable oils—on which dollars-and-cents maximum prices now are set—were covered by the schedule at the individual seller's top price as of October 1, 1941, or 111 per cent of his November 26, 1941, price.

Pine Oil. Prices for natural and synthetic pine oil have been rolled back to the levels prevailing in October 1941. There has been a substantial gap between the supply and the demand for pine oil, which has exerted a tremendous upward pressure on the pine oil market. As a result, according to Price Administrator Henderson, a minority of producers advanced their prices prior to March 1942 to uneconomically high levels. Therefore, it was found advisable to establish prices for most grades of pine oil by a specific regulation.

The specific dollars-and-cents maximum prices established by the regulation—Maximum Price Regulation 179—apply to three classifications of pine oil: basic pine oil, natural alpha terpineol, and light gravity pine oil. The ceiling prices established for these grades is the price at which 80 per cent of them sold during October 1 to 15, 1941. Although specific maximum prices are established for the various grades, it is also provided that no one may sell pine oil for more than his maximum price established by Section 1499.2 of the General Maximum Price Regulation.

B3 reagent grade of pine oil manufactured by the Hercules Powder Co., and synthetic beta pine oil manufactured by Newport Industries, Inc., are specifically exempted from the schedule and continue under the provision of the General Maximum Price Regulation.

WPB Appoints Chemical Advisory Committee

APPOINTMENT of a committee of distinguished American chemists and chemical engineers to advise the Government on technical processes has been announced by Ernest W. Reid, chief, Chemicals Branch, WPB.

Work of the committee will be to pass upon the relative merits of competing chemical processes involved in the war effort. The basis upon which the findings will be made will be (a) which process can be placed in production soonest and (b) which uses the smallest amount of critical materials.

It is difficult under the present war economy, Dr. Reid explained, to obtain unbiased, factual testimony as to which of a number of proposed chemical methods is best. Each new process has its adherents and in most instances each has its own good points. The advisory committee will evaluate each process in the light of the war program and will recommend adoption of one or another.

The committee is headed by Donald B. Keyes, head consultant to the branch and professor of chemical engineering at the University of Illinois. Members are: Marston T. Bogert, Joel H. Hildebrand, S. C. Lind, Frank C. Whitmore, Gustavus J. Esselen, Carl S. Miner, Foster D. Snell, Charles C. Brown, Charles R. Downs, Sidney D. Kirkpatrick, and Fred H. Rhodes.

The committee includes three past presidents of the AMERICAN CHEMICAL SOCIETY, four Councilors, and two Directors. All are recipients of honors in the chemical field.

Treatment of Ores for Maximum Recovery Studied

SEEKING the most efficient method of treating ores to obtain maximum recovery of precious metals and minerals, the U. S. Bureau of Mines has completed tests on 21 ore samples from nine states. Because many of the samples were complex and did not respond to standard testing methods, the bureau supplemented standard methods with microscopic and spectroscopic examinations.

Dry Milk Plants

FOURTEEN new factories for the production of dry milk are to be built as soon as the WPB gives clearance on materials. Agriculture officials have predicted production of 500,000,000 pounds of dry milk solids in 1942, a gain of 26,000,000 pounds over 1941.

OPA Announces First Commodity Practices Regulation

AMERICAN consumers have been given a guarantee by Price Administrator Leon Henderson that the $500,000,000 they will spend this year on soap will buy at least as much as it does at present and that the quality will not be debased. In the first OPA regulation dealing exclusively with size and quality of a commodity, the Price Administrator set the types of soap now being sold in different parts of the country as minimum standards for the manufacturers. All forms of household soaps are covered, and no reduction in the size of cake or package, or deterioration in the quality, or "serviceability", can be made.

The regulation, Commodity Practices Regulation 1, applies only to manufacturers, but the benefits carry through to householders since the prices that retail stores can charge for soaps are controlled by the General Maximum Price Regulation.

Plant Planned for Liquid Fuel and Lubricants from Coal

A FAR-REACHING study of practical and economical methods for producing liquid motor fuels and lubricants from coal will be undertaken by the U. S. Bureau of Mines, Pittsburgh, Penna., as soon as a new experimental plant just authorized by Congress can be erected and equipped. An appropriation of approximately $85,000 has been made available.

The Fischer-Tropsch method will be investigated with a view to developing means to produce gasoline from the coals of Alaska and the United States. The bureau has been studying a modification of the Bergius process for several years. The experimental plant will have a capacity of about 100 pounds of gasoline per day and will include chemical engineering equipment such as catalyst chambers, pumps, charcoal scrubbers, distillation columns, cracking units, and control instruments. Future plans call for a pilot plant to handle about 10 tons a day and a small plant which can be moved and erected in a short time at little cost.

New Process for Making Butylene Glycol Developed

A SHORT and economical process for making butylene glycol, a relatively rare chemical with several important commercial uses, has been announced by the U. S. Department of Agriculture. The new method, being developed at the department's Northern Regional Research Laboratory, Peoria, Ill., involves the

fermentation of plentiful farm crops, such as corn and wheat. The laboratory is now producing butylene glycol on a pilot plant scale. It may be used in making antifreeze for automobile radiators and in production of commercial solvents. It has a number of industrial chemical applications for war industries.

The laboratory is also studying butylene glycol as a possible link in production of butadiene for synthetic rubber. Considerable interest has been shown by industry in the fermentation process for producing butylene glycol. The major problem remaining is conversion of butylene glycol to butadiene on a commercial scale. Chemists at the Peoria laboratory have succeeded in producing excellent yields of pure butadiene from corn-made butylene glycol in the laboratory, but they have not as yet developed the process to a pilot-plant scale and are not making any definite predictions.

Pilot Plant for Sponge Iron Production Planned

PLANS for an immediate study of the methods of producing sponge iron, an acceptable substitute for scrap iron in manufacturing steel, and for the erection of pilot plants to guide future operations in this field have been launched by the U. S. Bureau of Mines. Funds totaling $600,000 have been made available by Congress under the head of "war prosecution" activities, to develop methods of utilizing untouched iron ore deposits and to assist in alleviating the shortage of scrap iron. Sponge iron is produced directly from iron ore without going through the liquid stage, such as that employed to produce pig iron in a blast furnace. It is adaptable to smaller and less expensive plants than the standard blast furnace installation and produces an iron that is low in carbon. Many sponge iron reduction processes are known to be workable, but none has been applied commercially on a large scale to United States iron ores because the standard reduction methods have produced enough iron in the past.

Helium Production to Be Expanded

HELIUM will be produced in greatly increased quantities to meet expanding wartime needs under a program recently inaugurated by the U. S. Bureau of Mines. Millions of additional cubic feet will flow from the enlarged plant at Amarillo, Tex., being processed from gas produced from government wells now in operation. In addition, a new helium production plant at an unannounced location will be supplied with helium-bearing natural gas from an existing gas line transporting gas for fuel markets. A new congressional appropriation of $4,000,000 to be made available from Navy Department funds will enable the bureau to expand its helium-producing program, not only for the Army and Navy but for medical and scientific uses.

Government Program Enlarged

JESSE JONES, Secretary of Commerce, has announced that the Metals Reserve Company, upon recommendation of the War Production Board, is enlarging its program for the purchase of domestic mercury on the basis of $192 per flask, f. o. b. warehouse New York area, by making purchases not only in New York but also at Ore Purchase Depots already established at numerous points in many western states and by conditionally extending the program to December 31, 1943.

The Synthetic Rubber Situation

For immediate release
Friday, July 17, 1942

RUBBER COORDINATOR Arthur B. Newhall has sent out the following letter on the synthetic rubber situation in response to many inquiries about the present status of the program:

As a result of recent publicity given the synthetic rubber program by radio and press, considerable correspondence has come to this office, both direct and forwarded from other departments of the Government.

The inquirers have asked a wide variety of questions. In the following summary we have attempted to answer these questions in a nontechnical way, with the thought that such a summary may give each inquirer a fuller understanding of the problem than answers to his own particular questions might furnish.

PARAGRAPH ORDERED DELETED BY CENSOR.

The present program has been fixed at this amount, not because we are still searching for methods or processes but because the amount of raw material required to build plants to use any of the processes is limited and the amount allotted is all that can be spared at this time to be taken away from other critical needs in the war program. Confusion arising from the public statements of different proponents of different processes has not in the least detracted from the general policy of going forward with this program to completion at the earliest possible moment.

Buna S, which is a general purpose rubber, is made by a chemical combination of butadiene and styrene. Butadiene can be made from either alcohol or petroleum, and many of the questions regarding the present program arise on account of this fact.

Prior to the declaration of war, petroleum was chosen as the base material from which to manufacture synthetic rubber for three reasons: the more advanced experimental development of the process in this country; the substantially lower cost of production; and the apparent lack of increasing defense demands.

After the declaration of war, comparative costs were not important. Rubber was essential, and speed was the first consideration. Our principal crude supply was cut off. An increased synthetic program was entered into. This program embraced all available alcohol which could be released from other war needs at that time and as more alcohol became available, because of domestic wartime measures, the proportion of alcohol to be used in the program was increased. Thirty per cent of the butadiene included in the present program is being made from alcohol and most of the remainder from petroleum.

When you start a new industry naturally rapid changes take place. This has been particularly true with synthetic rubber and important changes are still going on. As an illustration, at the outset, in spite of its ultimate increased cost over petroleum, the alcohol process required less strategic material for the building of new plants; that is, unless you had to go back and build a distillery to get the alcohol. Already, however, a new and better method has been devised in the use of petroleum, and today the amount of strategic material, whether we start with petroleum or alcohol, is practically on an equal basis.

We hope we have cleared up the matter in your mind. The picture is changing almost daily, but we are satisfied that all who have a part in the undertaking are doing their best to accomplish the one thing in which we know the American people are interested—to be sure that enough rubber is made available, regardless of its source, for carrying on the war effort and supplying essential civilian needs.

In closing, may we leave this thought with you: Today the program is set as we have outlined. Tomorrow some possible improvement in process or material may appear. If we can use the new, we always will, but we cannot take on the new if to do so would slow up the program. Speed is essential.

Sincerely yours,
ARTHUR B. NEWHALL
Coordinator for Rubber



Blackout Aids

Tenite strips act as tracks permitting the easy raising and lowering of blackout shades and preventing the escape of light around the edges. The strips, extruded of Tennessee Eastman Tenite by Extruded Plastics, Inc., are designed for use in industrial plants as well as in homes. They are distributed by Plastic Products Engineering Co., 500 Fifth Ave., New York, N. Y.

CHEMICAL NEWS PARADE

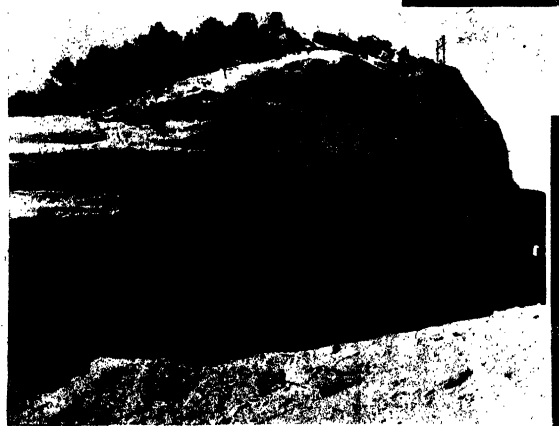


Celite diatomaceous earth quarries of Johns-Manville, New York, are made up almost entirely of accumulated skeletons of myriad billions of tiny sea plants, called diatoms, that were deposited millions of years ago while the hills were part of the ocean bed. Today that 4,000-acre deposit, with roughly 100,000,000 tons of siliceous diatoms, is said to be the largest source in the world of pure diatomaceous earth. *Above.* A huge kiln in which diatomaceous earth is calcined, one step in the manufacture of high flow-rate filter-aids. *Right.* At left a car of pressed brick is being pushed into a drier. At right stand two cars of natural slabs. *Below.* Once the center of a hill, this wall gives an idea of the depth of the deposit, over 1,700 feet thick in some parts.

ROBERT YARNALL RICHIE PHOTOS, LEFT AND BELOW



Below. Two mechanical saws cut natural insulating brick from the bank of the quarry slope. The first saw makes vertical cuts at right angles to the face while the second cuts horizontally and vertically, parallel to the face.

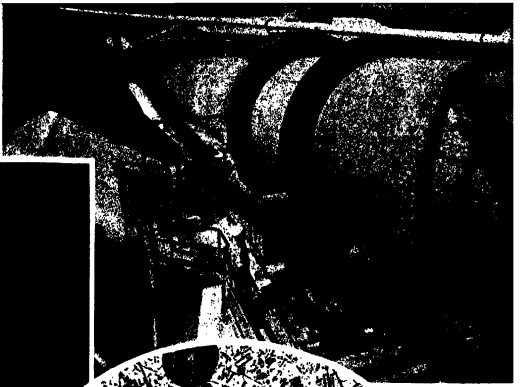


ROBERT YARNALL RICHIE PHOTO, RIGHT

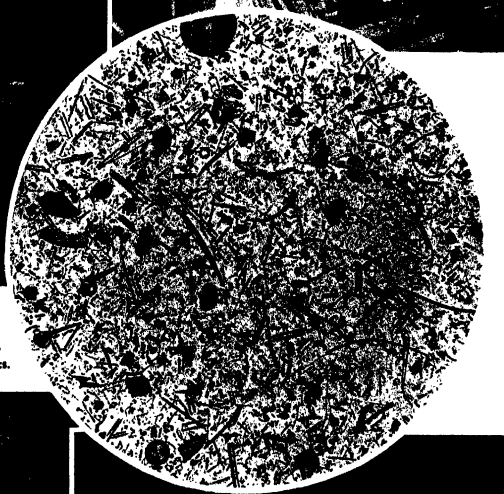


Right. Rotary kilns. *Below.* A train of the electrically operated railroad used to haul raw Celite to the mill from glory holes where it is stored. The deposit is quarried at different levels to provide various grades. Natural brick is used in furnaces against temperatures up to 1,600° F., and after suitable processing against temperatures to 2,500° F. *Below right.* Photomicrographs of Standard Super Cel enlarged to 200 diameters.

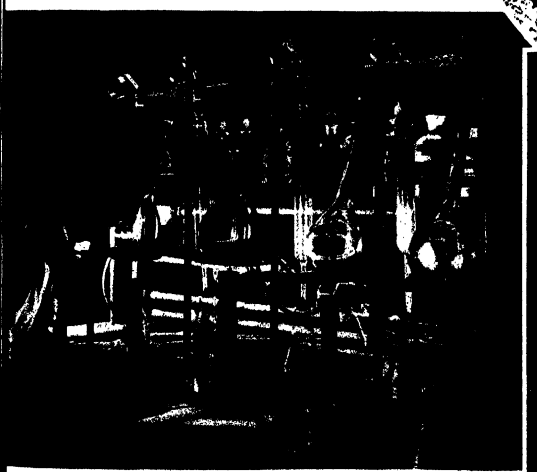
ROBERT YARNALL RICHIE PHOTOS, RIGHT AND BELOW



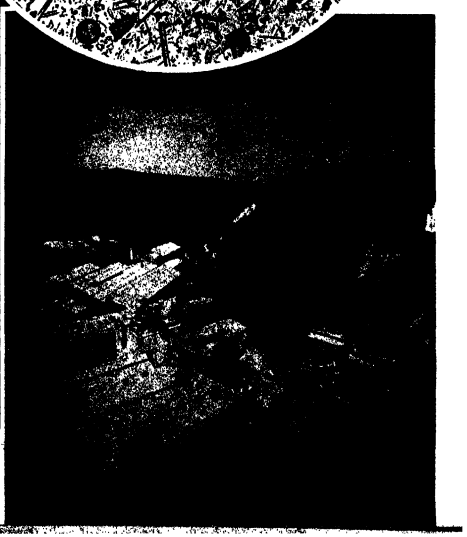




Below. In this control laboratory Celite filter-aids are tested rigorously. *Below right.* The quarries nestle in hills. Uses of Celite include high-temperature insulations, filter-aids, and inert fillers for many substances, such as paint, paper, and plastics.



ROBERT YARNALL RICHIE PHOTOS, RIGHT AND ABOVE





American Chemical Society[1]

104TH MEETING. Buffalo, N. Y., September 7 to 11, 1942.

105TH MEETING. Indianapolis, Ind., April 12 to 16, 1943.

106TH MEETING. Minneapolis, Minn., fall of 1943.

NATIONAL CHEMICAL EXPOSITION and NATIONAL INDUSTRIAL CHEMICAL CONFERENCE. Sherman Hotel, Chicago, Ill., November 24 to 29, 1942.

TEXAS A. & M. SECTION. Chemistry Lecture Room, College Station, Tex., August 25, 7:30 P. M. F. F. Bishop, "Chemistry of Powders and Explosives."

Other Scientific Societies

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Netherland-Plaza Hotel, Cincinnati, Ohio, November 16 to 18. Annual meeting.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Vancouver, B. C., September 9 to 11.

AMERICAN OIL CHEMISTS' SOCIETY. Drake Hotel, Chicago, Ill., October 7 to 9.

AMERICAN PETROLEUM INSTITUTE. Chicago, Ill., November 9 to 13. Annual meeting.

NATIONAL LUBRICATING GREASE INSTITUTE. New Orleans, La., October 26 to 28.

NATIONAL PETROLEUM ASSOCIATION. Hotel Traymore, Atlantic City, N. J., September 16 to 18. Annual meeting.

NEW ENGLAND ASSOCIATION OF CHEMISTRY TEACHERS. University of New Hampshire, Durham, N. H., August 11 to 14.

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY. Hotel Statler, Boston, Mass., September 29 to October 1.

[1] The list of the SOCIETY's National Officers and Directors, Editors, members of Council, Divisional and Local Section Officers, Committees, and Chapters of Student Affiliates appears in CHEMICAL AND ENGINEERING NEWS three times a year—usually February 10, May 10, and October 10. The latest list is printed on page 601 of the May 10 issue.

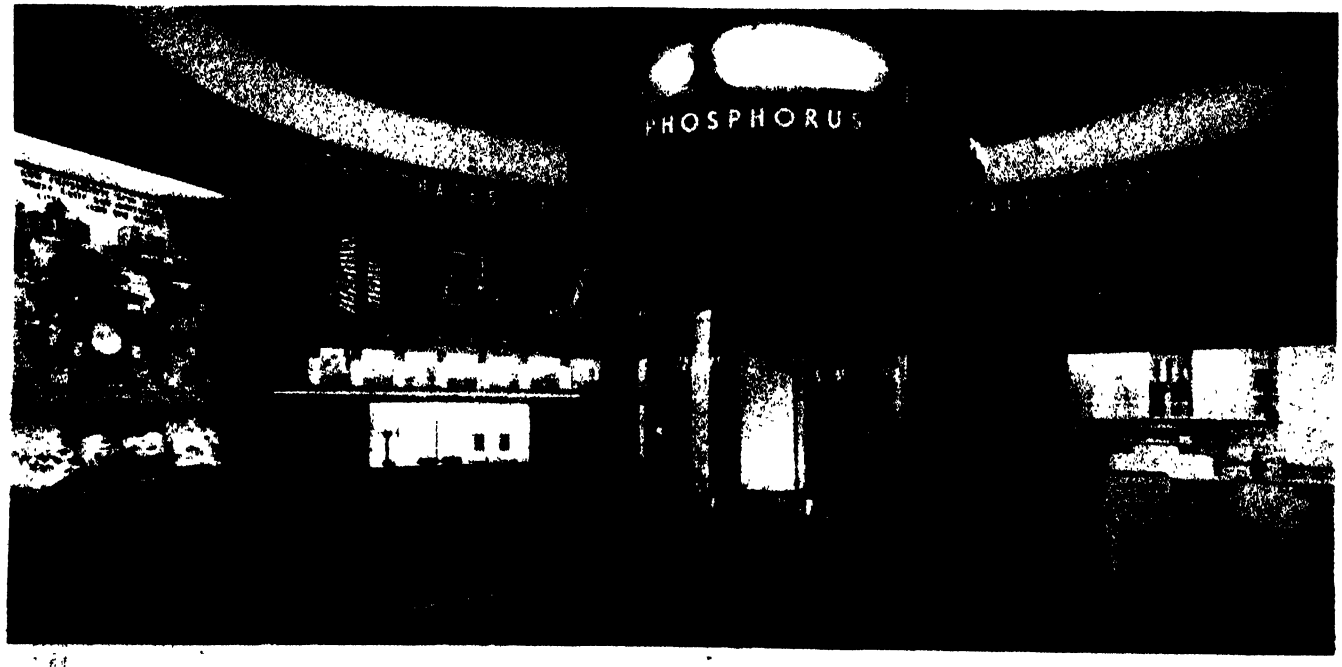
Exhibit Tells Story of Phosphorus

RECENTLY opened to the public in Chicago's Museum of Science and Industry is an interesting exhibit planned and executed under the supervision of the technical staff of the Victor Chemical Works at a cost in excess of $30,000. The exhibit is compactly housed in an ingeniously illuminated circular room. Suspended from the center of the ceiling, a rotating ultraviolet beacon casts an unseen beam upon a fluorescent-painted mural which adorns the upper part of the walls. As the light rotates, succeeding portions of the mural glow momentarily, bringing out dramatically many of the important uses of phosphorus compounds. Directly below in the center of the room is a demonstration platform dominated by two towering glass cylinders. In this glass-enclosed pilot plant, the manufacture of phosphoric acid can readily be observed, a process heretofore hidden within the confines of steel and brick.

Beneath the platform elemental phosphorus is stored within a heat-jacketed reservoir. From here the molten phosphorus is slowly pumped up to the base of the first glass cylinder. Immediately upon exposure to air this extremely active element bursts into flame, combining with oxygen to form phosphorus pentoxide (P_2O_5), a gray smoky cloud that completely fills the Pyrex cylinder. Suction draws this cloud of phosphorus pentoxide through a glass connecting tube to the second cylinder which serves as a water spray tower. Here the phosphorus pentoxide unites with water to form phosphoric acid (H_3PO_4). About a pound of phosphorus is consumed daily in the continuous operation of this miniature plant.

On the far side of the room a large, animated production diagram extending from ceiling to about waist level, tells the story of phosphorus from raw phosphate rock to its ultimate conversion into a host of phosphorus compounds. Beginning at the top, model steam shovels in simulated action load phosphate rock, gravel, sand, and coke into a tiny cintering plant. The subsequently fused mixture is then brought by belt conveyor to an electric furnace where liberation of the gaseous phosphorus at temperatures above 2700° F. is vividly portrayed.

Continuing down the animated flow sheet, the gaseous phosphorus proceeds to the condenser, thence to a storage tank. From here phosphorus is pumped to a miniature tank car symbolizing an actual shipment to an industrial user. A



second pipe line leads to the burner, hydrator, and precipitator house where the elemental phosphorus is converted into phosphoric acid, a repetition of the process demonstrated by the pilot plant in the center of the room.

From either side of the animated production diagram, phosphoric acid flows to illuminated colored translites which line the adjacent walls of the room. Each pictures an important use of one of the many well-known phosphatic salts subsequently made from phosphoric acid. Beneath the colorful translites, button-operated models illustrate by actual demonstration other important uses of phosphate compounds--how wood, paper, and textiles become flame-resistant when treated with ammonium phosphate, how salt remains free-flowing when filled with tricalcium phosphate, how phosphoric acid prevents steel from rusting.

Other dioramas dramatically portray the story of chemical leavening where tiny bubbles of carbon dioxide gas can be seen expanding within the cross section of a magnified muffin. Another illustrates the importance of calcium and phosphorus in building strong, healthy bones, teeth, muscles, and nerves. Last and by far the most imposing is a full-sized kitchen complete with stove, sink, refrigerator, and the many products used by the housewife. While the background blacks out, biscuits in the oven, baking powder on the table, soap powder, matches, beverages in the ice box, salt, and many other items in which phosphates of one kind or another play an important part, all glow vividly in the unseen rays of an ultraviolet light.

The exhibit of the Victor Chemical Works is worthy of inspection by technical expert and layman alike.

University of Illinois Receives Research Gifts

GIFTS for research to the University of Illinois from industry and private organizations totaled $343,340 for the year ending June 30, 1942, according to a recent announcement, bringing the five-year total to $1,337,937. The gifts provide funds for specific research covering a wide range of projects. The largest single donor was the Rockefeller Foundation, which allotted nearly $40,000 for four projects involving a study of amino acids, development of neurology and neurosurgery, teaching psychiatry, and spectroscopic analysis of water.

Inorganic Fellowships Offered at University of Florida

THE University of Florida is offering two fellowships for graduate students in the inorganic field. These fellowships pay $450 with breakage fees, but small university fees must be paid. Further information is available through Fred H. Heath, Department of Chemistry, University of Florida, Gainesville, Fla.

Method for Fire-Resistant Rubber Patented

FIREPROOF rubber can be made from chlorinated rubber mixed with ordinary rubber and vulcanized in the usual way, it is claimed in Patent 2,286,697 granted to Harold A. Tunstall and Benjamin B. Evans of Gravesend, England. The patent is assigned to W. T. Henley's Telegraph Works Co., Ltd., London. The fire-resistant rubber is designed for insulating electric cables or wires which come in close contact with high temperatures.

Antiknock Gasoline Made from Carbon Monoxide, Hydrogen

HIGH antiknock gasoline can be synthesized from carbon monoxide and hydrogen, according to Patent 2,286,814 issued to Lebbeus C. Kemp and assigned to the Texas Co., New York. Both gases are available in large quantities and can be readily produced. The two gases, in presence of a catalyst, are converted into a mixture of various hydrocarbons, including butanes and butylenes. The butane is isomerized, and the isobutane then reacted with the butylene in the presence of another catalyst to form liquid hydrocarbons, which are said to have a high antiknock value and to vaporize within the range of gasoline.

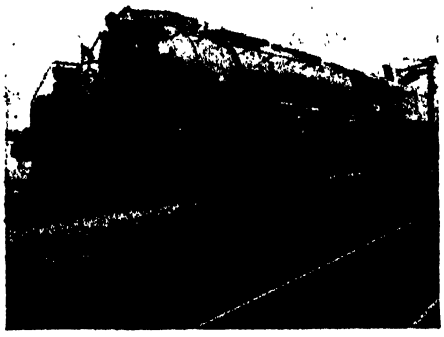
SODIUM and potassium chromates have been placed under control by the British Indian Government, and sale or disposal of these products in the future will be under the same restrictions as sodium and potassium dichromates and chrome alum.

WITH the Australian match industry undertaking manufacture of chlorate of potash, optimism has been reported in that country that matches may soon be available in prewar quantities.



Tenite Nozzles for Fire Fighting

Tenite nozzle jets, sold by Mul-T-Jet Nozzle Corp., 11 West 42nd St., New York, N. Y., are used on standard fire-fighting equipment. The water is cut into tiny streams that cross one another and break into a fine spray, producing artificial fog at only average pressures. The jets cannot rust or tarnish. Although exceptionally light in weight, they have sufficient strength to withstand any nozzle pressure that can be used on hand lines.



The Finest

THAT SKILL AND EXPERIENCE CAN BUILD

To our Railroads, America pays thankful tribute! They are doing a magnificent job in speeding troop and war material movement. Since pioneer days, our railroads have led the world in quality, efficiency and capacity. They are the finest that skill and experience can build.

But for these railroads—the shops that build locomotives, cars, rails and equipment, there had to be an abundance of water. With amazingly few exceptions, it was Layne who designed and built their Well Water Systems. Layne Wells and Pumps are famed for their high efficiency, long life and low upkeep cost.

Layne Well Water Systems, like our great American railroads are doing a magnificent job. They are standing up to unmerciful treatment—day after day and month after month of continuous full capacity operation. It is in this tragic period of emergency that Layne reliability, skillful design and rugged construction is most appreciated. Thousands of Layne Well Water Systems are serving railroads, factories, municipalities, irrigation projects and both the Army and Navy. For late catalogs, bulletins, folders, etc., address.

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Layne-Texas Company.....Houston, Texas.
Layne-Western Company.....Kansas City, Mo.
Layne-Western Co. of Minn.....Minneapolis, Minn.
International Water Supply, Ltd...London, Ont.

10,000 Scientists to Handle War Metallurgical Research

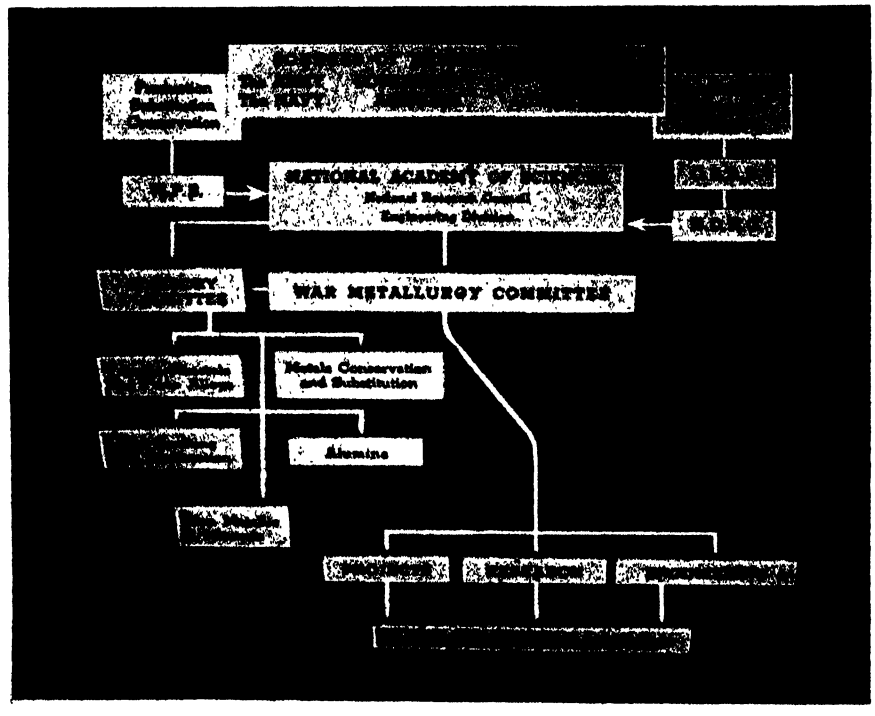
F. B. JEWETT, president of the National Academy of Sciences, announces that the Academy's Metals and Minerals Advisory Committee for the past 18 months has furnished OPM and WPB with 113 reports. Fifty-three of these were on metals substitution and conservation, 47 on ferrous minerals and ferroalloys, 4 on tin smelting and reclamation, and 9 on nonmetallic minerals. These reports, prepared by the various subcommittees of the Advisory Committee, dealt principally with problems arising from the necessity for allocation and substitution of materials, not only for general civilian uses, but even more particularly for war production processes and increased production of war materials.

The work of this Advisory Committee according to Dr. Jewett, has been greatly enlarged since Pearl Harbor and is to be further increased as it functions with and for the new War Metallurgy Committee. Clyde Williams, director of Battelle Memorial Institute, Columbus, Ohio, and chairman of the Advisory Committee, is also chairman of the new War Metallurgy Committee which has primarily been set up to appraise and conduct needed research work for the Army, the Navy, and other governmental departments as well as industry. This committee is composed of 26 members, the Advisory Committee of 63 regular members, plus special members, and 20 other specialists frequently are called in for advice on specific problems. Associations and technical societies are also taking an active part in the problems of metallurgical reports and research.

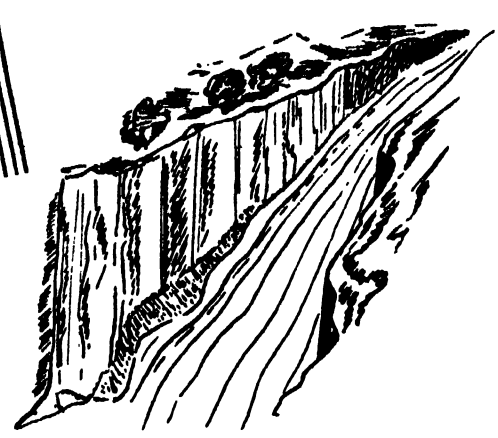
It is the function of the War Metallurgy Committee to collect data and information as requested by either the WPB or the Office of Scientific Research and Development, through its National Defense Research Committee, and to plan, present, and supervise definite research projects for either war materials or armaments. The War Metallurgy Committee, and its Advisory Committee, according to Dr. Jewett, is set up to function as the nerve center for all metallurgical research organizations and departments in this country. The heads of any business, university, or research organization can be counted upon by this committee to make available the experience of their metallurgical scientists and engineers or their laboratory data. There are in excess of 10,000 such individuals in this country, and their combined experience represents well over 125,000 man-years.

One of the basic considerations in the operation of this committee is that of saving time, mistakes, and money. When a problem is proposed, through either the WPB or the Office of Scientific Research and Development, immediate action can be obtained by telephone communication with the leading scientists on that particular subject; initial committee meetings are often held within 24 hours, and, if the request is urgent, within the same day a plan of procedure is laid down and submitted.

CONTINUED ON PAGE 978



Filtrate flows freely down the channel of the F-M FREEFLOW Filter Plate without backing up, much as water flows freely down a river with an ever-deepening river bed.



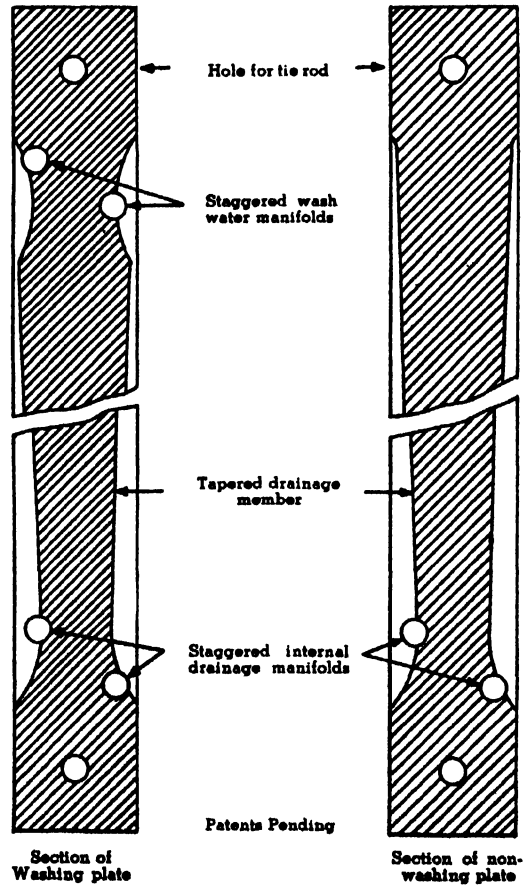
More Freely Flowing Filtrate Means GREATER CAPACITY

And who doesn't want extra filter capacity today . ... extra flow capacity without the necessity of getting additional filter press area?

The F-M FREEFLOW Filter Plate has progressively deepening channels. As filtrate flows in through the cloth, it finds room in which to flow — such as tributary streams find room in an ever-deepening river bed. The flow doesn't back up as it tends to do in plates with channels of uniform depth.

We can make shipments from stock. F-M FREEFLOW Plates come in many sizes and fit all standard presses. Choice of several different woods and Bakelite.

F-M FREEFLOW FILTER PLATE



FILTER MEDIA CORPORATION

Specialists in Filter Cloth for Industrial Filtration

Chicago — Irvington-on-Hudson, N. Y. — Salt Lake City

S-FM-1

10,000 Scientists to Handle War Metallurgical Research

CONTINUED FROM PAGE 976

Everyone in this country, and scientists and industrialists are no exception, is naturally anxious to contribute everything he can toward winning the war. New thoughts, new ideas, new short cuts, are constantly coming to the front. While it is not the place of the War Metallurgy Committee, according to Dr. Jewett, to be the repository for such suggestions and ideas, it recognizes as a very definite part of its wartime job, the appraisal of such of these problems and possibilities as are referred to it by the WPB or the Office of Scientific Research and Development.

Another important function of the War Metallurgy Committee is to digest and make available to those properly interested through their participation in the war effort the results of both Canadian and English metallurgical research. Obviously both Canada and England have a great many of the same problems which confront us, and the interchange of information makes available to all the best thinking and practice of scientists and industrialists on both sides of the Atlantic.

Typical of the problems referred to this committee is one asking for improvement in welding processes. A subcommittee was immediately appointed, which collected all available known data from universities, engineering foundations, and research departments of business organizations. The Project Section of the War Metallurgy Committee worked up the research indicated and research procedure; with the approval of National Defense Research Committee and the Office of Scientific Research and Development, this research was placed with one of the university laboratories and compensated for on a cost basis from funds made available by OSRD.

Typical of requests for data and projects from the WPB is that of the effect of substitution of lead-silver for tin-lead soldering of tin cans used for food products. Since tin is the one important metal which is not found in the United States, even in low-grade ores, it is obviously important that the conservation of the present use of tin is urgent. Since a great proportion of the total consumption of tin is used in soldering, the substitution of lead-silver for tin-lead soldering is immediately dictated, but the problems involved in certain canning processes are such that definite research is needed before such substitution can be ordered.

This research project was prepared through the Project Section of the War Metallurgy Committee and will be administered through its research section, the work being done in one large university research laboratory, in cooperation with the National Canners Association.



Full Use of Available Drums Stressed

THE "Drums of War" and ways to handle drums for victory are dramatized in a two-color poster distributed by Commercial Solvents Corp., Terre Haute, Ind. A limited supply of copies is available to companies requesting them. In the national effort to utilize fully the supply of drums, Commercial Solvents is also placing a small label on all 55-gallon drums shipped from its plants. The label carries the same suggestions for use as are listed on the poster:

Roll drums off trucks or loading platforms—don't drop.

Don't rinse empty drums—just replace bungs and tighten securely.

Don't contaminate drums by filling with other materials.

Return drums as soon as empty to production point shown on drumhead.

For victory, make every drum go on as many round trips as possible—as often as possible.

Bausch & Lomb Sponsors Idea Campaign

THE "MacArthur Month" campaign, conducted by Bausch & Lomb, Rochester, N. Y., to stimulate the flow of ideas to save time, labor, and materials and improve manufacturing processes, produced 2,035 ideas in 30 working days. This was at the rate of about 68 per day as against approximately 10 a day received under ordinary circumstances.

Although its regular Suggestion System had always paid liberally for acceptable ideas, the company has paid out a total of $12,374.

Instrument School for Employees Sponsored

A SCHOOL to enable plant and office employees to gain a greater knowledge of instruments, their construction, and use by America's war industries has been established by the Wheelco Instruments Co., Chicago, Ill. Classes are held weekly, with lectures designed to broaden the individual employee's knowledge of an instrument's construction features, beyond the work done in his particular department, and to familiarize him with the instruments used in industry. The course has been planned with preliminary lectures on fundamentals of measurement and control, with later sessions to be devoted to discussions of individual instruments and their uses.



The Furans

Informative Literature *for* Industrial Chemists

Requests for information about the use of Furfural and its derivatives are welcomed. Here are some of the bulletins and reprints, available for the asking, relating to various applications, properties, and characteristics of these chemicals:

The Furans—This 20 page booklet describes Furfural and its derivatives. Uses and properties are discussed.

Furfural as a Selective Solvent—Here is a booklet relating to the application of Furfural for refining in the petroleum industry.

Chemical Resistant Coatings (Bulletin 58)—The finishing of table tops, benches, and other porous surfaces with Furfuryl Alcohol resin is described.

Furfural as a Herbicide (Bulletin 73)—This pertains to weed killers.

Preservative, Fungicidal and Bactericidal Action of Furan Compounds (Bulletin 77)—This is a bibliography listing references to patent and literature articles on subject.

Preservative Action of Furfural (Bulletin 79)—Effectiveness of Furfural is compared with other commonly used preservatives.

Bibliography of Furfural Resin Literature (Bulletin 80)—This is a 17 page list of literature and patent references to resins made with Furan compounds.

Affinity of Hydrophilic Aggregate for Asphaltic Bitumen (Reprint)—Furfural improves adhesion between rock and asphalt.

Thermal Stability of Furfural (Reprint)—Describes effect of heat on properties of Furfural.

Get a sample of Furfural and try it for your purposes. Its wide utility may surprise you.

The Quaker Oats Company

TECHNICAL DIVISION 1-8

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FURFURAL - FURFURYL ALCOHOL - HYDROFURAMIDE
... TETRAHYDROFURFURYL ALCOHOL ...



Modern Theories of Organic Chemistry. *H. B. Watson.* 2nd ed. vii + 267 pages. Oxford University Press, 114 Fifth Ave., New York, N. Y., 1941. Price, $5.00.

THE second edition of this survey of recent theoretical aspects of organic chemistry retains the clear, logical presentation which characterized the first edition in 1937. The original 12 chapters have been expanded to 16 partly by subdivision and partly by introduction of new material. The chapters deal with theories of chemical combination; applications of the electronic theory in organic chemistry, strengths of acids and bases, the inductive effect; applications of the electronic theory in organic chemistry, substitution in aromatic compounds; the new physical methods of investigation; kinetic methods; applications of the electronic theory in organic chemistry, general discussion; free radicals; compounds of divalent carbon and allied problems; esterification and hydrolysis; aliphatic substitution; addition to unsaturated compounds; tautomeric change; migrations from side-chain to nucleus and other rearrangements; a review of some stereochemical problems; applications of kinetic methods to stereochemical problems; and stereochemistry of elements other than carbon.

The book can be recommended to students and teachers of chemistry as a good discussion of the above topics. It is not a complete reference work and does not pretend to treat any topic exhaustively. The material has been chosen to give a sound, reasonable presentation which provides a good introduction to this fascinating field of chemistry. The book is well written, edited, and printed.

R. L. SHRINER



Photomicroscopy in Crude Oil Analysis

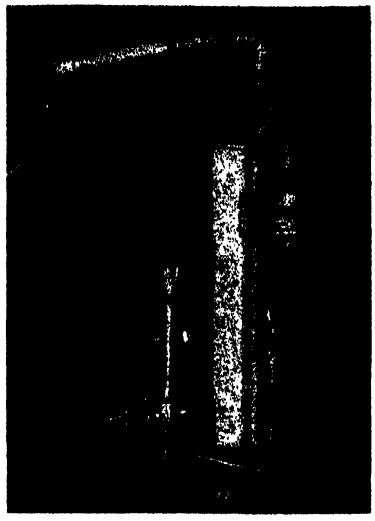
PHOTOMICROSCOPY, making pictures with a combination camera and microscope, has been employed successfully by U. S. Bureau of Mines chemists to identify and study the tiny brine droplets and salt crystals in crude petroleum which often interfere with the refining process. Designed to supplement the chemical analysis previously used and to provide a visual record as an aid in simplifying the industry's refining problems, the new process is described in a technical paper covering data relating to the physical state of salts in some of the Midcontinent oils, an investigation made in cooperation with the State of Oklahoma. Detailed descriptions of the microscopic phenomena, together with photomicrographs of droplets and crystals, are contained in Technical Paper 638, "Photomicroscopy of Salt in Petroleum", by Lloyd F. Christianson and J. W. Horne, which may be obtained from the Superintendent of Documents, Washington, D. C., for 25 cents.

Booklet on Oxygen Breathing Apparatus

A HANDBOOK, "Self-Contained Oxygen Breathing Apparatus", which may play

CONTINUED ON PAGE 982

How Long Should A Water Still Last?



Conservation is a problem these days. But if you have a Barnstead Water Still, you have no problem. We know of Barnstead Stills that are producing pure distilled water of the highest grade after fifteen years of constant use. All it takes is periodic cleanings and reasonable care in operation. Barnstead simplifies these requirements by making their stills so that they are extremely easy to clean and operate. If you need operating and maintenance instructions for your Barnstead Still, write to us. Specify the serial number of your still.

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HI-FLASH SOLVENT

W. P. B.'s M-150 prohibits the use of Xylol and the lower-boiling, high-solvency petroleum thinners, except under high priority ratings.

If this affects you, it is quite possible you may find Neville Hi-Flash Solvent a suitable replacement.

Neville Hi-Flash Solvent is noted for its mild odor, uniformity, and good solvency strength.

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TAR PAINTS • RECLAIMING, PLASTICIZING, NEUTRAL, CREOSOTE, SHINGLE STAIN OILS

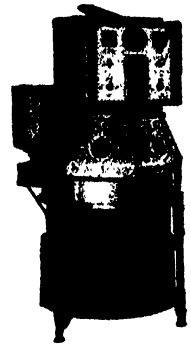
Years of use condensed to a few days with

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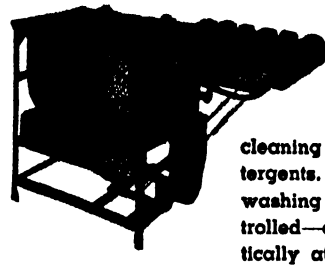
ATLAS-OMETERS offer a simple, controllable method of reducing months of actual use conditions to just a few days testing. By accelerating the effect of sun, weather, and laundering, they determine, in your laboratory, how a product will resist sun, washing and weathering. Government requirements for many products specify the use of the Fade-Ometer, Launder-Ometer, or Weather-Ometer.

ATLAS FADE-OMETER



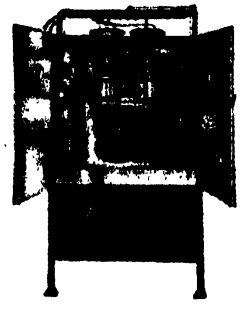
The accepted standard for determining the fastness to light of dyes and fabrics—originated and made solely by Atlas, and now used all over the world. Atlas enclosed Violet Carbon Arc represents closest approach to natural sunlight. Temperature automatically controlled.

ATLAS LAUNDER-OMETER



Standard laboratory washing machine of the A.A.T.C.C. Tests washing action, textile shrinking, staining, and color fastness to dry cleaning solvents, soaps and detergents. All factors, including washing action, carefully controlled—can be reproduced identically at any time.

ATLAS WEATHER-OMETER



Reproduces faithfully the destructive action of sun, rain, heat and cold, with all the attendant phenomena of expansion and contraction. Shows natural weathering effect from any given conditions at any time, any location. Newest Weather-Ometer has twin arcs, for faster testing.

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377 W. Superior Street, Chicago, Illinois

ATLAS-OMETERS

Accelerated Testing Equipment

FADE-OMETER • LAUNDER-OMETER
WEATHER-OMETER

Beyond the Flyleaf

CONTINUED FROM PAGE 980

a vital role in saving valuable property and in protecting the lives of men engaged in wartime production of minerals, has been published by the U. S. Bureau of Mines. The book contains information on the construction, care, and use of both the older and newer types of apparatus worn by men in fighting mine fires and in rescuing persons overcome in mines because of insufficient oxygen or harmful gases or in entering underground workings for exploratory or other purposes when they contain toxic or irrespirable gases. Copies of the 234-page publication may be obtained from the Superintendent of Documents, Washington, D. C., for 35 cents per copy.

Salvage Collection

How an industrial concern enabled its home community to establish a record for the collection of war-use salvage is told in a brochure issued by the Lukens Steel Co., Coatesville, Penna. The company planned, launched, and led a drive that yielded scrap totaling 616,065 pounds, 46.68 pounds per capita. Scrap metal, rubber, and rags were sold to local junk dealers, paper was sold to paper mills near Coatesville, while Lukens Steel bought the scrap iron and steel.

New Spectrum Chart Published

Of special interest to teachers of physics, chemistry, and electrical engineering and to practicing engineers and scientists is a new seven-color wall chart of the entire electromagnetic spectrum recently published by the Westinghouse Research Laboratories. Every part of the electromagnetic spectrum, of practical significance, is analyzed in detail. Emphasis is placed on uses of each kind of radiation. Spectral terms are carefully and simply defined in a special glossary.

The chart, approximately 30 by 40 inches in size, will be sent postpaid for $2.00. Orders should be sent to Publications Section, 6-N-17, Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penna.

Company Publication Simplifies WPB Order

To simplify use of the War Production Board's Conservation Order L-134, Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Penna., has issued a single sheet tabulating the company's regularly listed pyrometer parts which come within the scope of the order, showing the temperature and other conditions which now limit the use of each.

Colloid Chemistry

Those acquainted with the various editions will be pleased to learn that Jerome Alexander is compiling the fifth edition of "Colloid Chemistry, Theoretical and Applied". He has again secured the cooperation of a large number of experts in the various phases of colloid chemistry, but as before would be very pleased to have the assistance of those with special interests. Such parties should communicate with him without delay at 50 East 41st St., New York, N. Y. Contributions intended for the volume should reach Mr. Alexander not later than October 1, 1942.

Lecture Data on Incendiaries Available

"Incendiary Materials", an article by William E. Caldwell, lieutenant colonel, C. W. S., has been prepared for distribution. Copies are available to anyone who might wish to give information of this type in lecture form. They may be secured from Colonel A. Gibson, C. W. S., Office of Civilian Defense, Washington, D. C.

★ ★ ★ GREAT TO FISH IN
but UNFIT for Industrial Use



Surface waters cascading over rocks and lying quiescent in shaded pools offer an impelling lure to the angler. Even though crystal-clear, however, such water is practically never suitable in its natural state for steam generation, processing or other industrial needs.

Any water from river, deep well or other natural source requires study and treatment before use, to safeguard and prolong the life of boilers and other plant equipment operating under today's heavy demands. The Betz organization of engineers and chemists is trained and skilled in the conditioning of any water for any industrial use. For any plant, however large or small, Betz stands ready to render a complete water service — of consultation, research, design and supervision.

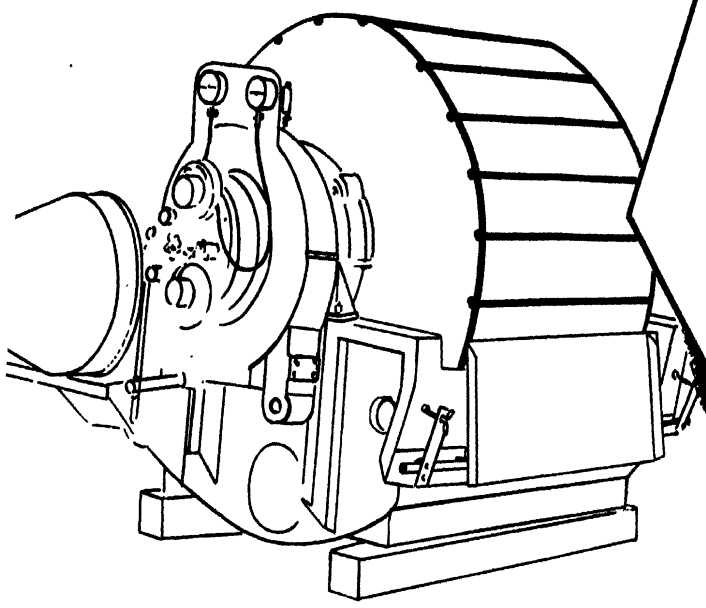
Write for complete information, giving details of your particular problems.

If you are interested in steam purity and its safeguarding by conductivity instruments, write for booklet describing the accurate, rugged low cost Betz Conducto-Bridge.

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IN FILTER DRUM CONSTRUCTION



PANELS *instead of Wire Winding on the Drum*

OLIVER *Panel Type* FILTER*

This filter, already operating with excellent results in a number of large plants, is designed to handle pulps which will not form a thick cake — for example, pulps of a sticky, colloidal nature. A Continuous drum filter with wire wound deck cannot properly discharge a cake which, in thickness, does not exceed the diameter of the wire winding. By contrast the OLIVER PANEL FILTER will discharge such cakes effectively. An ingenious discharging device, together with slight inflation of the cloth, does the trick.

Cloths are applied in panel sections, usually not over three panels to a piece. Specially designed division strips hold the cloth firmly in place. Cloth changes can be quickly made. Operating and maintenance costs are attractively low, due partly to low cloth wear and also to the fact that only a few ounces of air are needed for cloth inflation at the line of discharge. The fact that its basic design is OLIVER is vitally important.

The OLIVER PANEL FILTER is something radically different in drum filter construction and operation. It does successfully what no wire wound drum filter can do — namely, handle thin, sticky cakes successfully. It was designed to do this and does do it.

If the pulp you are handling is of this nature, investigate the OLIVER PANEL FILTER. It should enable you to cut your filtration costs and improve washing results.

The OLIVER PANEL FILTER supplements but does not supplant the original OLIVER CONTINUOUS FILTER with wire wound drum.

* Numerous patented features.

OLIVER UNITED FILTERS INC.

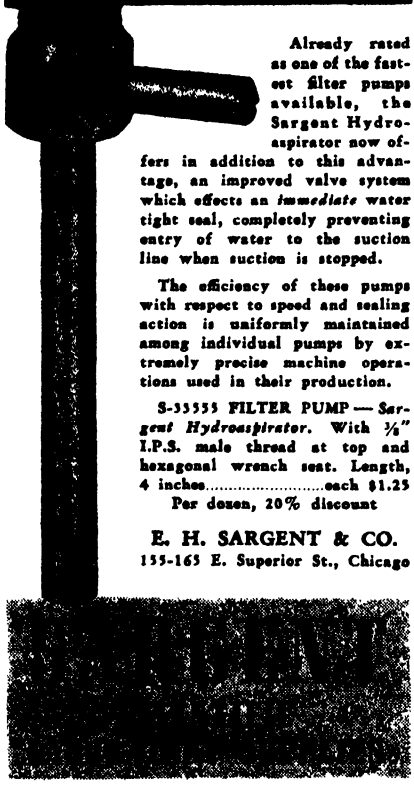
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HYDROASPIRATOR
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Already rated as one of the fastest filter pumps available, the Sargent Hydroaspirator now offers in addition to this advantage, an improved valve system which effects an *immediate* water tight seal, completely preventing entry of water to the suction line when suction is stopped.

The efficiency of these pumps with respect to speed and sealing action is uniformly maintained among individual pumps by extremely precise machine operations used in their production.

S-35555 FILTER PUMP — *Sargent Hydroaspirator.* With ¼" I.P.S. male thread at top and hexagonal wrench seat. Length, 4 inches.....each $1.25
Per dozen, 20% discount

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The L. S. O. G. Exchange

Edited by A. A. Ashdown, Ed. F. Degering, J. E. Hawkins, and S. L. Redman

Send items to Ed. F. Degering, Department of Chemistry, Purdue University, Lafayette, Ind.

Do you have trouble getting a sufficient number of your members out for meetings? Does the problem of a social hour after your meetings seem an unsurmountable one? Are you stumped for entertainment when a visiting speaker is accompanied by his wife? Do you hesitate to plan a social outing because the wives of your members are not acquainted with each other? If so, the Louisiana Section suggests a happy solution for all these difficulties through the formation of a Ladies' Auxiliary.

The Ladies' Auxiliary of the Louisiana Section of the AMERICAN CHEMICAL SOCIETY was founded in February 1939 with a charter membership of 16. At the present time the membership is 44. This percentage increase in itself is an indication of how the project has been received. But this does not tell the whole story. Not only does the Ladies' Auxiliary carry on a most worth-while program, but its activities have proved of both direct and indirect benefit to the section. The attendance curve at section meetings, for example, has gone up owing largely to the fact that both husband and wife have an interest in attending these twin functions which are held on the same night. Cases are on record where a husband has attended a section meeting primarily because his wife did not want to miss a meeting of the Ladies' Auxiliary.

Perhaps the best way to indicate to other sections how such a group functions is to describe briefly how the organization is set up in the Louisiana Section. The constitution of the auxiliary grants eligibility to a wife, sister, or mother of a member of the AMERICAN CHEMICAL SOCIETY. There are four officers—President, Vice President, Secretary, and Treasurer, and the dues are $1.00 a year. The auxiliary has the following standing committees:

Executive Committee consists of the officers and retiring President, who serves automatically for two years on the executive committee following her term of office.

The Program Committee plans programs which are given at the same hour as the section meeting. The programs are held in another room in the same building and consist of book reviews, dramatic readings, and talks by prominent people. Many such programs can be arranged through the State Board of Health, State Conservation Committee, social agencies, and the advertising departments of various commercial concerns. Usually such programs may be obtained gratis.

The Membership Committee obtains the names of prospects through the Secretary of the section and these prospective members are invited to teas or bridge parties, as well as to the monthly meetings. Occasionally a husband becomes a member of the section through the interest of his wife in the Ladies' Auxiliary.

The Publicity Committee performs the function of publicizing the meetings of the auxiliary in the local newspapers.

The Hospitality Committee has the specific function of entertaining the wives of any visiting speakers to the section.

The Entertainment Committee plans social functions that are given with the idea of having the members of the auxiliary become better acquainted.

The Refreshment Committee prepares refreshments for both the section and auxiliary membership for the joint social hour which is held in the meeting room of the auxiliary after the monthly programs of the section and auxiliary. The cost of the refreshments is defrayed by the section and quite frequently the auxiliary obtains free refreshments through contacts with

better production . . . through FASTER HEAT

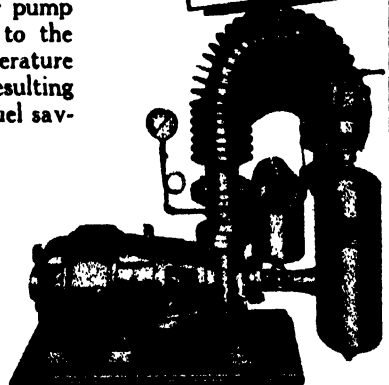
Speed up your boiling time in process through prompt and thorough removal of condensate and automatic and continuous separation and removal of entrapped air by the positive Cochrane-Becker closed circuit system . . . eductor pump returns condensate to the boiler at high temperature and high pressure resulting in faster heat and fuel savings up to 28%!

For higher quality, increased production and lower cost—the C-B system sets new standards of drainage efficiency. Write for Publication No. 3025.

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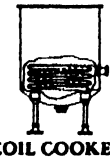
Plant operators everywhere have found this system provides:

1. Hotter—more uniform heating
2. Increased production capacity
3. Improved quality
4. 1% fuel saving for every 11° gained
5. Increased boiler capacity
6. Less make-up water



Cochrane COCHRANE BECKER SYSTEM

The Cochrane-Becker system can improve results obtained from this kind of equipment



COIL COOKERS



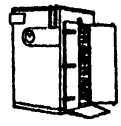
JACKETED KETTLES



JACKETED MIXERS



DRYING ROLLS



DRYERS

the advertising departments of various local concerns.

In addition to the above committees, the Ladies' Auxiliary on October 15, 1941, formed its own Red Cross unit working in conjunction with the American Red Cross. This unit keeps its own register, record of members, hours worked, and garments sent in to Red Cross headquarters and makes a monthly report at its own business meetings. Many of the members are working in Civilian Defense activities.

The Louisiana Section urges that, if you do not already have a Ladies' Auxiliary in your section, you waste no time in organizing such a valuable adjunct.

A. WATSON CHAPMAN, *Louisiana Section.*

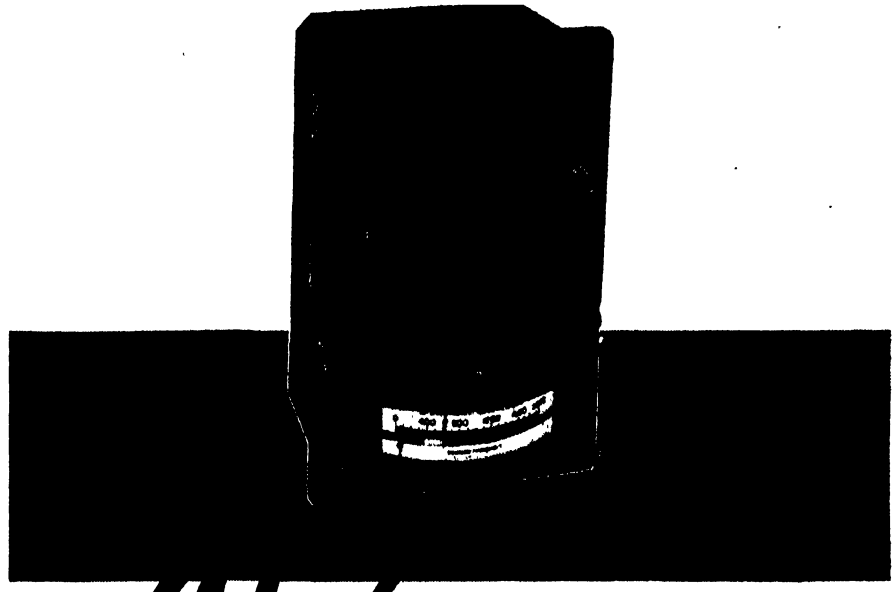
Government Loans to Students

THE Government is to make loans to more than 10,000 college men and women seeking technical or professional degrees in six specified fields, to make sure that their education is completed in the shortest time possible and applied to the war effort. Congress has provided $5,000,000 for training in engineering, physics, chemistry, medicine (including veterinary), dentistry, and pharmacy. Loans will be made to students registered in accelerated programs, whose technical or professional education can be completed within two years, who agree in writing to participate in accelerated programs of study and to engage, for the duration of the war in which the United States is now engaged, in such employment or service as may be assigned by officers or agencies designated by the chairman of the War Manpower Commission.



Old Rubber for Reclaim

Al Costello, employee of B. F. Goodrich Co., examines part of a 70-year-old shock absorber that Goodrich reclaimers say is the oldest rubber product they have ever seen which has reclaim value. Two parts of the product were contributed to the national scrap rubber drive by William E. Daywalt of Tiffin, Ohio. The date the shock absorber was manufactured is clearly branded in the rubber.

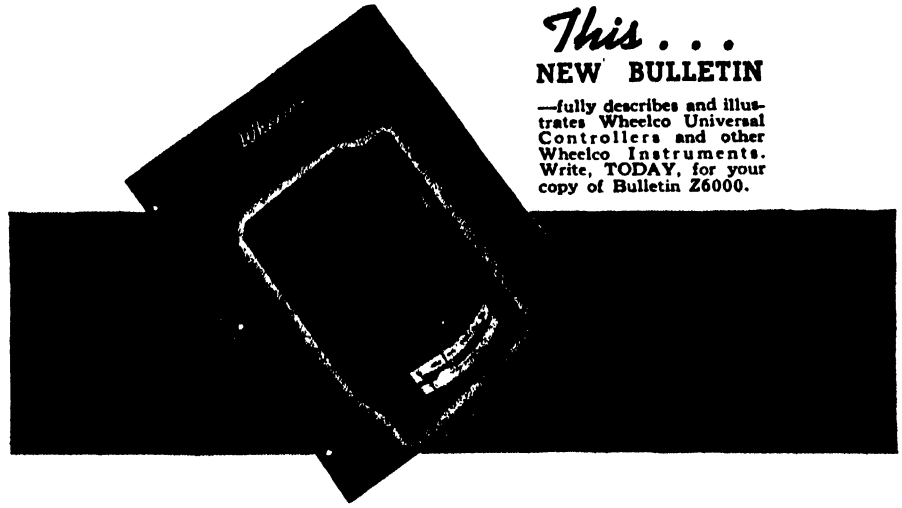


Only Wheelco UNIVERSAL Temperature Controllers can give you:

1. "Electronic Principle" Control, *plus*
2. Extreme accuracy of temperature measurement, *plus*
3. Interchangeability of all component parts, *plus*
4. Interchangeability of scale ranges, *plus*
5. Ready accessibility of all parts for individual checking, *plus*
6. Setting devices which may be mounted and locked within the instrument case as a precaution against sabotage.

Wheelco UNIVERSAL Controllers include Capacitrols, Potentio-trols, Limitrols and Resistance Thermotrols.

Wheelco UNIVERSAL Controllers have unlimited applications for indicating, measuring and controlling temperatures. For complete information on these instruments write for free bulletin.



This . . . NEW BULLETIN

—fully describes and illustrates Wheelco Universal Controllers and other Wheelco Instruments. Write, TODAY, for your copy of Bulletin Z6000.

Wheelco Instruments Co.

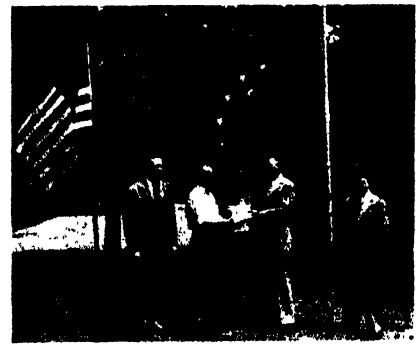
851 W. HARRISON STREET CHICAGO, ILL.

THE WALL STREET OF CHEMISTRY

	Annual Earnings		Per Common Share	
	1941	*1942*	*1941*	*1942*
Catalin Corp.	$ 166,842	$ 111,901	—	—
Crown Zellerbach Corp.	8,866,287	9,018,801	$2.75	$2.85
Owens-Illinois Glass Co.	7,640,538	9,090,274	2.87	3.42
U. S. Plywood Corp.	781,773	992,829	3.28	3.85
Six Months' Earnings				
Corn Products Refining Co.	4,878,641	4,160,660	1.59	1.30
E. I. du Pont de Nemours & Co., Inc.			3.75	2.09
Ferro Enamel Co.	323,899	135,074	1.39	0.58
Hercules Powder Co.	2,831,189	2,195,130	1.95	1.47
Libbey-Owens-Ford Glass Co.	5,377,247	754,966	2.14	0.30
Standard Brands, Inc.	4,308,573	2,864,877	0.30	0.19
Tubize Chatillon Corp.	845,107	631,476	0.92	0.21
Westinghouse Electric & Manufacturing Co.	11,568,401	6,731,701	4.33	2.10
June Quarter Earnings				
Air Reduction Co.	1,747,504	1,322,875	0.64	0.49
Allegheny Ludlum Steel Corp.	1,449,183	1,205,565	1.10	0.92
Freeport Sulphur Co.	953,419	735,417	1.20	0.92
Johns-Manville Corp.	1,457,213	1,103,054	1.62	1.24
National Malleable & Steel Castings Co.	473,529	265,943	0.98	0.55
Penick & Ford	384,559	319,609	1.04	0.87
Texas Gulf Sulphur Co.	2,598,640	2,368,653	0.68	0.62

Uruguay Increases Demand for Carbon Tetrachloride

Increased Uruguayan demand for carbon tetrachloride is reported through semi-official sources. Comparatively small prior to 1939, increasingly extensive use of the product in making sheep remedies has led to a rise in imports—190,400 pounds in 1940, compared with 99,600 pounds in 1939, and substantial gains in 1941.



Minute Man Flag to Foxboro

Alfred C. Sheehy, deputy state administrator of War Savings Staff for Massachusetts, presents the Treasury Department Minute Man Flag and Certificate to Irving W. Lane, veteran employee of The Foxboro Co., Foxboro. The company has over 95 per cent enrollment in pay-roll allotment plan for war bond purchases.



PROFITS
THROUGH pH CONTROL

If you are now controlling the pH of your processes you can benefit from the increased speed, accuracy, and versatility of the Beckman INDUSTRIAL MODEL pH METER. If you are not controlling pH, a letter outlining your production processes and problems will bring helpful information on how you can speed up operations, reduce spoilage, increase profits, and obtain uniformly superior products with this accurate simplified meter. This service is free and incurs no obligation.

21070 Beckman Industrial pH Meter $155.00

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CROWN QUALITY AMORPHOUS MINERAL WAX

AMORPHOUS MINERAL WAX

190° F. Melting Point (minimum)

BLACK AMBER
BROWN YELLOW

Manufactured by

AMERICAN WAX REFINING CORPORATION

CAVEN POINT ROAD JERSEY CITY, N. J.

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Specify **Florite Desiccant**



For Efficient Dehydration of GASES and LIQUIDS

FLORITE, the new granular drying agent, is now being used successfully for dehydrating natural gas, propane, gasoline, air, nitrogen, carbon dioxide and other gases and liquids where high drying efficiency is required.

It selectively adsorbs 4 to 20% of its weight in water, depending upon the particular application, and is regenerated by heating to 300–350°F. FLORITE is hard, stable, non-corrosive, non-poisonous, and is available in a variety of particle size classifications.

WRITE FOR COMPLETE DETAILS

Floridin Company, Inc.

LIBERTY AVE. HAVEN, PENNA.

India Investigates Plastics Possibilities

INDIA is actively developing its plastics possibilities based on the possession of a number of raw materials, a consular report states.

Plastic materials have been developed from groundnut seed cake, coffee beans, bagasse, and jute waste. Several products have been developed from oil plastics, while wool substitutes have been produced from certain seed cakes.

British Issue War Standard for Paint

THE British Standards Institution has issued a war emergency standard for red lead ready-mixed paints. However, for special and export purposes the specifications must be used without amendment beyond substitution of white spirit for turpentine wherever possible. For the home market, principal changes from peacetime specifications in the emergency amendment are that turpentine must not be used but replaced by white spirit, other drying oils shall be substituted for either raw, boiled, or refined linseed oil, and suitable extenders of specified emergency types shall be used.

Canada's First Aniline Plant Goes into Operation

CANADA'S first aniline plant, located near Kitchener, Ontario, in a former rubber footwear factory which has been completely remodeled, is in production. The new plant uses the nitrobenzene process, with a number of important modifications. The nitration stage is automatic, and minimum floor space is required. The plant is producing thousands of gallons of aniline per day, with plans also in progress for manufacture of vulcanization accelerators.

Civilian Dye Shades in United Kingdom Cut in Half

SHADES which may be used in dyeing civilian cloth in the United Kingdom have been curtailed 50 per cent in number since 1940, under orders of the Dyestuffs Controller. The depth of coloring likewise has been regulated. In an endeavor to offset such limitations, however, the allowed shades have been given a romantic nomenclature, such as Patriot Blue, Kew Green.

SUFFICIENT formalin to meet essential requirements is anticipated from the output of a formaldehyde plant erected by the Eire Emergency Scientific Research Bureau at Riverstown Distillery in cooperation with the Irish Alcohol Factories, Ltd. Distribution of supplies from this plant already has begun.



One plate of stainless steel if rolled into a plate of Jessop Silver-Ply Stainless-Clad Steel (20% cladding), will make available 5 *times* more stainless surface.

Use of 5% to 50% Silver-Ply Stainless-Clad Steel conserves strategic alloys for the war effort . . . and you still have the desired protection of stainless steel on the clad side, strength from the mild steel backing and better thermal conductivity. It also economizes on material costs with savings up to 45% as compared to solid stainless.

If your operations involve processes where corrosion of equipment must be avoided and product purity must be maintained, Silver-Ply Stainless-Clad may solve your problems, for it is corrosion resisting, stain-free and easy to clean.

Write for descriptive booklet listing applications for processing and storage equipment for use in your specific industry.

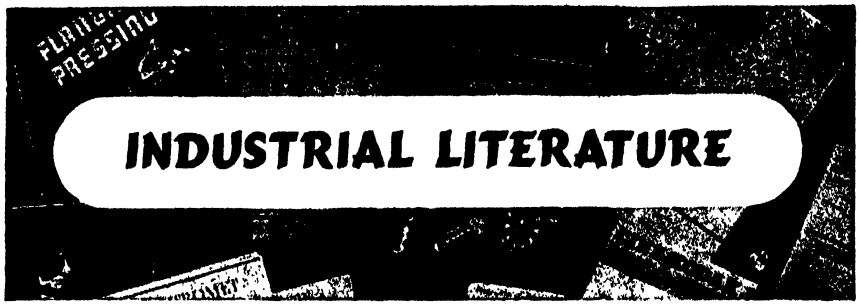
* Manufactured under U. S. Pat. Nos. 1,997,538 and 2,044,742

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General Offices
WASHINGTON, PENNA., U. S. A.

JESSOP STEELS FOR AMERICA AND HER ALLIES

CARBON • HIGH SPEED • SPECIAL ALLOY • STAINLESS • COMPOSITE STEELS



Listed publications should be requested directly from the company concerned. Use business stationery, mention bulletin numbers, and refer to this journal. Publications will be sent free unless otherwise noted.

Alloys, Ceramics, Synthetics. The expanding activities of this manufacturer in the direction of alloys and synthetics supplement the original business of producing chemical stoneware. In this bulletin the authors present a quick summary of the application of Tygon as well as metal coatings to a variety of process industries' problems. *Bulletin "D" CEN.* The United States Stoneware Co., Akron, Ohio.

Brush Sifters. The application of brush sifters to food, drug, chemical, and allied industries is described in this 8-page bulletin. Some of the units described are simple sifters, while others are combined mixers and sifters. Along with photographs the authors supply specification tables for the principal items in the line. *Catalog 27-A CEN.* Robinston Manufacturing Co., Muncy, Penna.

Conveyors. Package handling problems are dealt with in this 24-page bulletin on conveyors. A 2-page spread devoted to proper selection of conveyors is a working analysis of the conveyor problem. Applications described in this bulletin range all the way from the carrying of small jars to the delivery of heavy bags of chemicals and the movement of oil drums through the plant. *Catalog 307 CEN.* Standard Conveyor Co., North St. Paul, Minn.

Electric Motors. The authors of this bulletin have added to the wartime literature designed to help plant men get longer life and better service out of equipment. This nontechnical book gets over its point with the aid of cartoons but, nevertheless, is full of valuable suggestions. *A Guide to Wartime Care of Electric Motors CEN.* Allis-Chalmers Mfg. Co., Milwaukee, Wis.

High-Pressure Motor-Driven Pumps. This line of vertical pumps includes simplex, duplex, and triplex types. There are four groups of pumps in the single acting power pump class, each available in nine sizes. The bulletin describes single acting triplex pumps designed to carry pressures from 1,400 to 11,100 pounds per square inch, with a capacity range from 3.68 to 22.40 gallons per minute. Four sizes of low volume, double plunger, high-pressure pumps are described. These have capacities ranging from 6,000 to 15,000 pounds per square inch. Capacity and dimension tables, together with well-chosen photographs, make this a useful bulletin. *Bulletin 260-A CEN.* The Watson-Stillman Co., Roselle, N. J.

Horizontal Duplex Plunger Power Pumps. Generous use of line drawings makes this 6-page bulletin a useful data sheet on this type of pump. The manufacturer recommends them for high-pressure hydraulic service for pipe lines and oil refineries. *Bulletin W-412-B40 CEN.* Worthington Pump and Machinery Corp., Harrison, N. J.

Material Handling. The application of overhead handling to a variety of industrial jobs is illustrated in this newsy type of folder. The illustrations show such diversified work as the serving of dyeing machines, handling of bakery products, and conveying of metal parts for finishing. *Cleveland Crane Graphic Folder CEN.* The Cleveland Crane & Engineering Co., 1129 East 283rd St., Wickliffe, Ohio.

Recording Thermometers. Detailed information on construction and application of this liquid-filled recording thermometer is put together in workmanlike form in a 6-page bulletin. The thermometers are offered for a temperature range from −125° F. to +400° F. *Bulletin T302 CEN.* The Bristol Co., Waterbury, Conn.

Rheostats and Resistors. In addition to rheostats and resistors this catalog includes information on tap switches, chokes, attenuators for a variety of uses in industry. Detailed dimension tables and list prices add to the value of the catalog. *Be Right with Ohmite Catalog CEN.* Ohmite Manufacturing Co., 4835 West Flournoy St., Chicago, Ill.

Rotary Dryers. In this 4-page bulletin the design and construction of this type of dryer is given in summary. The line includes standard single and double shell dryers, and also an injector type dryer which has been more recently developed. Illustrations show the application of the dryer to fertilizer and sewage work. The bulletin also lists dryers in a variety of other services. *Bulletin 18 CEN.* Perkins Dryer Co., Inc., 127 North Dearborn St., Chicago, Ill.

Rotary Positive Blowers. This 20-page bulletin presents details about the advantages of positive displacement blowers, their operating principles, and design and construction features. Characteristic curves are reproduced for one constant-speed operation, multispeed, and variable speed operation. Well-chosen illustrations indicate the suitable types for a wide variety of industrial services ranging from vacuum filtration to the supplying of air for combustion and use of the equipment on water gas machines. *Bulletin 22-23-B-11 CEN.* Roots-Connersville Blower Corp., Connersville, Ind.

Silver Alloy Brazing. In the pages of this bulletin the authors have supplied a simple manual for the applying of Easy-Flo No. 3 silver solder. This is a low-temperature composition conforming to Navy specifications. In the bulletin line drawings illustrate application detail. The authors point out that the use of this method produces high strength, ductile, and corrosion-resistant joints at the low temperature of 1,270° F. *Silver Alloy Brazing of Fabricated Copper Piping Bulletin CEN.* Handy & Harman, 82 Fulton St., New York, N. Y.

Steam-Jet Ejectors. The two-stage ejectors described in this bulletin are manufactured in two general types: condensing and noncondensing. The condensing type has an inter-condenser between stages. The inter-condenser reduces the over-all steam consumption of the ejector by condensing the first stage motive steam and condensable vapors entering the first stage suction, and by cooling the air or noncondensable vapors which must be handled by the second stage. In the noncondensing type the first stage discharges directly into the second stage. The second stage must therefore handle the first stage motive steam and condensable vapors entering the first stage suction together with the air or noncondensable vapors. *Bulletin W-205-B7A CEN.* Worthington Pump and Machinery Corp., Harrison, N. J.

Step Valves. A data sheet is offered describing the function of step valves used in Milton Roy pumps, how it functions in working against pumping pressures up to 20,000 pounds per square inch. Illustrations show typical valve designs and why the double-ball checks used in step-valve construction are claimed to be nonclogging and self-cleaning. *Bulletin 426 CEN.* Milton Roy Pumps, 1300 East Mermaid Ave., Chestnut Hill, Philadelphia, Penna.

Strainers. The Yarway fine-screen strainer described in this bulletin is made in six standard sizes, ½ to 2 inches. This strainer has three improved features: plating inside and outside for protection against rusting; screen of special Monel woven wire fine enough for straining service but having ample free area; straight thread and machined face on blow-off bushing for easy removal and replacement of screen and for tight joint. *Bulletin S-200 CEN.* Yarnall-Waring Co., Chestnut Hill, Philadelphia, Penna.

Temperature Control Products. This catalog contains condensed information on temperature control products for heating, ventilating, air-conditioning, and industrial applications. It discusses motor-operated valves, control motors, thermostats, humidity controllers, program switches, and accessory equipment which goes to make up the system. *Condensed Catalog CEN.* Barber-Colman Co., Rockford, Ill.

Unibestos Insulation. This bulletin describes the variety of forms and shapes in which this material is available. In addition to information on thermal efficiency and application, the authors have included a table showing the thickness required for various heat insulation jobs. *They'll Specify Unibestos Bulletin CEN.* Union Asbestos & Rubber Co., 1821 South 54th Ave., Cicero, Ill.

Amberlite Ion Exchange Resins

Make an Important Contribution to the Synthetic Rubber Program

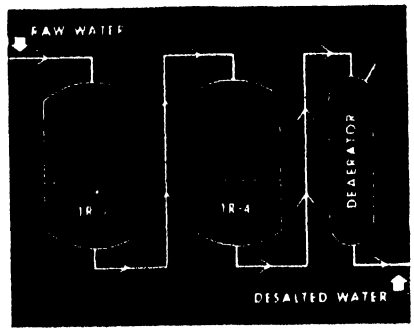
★

AMBERLITE Ion Exchange resins are providing a timely answer to the problem of producing pure water economically and in the huge quantities required by the swiftly expanding synthetic rubber industry.

Water passed through beds of these synthetic resins meets the rigid requirements of purity required for the processing of synthetic elastomers since it is equal or superior to distillate or condensate.

Furthermore, the AMBERLITE process makes possible the production of pure water in almost unlimited quantities with a minimum of equipment and space for operations—important advantages in these times when materials for equipment and new construction are at a premium.

AMBERLITE Ion Exchange resins have for several months demonstrated



their practical value in the synthetic rubber processing industry in the operation of a large AMBERLITE unit. Now in full operation, this unit is providing results on a commercial scale that compare very favorably with the theoretical capacity previously determined in The Resinous Products & Chemical Company laboratories.

The synthetic rubber industry is only one segment of the broad industrial field to which AMBERLITE Ion Exchange resins are bringing economics, as well as faster and more uniform production of pure water. Other processes involving emulsions and dispersions offer equally fertile fields for the use of AMBERLITES.

The recovery of metal from industrial wastes, the purification of quality chemicals and dyestuffs, and the softening and desalting of water are but a few of many other branches of the process industries which can profitably use the AMBERLITES.

For further information regarding the AMBERLITE Ion Exchange resins, write The Resinous Products & Chemical Company, holder of the United States patents issued to Adams and Holmes relating to ion exchange resins.

OTHER RESINOUS PRODUCTS & CHEMICAL COMPANY SYNTHETIC RESIN DEVELOPMENTS

Synthetic Resin Plywood Adhesives



TECO — a phenolic resin film, is the standard plywood adhesive where maximum durability is essential. AMBERLITE — water soluble phenol formaldehyde resin adhesives, and UFORMITE — urea formaldehyde resin adhesives, cover a wide range of applications in the plywood industry.

Synthetic Resins as Coatings



AMBEROLS (modified oil-soluble phenol formaldehyde resins) paved the way for the modern, quick-drying varnishes. DURAPLEX alkyd resins, UFORMITE urea formaldehyde resins, and ACRYLOID polymers of acrylate and methacrylate esters have extended the use of synthetic resins in paints, varnishes, lacquers, printing inks, coated fabrics, and floor coverings, and are now being used extensively to speed our victory program.

Resin Emulsion Paints



The use of alkyd resin emulsions as clear coatings, primers, and — in pigmented form — as paints, has resulted in coatings requiring no volatile solvents. This emulsion, AQUAPLEX, is the base for quick-drying paints.

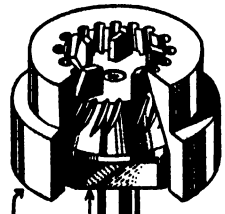
Paraplex Resins



PARAPLEX resins are tough, rubbery products of varying softnesses, outstanding as resin plasticizers for nitro-cellulose and ethyl-cellulose.

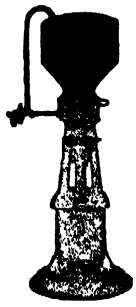
THE RESINOUS PRODUCTS & CHEMICAL COMPANY

PLUS Your Product
...AND SHOW A GREATER PROFIT!



Original design of rotor and stator in

EPPENBACH COLLOIDAL MILL assures more efficient triple action.



AMAZING RESULTS have been achieved with the Eppenbach Colloidal Mills. Products, as wide apart as emulsions, serums, lipsticks, rubber compounds, have acquired new, improved qualities, because the Eppenbach is so far ahead in its triple action.

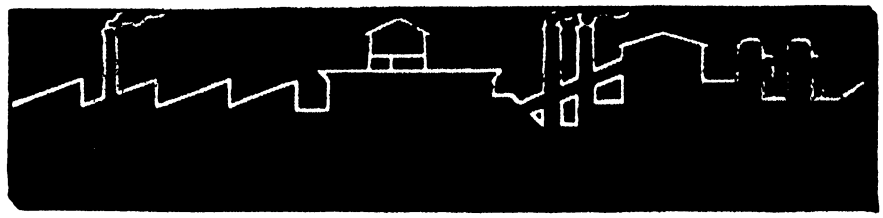
It's more powerful, the mixing turbines break liquids more violently. Clearances can be so finely adjusted, they seem practically closed. The teeth in the rotor and stator shear the materials mechanically—then the smooth surfaces hydraulically shear to any required particle size.

Perfect control is assured. No air is sucked in. Micrometric adjustments are made without stopping. Water jackets provide right temperatures. Rotor is only moving part—and it's conically shaped to take up wear. Self-cleaning, simple, rugged. *Write us.*

EPPENBACH INC.

PROCESSING EQUIPMENT FOR OVER 29 YEARS

[illegible] Blvd., Long Island City N.Y.



Wood-Moisture Determination

THE speedy and accurate determination of moisture content in wood, by the dependable electrical resistance method, is provided by the Model MB-L megohm-bridge with standard pin-type electrode, recently developed by Industrial Instruments, Inc., 156 Culver Ave., Jersey City, N. J. This instrument supplies direct readings in moisture-content percentage terms for meeting specifications covering precise condition of lumber, as called for by the Army, Navy, furniture manufacturers, and others.

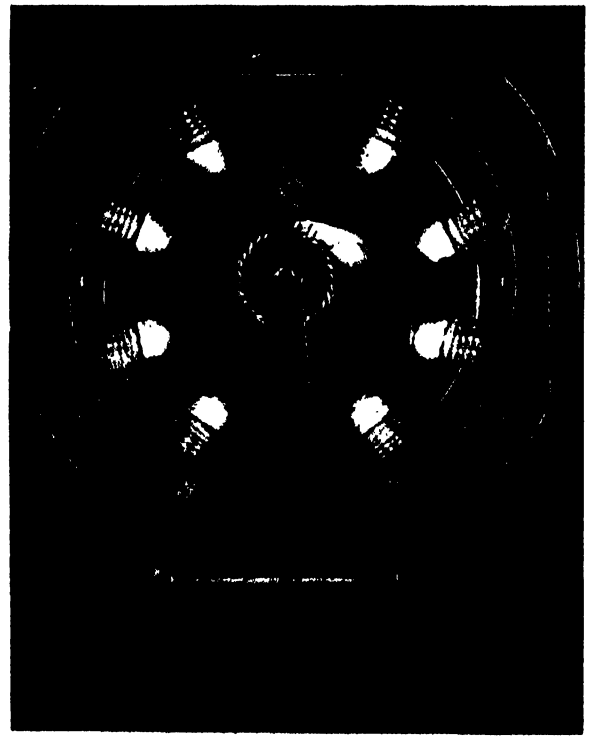
This simplified wood-moisture tester is a modified wheatstone bridge using a cathode-ray electronic tube as the null or balance indicator. The combination switch and control knob is rotated until the null indicator flashes, at which point moisture content is read directly on the dial. Since the bridge circuit is self-compensating, there are no variables to contend with or compensate for such as voltage fluctuations or varying tube characteristics.

Portable Floodlight

A PORTABLE battery-operated floodlight has been announced by the Illuminating Laboratory of the General Electric Co., Schenectady, N. Y., especially for combustible areas which cannot have installed lighting. This unit is intended for use in such places as powder igloo interiors, powder magazines, freight car and warehouse interiors containing combustibles, and during blackouts and other emergencies.

Infrared Lamps Used for Armature Baking

RADIANT drying lamps, replacing steam heat, have reduced the drying time for 12-inch armatures from 18 to 5 hours in a small industrial repair shop. For this purpose 120 infrared 250-watt reflector drying lamps (type R-40), manufactured by Westinghouse, Pittsburgh, Penna., are arranged in tubular form in two equal adjustable banks. Three 10-kw. sections, each consisting of eight groups of five lamps, permit three armatures to be baked simultaneously or individually. Heating temperatures range between 240° and 260° F. as compared to 185° to 200° F. with steam heat.



Plastic Window Pane

A NEW type window pane of transparent plastic laminated with wire mesh which will withstand the explosion of a 150-pound bomb 8 feet away has been developed for use in military construction and industrial plants in potential air raid zones. The new material was developed by the Plastics Division of Monsanto Chemical Co., St. Louis, Mo., in cooperation with the United States Navy to end the menace of flying glass, which experience in England revealed was one of the chief dangers in an air raid. The panes consist of standard, 16-mesh wire screening sandwiched between two sheets of Vuelite, Monsanto's transparent cellulose acetate sheeting originally developed for fluorescent lighting fixtures.

Electrically Equipped Trucks

THE Clark Tructractor Division of Clark Equipment Co., Battle Creek, Mich., is providing its trucks with full electric equipment for storage battery power, where electric operation seems best fitted to the job. The machines lift from 2,000 to 7,000 pounds, using a hydraulic vane type pump driven by special series-wound motor. The same pump operates the tilting unit, which enables the operator to tilt the load back 10 degrees in 5 seconds for safe riding and tilt it forward 3 degrees in 1 second for tiering.

THE executive offices of Evans Chemetics, Inc., and the offices and laboratories of the Ralph L. Evans Associates are now located at 250 East 43rd St., New York, N. Y.

CONTINUED ON PAGE 995

CHEMICAL MARKET PRICES

July 31, 1942

Compiled from weekly current price listings in the *Oil, Paint and Drug Reporter*, with permission of the publisher under its copyright. These prices, unless otherwise specified, are those prevailing in the New York market for technical grades in usual large commercial quantities.

Acetaldehyde, drums, c/l., wks.	lb.	.11
Acetamide, tech., kegs, 500-lb. lots, works	lb.	.30
Acetanilide, tech., powd., bbls.	lb.	.27
Acetic anhydride, drums, c/l., frt. allowed	lb.	.11½
Acetone, C. P., drums, c/l., dlvd.	lb.	.08½
Acetophenetidin, bbls., 1000 lbs.	lb.	1.00
Acetophenone, drums, 100 lbs.	lb.	1.55
Acid, abietic, drums, c/l.	lb.	.08¾
Acetic, 28%, bbls., c/l.	100 lbs.	3.38
56%, bbls., c/l.	100 lbs.	5.58
Glacial, synth., drums, c/l.	100 lbs.	9.15
Glacial, U. S. P., drums, c/l.	100 lbs.	10.95
Acetylsalicylic, U. S. P., bbls.	lb.	.40
Anthranilic, tech., bbls.	lb.	.95
Battery, cbys., c/l., E. wks.	100 lbs.	1.60
Benzoic, tech., bbls.	lb.	.43
Boric, tech., gran., bags	ton	99.00
Butyric (99%), drums, c/l., wks.	lb.	.22
Chloroacetic, mono-, tech., bbls. wks.	lb.	.17
Chlorosulfonic, drums, c/l., wks.	lb.	.03
Chromic, 99%, drums	lb.	.16¼
Cinnamic, bottles	lb.	3.50*
Citric, cryst., bbls., c/l.	lb.	.20
Cresylic, H. B., 210–215°, drums, c/l., wks., frt. equal	gal.	.81
Formic, 90%, cbys., f. o. b. works, c/l.	lb.	.10½
Gallic, tech., bbls.	lb.	1.10
Hydriodic, 57%, 5-lb. bot.	lb.	2.90
Hydrobromic, 34%, cbys.	lb.	.35
Hydrochloric, 20°, tanks, wks.	100 lbs.	1.75
Hydrofluoric, 30%, bbls., wks.	lb.	.06
60%, lead cbys.	lb.	.14
Hydrofluosilicic, 30%, bbls., wks.	lb	.09
Hypophosphorus, U. S. P., 30%, 5-gal. demis.	lb.	.75
Lactic, dark, 22%, bbls.	100 lbs.	2.90
Light, 22%, bbls., wks.	100 lbs.	3.90
Maleic, powd., drums	lb.	.30
Mixed, tanks, wks. N unit.	lb.	.05
S unit.	lb.	.0085
Naphthenic, 220–230, drums	lb.	.13
Nitric, C. P., cbys.	lb.	.13
36°, cbys., c/l., wks.	100 lbs.	5.00
Oxalic, bbls., wks.	lb.	.11¼
Phosphoric, U. S. P., 50%	lb.	.10½
Picramic, kegs	lb.	.65
Picric, bbls.	lb.	.35
Pyrogallic, tech., bbls.	lb.	1.45
Salicylic, tech., bbls.	lb.	.33
Stearic, distilled, d. p., bags, dlvd.	lb.	.1580
Sulfanilic, tech., 250-lb. bbls.	lb.	.17
Sulfuric, 66°, cbys., c/l., E. wks.	100 lbs.	1.50
66°, tanks, E. wks.	ton	16.50
60°, tanks, E. wks.	ton	13.00
Oleum, 20%, tanks, E. wks.	ton	19.50
Tannic, tech., bbls.	lb.	.71
Tartaric, U. S. P., cryst., bbls.	lb.	.70½
Tungstic, pure, 100-lb. pkg.	lb.	2.86
Alcohol, ethyl, 190 proof, from molasses, drums, c/l.	gal.	8.19
Amyl, from pentane, tanks	lb.	.131
Butyl, normal, tanks, frt. allowed	lb.	.12½
Cinnamic, bottles	lb.	3.00
Denatured, C. D. 14, drums, c/l., wks., E.	gal.	.65
Diacetone, tech., drums, c/l.	lb.	.11
Furfuryl, tech., drums, c/l., wks.	lb.	.20
Isobutyl, ref., drums, works	lb.	.0860
Isopropyl, ref., 91%, drums, c/l., f. o. b. dest.	gal.	.40½
Wood, *see* Methanol		
Aldol, 95%, drums, c/l., wks.	lb.	.12
Alpha-naphthol, bbls.	lb.	.52
Alpha-naphthylamine, bbls.	lb.	.32
Alum, ammonia, lump, bbls., wks.	100 lbs.	4.25
Chrome, bbls.	lb.	.12½
Potash, lump, bbls., wks.	100 lbs.	4.50
Soda, bbls., wks.	100 lbs.	3.25
Aluminum, metal, 98–99%, drums, c/l.	lb.	.15
Chloride, anhyd., commercial, drums extra, c/l., wks.	lb.	.08
Stearate, bbls., c/l.	lb.	.23
Sulfate, comm'l, bags, c/l., wks., frt. equal	100 lbs.	1.15
Iron-free, bags, wks.	100 lbs.	1.75
Ammonia, anhydrous, fertilizer, f. o. b. wks., frt. equalized	ton	90.00
Pure, cyls.	lb.	.16
Ammonia, aqua, 26°, tanks (on NH_3 content), f. o. b. wks.	lb.	.04
Ammonium bicarbonate, drums	lb.	.0564
Bifluoride, bbls.	lb.	.16
Bromide, bbls.	lb.	.31
Carbonate, tech., bbls.	lb.	.08¼
Chloride, gray, bbls.	100 lbs.	5.50
U. S. P., gran., bbls.	lb.	.10
Iodide, 25-lb. jars	lb.	3.65
Linoleate, 80%, anhyd., bbls.	lb.	.12
Nitrate, tech., bags, c/l., wks.	100 lbs.	4.35
Oleate, bbls.	lb.	.14
Oxalate, kegs	lb.	.23
Persulfate, cases	lb.	.25½
Phosphate, dibasic, tech., bbls.	lb.	.07¼
Sulfate, bulk, c/l., f. o. b. cars, ports contract	ton	29.00
Sulfide, liq. 40–45%, basis 100%, tanks, dlvd.	lb.	.07½
Amyl acetate, from pentane, tanks, frt. allowed	lb.	.14½
Chloride, mixed, tanks, wks.	lb.	.06
Mercaptan, drums, l. c. l., wks.	lb.	1.10
Oleate, drums, l. c. l., wks.	lb.	.31
Stearate, drums, l. c. l., wks.	lb.	.32½
Amylene, tanks, wks.	lb.	.09
Anilin oil, drums	lb.	.15
Anthraquinone, subl., bbls.	lb.	.70
Antimony, chloride, soln., cbys.	lb.	.17
Needle, Bolivian, 67%	lb.	.18½
Oxide, bags, c/l.	lb.	.15
Salts, 65%, bbls.	lb.	.40
Argols, test 75–80%, basis 100%, f. o. b. Spanish ports	100 kilos	105.00
Arsenic, metal, kegs	lb.	No prices
White, c/l., kegs	lb.	.04
Arsenous chloride, cans	lb.	4.85
Barium carbonate, natural, 99%— 200 mesh, bags, c/l., wks.	ton	43.00
Chloride, tech., cryst., bgs., c/l.	ton	72.50
Dioxide, drums, wks.	lb.	.10
Hydroxide, bbls., wks.	lb.	.06
Nitrate, casks	lb.	.11
Barytes, floated, 350-lb. bbls., wks.	ton	27.65
Benzaldehyde, tech., drums	lb.	.45
Benzidine base, bbls.	lb.	.70
Benzol, tanks, frt. allowed E. of Omaha	gal.	.15
Benzoyl chloride, carboys	lb.	.23
Benzyl acetate, F. F. C., drums	lb.	.59*
Beta-naphthol, tech., bbls.	lb.	.23
Beta-naphthylamine, tech., kegs	lb.	.51
Bismuth, metal, ton lots	lb.	1.25
Bismuth nitrate, cans	lb.	1.30
Oxychloride, kegs	lb.	3.10
Subnitrate, powd., barrels	lb.	1.20
Blanc fixe, dry, bags, c/l.	ton	60.00
Bleaching powder, drums, wks.	100 lbs.	2.25
Bone black, 4, bbls., c/l., frt. allowed E.	lb.	.11
Borax, tech., gran., bulk, c/l., frt. allowed	ton	41.50
Bordeaux mixture, drums	lb.	.11
Bromine, cases	lb.	.25
Bromoform, cbys.	lb.	1.42
Butyl acetate, drums, c/l., frt. allowed	lb.	.14½
Aldehyde, drums, l. c. l.	lb.	.16½
Lactate, drums	lb.	.26½
Stearate, drums	lb.	.31
Cadmium, metal, ingots, cases	lb.	.90
Bromide, 25-lb. jars	lb.	1.65
Sulfide, boxes	lb.	1.35
Caffeine, 100-lb. drums, 10,000 lbs. or more	lb.	2.60
Calcium acetate, bags	100 lbs.	3.00
Arsenate, bgs., c/l.	lb.	.07
Carbonate, precip., bags, 50 lbs., c/l., wks.	lb.	.02½
Chloride, bags, flake, c/l., dlvd.	ton	18.50
Gluconate, U. S. P., bbls., 150 lbs.	lb.	.52
Phosphate, dibasic, 38–40% P_2O_5, bags, Atlan. pts.	unit-ton	No prices
Tribas, bbls.	lb.	.0635
Calomel, bbls., kegs, 50 lbs. or more	lb.	2.95
Camphor, synthetic, gran., powd., drums, ton lots	lb.	.42
Carbasole, 95%, drums, ton lots, wks.	lb.	.70
Carbon bisulfide, drums, c/l.	lb.	.05
Black, reg., uncomp., bgs., c/l., works	lb.	.03625
Dioxide, liq., cyl.	lb.	.06
Tetrachloride, drums, c/l., frt. allowed	gal.	.73
Casein, dom., 20–30 mesh, bags, c/l.	lb.	.15
Cerium oxalate, bbls., wks.	lb.	.35
Charcoal, willow, powd., bbls.	lb.	.06
China clay, bulk, c/l., wks.	ton	7.60
Chloral hydrate, drums	lb.	.90
Chlorine, liq., c/l., cyl., dlvd.	lb.	.05¼
Tanks, wks., frt. equal	100 lbs.	1.75
Chlorobensene, mono-, drums	lb.	.07
Chloroform, tech., drums	lb.	.20
Chromium acetate, 24%, powd., bbls.	lb.	.22
Coal tar, crude, bbls., c/l., wks.	bbl.	8.25
Cobalt oxide, black, kegs	lb.	1.84
Copper carbonate, 52–54%, bbls.	lb.	.18
Chloride, bbls.	lb.	.23¼
Cyanide tech., bbls.	lb.	.34
Metal, elec.	lb.	.12
Oxide, black, bbls., tons, wks.	lb.	.19½
Sulfate, bbls., c/l., wks.	100 lbs.	5.15
Copperas, cryst., bulk, c/l., wks.	ton	14.00
Cream of tartar, bbls.	lb.	.57½
Cresol, U. S. P., drums, c/l., wks.	lb.	.11
Crotonaldehyde, 97%, c/l., wks.	lb.	.15
Cyanamide, 22% N, pulvd., dlvd., contracts	Nitrogen unit	No prices
Diamylamine, drums, c/l., wks.	lb.	.61
Diamylene, tanks, wks.	lb.	.09½
Diamyl phthalate, tanks	lb.	.21
Diatomaceous earth, dom., bags, c/l., Pacific Cst.	ton	22.00

Dibutylamine, drums, l. c. l., wks.	lb.	.64
Dibutylphthalate, drums, c/l., dlvd.	lb.	.21
Tartrate, drums	lb.	.92
Dichloroethyl ether, drums, c/l., wks.	lb.	.15
Diethanolamine, drums, c/l., wks.	lb.	.23½
Diethylaniline, drums	lb.	.40
Diethylene glycol, drums, c/l., wks.	lb.	.14
Monobutyl ether, drums, wks.	lb.	.22½
Monoethyl ether, drums, c/l., wks.	lb.	.14½
Diethyl phthalate, drums, c/l.	lb.	.21½
Sulfate, tech., drums, wks.	lb.	.13
Diglycol oleate, light, bbls.	lb.	.17
Dimethylaniline, drums	lb.	.23
Dimethyl phthalate, drums, c/l., dlvd.	lb.	.20
Dinitrobenzene, tech., drums	lb.	.18
Dinitrochlorobenzene, bbls.	lb.	.14
Dinitronaphthalene, bbls.	lb.	.35
Dinitrophenol, bbls.	lb.	.22
Diphenyl, bbls., c/l., wks.	lb.	.15
Diphenylamine, bbls.	lb.	.25
Diphenylguanidine, bbls.	lb.	.35
Epsom salt, tech., bags	100 lbs.	1.80
Ether, concn., drums	lb.	.11
Nitrous, bots., 100 lbs.	lb.	.93
Ethyl acetate, 85-90%, tanks, frt. allowed	lb.	.11
Acetoacetate, drums, c/l., wks.	lb.	.37½
Bromide, drums	lb.	.50
Chloride, drums	lb.	.18
Formate, drums	lb.	.27¼
Methyl ketone, drums	lb.	.09
Ethylene dichloride, drums, c/l., wks., frt. allowed	lb.	.0742
Glycol, drums, c/l.	lb.	.14½
Monobutyl ether, drums, wks.	lb.	.16½
Monoethyl ether, drums, wks.	lb.	.14½
Monoethyl ether acetate, drums, wks.	lb.	.11½
Monomethyl ether, drums, wks.	lb.	.15½
Feldspar, 20 mesh, bulk, wks.	ton	9.75
Film scrap colors, dk., cs., 1000 lbs., E. wks.	lb.	.13½
Fluorspar, 95%, bags, f. o. b. mines	ton	34.00
Formaldehyde, bbls., c/l.	lb.	.05½
Fuller's earth, bags, c/l., mines	ton	8.50
Furfural, tech., drums, contract, works	lb.	.10
Glauber's salt, bbls., c/l.	100 lbs.	1.05
Glycol phthalate, drums	lb.	.38
Stearate, drums	lb.	.26
Hexamethylenetetramine tech., drums	lb.	.32
Hydrogen peroxide, 100 vol., cbys., c/l.	lb.	.16
Hydroquinone, kegs	lb.	.90
Indigo, synth., liq., bbls.	lb.	.16½
Iodine, resubl., jars	lb.	2.00
Iodoform, drums, 100 lbs.	lb.	3.95
Iron acetate, N. F. IV, cbys.	lb.	.15
Iron chloride, tech., cryst., bbls., wks., frt. allowed	lb.	.05
Isopropyl acetate, tanks, frt. allowed	lb.	.07½
Lead acetate, white, broken	lb.	.12¾
Arsenate, bbls.	lb.	.11
Metal, N. Y.	1 lb.	.0650
Oxide, litharge, bbls., 20-ton lots	lb.	.0790
Peroxide, powd., tech	lb.	.23
Red, bbls., 20-ton lots	lb.	.09
Sulfate, bbls.	lb.	.0725
White, basic carb., bbls.	lb.	.0825
Lecithin, edible, drums, c/l.	lb.	.34
Tech., dms., c./l.	lb.	.28
Lime, live, chemical, bulk, wks.	ton	7.00
Lime-sulfur, dry, bags, c/l.	lb.	No prices
Lithopone, ordinary, bbls.	lb.	.04½
Magnesite, calcined, dom., bags	ton	83.00
Magnesium carbonate, tech., bags, c/l.	lb.	.06¼
Chloride, drums	ton	32.00
Fluosilicate, cryst., bbls.	lb.	.18
Oxide, light, bbls.	lb.	.26
Manganese chloride, bbls.	lb.	.14*
Dioxide, 85-90%, bbls., c/l., wks.	ton	74.00
Sulfate, anhyd., bbls., wks.	lb.	.10½
Mannitol, commercial, bbls., wks.	lb.	.35
Menthol, nat., cans	lb.	13.00
Mercury bichloride, cryst., drums, 50 lbs. or more	lb.	2.39
Mercury, flasks, 76 lbs., mines	flask	191.00
Meta-phenylenediamine, kegs	lb.	.65
Meta-toluylenediamine, kegs	lb.	.70
Methanol, synthetic, drums, frt. allowed, c/l.	gal.	.34½
Tanks, frt. allowed	gal.	.28
Methyl acetate, 97-99%, tanks	gal.	.09½
Chloride, cylinders	lb.	.32
Formate, l. c. l., drums	lb.	.89
Hexylketone, drums, tech., wks.	lb.	.60
Salicylate, drums	lb.	.35
Monoamylamine, drums, c/l., wks.	lb.	.61
Monobutylamine, drums, l. c. l., wks.	lb.	.51
Monoethanolamine, drums, wks.	lb.	.24
Naphthalene, crude, dom., 74 deg., bags, c/l., wks.	100 lbs.	2.75
Nickel salt, single, bbls.	lb.	.13
Niter cake, bulk	ton	16.00
Nitrobenzene, drums	lb.	.08
Nitrocellulose, alcohol-sol., bbls., wks.	lb.	.28
Nitrogen solution	unit	1.2158
Octanol, normal, drums	lb.	.85
Oil, castor, No. 3, tanks	lb.	.12¾
China wood, dms.	lb.	.39
Coconut, crude, tanks	lb.	.0835
Cod, Newf., bbls.	gal.	.85
Corn, crude, tanks, mills	lb.	.12¾*
Cottonseed, cooking, bbls.	lb.	.16¾
Linseed, raw, tanks	lb.	.1260
Menhaden, crude, tanks, f. o. b. Baltimore	gal.	.0890
Neat's-foot, pure, bbls.	lb.	.19¼
Oiticica, bbls.	lb.	.25*
Oleo, No. 1, bbls.	lb.	.13¼
Olive oil, denat., bbls.	gal.	4.20
Edible, Calif., drums	gal.	4.25
Palm, Niger, bbls.	lb.	.0825
Peanut, crude, tanks	lb.	.12½
Perilla, drums	lb.	.2450
Rapeseed, denatured, c. i. f.	gal.	.1150
Red, bbls.	lb.	.1330
Soy bean, crude, tanks	lb.	.12¾*
Sperm, 38°, bbls.	lb.	.1301
Whale, bbls., natural, refined	lb.	.1070*
Ortho-dichlorobenzene, drums	lb.	.06
Ortho-nitrochlorobenzene, kegs	lb.	.15
Ortho-nitrotoluene, drums	lb.	.09
Ortho-toluidine, bbls.	lb.	.19
Para dichlorobenzene, drums, c/l.	lb.	.11
Para-formaldehyde, drums	lb.	.23
Paraldehyde, tech., drums	lb.	.12
Para-nitraniline, drums	lb.	.45
Para-nitrochlorobenzene, drums	lb.	.15
Para-nitrotoluene, bbls.	lb.	.30
Para-phenylenediamine, bbls.	lb.	1.25
Para-toluidine, bbls.	lb.	.48
Paris Green, 250-lb. kegs	lb.	.24
Perchlorethylene, drums, c/l., wks.	lb.	.08
Phenol, drums, c/l., wks.	lb.	.12¾
Phenolphthalein, yellow, drums, ton lots	lb.	.80
Phenylethyl alcohol, bottles	lb.	2.10
Phloroglucinol, tech., tins, wks.	lb.	15.00
c. p., tins, wks.	lb.	20.00
Phosphorus, red, cases	lb.	.40
Oxychloride, 175-lb. cylinders	lb.	.15
Trichloride, cyl.	lb.	.15
Phthalic anhydride, bbls., c/l.	lb.	.14½
Platinum, metal, solid	os.	36.00
Potash, caustic, solid, drums	lb.	.06¼
Potassium acetate, tech., bbls.	lb.	.28
Bicarbonate, gran., bbls.	lb.	.19
Bichromate, casks, c/l., wks.	lb.	.09½
Bromide, U. S. P., gran., bbls.	lb.	.27
Carbonate, 80-85%, calc., casks.	lb.	.06½
Chlorate, cryst., kegs	lb.	.11*
Chloride, tech., cryst., bgs.	lb.	.08*
Cyanide, drums	lb.	.55
Meta-bisulfite, bbls.	lb.	.18
Muriate, fert., bulk	K_2O unit	.53½
Permanganate, tech., drums	lb.	.19¾
Prussiate, red, casks	lb.	No prices
Yellow, casks	lb.	.17
Pyridine, denat., drums	gal.	1.71
Pyrocatechin, c. p., drums	lb.	2.15
Quinine, 100-oz. cans	os.	.97½
Resorcinol, tech., kegs	lb.	.68
Rochelle salt, powd., bbls.	lb.	.43½
Saccharin, drums	lb.	1.45
Salt cake, bulk, wks.	ton	15.00
Saltpeter, gran., bbls.	100 lbs.	8.20
Silica, amorph., 96%, 325 mesh, bags, c/l., wks.	ton	20.00
Silver nitrate, vials	os.	.26¼
Soda, ash, 58%, light, paper bags, contract, wks.	100 lbs.	1.05
Caustic, 76%, solid, drums, contract, wks.	100 lbs.	2.30
Sodium acetate, flake, 60%, bbls.	lb.	.05
Alginate, drums	lb.	.79
Antimoniate, bbls.	lb.	.15
Benzoate, U. S. P., bbls.	lb.	.46
Bicarbonate, U. S. P., powd., bbls., c/l., wks.	100 lbs.	1.85
Bichromate, c/l., wks.	lb.	.07½
Bisulfite, bbls.	100 lbs.	3.00
Bromide, U. S. P., bbls.	lb.	.27
Chlorate, cryst., bags	lb.	.06¼
Chloride, bags	ton	15.70
Cyanide, 96-98%, dom., drums	lb.	.14
Fluoride, white, 90%, bbls., c/l., frt. alld.	lb.	.08
Metallic, untrimmed bricks, drums, f. o. b. Niagara Falls	lb.	.15½
Metasilicate, gran., bbls.	100 lbs.	2.50
Napthionate, bbls.	lb.	.50
Nitrate, crude, bulk, works	ton	27.00
Nitrite, bbls.	lb.	.06¾
Perborate, bbls.	lb.	.14¾
Phosphate, disodium, cryst., bags, c/l., wks.	100 lbs.	2.55
Phosphate, trisodium, bags, c/l., wks.	100 lbs.	2.70
Picramate, kegs	lb.	.65
Prussiate, yellow, bbls.	lb.	.11
Silicate, drums, c/l., 40°	100 lbs.	.80
Silicofluoride, dom., bbls.	lb.	.09
Stannate, drums	lb.	.33½
Sulfate, anhyd., bags	100 lbs.	1.70
Sulfide, cryst., bbls.	100 lbs.	2.40
Solid, 60%	100 lbs.	3.15
Sulfocyanide, c. p., bbls.	lb.	.55
Thiosulfate, reg., cryst., bgs.	100 lbs.	2.25
Tungstate, tech., kegs	lb.	No prices
Strontium carbonate, tech., bbls.	lb.	.25*
Nitrate, bbls.	lb.	.07¾
Sulfur, bulk, mines	ton	16.00
Chloride, drums	lb.	.03
Dioxide, commercial, cyl., wks.	lb.	.07
Tetrachloroethane, 50-gal. drums	lb.	.08
Thiocarbanilid, bbls.	lb.	.24
Tin, Straits	lb.	.52
Crystals, bbls.	lb.	.39
Oxide, bbls.	lb.	.55
Tetrachloride, anhydrous, drums, bbls.	lb.	No prices
Titanium dioxide, bags	lb.	.14¾
Toluene, tanks	gal.	.28
Triamylamine, drums, c/l., wks.	lb.	.98
Triamylborate, drums, l. c. l., wks.	lb.	.33
Tributylamine, drums, c/l., wks.	lb.	.78
Trichloroethylene, drums, wks., frt. allowed	lb.	.08
Tricresyl phosphate, tech., drums.	lb.	.25
Triethanolamine, drums, c/l., wks.	lb.	.19
Triphenyl phosphate, barrels	lb.	.31
Tungsten, tech., powder	lb.	2.60
Urea, dom., 46 + % N., bags, f. o. b. wks. or seaboard	ton	80.00
Vanillin, 25-lb. tins	lb.	2.35
Whiting, comm., dry-grd., bags, c/l., wks.	ton	18.00
Xylene, 10°, tanks	gal.	.30
Xylidine, drums	lb.	.35
Zinc ammonium chloride, bbls.	lb.	.0565
Chloride, tech., fused, drums	lb.	.05
Dust, bbls., c/l.	lb.	.1035
Metal slabs, at N. Y.	lb.	.0865
Oxide, Amer., bags	lb.	.0725
Stearate, tech., bbls.	lb.	.30
Sulfate, cryst., bgs., c/l., wks.	100 lbs.	3.60

* Nominal.

EMPLOYMENT INFORMATION

RATES to be paid in advance. Standard setting 5c a word, minimum charge $2.00 each; include 8 words for box address. Exceptions see ⟶ Display, $10.00 per column inch. 2 inches maximum, larger units at regular display unit rates. No discounts or allowances.
SEND advertisements with remittance to INDUSTRIAL AND ENGINEERING CHEMISTRY, 332 West 42nd St., New York, N. Y., to reach there not later than 10:00 A.M. on the 10th and 25th, closing dates for editions of CHEMICAL and ENGINEERING NEWS of the 25th and 10th, respectively. Insertions made in order of receipt provided necessary remittances are complete.
EMPLOYERS are requested to mention in their announcements the section of the country in which the open position is located to ensure replies only from those who are geographically available.
In printing these advertisements the SOCIETY assumes no obligations as to qualifications of prospective employees or responsibility of employers.

UNEMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking employment for themselves are allowed in one calendar year 3 announcements free (one per issue) set in standard style and limited to 50 words each, including 8-word box address, and 3 additional standard announcements at 50% of regular rate. Further announcements and excess words at full rate.

EMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking new positions are permitted 3 standard announcements during the calendar year at 50% of the regular rate—include 8 words for box address.

EMPLOYERS seeking chemists and chemical engineers are permitted 3 standard announcements, not to exceed 50 words each including box address and not more than one per issue, during the calendar year without charge, provided they agree in writing to acknowledge all replies (excess words 5c each), otherwise full rate applies.

The AMERICAN CHEMICAL SOCIETY is vitally interested in the welfare of its members and in seeing that the chemical industry is manned with competent chemists and chemical engineers. These pages are part of our service in that connection. In addition most of the larger sections of the AMERICAN CHEMICAL SOCIETY and several of the smaller ones have active employment committees. Local section secretaries in your area will inform you as to any employment aids that may be available locally.

An Employment Clearinghouse is operated at each national meeting of the SOCIETY for the purpose of bringing together representatives of industry looking for chemists and members and student affiliates in attendance wishing to make such contacts. For further details, consult the preliminary and final programs as printed in the NEWS EDITION prior to each meeting.

In the New York area, special employment facilities are offered by the Employment Bureau of the Chemists' Club, 52 East 41st St., New York, N. Y. In the Chicago area, the Chicago Section maintains an employment service at 413 Stevens Hotel, Chicago, Ill.

Those replying to announcements should be careful to send copies and not original documents. Advertising circulars will not be forwarded and to that end all letters will be opened at the forwarding office.

SITUATIONS OPEN

Those announcements in which the letter "P" is part of the address key have paid in full and are not committed to acknowledge replies. The Society regards acknowledgment by employers of all applications as an act of common courtesy but can assume no responsibility for their failure to do so.

EXECUTIVES, CHEMICAL ENGINEERS AND CHEMISTS with exceptional backgrounds of experience should use our confidential and individual method of contacting responsible employers. No limit to territory. We negotiate all overtures. Established 1915. The National Business Bourse, 20 W. Jackson Blvd., Chicago, Ill.

GRADUATE FELLOWSHIPS still available. Large eastern university. Half tuition and $700.00 cash. Recipient may carry nine credit hours of study but must devote half his time to assisting. Young women considered.
Box 22-N-7, Ind. & Eng. Chem., Easton, Pa.

SUCCESSFUL SOUTHERN chemical company desires man for original research work in organic chemistry. Individual will be able to work largely on own initiative, and position offers excellent opportunity. Give full particulars, including draft status.
Box 64-NP-7, Ind. & Eng. Chem., Easton, Pa.

RESEARCH ASSISTANTSHIP or graduate student fellowship available at large Eastern Canadian university. New research project. Bachelor degree and preferably one year research experience in organic or biochemistry required. Applications considered from men and women. Give full information, references, and photograph.
Box 80-N-7, Ind. & Eng. Chem., Easton, Pa.

ANALYST for RESEARCH laboratory in wood chemistry, Pacific Coast University, experience in wood chemistry desirable but not essential. Wood, organic, or biochemistry background preferred. Women eligible. $1800–$2000.
Box 20-TP-7, Ind. & Eng. Chem., Easton, Pa.

POST-DOCTORATE research fellowship in physical chemistry at large eastern university. Microcalorimetry of solutions; opportunity for other types of physico-chemical measurements applied to biochemistry. Fellowship renewable. Give details of education, experience, references, etc. $2400 per annum minimum.
Box 28-T-7, Ind. & Eng. Chem., Easton, Pa.

WANTED: RECENT graduate, chemist, with rubber laboratory experience. Class three draft status. Akron district.
Box 39-TP-7, Ind. & Eng. Chem., Easton, Pa.

CHEMISTS—ANALYTICAL and research for established laboratories in the fermentation and beverage field in New York area. Submit details of training, experience, references and draft status if male.
Box 41-TP-7, Ind. & Eng. Chem., Easton, Pa.

WANTED: METALLURGIST capable of overseeing the production of straight carbon and alloy steel castings, acid electric furnace, steel foundry located in eastern Pennsylvania. In reply state age, experience and salary desired.
Box 57-T-7, Ind. & Eng. Chem., Easton, Pa.

RESEARCH FELLOWSHIP in organic research or analysis, available in September. Work for advanced degree, majoring in analytical or organic chemistry. Qualifications: B.S. or M.S. with a good grounding in analytical or organic chemistry. Stipend $770 yearly. Send applications to H. B. Hass, Dept. of Chemistry, Purdue University, Lafayette, Ind.

CHEMIST with good basic training and initiative, for work in dye laboratory in conjunction with production dyeing of stock and piece goods. Experience as dyer desirable but not essential. Must have good "color eye" and knowledge of color matching. In reply give full particulars of training, experience, draft status and salary desired. Eastern location.
Box 12-N-8, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST or chemical engineer: Large central power station in Ohio. Recent graduate. Or experience in industrial water work involving electrometric and colorimetric analyses. Give details of training, experience, etc. Minimum salary expected, references and photo.
Box 14-N-8, Ind. & Eng. Chem., Easton, Pa.

GRADUATE TEACHING and Research Assistantships in Chemistry (three) available. Stipend $550, September 15–June 1, from which some fees are payable. 10 hours' course work permitted each term. In applying include snapshot, list of courses with grades, references. E. C. Gilbert, Chairman, Department of Chemistry, Oregon State College, Corvallis, Oregon.

CHEMICAL TECHNICIAN for analytical work in a hospital in Brooklyn. Female preferred. Salary $85.00 per month plus meals.
Box 18-N-8, Ind. & Eng. Chem., Easton, Pa.

FELLOWSHIP fat research available Sept. 1–15. $100 per month with remission of tuition fees and laboratory fees in major department. Applicant with M.S. degree and well trained in organic chemistry. Submit complete data first letter including photograph, draft status, religious preference and transcript to R. Adams Dutcher, Department of Agricultural and Biological Chemistry, Pennsylvania State College, State College, Pa.

WOMAN CHEMIST with some library training and experience. University. Middle Atlantic. Include full details and photo.
Box 25-N-8, Ind. & Eng. Chem., Easton, Pa.

PHARMACOLOGIST or PHYSIOLOGIST for industrial biochemical research laboratory. Man with graduate degree preferred. Give training, experience, and personal data. Send photograph.
Box 26-N-8, Ind. & Eng. Chem., Easton, Pa.

WANTED—GRADUATE Chemist with laboratory and plant experience in paper coating. Location Middle West.
Box 28-NP-8, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL ROUTINE chemists wanted by midwest manufacturer of corn products. Major in chemistry with Bachelor's degree. Preferably male and draft deferred. Starting salary $150.00 per month.
Box 29-NP-8, Ind. & Eng. Chem., Easton, Pa.

POSITION OPEN for a chemical engineer for process investigations. Also position for an organic chemist. Both positions in Research Department of large midwestern distillery operating on defense contracts. Prefer M.S. or better and 3-A.
Box 32-NP-8, Ind. & Eng. Chem., Easton, Pa.

FELLOWSHIP at UNIVERSITY of Michigan provided by Standard Oil Company of California for Graduate training in Chemical Engineering with emphasis on petroleum production. Full academic work may be taken including a research problem beginning October or next February. Stipend $750. Address D. L. Katz, East Engineering Building, Ann Arbor, Michigan.

CHEMICAL ENGINEER, 3 or 4 years experience. Preferable in pilot plant scale work on the production and refining of organic chemicals for research and development work in large kraft pulp mill by-products plant. Location southeast.
Box 57-N-8, Ind. & Eng. Chem., Easton, Pa.

EDITORIAL ASSISTANT on Chemical and Engineering News to do editing, some rewriting, caption writing, proofreading, production details, and general office work. Several years' college training in journalism and chemistry desired, as well as a knowledge of typewriting and preferably of stenography. State qualifications fully and submit photo. Apply to Industrial and Engineering Chemistry, P. O. Box B, Woods Hole, Mass.

MALE CHEMIST with B.S. or equivalent having at least four years experience in formulating pigmented industrial finishes as assistant to technical director, Jones Dabney Company, Louisville, Ky.

MANUFACTURER of SYNTHETIC resins. Phenol & Urea Glues for Plywood, Airplanes, Furniture, etc. Laminating Resins. Wood Impregnating Resins. All to Army, Navy, & Aeronautical Spec's. Desires Sales Representative—comm. basis.
Box 59-NP-8, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMISTS. Inorganic or organic needed by a laboratory that deals with a wide variety of materials. Very large and nationally-known company engaged in War work. Both experienced and inexperienced men will be considered. Applicants should submit educational history, experience, age and a recent photograph.
Box 62-NP-8, Ind. & Eng. Chem., Easton, Pa.

LARGE EASTERN corporation wants applications from Industrial Engineers not now with war industries. Must be graduate of recognized engineering school, 2–5 years' industrial experience.
Box 63-N-8, Ind. & Eng. Chem., Easton, Pa.

MEN & WOMEN—Analyst—junior capacity routine examination raw materials. Well-rounded chemistry training. Some pharmacy interesting. New Jersey. Salary open: —1) *Organic* chemist, 2) *Chemical Engineer*, young, little experience. Excellently rated New York Laboratory. Salary open. *Biochemist*, Ph.D. preferred. Nutrition experience. New Jersey. Salary open. *Organic Chemist*, Ph.D. research. Problem determined by background. New Jersey. Salary open. *Microchemists* and analytical, $28–$40. New Jersey. *Biochemist*, research problem kidney. Endocrine experience. East. To $80. *Men. Director Research & Development*, pharmaceutical manufacturer; physician having this experience. $7000–$8000. *Director*, laboratory, all around training Biological sciences, Chemistry, Pharmacy. Age 30–35, $5000–$10,000. *Production* manager; Jellies, ointments, creams, ampules manufacturing experience; pharmaceutical training. East. $3500–$5000. *Women, Librarian*, medical German and French. American born. Vicinity New York. 5 day week; $45 up. *Bacteriologist*, stenographer. New York City. Salary open. Everett Brown Agency, 17 John St., New York, N. Y. C.

SECRETARY to RESEARCH Director, women chemist able to do shorthand and typing. College graduate. Some knowledge of organic chemistry and German desirable. Salary will depend upon qualifications. Location, New York State. Send details of training, experience, salary expected, and recent photo.
Box 65-N-8, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 994)

Address communications to the box number indicated and Mail to Easton, Penna.

The American Chemical Society has no information concerning the position advertised, or in regard to those seeking employment.

(Situations Open Continued)

WANTED GRADUATE Chemist with experience in water paste and powder paints.
Box 66-NP-8, Ind. & Eng. Chem., Easton, Pa.

CHEMIST or CHEMICAL Engineer with advanced degree wanted for corn products research. Must be experienced in this field.
Box 74-NP-8, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL CHEMIST or Chemical Engineer with engineering and mechanical ability and initiative for individual work. Development or analytical experience in mechanical packings, gaskets, lubricants, plastics or rubber preferred. State fully qualifications and salary desired.
Box 80-NP-8, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER. A leading trade journal has opening on its editorial staff for capable young chemical engineer with ability to write. Must be conversant with petroleum refining processes, petroleum synthetics, and petroleum processing equipment. Would have headquarters in New York. Age preferred 30-35. Give full details, qualifications, training, experience, salary, and personal data including draft status.
Box 82-NP-8, Ind. & Eng. Chem., Easton, Pa.

SALES CHEMIST—chemical firm requires services of chemist or chemical engineer having industrial chemical and sales experience. State full particulars including age and draft position. Send photograph with application.
Box 87-NP-8, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(A.C.S. MEMBERS)

ORGANIC CHEMIST. B.S. in Ch.E. 1935, age 29, married. Six years' experience in organic synthetics. Product and process development from laboratory to plant production. Desires location near New York or New Jersey.
Box 45-T-4, Ind. & Eng. Chem., Easton, Pa.

CHEMIST and BIOCHEMIST, Ph.D., Major Organic. Fifteen years' of research in synthetic organic, enzymes, proteins, carbohydrates, chemistry and physiology of bacteria, mechanism of drug action, immunochemistry. Forty publications, patents. Also several years' research in Europe. Now engaged in biochemical research in a large Eastern University. Desires a change to a responsible position with a progressive group. Imaginative, resourceful. Age 45. Gentile. Please give details in first letter.
Box 41-T-5, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, Ph.D., desires work in research or development. Researches in kinetics, high vacuum, electrochemistry. Now working in radio tube factory, thermionic emission, production development of direct emission filaments. Good background in physics, mathematics. 29, married, English born, American citizen. Phi Lambda Upsilon, publication.
Box 18-N-7, Ind. & Eng. Chem., Easton, Pa.

TEACHER, RESEARCH worker: Ph.D. Majors: Physical chemistry, chemical engineering. Twelve years' teaching these with inorganic, analytical chemistry, metallurgy, microscopy, etc. Sixteen years' industrial research, consulting, testing. Numerous publications.
Box 31-N-7, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Ph.D. 1942. Vitamins and nutrition. Good foundation in organic, physical, and physiology. Research on B complex and protein requirements. Publications. Five years' teaching biochemistry, general and physical chemistry. Desires research or teaching.
Box 63-N-7, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S. in chemistry. Minor in chemical engineering. 1941 graduate from A.C.S. accredited engineering college. Excellent experience in public relations. One year experience in development and research. Prefers job in organic production. Must be in defense. Presently employed, but available after short notice. Single. Willing to travel anywhere. Phi Lambda Upsilon.
Box 24-T-7, Ind. & Eng. Chem., Easton, Pa.

PH.D. Twenty years' experience in industrial research and development. Some teaching experience. Wish to return to teaching with opportunity for pure research. Excellent record of applied research in colloid chemistry, nutrition and organic chemistry.
Box 29-T-7, Ind & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, eleven years' experience including teaching chemical engineering, chemist in control laboratory, pulp research, gas absorption, waste liquor evaporation and combustion and process engineer in munitions plant, desires responsibility and hard work in the West. Age 37, married, two children.
Box 30-T-7, Ind. & Eng. Chem., Easton, Pa.

CHEMIST B.S., M.S. 1942. A. C. S. accredited college. Organic and Biochemistry. Some industrial experience. Single. Favorable draft status. Position in essential industry desired. Available immediately.
Box 42-T-7, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, Texas A & M, 10 years' experience in control, plant, and research laboratories of petroleum refineries. Also 10 years' experience in charge of plant operations including vapor phase cracking and the manufacture of gums, resins, solvents, toluol, benzol, and naphthalene from petroleum oils.
Box 34-T-7, Ind. & Eng. Chem., Easton, Pa.

COLLEGE-TEACHING. Ph.D. 1935. Employed. Desires change in position where opportunities in teaching and research are available. Prefer analytical or inorganic. Also physical, organic, chemical microscopy, X-ray crystallography and metallurgy. Nine years' teaching experience. Age 37. Family.
Box 43-T-7, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, B.A., 1940, Biology and Chemistry Major; two years' graduate work in organic chemistry and biochemistry. Synthetic organic work preferred but am willing to try almost any laboratory work. Single, Protestant, age 24. Eastern states preferred but will consider other locations.
Box 45-T-7, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST. M.S. 1940. Unusually thorough training in general inorganic, organic fields. Capable of independent research. Three years of industrial experience. Married, Protestant, 29 years of age, 3-A draft. Prefer Southwest or Mountain area, but will consider anything in Western Hemisphere. Available after A. C. S. meeting in Buffalo.
Box 47-T-7, Ind. & Eng. Chem., Easton, Pa.

RECENT B.A. Physiological chemistry: Well-grounded biochemistry, bio-assays, applied physiology, medical, x-ray technology, bacteriology, chemical microscopy, colloids, etc. Prefer to work, learn pharmaceutical-type laboratory or plant but consider others. Excellent personal references. Immediately available. Age 23. 2-A continued if chemist.
Box 78-T-7, Ind. & Eng. Chem., Easton, Pa.

RESEARCH and DEVELOPMENT chemist, M.S. 1930. Successful in directing research and development work for past seven years. Experienced in protective coatings, building materials, adhesives, asphalts and allied materials. Considerable production experience. Married, family, age 36. Location immaterial. Available on short notice.
Box 19-N-8, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.S. from leading mid-western university. One year toward Ph.D. Also excellent training in analytical, physical, biological and engineering. Nineteen months with T.V.A. Good references. Desires employment, preferably research. Available immediately, anywhere. Age 24, single good health. Draft 2-A.
Box 20-N-8, Ind. & Eng. Chem., Easton, Pa.

RECENT GRADUATE, B.S. in Chemistry June, 1942; minor in Physics and Mathematics; excellent background in analytical, organic and physical chemistry. Single, age 22, American, Jewish, draft classification 4-F. Available immediately; eastern location preferred.
Box 21-N-8, Ind. & Eng. Chem., Easton, Pa.

INORGANIC and PHYSICAL Chemist desires research or defense position in Rocky Mountain or Pacific Coast Area. Ph.D. University of Minnesota 1930. Eight years' research experience with the Tennessee Valley Authority. Five years' teaching experience. Age 40. Address: Earl F. Ogg, R.R. 2, Coeur d'Alene, Idaho.

ORGANIC CHEMIST, Ph.D., 1941, minors analytical and inorganic. Sigma Xi. Ten years' teaching and research experience. Resourceful and industrious. Married. Age 34. Draft deferred, Class 3-A. Negro. Available immediately.
Box 23-N-8, Ind. & Eng. Chem., Easton, Pa.

WANTED OPPORTUNITY to use ingenuity and intelligence in progressive research. Ph.D. 1940. Excellent training physical and analytical chemistry. Research in surface tension and kinetics. Sigma Xi, Phi Lambda Upsilon, teaching fellowship. Age 31, married, dependents.
Box 30-N-8, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. 1933, employed, married, one child, age 33. Nine years' University teaching, two years' industrial research. Experience in pharmaceuticals, organometallics, and sulfur derivatives. Industrial research or academic position desired.
Box 33-N-8, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, S.B. M.I.T. 1940. Major organic, graduate courses. Thesis on vitamin D. Two years' experience, original organic and biochemical research. Four publications. Employed, 2-B, available short notice.
Box 34-N-8, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S., 1941. Desires position, analytical or otherwise, with plant doing essential war work. Thorough chemical training. Analytical experience in agricultural field. Honor society. Age 23, single, Jewish. Available short notice.
Box 35-N-8, Ind. & Eng. Chem., Easton, Pa.

LICENSED CHEMICAL Engineer. Experience pilot plant supervision, process development and equipment design in organic chemicals manufacture. Married, American. Desires responsible position in manufacture or research. Available one month.
Box 41-N-8, Ind. & Eng. Chem., Easton, Pa.

TECHNICAL MARKET ANALYST Ph.D. 1940. Well rounded graduate training in physical, organic and inorganic chemistry. Limited training in metallurgy. Two years' industrial research experience. Desires position as market analyst for research or technical divisions of well established progressive company. Married, draft status 3-A, Phi Beta Kappa, Sigma Xi. Available on reasonable notice.
Box 37-N-8, Ind. & Eng. Chem., Easton, Pa.

RESEARCH DIRECTOR Ph.D., formerly assistant at Kaiser Wilhelm Institute of Chemistry and University of Paris. 15 years' research experience in organic chemistry, synthetic pharmaceuticals, hormones, alkaloids, microanalysis. Patents and publications. Now director of research industrial laboratory. Desires similar position in large industrial research laboratory or university. Austrian, have first citizenship papers. Married, age 38.
Box 39-N-8, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL ORGANIC Chemist. Ph.D. Nine years' of industrial experience in fundamental and applied research, semiplant operations and technical service on synthetic resins, naval stores and cellulose derivatives. Directing research at present. Trained in chemical engineering and sales. Patents and publications. Age 35, married, one child, Protestant, American, location immaterial. Will consider sales, production or research. Qualified to direct plastic and protective coating program in aviation field.
Box 42-N-8, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER—chemist B.Ch.E., M.Ch.E. Three years' industrial experience in fine organic field, which includes research and pilot plant development in alkaloids and rubber latex, and large scale production of vitamins. Single, 26, Christian, American. Draft deferred. Location preferred East. Desires permanent position reliable concern.
Box 43-N-8, Ind. & Eng. Chem., Easton, Pa.

ORGANIC Ph.D. 45, married, 9 years with organic & 9 years with pharmaceutical industries—also management and patent experience. Would like joining research or development dept. of very active firm.
Box 44-N-8, Ind. & Eng. Chem., Easton, Pa.

COLLEGE TEACHING position wanted by Ph.D. Physical Chemistry, 1941. Two years' teaching assistant in large midwestern university. Research publications. Phi Beta Kappa. Sigma Xi. Phi Lambda Upsilon. Age 25. Married. Draft 3-A. Willing locate anywhere.
Box 45-N-8, Ind. & Eng. Chem., Easton, Pa.

PETROLEUM TECHNOLOGIST. B.S. in Ch.E. 12 years' experience in petroleum refining including research, design, and operation, particularly alkylation reaction both of isobutane and benzene. American. Age 34. Married, draft classification No. 3-A. Presently employed. Desire permanent position with opportunity for advancement.
Box 51-N-8, Ind. & Eng. Chem., Easton, Pa.

SANITARY CHEMIST. M.S. Western university, course work toward doctorate; 13 years' experience sewage research, alkalies, explosives, extensive analytical experience. Prefer West, especially Rocky Mountain region. Married, Sigma Xi, deferred. Publications.
Box 52-N-8, Ind. & Eng. Chem., Easton, Pa.

PHARMACEUTICAL CHEMIST, B.S. Pharmacy, M.S. chemistry. Leading midwestern university. Registered pharmacist. Six years' diversified experience in pharmaceutical industry, particularly analytical control. Now employed, but desire to make change offering greater opportunity, preferably in an essential industry. Honor Societies. Single, draft deferred. Available on short notice.
Box 53-N-8, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.S. Four years' experience making synthetic organic chemicals. Two of these years spent in industrial research. Protestant. Married. Draft 2-B. Desires research position.
Box 54-N-8, Ind. & Eng. Chem., Easton, Pa.

RUBBER CHEMIST, university graduate. Experienced rubber technology, research and development. Employed. Excellent record. Prefers position chief chemist small company or head new department in company entering rubber field. East or Midwest. Initial salary $4200. Married, dependents.
Box 55-N-8, Ind. & Eng. Chem., Easton, Pa.

CHEMIST: ORGANIC and enzyme chemistry major; physical minor. Research completed at A.C.S. accredited university. Publications. Adaptable, independent, willing worker. Draft deferred.
Box 61-N-8, Ind. & Eng. Chem., Easton, Pa.

FOOD CHEMIST with over twenty years' wide experience in the Food Industry, in direction, research, process development, quality control, and factory problems. Desires a responsible position.
Box 69-N-8, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 995)

(Situations Wanted Continued)

TEACHING POSITION, physical or inorganic chemistry, wanted by physical chemist, Ph.D. 1940. Teaching experience inorganic chemistry. Publications. Honor Societies. Age 27, single, draft deferred. Now employed in research, available on reasonable notice.
Box 67-N-8, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST, A.M. (Physical and Organic). Seventeen years' in research and development including 12 years with prominent Eastern consulting firm, 3 years at leading research institute. Special experience printing inks, colloids, textiles, paper. Especially interested in rheology, microscopy, surface chemistry. Age 41, married, one child. Employed but seeking position with greater opportunities, with reputable firm providing good research facilities and pleasant working conditions. Excellent references.
Box 71-N-8, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, B.S. with four years' laboratory experience in organic compounds including synthetic rubber, plastics and surface coatings, familiar with pilot plant operation, seeks position where knowledge can be best utilized. Best references.
Box 72-N-8, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER seeking better position. Three years' experience in petroleum research and pilot plant development—mostly alkylation work. Minimum salary acceptable depending upon location of work $3600.00. Available 30 days notice.
Box 73-N-8, Ind. & Eng. Chem., Easton, Pa.

PETROLEUM CHEMIST: Bachelor degree and graduate credits. Now employed; seeking change. Four and a half years' research and development experience on resins; light oil, kerosene and lube oil refining and distillation problems; tar and pitch work. Draft 3-A.
Box 75-N-8, Ind. & Eng. Chem., Easton, Pa.

COLLEGE TEACHING desired by young organic chemist, M.S. formerly assistant at large eastern university. Research experience, publications. Available September 1942.
Box 77-N-8, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, 5½ years' research experience in inorganic chemistry. Colloidal and surface chemical investigations in pigment field. High temperature gas reactions and photochemical research. 28 years old, married, draft deferred. M.S. degree.
Box 79-N-8, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER. 11 years' experience process work, engineering and sales in petroleum refining, organic chemicals and equipment. Desires responsible engineering work in Metropolitan N. Y. or Phila. areas. Draft exempt, 34 years old with 3 dependents.
Box 83-N-8, Ind. & Eng. Chem., Easton, Pa.

Ph.D. in CHEMISTRY, M.S. in Chemical Engineering. Ten years' experience in scientific and industrial research, development, and administration. Specialized in catalysis, hydrocarbon chemistry and lately in rubber, plastics, and asphalt. Desires responsible and active position in research and development, preferably in synthetic rubber industry. Now employed in executive position.
Box 84-N-8, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, Ph.D., wide experience in foods, enzymes and fermentation. 14 years' successful career in plant-management, research and development. Seeking responsible position with progressive concern. First class references. Married.
Box 86-N-8, Ind. & Eng. Chem., Easton, Pa.

UNIVERSITY or LARGE college teaching position desired. Ph.D. Columbia 1942; major, organic; single, 28; draft status 2-B. Now doing industrial research for summer only. Prefer teaching. Location immaterial.
Box 88-N-8, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED (NONMEMBERS)

CHEMIST and ENGINEER 20 years' experience research, management and sales—oils and allied lines, starches, gums and dextrins, animal glues, waxes—research and development on sulfonations, esterifications, synthetic detergents, emulsions, bases for emulsifying mineral oils and fats, resins, textile and paper chemicals, rayon and acetate fibres, water-proofing compounds, abrasives, polishes, adhesives, dry colors, foods and enzymes. M.I.T. graduate. Desires position requiring broad experience in research and production.
Box 10-N-8, Ind. & Eng. Chem., Easton, Pa.

PATENT ATTORNEY. Organic chemist, Ph.D., five years' experience preparation and prosecution of patent applications, excellent linguist, desires connection with patent department or law firm.
Box 11-N-8, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, M.S. 1938, age 27, experience in petroleum, food, and drug chemistry. Excellent scholastic and employment records. Employed at present, wants position in essential war industry. Draft status 3-A. Location immaterial.
Box 13-N-8, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, Ph.D. many years experience in vegetable oils and fats desires position in production or research.
Box 17-N-8, Ind. & Eng. Chem., Easton, Pa.

SPECTROGRAPH OPERATOR: No practical experience as such, 16 weeks ESMDT training. Industrial Applications of Spectrograph at U.S.C. 18 years' glass and ceramic technology and manufacture. B.S. '09.
Box 38-N-8, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, 15 years' experience development, design, construction, and management. Fine chemicals, heavy chemicals, gas and by-products, electro-deposition. Available September 1st., 1942.
Box 40-N-8, Ind. & Eng. Chem., Easton, Pa.

RESEARCH SCIENTIST & AUTHOR. Co-operative position wanted; joint owner of patents, with patent applications for water-white pharmaceutical, aviation, and industrial oils, as well as "gaseous motor fuels"; promptly available; seeks further opportunity for co-operative research.
Box 48-N-8, Ind. & Eng. Chem., Easton, Pa.

PETROLEUM CHEMIST, M.S., age 35, married. Ten years' research development and plant production experience on lubricating oils and petroleum specialities. Capable of directing research or supervising plant operations. Employed but available on reasonable notice.
Box 56-N-8, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, six years' experience on lubricants, asbestos, cement products, pigments. Desire position in development or production. Graduate courses in Production, Supervision, Organic and Physical chemistry. Age 28, draft classification 3-A.
Box 81-N-8, Ind. & Eng. Chem., Easton, Pa.

CHEMIST: Fifty-two years. Experience sugar manufacture, petroleum refining, oil cracking development, synthetic resin manufacture and development, industrial analysis. Good with mechanical tools and equipment. Original thinker. At present employed. Would like work that is more varied and interesting.
Box 85-N-8, Ind. & Eng. Chem., Easton, Pa.

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In Defense Research
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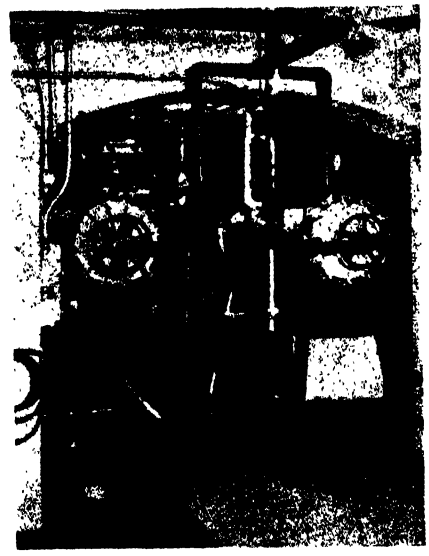
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See
CHEMICAL and ENGINEERING NEWS
June 10, page 724

Industrial News

CONTINUED FROM PAGE 990

Filterstones



CLOSED system filters, made by the Le-Val Filter Co., 1319 South Michigan Ave., Chicago, Ill., use low-cost filter aids instead of filter cloth, paper, or fine metal screens. The patented Filterstones are in the shape of hollow disks and will not give or break through even at high pressures. The stones are supported in the center of the cylindrical tanks and are revolved as they are back-washed and sprayed at the conclusion of a run.

Initial tests for flow rates on an installation of the type pictured for a water-thin highly corrosive product gave 333 gallons per hour per square foot of filter area with an 18-pound pressure drop across the stone. The units each contain 20 square feet of filtration area.

Employee Plan Extended to Dow Magnesium Corp.

EXTENSION of its five-way group protection program has provided employees of two plants of Dow Magnesium Corp. with the same scale of life insurance, sickness and accident, and hospitalization and surgical benefits in force for employees of the parent concern, the Dow Chemical Co. The group plan is being underwritten by the Metropolitan Life Insurance Co. on a cooperative basis whereby the employees contribute fixed amounts and the employer bears the balance of the entire net cost.

Sealing Compounds for Plywood Aviation Fuel Tanks

THE Presstite Engineering Co., St. Louis, Mo., has announced several new types of sealing compounds, especially developed to seal plywood tanks against aviation and aromatic fuel. One type is a brush, spray or slush-type plywood fuel tank sealer which is resistant to aromatic fuels. Another is a brush-on type sealer, resistant to aromatic fuels, used for sealing flange fittings into plywood fuel tanks.

MISCELLANEOUS

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WANTED: Germanium and indium metals in five kilo lots, also Caesium Carbonate in 10 kilo lots. Also wanted any salt of Gadolinium, Dysprosium, Hafnium, Rhenium, Scandium, Ytterbium, hundred gram lots. Box 78–N–8, Ind. & Eng. Chem., Easton, Pa.

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CULTURE TUBES; 4" × 5/8"; 5" × 5/8"; closing out about 150 gross; special price, any quantity. Room 604, 114 Liberty St., New York. (Telephone Barclay 7–5454).

FOR SALE: Filter Press, Sperry, 10" × 10", 6 Plates, 12 Frames, Abbe Jar Mill, Style "M", Hardinge Ball Mill, lined, 2' × 8', with steel balls, Denver #5, 6-cell Flotation Machine, complete, Denver Sub "A" Flotation Machine, Denver Continuous Rotary type Filter, 18" diameter, 12" long, complete, including traps and pumps, Dorr thickener, 5' × 3', Type "A" Dorr thickener, 4' × 4', Type "ATB", Dorr Laboratory Type "F" Classifier, 8" × 5', Alsop Hy-Speed Mixer, Enamel, 30 gals. Mixer Wooden tank and blades, Netco Head, 50 gals. 2 Rheostats, Ward-Leonard, 80 Ohms, 9.4–2.7 Amps. All in good to excellent condition immediate delivery. Box 27–N–8, Ind. & Eng. Chem., Easton, Pa.

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FOR SALE: "Fuel in Science and Practice": Vols. 1–17, bound; "International Critical Tables", complete set; "Industrial Arts Index": 1926–1931, 1934–1940, bound; "Journal of Biological Chemistry": Vols. 1–136, bound. A. Calvert, 221 Seaman Ave., New York, N. Y.

FOR SALE: International critical tables and index complete, perfect condition, $50. Winther Patente der Organischen Chemie (3 books) $15. Box 76–N–8, Ind. & Eng. Chem., Easton, Pa.

One-Coat Paint



A PAINT product that primes, seals, and finishes on any interior surface in one coat has been announced by American-Marietta Co., 43 East Ohio St., Chicago, Ill. Designated "Valdura Singlekote", it combines the hiding power and economy of water-type paints with washability, durability, and performance of oil-type coatings. It may be applied to surfaces previously coated with calcimine or casein paints, provided the old covering is bonded or tight to the wall. High hiding power permits coverage of dark surfaces with a single coat, and the product is self-leveling. It sets within 2 hours, dries within 12 hours, and provides a dead-flat finish when viewed at a 90° angle. Coverage is up to 750 square feet per gallon.

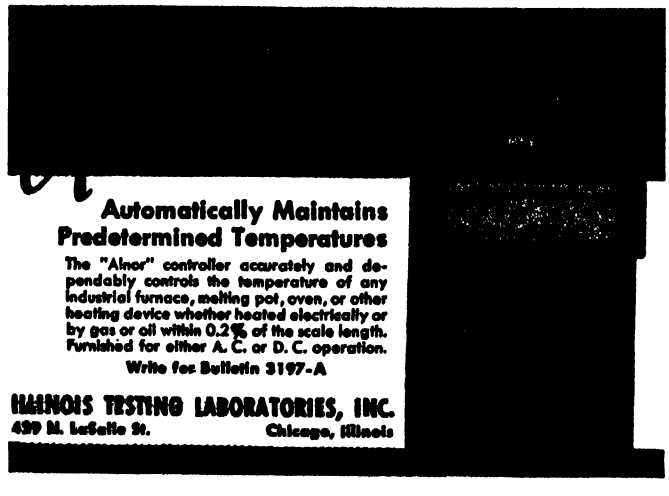
Voltage Breakdown Tester

SIMPLE means of testing voltage breakdown of materials or components is offered by the voltage breakdown tester announced by Industrial Instruments, Inc., 156 Culver Ave., Jersey City, N. J. The instrument consists essentially of a step-up transformer accurately controlled by a variac; current-limiting resistors safeguarding the equipment in the event of a dead short; a relay indicating by means of a panel light when there is a breakdown; a meter providing direct-reading voltages; and the rectifier and filter circuit providing the high-voltage direct current.

Flameproof Lighting Fixture

A FLAMEPROOF fluorescent lighting fixture of molded asbestos has been approved by the Underwriters' Laboratories. This substitute for steel lighting fixtures, the Asbestolite, is manufactured by Century Lighting, Inc., 419 West 55th St., New York, N. Y., and is designed for use in industrial war plants where complete fire resistance is required.

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CHEMICAL AND ENGINEERING NEWS
HARRISON E. HOWE, Editor
PUBLISHED BY THE AMERICAN CHEMICAL SOCIETY
VOLUME 20 AUGUST 25, 1942 NUMBER 16

The Salt-Consuming Industries of Niagara Falls

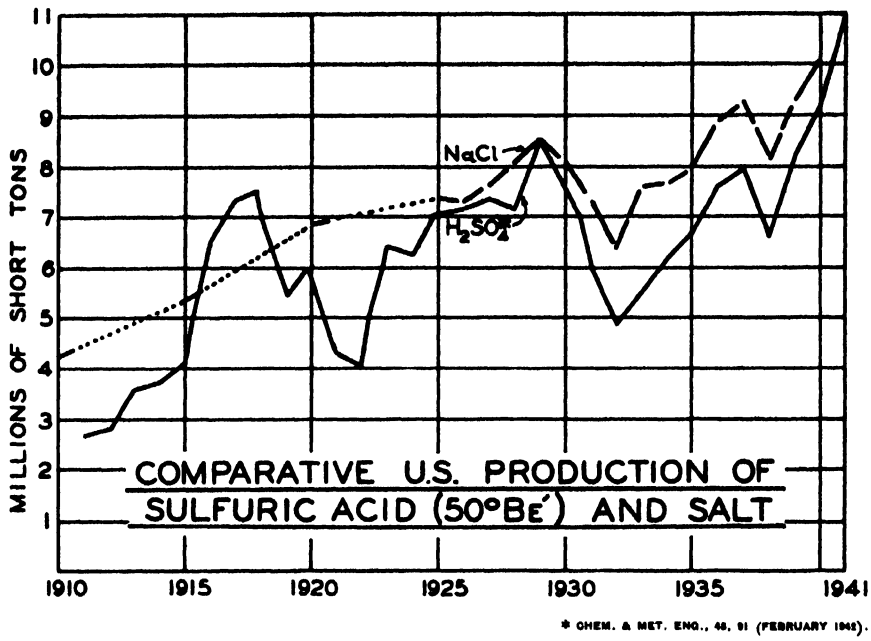
JANET SEARLES, Electrochemicals Department, E. I. du Pont de Nemours & Co., Inc., Niagara Falls, N. Y.



The roaring water of Niagara, hurtling down 167 feet into the gorge below, symbolizes the power behind a great chemical industry.

To those who know Niagara Falls only as a scenic wonder frequented by tourists from near and far, it must be something of a shock to learn that 400,000 tons of common salt, roughly 4 per cent of the total U. S. production, are consumed each year by six of the 30 industrial plants at Niagara Falls. Although the birth of Niagara's salt-consuming industries took place a little less than 50 years ago, the story of their development can match in color and character the endless tales of that old frontier.

Almost simultaneously with the evolution of Niagara Falls from a small grist mill center to the world's greatest source of power and light, American industrialists were successfully developing equipment for the commercial electrolysis of salt and its solutions. Two companies appear to have been "firsts" in this work; both were attracted to Niagara Falls by the promising power situation, the proximity to vast salt fields, and the favorable location with respect to potential consumers. The Roessler & Hasslacher Chemical Co., Perth Amboy, N. J., manufacturers of metal cyanides, ceramic colors, and similar chemicals, had found a satisfactory method for combining metallic sodium with potassium ferrocyanide to form a low-cost sodium potassium cyanide of high cyanogen content. At first the required sodium was imported from England, but as the demand from the mining industries rose it became evident that a domestic supply was imperative. In 1895, therefore, three partners—the English Castner Co., the German Deutsche Gold and Silber Scheideanstalt, and the Roessler & Hasslacher Chemical Co.—formed the Niagara Electro Chemical Co. at Niagara Falls for the production of sodium from fused caustic by the Castner process. Meanwhile engineers of the Mathieson Alkali Works



* CHEM. & MET. ENG., 48, 91 (FEBRUARY 1941).

The term "heavy chemical" invariably calls to mind sulfuric acid, yet this graph illustrates the fact that salt deserves equal consideration as "king" of the chemical industry.

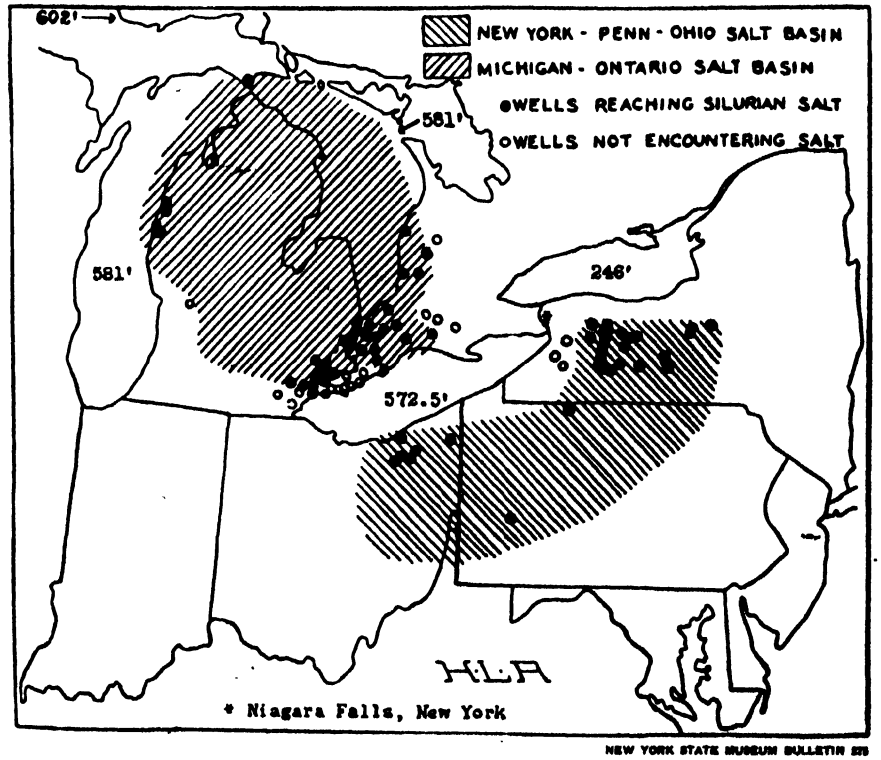
were developing the Castner rocking mercury cathode cell for electrolysis of brine in Saltville, Va. While the feasibility of this method for producing caustic soda and chlorine was satisfactorily proved, it was also demonstrated that a source of cheap power would be necessary. Mathieson, therefore, decided to build a new plant for the process at Niagara Falls. In 1896 it formed the Castner Electrolytic Alkali Co., which was operated as a subsidiary until merged with the parent company in 1917. It was in this plant that, late in 1896, Mathieson began the first U. S. production of bleaching powder.

The following year a new industry came to Niagara Falls when the Oldbury Electrochemical Co. began the manufacture of chlorates, including those of sodium and potassium, and potassium perchlorate by the electrolysis of salt solutions.

The year 1901 witnessed the founding of another company for the electrolytic manufacture of alkali and chlorine, the Roberts Chemical Co., which used the Roberts vertical diaphragm cell. The next year this firm distinguished itself by becoming the first United States manufacturer of hydrochloric acid ex the hydrogen and chlorine produced in caustic-chlorine cells (*10*).

It was about this time that Townsend and Sperry were developing the famed Townsend vertical diaphragm cell in their Brooklyn laboratories. Elon Huntington Hooker, founder and president of the Hooker Electrochemical Co., followed this work with interest. When the experimental studies had been successfully completed, ground was broken at Niagara Falls for the original Hooker plant. Eight months later, on January 9, 1906, operations were started in the plant, then known as the Development and Funding Co.

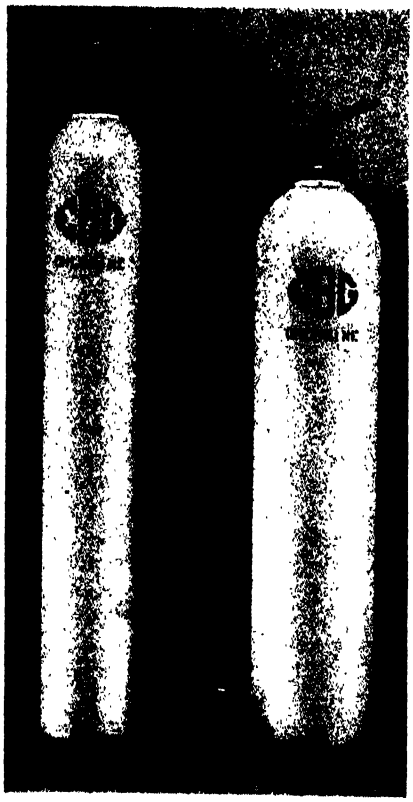
The first decade of the 20th century was an important one to the American alkali-chlorine industry, for it was in 1906 that E. D. Kingsley and his associates succeeded in liquefying the first small cylinder (1 pound) of liquid chlorine ever produced in this country. A year later the Electro Bleaching Gas Co. was formed to exploit this achievement, and in 1909 its operations were started in Niagara Falls, adjacent to the plant of the Roberts Chemical Co., which furnished the chlorine for liquefaction. Soon afterward the Roberts Chemical Co. was sold to the Niagara Alkali Co. Subsequently, the Roberts cells were replaced by Billiter horizontal diaphragm cells and later by circular diaphragm cells for more efficient operation. The first in this country to produce flake caustic soda, Niagara Alkali also was first in the production of caustic potash and carbonate of potash. Electro Bleaching Gas also flourished in the company of its neighbor and introduced chlorine into many new fields, such as textile, pulp and paper, and shellac bleaching; in 1913, it demonstrated the effectiveness of water sterilization with chlorine at Niagara Falls.



NEW YORK STATE MUSEUM BULLETIN 325

Map showing proximity of Niagara Falls to salt basins. Figures indicate elevation of the Great Lakes above sea level.

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NIAGARA ALKALI CO.

Pure EBG liquid chlorine in cylinders



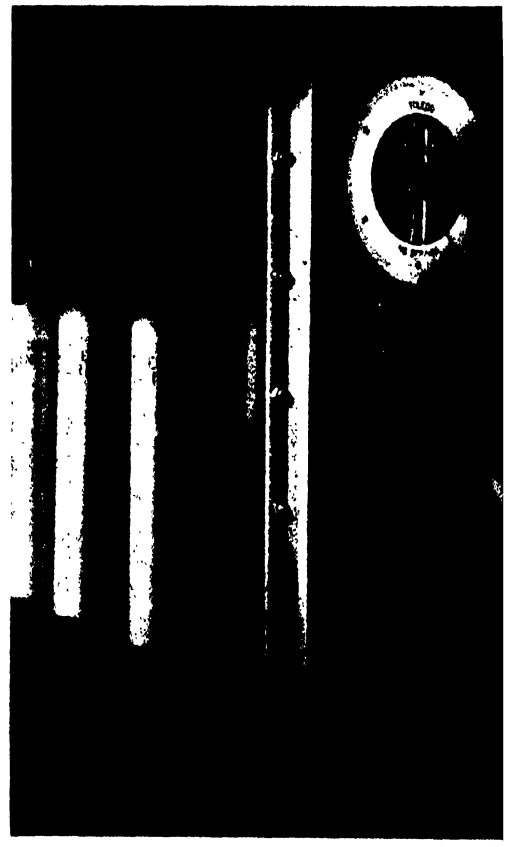
NIAGARA ALKALI CO

First cylinder of liquid chlorine made by Electro Bleaching Gas Co. in 1909



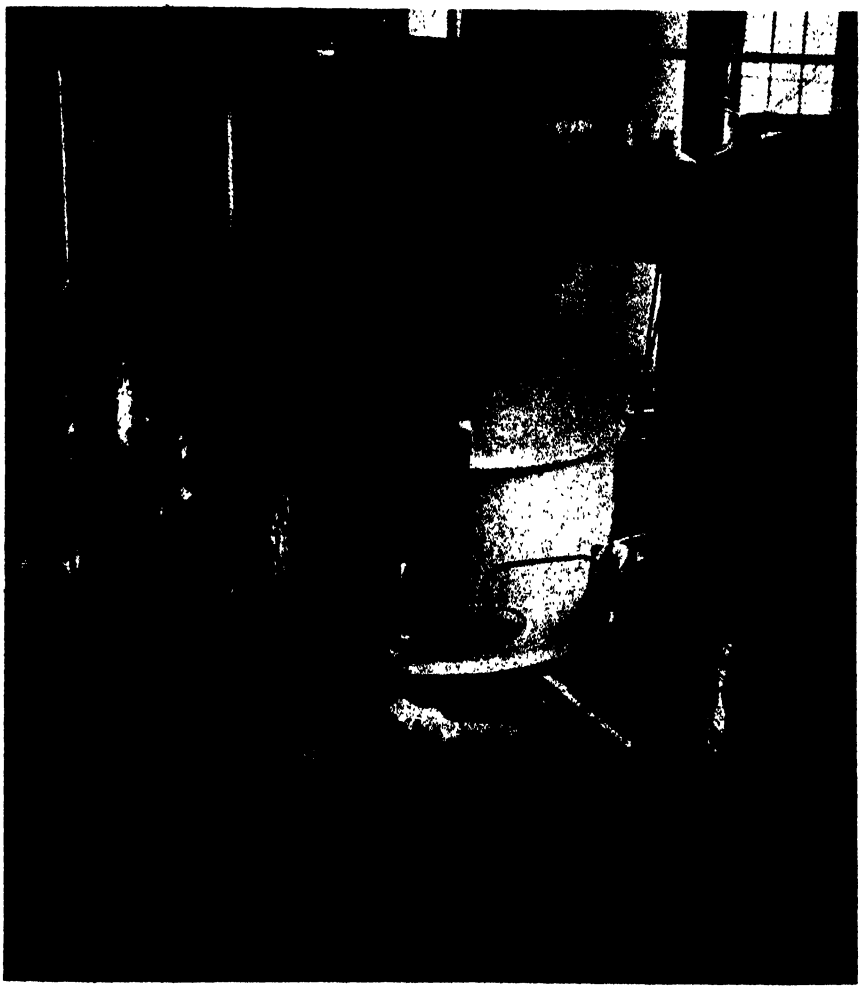
MATHIESON ALKALI WORKS (INC.)

Testing chlorine cylinder valves



MATHIESON ALKALI WORKS (INC.)

Filling chlorine cylinders

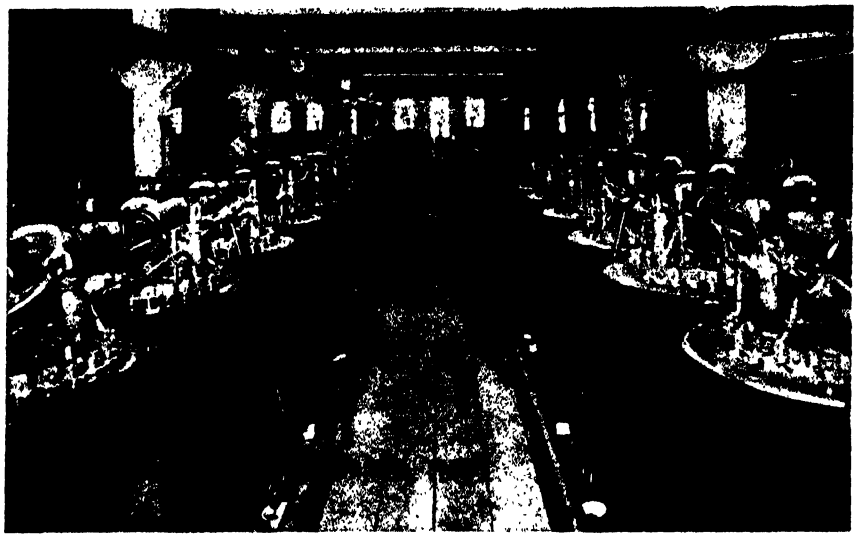


NIAGARA ALKALI CO.

Automatically controlled, multi-circulation caustic soda evaporators

In 1917 Niagara Alkali was acquired by Electro Bleaching Gas and the two companies grew side by side until July 1, 1941, when they united under the name of Niagara Alkali Co.

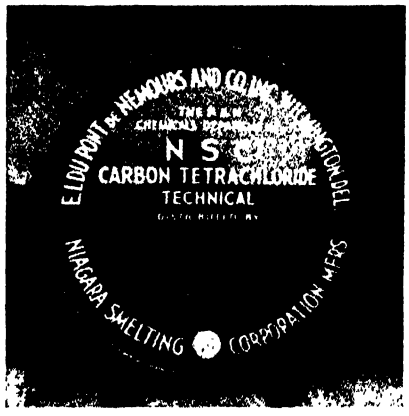
The change wrought in the Nation's chemical markets by the first World War brought still another electrolytic alkali in-



Cell room at Niagara Alkali Co.

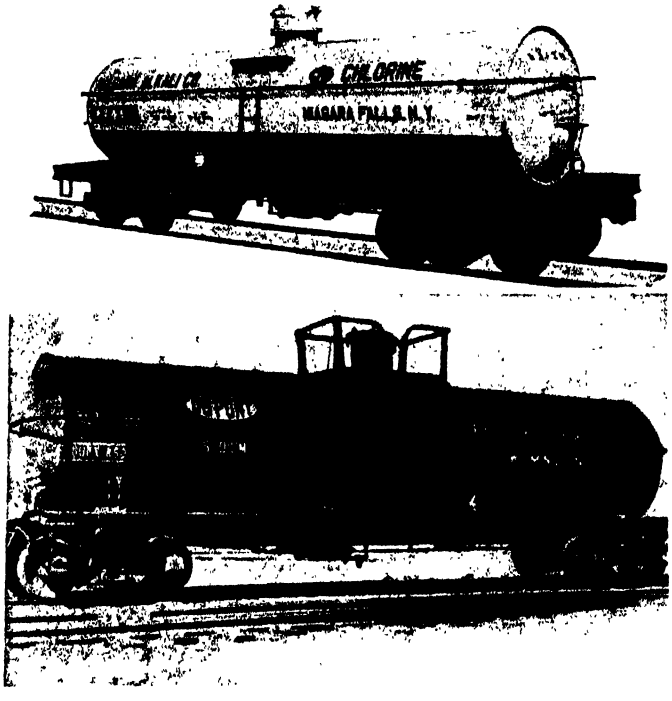
dustry to Niagara Falls, the Niagara Smelting Corp. Originally organized for the manufacture of aluminum, Niagara Smelting never produced this metal, but has been conducting successful caustic-chlorine operations in Wheeler type vertical diaphragm cells since its founding in 1916. The company consumes a large portion of the chlorine produced for the manufacture of chlorides, most important of which is carbon tetrachloride made from carbon disulfide (*5*).

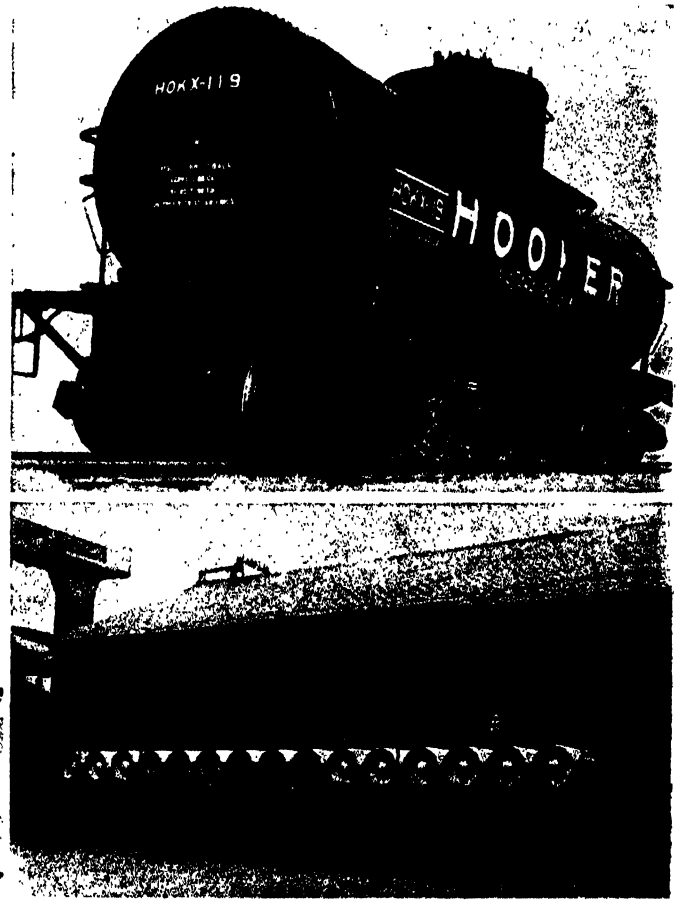
As a matter of fact, the chlorine evolving from the anodes of the thousands of cells in these six factories at Niagara Falls has found its way into other industries by many and devious paths. In addition to the vast quantities consumed in the manufacture of chlorine derivatives, 300 tons of liquefied chlorine, or about 15 per cent of the total U. S. production for 1941, is shipped out daily in cylinders, ton tanks, and tank cars. All the producers at Niagara Falls have played their important part in perfecting the design of chlorine containers; to Mathieson, however, goes the distinction of developing the famed ton container and its carrier, the multi-unit



NIAGARA SMELTING CORP

Carbon tetrachloride drums





Tank cars for the basic electrolytic products of salt. *Left above.* Single-unit tank car for liquid chlorine, Niagara Alkali Co. *Left below.* A sodium tank car, E. I. du Pont de Nemours & Co. *Top.* Liquid caustic soda tank car, Hooker Electrochemical Co. *Bottom.* Multi-unit chlorine tank car, Mathieson Alkali Works (Inc.).

tank car. History relates that the first single-unit chlorine tank car was shipped from Wyandotte, Mich., to Chrome, N. J., in 1909 (*11*). Thirteen years later Mathieson put the first multi-unit tank car into service, but another three years were required to win full tank-car rating for the new carrier by the Interstate Commerce Commission. Meanwhile, equally important strides were being made by the chlorine producers in the development of new and valuable derivatives of chlorine. Today more than 30 chlorine products form the list of vital industrial chemicals manufactured by these six companies. Included are such a variety of compounds as disinfectants, medicaments, bleaching agents, solvents, mordants, dyestuff intermediates, dielectrics, etc., to which have been added countless specialty products with manifold applications.

In 1923 Mathieson established another "first". By combining the hydrogen evolved in its caustic-chlorine cells with nitrogen from the air, the manufacture of synthetic ammonia was initiated in the United States (*4*).



MATHIESON ALKALI WORKS (INC.)

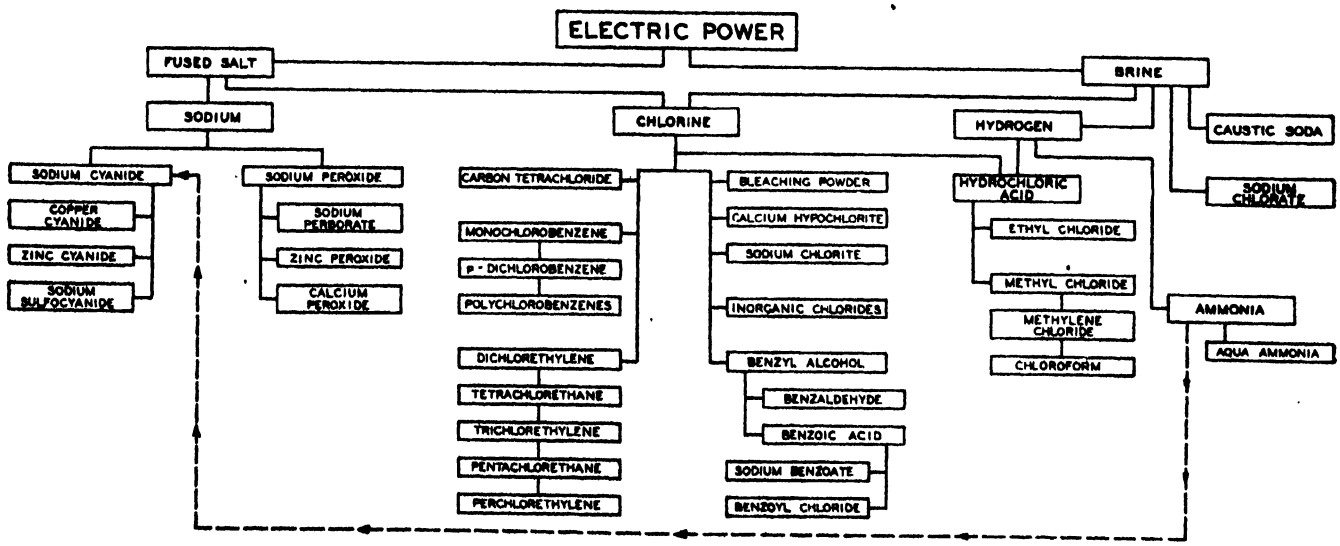
Loading a multi-unit tank car

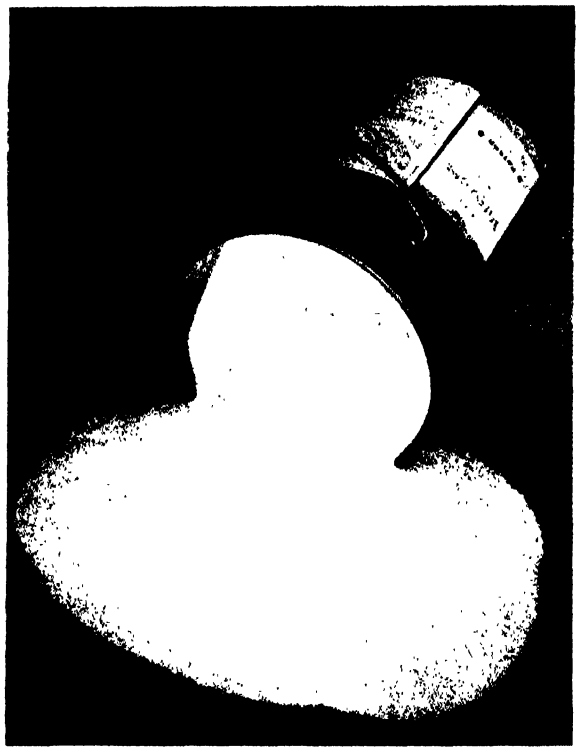
During this period of development, extensive work was being carried out on electrolytic cells for sodium manufacture. R. J. McNitt had converted the Castner fused caustic cell to a fused salt electrolyzer, but many technical problems impeded production. Finally in 1924 James C. Downs succeeded in perfecting a highly efficient sodium cell. The following year the partnership controlling the Niagara Electro Chemical Co. was dissolved and all interests were taken over by the Roessler & Hasslacher Chemical Co. In 1930 this firm was acquired by E. I. du Pont de Nemours & Co., Inc., and operated as a subsidiary until January 1, 1933, when it became The R. & H. Chemicals Department of du Pont. Recently, June 1, 1942, the name was changed to Electrochemicals Department, the better to typify its various products. Much of the sodium produced in the Downs cells was, and is, consumed at the plant itself in the manufacture of sodium peroxide, sodium perborate, and other peroxygen products, sodium cyanide and related metal cyanides, and a variety of specialty products.

As R. & H. was working on the sodium cell, Hooker was seeking to perfect its caustic cell. It was in 1925 that K. E. Stewart of the latter company began his work on an improved asbestos diaphragm, intended originally for use in the Hooker Type E or Marsh cells. This and other refinements led to the development of the present Hooker Type S cell, compact in design and offering less radiating surface than the earlier types (*9*).

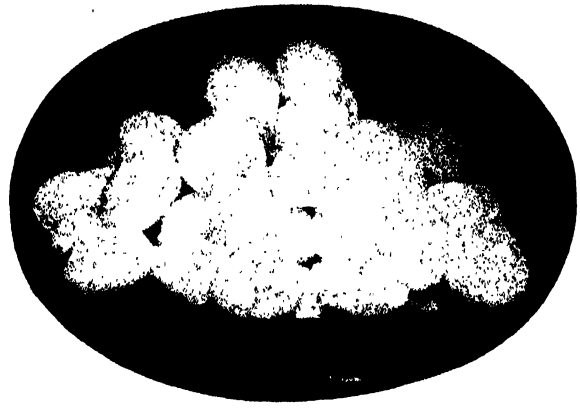
The salt-consuming industries on the Niagara Frontier have devoted their efforts to the improvement of basic processes and the development of new specialties and derivatives. The efficiency attained by these six old friends has been greatly promoted by the aggressive, independent research which has made of each a leader in its field, and by a spirit of mutual cooperation which derives from the similarity of economic problems encountered. Rarely does the tourist entering Niagara Falls detect the low red buildings

PRINCIPAL PRODUCTS MANUFACTURED BY THE SALT-CONSUMING INDUSTRIES OF NIAGARA FALLS, NEW YORK





Du Pont's sodium peroxide, known by the trade name "Solozone" DFF



One-ounce egg-shaped castings of du Pont's sodium cyanide, known by the trade name "Cyanegg"

of Oldbury behind its old-world brick walls. Nor does he usually find time to admire the growth of near-by Niagara Alkali and Hooker, apparent though this is from the structure and different hues of their many buildings. Further down the Niagara River, the equally numerous buildings of Mathieson and du Pont's Electrochemicals Department appear to be scrambled behind a maze of fences. Off by itself, beyond the city limits, Niagara Smelting stands as a sentinel above the deep chasm formed by the water from the Falls.

Behind each new discovery and development of the 50 or more chemicals derived from salt at Niagara Falls lies a tale of energy and perseverance. It is impossible even to skim the surface in an article of this sort, for to recount these stories would fill a good-sized book. However, for the benefit of those who might like to delve further into such fascinating history, a few of the many available references are appended.

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(10) Pritchard, D. A.[6], *Trans. Am. Electrochem. Soc.*, 49, 34 (1926).
(11) Wells, H. P.[7], Mabey, H. M.[8], and Rowland, J. M.[8], *Ibid.*, 49, 48 (1926).

[1] Niagara Smelting Corp.
[2] Roessler & Hasslacher Chemical Co.
[3] Mathieson Alkali Works (Inc.)
[4] American Lubricants, Inc.
[5] Hooker Electrochemical Co.
[6] Canadian Salt Co., Ltd.
[7] Niagara Alkali Co.

IMPORTANT NOTICE

Convention Attendance

IN THE preliminary program of the Buffalo meeting, it was announced that divisional meetings would start on Tuesday morning. Those who have made hotel reservations undoubtedly have done so on the basis of this information. Since then, plans have been changed so that divisional meetings will start Monday at 2:00 P. M. in order that an extremely important general meeting may be scheduled for Wednesday afternoon.

Because of this departure from customary practice, many individuals may wish to change their time of arrival. Owing to the critical hotel situation expected in Buffalo over Labor Day week end, the Hotels and Housing Committee urge that anyone planning to arrive earlier than the date indicated on his reservation notify the committee *at once*. The alteration can be made at this time—later it may not be possible.

Send your communication to Edward F. Wesp, Chairman, Hotels and Housing Committee, Buffalo Meeting of the AMERICAN CHEMICAL SOCIETY, Buffalo Convention and Tourists Bureau, Genesee Building, Buffalo, N. Y.

A. C. S. Golf Tournament

THE Niagara Falls Golf and Country Club, located by the Niagara Gorge and the escarpment overlooking Lewiston, N. Y., has been chosen for the regular A. C. S. Golf Tournament. The course is probably one of the most interesting in Western New York. Its sand traps are a challenge to any golfer, whether he shoots 80 or 120. Everyone entering the tournament will not only enjoy a good golf game but also a pleasant 19th hole.

Physical and Inorganic Chemists Cancel Symposium

THE annual symposium of the Division of Physical and Inorganic Chemistry, AMERICAN CHEMICAL SOCIETY, usually held at Christmastime, will be omitted in 1942 because of world conditions.

Chicago Section Moves

THE Chicago Section of the A. C. S. moved its headquarters to the Medinah Club, 505 North Michigan Ave., Chicago, Ill., as of August 1. The move was made necessary by the fact that the United States Army has requisitioned the Stevens Hotel, headquarters of the section for many years, for the lodging and training of Army and Air Force technicians.

The Chicago Chemists' Club, which shared the quarters of the Chicago Section in the Stevens Hotel, has made a similar arrangement with the section for the use of quarters at the new address.

Synthetic Resin Replaces Industrial Rubber

Applications of Resistoflex, a "Substitute" for Rubber, Pictured on Pages 1040 and 1041

INDUSTRY, busy supplying the diverse munitions of war, requires rubber for countless important parts of the machines used to fabricate the Army's weapons of destruction. War workers commutation may become slower and consume more time as the trend to transportation pools and walking becomes more pronounced, cars may be put up for the duration, rubber's use in myriad things may be completely prohibited—and production of fighting tools would be slowed hardly enough to show on War Production Board Nelson's charts. But a lack of rubber for the intricate machine tools and fabricating units of industry would wreak havoc with mounting trends. Stopping of any of these machines means fewer weapons for the United Nations. This must not happen. The answer is not only in the conservation of the Nation's 700,000-ton backlog of crude rubber and in collection of vast quantities of scrap. All these supplies are needed for Army truck tires, for Navy life rafts, and for Marine assault boats. Industry has had to find substitutes, and one company, the RCA Manufacturing Co. at Camden, N. J., manufacturer of things diverse as phonographs and electron microscopes, has succeeded in replacing many of its rubber objects with a substitute—a substitute which in almost every instance has out-performed the natural material. This replacement is compounded from polyvinyl alcohol, which exists only in a blissful polymerized union for, being the enol form of acetaldehyde, it cannot exist as a monomer. This material is marketed by the Resistoflex Corp. of Belleville, N. J., in compounded, extruded, and fabricated shapes under the trade mark, Resistoflex PVA. Add to the anomalies of Resistoflex, it easily resists oil, organic solvents, gasoline, is impermeable to oxygen, nitrogen, and hydrogen, but in the presence of water, like a small boy in vacation time, it is completely undone. The complex molecule is soluble in water and for all applications must be engineered to the task to which it is put. Recognition of a limitation serves to make exploration of permissible applications more thorough; and with notable success this was done by RCA and Resistoflex, for minor concentrations of water, such as in gasoline and foods, have no effect on the compounded material.

Typical examples are the flexible gas and air lines on the automatic machines for forming radio tubes. Custom had made rubber tubing standard for these installations because of its ready availability, relatively low cost, and ease of installation. Similarly the many connections between valves, traps, pumps, and gages for evacuating and sealing operations were all made from pure gum rubber. Today these are made from Resistoflex, but not before both managements had subjected the new material to every torture test their dubious engineers could devise. Machines shook, pounded, twisted, pulled, and flexed samples of Resistoflex hose carrying hot oil, gases under pressure, organic solvents for metal cleaning, illuminating gas, and as little air as an efficiently modern, high-vacuum pump could leave. Then came plant trials, side by side with standard rubber materials, and in every use sanctioned by design engineers, polyvinyl, like Pollyanna, came cheerfully through.

Installations of the new hose are made with little or no change in machine design. In several cases it has eliminated the need for an extension of metal pipes—another proposed rubber conservation step; such extensions would shorten the lengths of rubber connecting tubes. Only a few sizes of hose are now stocked to match the standard pipe nipples used, making these polyvinyl compounds as adaptable as the original material; for in addition to replacing rubber with Resistoflex, RCA is also to a large extent using tubing of this type to displace flexible metal hose, generally made of brass, copper, or stainless steel.

Another advantage offered by Resistoflex tubing is the fact that the compound from which it is extruded can be varied to meet the particular requirements of specific applications. Thus, when RCA first started experimenting with the material, engineers of the Resistoflex Corp. formulated a special compound to meet its needs. From this was fabricated a cotton-covered hose especially adapted to required processes. This hose has been standardized for many uses where a quantity of high-grade gum rubber was formerly employed. Already the life of this new tubing has proved to be far in excess of that normally experienced.

Rubber Machine Parts

While the replacement of rubber tubing was a major objective, the RCA conservation campaign did not stop there. The company was also using rubber for many machine parts of a highly mechanical nature. Experiments with Resistoflex PVA in the tubing field had revealed that, in addition to having high solvent resistance and exceptionally low permeability, it was extremely tough and stood up under both flexing and abrasion. The Resistoflex engineers were asked to revamp samples of their sheet stock until a compound was formulated which conformed to the rubber durometer index and texture. Testing of the alternate material was simplified by the ease with which blocks could be fabricated. Pieces were cut or punched from $^1/_{16}$- or $^1/_8$-inch sheet. These were then laminated into washers, spacers, and rollers, without the need for any special presses or molding machinery. Rough shapes so formed were machined to required dimensions on standard shop equipment. Some such sections were frozen solid in liquid air or mounted on wooden blocks to facilitate machining.

In these mechanical applications involving abrasive action and torsional strains, Resistoflex has consistently outlasted rubber. A typical instance involves a power transmission device wherein a revolving turret carries a series of heads, which in turn are revolved in a sequence of indexed positions. The heads are caused to rotate when their shallow-toothed, metal-drive gears are brought into mesh with rings clamped to driven shafts below the turret. Resistoflex easily replaced rubber for these power transmission rings.

In another application a two-ply tube was formed by rolling $^1/_{16}$-inch sheet about a $^1/_8$-inch diameter mandrel. This tube was installed in a sandblast suction line where rubber tube had lasted only a few days. The replacement tubing has already been running for several months. In the same machine sandblast shields made of PVA sheet have likewise proved their worth, not only in wear but because it has been possible to fabricate the compound to combine maximum protection with flexibility needed for easy operation.

The list where the "substitute" material is becoming standard is growing daily. Among mechanical parts being fabricated from the synthetic resin are forming rollers, forming-press jaw linings, aligning devices, vibration dampers, shock absorbers, power transmission rings, foot pedal coverings, metal belt pulley facings, and in ball mill cover gaskets where it stands up under solvents which destroyed previous gaskets made from natural or synthetic rubber. Sections of sheet material have been cemented together to make a small-parts conveyor belt, superior even to a belt of woven wire.

RCA's campaign has resulted not only in releasing quantities of rubber, but also in technological advances through the necessity of testing a material which normally might not have been considered.

Florence B. Seibert to Receive Garvan Medal



Florence B. Seibert

THE Garvan Medal honoring women in chemistry will be awarded to Florence B. Seibert, associate professor of biochemistry, Henry Phipps Institute of the University of Pennsylvania, at the 104th meeting of the AMERICAN CHEMICAL SOCIETY to be held in Buffalo, N. Y., September 7 to 11

Dr. Seibert has been named to receive the award because of "distinguished work on the chemistry of tuberculosis". She isolated the active substance in tuberculin, widely used in the detection of tuberculous infection in man and animals, prepared the International Standard tuberculin, and is the recognized expert in her field. The purified tuberculin protein that she has prepared is said to have vastly improved the methods of diagnosis. Her latest work has consisted of the production of a large quantity of the purified tuberculin for deposit as an official standard tuberculin.

Dr. Seibert also discovered the frequent presence of fever-producing bacteria in distilled water, a finding called of great importance in surgery and in all fields involving intravenous injection. Her research led to a refinement in methods of producing distilled water for injection so that now fever should not result from such injections.

Dr. Seibert is thoroughly modern in her approach to chemical problems and, as a result of a year's work with Professors The Svedberg and Arne Tiselius in Upsala, Sweden, is an expert in the rapidly developing techniques of high-speed centrifugation for the determination of molecular weights and electrophoresis.

From the start her work has been marked by remarkable accuracy in delicate manipulations. Her skill in chemical procedure is shown by the fact that she was able to recrystallize the tuberculin protein no less than 14 times, a remarkable feat in view of the known difficulty in crystallizing proteins. Her work has been of both theoretical and practical importance.

Dr. Seibert was born in Easton, Penna., on October 6, 1897, and was graduated from Goucher College in 1918. She received the Ph.D. degree in 1923 from Yale University, where she was Van Meter Fellow and Porter Fellow. Under Lafayette B. Mendel at Yale she showed that the production of fever by distilled water depended on the bacterial contamination of supposedly pure water.

Awarded the Porter Fellowship at the University of Chicago in 1923-24, she continued her research under H. Gideon Wells and Esmond R. Long, and proved that minute amounts of nitrogenous material in contaminated distilled water were quite adequate to account for the fevers produced. Dr. Seibert began her work on tuberculin using a synthetic protein-free culture medium devised by Dr. Long, and established definitely the protein nature of tuberculin. Isolating the protein concerned in highly purified form, she studied its chemical and biological properties. Her product was recognized as the standard for potency of tuberculin by the Division of Biologics Control of the National Institute of Health of the U. S. Public Health Service.

Dr. Seibert was on the staff of the Sprague Memorial Institute, Chicago, from 1924 to 1932. In the latter year she joined the faculty of the Henry Phipps Institute which is devoted to the study, treatment, and prevention of tuberculosis. She received the Ricketts Prize of the University of Chicago in 1924, and the Trudeau Metal of the National Tuberculosis Association in 1938. Goucher College honored her with the LL.D. degree in 1937 and the University of Chicago with the Sc.D. degree in 1941, when she spoke at the university's semicentennial celebration.

She is a member of the AMERICAN CHEMICAL SOCIETY, the American Society of Biological Chemists, American Association for the Advancement of Science, Chicago Institute of Medicine, Society of Experimental Biology and Medicine, Physiological Society of America, the National Tuberculosis Association, Phi Beta Kappa, and Sigma Psi.

She has published many papers in the fields of cellulose, bacterial and protein fevers, the chemistry of proteins and tuberculin, immunology, and tuberculosis.

The Women's Award Committee, which chose Miss Seibert to receive the medal, is composed of Mary L. Sherrill, Chairman, William Lloyd Evans, Louise Kelley, M. L. Crossley, Cornelia T. Snell, and Hiram S. Lukens.

The Garvan Medal was founded by the late Francis P. Garvan of New York, president of the Chemical Foundation, Inc. The first award, in 1938, went to Emma Perry Carr, head of the chemistry department of Mount Holyoke College, for her researches in physical chemistry, especially on the structure of organic molecules by means of absorption studies in the far ultraviolet, and the second in 1940 to Mary E. Pennington of New York, authority on the refrigeration of perishable foods, as being an outstanding woman chemist, whose unique career has been that of a teacher, director of research, and consultant.

Oncley Receives A. C. S. Award



BACHRACH

John Lawrence Oncley

THE AMERICAN CHEMICAL SOCIETY Award in Pure Chemistry for 1942, initiated by the late A. C. Langmuir and now provided through the generosity of Alpha Chi Sigma, has been awarded to John Lawrence Oncley, in charge of the Ultracentrifuge Laboratory at the Harvard Medical School. The $1,000 prize will be presented at the AMERICAN CHEMICAL SOCIETY meeting in Buffalo, September 7 to 11.

Born in Illinois, Dr. Oncley was educated at Southwestern College, Winfield, Kans., and at the University of Wisconsin. At the age of 32 he is already outstanding in original accomplishment. His career in chemical research has included duties as fellow of the National Research Council at Massachusetts Institute of Technology, instructor in chemistry at the University of Wisconsin, research chemist at the General Electric research laboratory, instructor in chemistry at M. I. T., and research associate at the Harvard Medical School.

His investigations in the dielectric properties of gases, insulating oils, resins, rubbers, and proteins have proved of fundamental importance and have brought him wide acclaim. Dr. Oncley has developed radio-frequency bridge methods suitable for precise dielectric constant determinations with proteins and with their aid has completed what may be termed the first completely satisfactory study of the dielectric dispersion behavior of water-soluble proteins. These studies in turn have led to an interest in the molecular size and shape of protein molecules, which is being broadened by new experience in charge of Harvard's Ultracentrifuge Laboratory.

Previous Recipients of A. C. S. Award

Recipient	Meeting	Year	In Recognition of
Linus Pauling	Buffalo	1931	Work on the structure of crystals and nature of the chemical bond
Oscar Knefler Rice	Denver	1932	Studies of the mechanism of chemical reactions
F. H. Spedding	Chicago	1933	Application of spectroscopy to the study of atomic and molecular structure
C. Frederick Koelsch	Cleveland	1934	Researches on the chemistry of condensed ring systems
Raymond M. Fuoss	San Francisco	1935	Authorship of the first comprehensive theory of electrolytic solutions which, at lower concentration, applies to all solvent media and to all electrolytes
John Gamble Kirkwood	Pittsburgh	1936	Work with the dielectric properties of matter under high pressures
E. Bright Wilson, Jr.	Rochester	1937	Work in physical chemistry
Paul Doughty Bartlett	Milwaukee	1938	Progress in the important borderline field between organic and physical chemistry and in particular his research in stereochemistry and mechanisations of organic reactions
Lawrence Olin Brockway	Detroit	1940	Contributions in the determination of molecular structure by electron diffraction methods
Karl A. Folkers	Atlantic City	1941	Contributions in the field of organic chemistry, including Erythrina alkaloids, vitamin B_6, catalytic hydrogenations, and pyrimidines

Data Published on Selective Service

Because of the wide interest in this subject and the need for obtaining trained men for our Production Army, we give below references to information we have published on occupational deferments, including those of men in training, and the need for technically trained persons. Future developments will be brought to the attention of our readers.

Chemical and Engineering News

(News Edition previous to 1942)

Vol. 18 (1940), pages 890, 1127
Vol. 19 (1941), pages 129, 311, 457, 459, 489, 520, 587, 681, 797, 1164, 1412, 1464
Vol. 20 (1942), pages 110, 157, 472, 579–80, 788, 812, 837–39, 985

Industrial and Engineering Chemistry

Vol. 33 (1941), pages 1, 135, 283, 561
Vol. 34 (1942), pages 2, 131, 259, 648

★ IT'S A MUST ! A. C. S. MEETING

SEPTEMBER 7 to 11

BUFFALO ★

Sets of Abstracts

Sets of abstracts of the Buffalo meeting papers in planographed book form will be supplied by the A. C. S. News Service, 1155 16th St., N. W., Washington, D. C. Sets are not guaranteed to be complete, but contain abstracts from all divisions as submitted by authors. The abstracts will be mailed as soon as possible after receipt of order, beginning about September 2, and will also be on sale at the Buffalo meeting of the American Chemical Society, September 7 to 11, 1942.

This enterprise is undertaken in a spirit of service and not for profit. Sets are offered on the following terms:

To members of divisions who forward receipt for divisional dues with remittance and order, 50 cents.

To those without receipt for divisional dues, who remit with order, $1.00.

To those who fail to enclose remittance with order, necessitating correspondence, $1.25.

To those who require bills to be rendered, $1.50.

Alpha Chi Sigma Chapter Sets Up New Award

In commemoration of Charles E. Munroe, the George Washington Chapter of Alpha Chi Sigma has established an annual award of prizes for the best essays submitted by freshmen and sophomore students of chemistry at certain colleges in the District of Columbia. The topic of the essay this year was "New Developments in Chemistry and Their Relation to the World Crisis". First prize was awarded to Raymond P. Wheeler of Catholic University. David J. Barsa and Louise C. Powell, both of George Washington University, won the second and third prizes, respectively.

Motion Pictures Issued on Heat and Home Insulation

"Heat and Its Control" and "The Story of Rock Wool Home Insulation", new educational motion picture films in sound, produced under the direction of the U. S. Bureau of Mines, 4800 Forbes St., Pittsburgh, Penna., are ready for distribution. Copies in 16-mm. sound are available free of charge, except that the borrower is expected to pay transportation charges and for loss or damage other than normal wear.



Du Pont Branch Managers of Electrochemicals Department Meet

An average of over 31 years each of service with E. I. du Pont de Nemours & Co., Inc., is the record of these 11 men photographed at the recent branch office managers' meeting of the Electrochemicals Department in Wilmington, Del. *Back row, left to right:* A. C. Stepan, C. Dittmer, R. H. Dufault, L. R. Kennette, A. R. Tucker, and W. P. Stoll. *Front row, left to right:* H. A. Schumacher, E. C. Schwarzenbek, G. W. Goerner, C. Seiler, and G. A. Bode. Mr. Schumacher is the manager of the West Coast plant; Mr. Bode, manager of Miscellaneous Sales; the others, branch office managers.

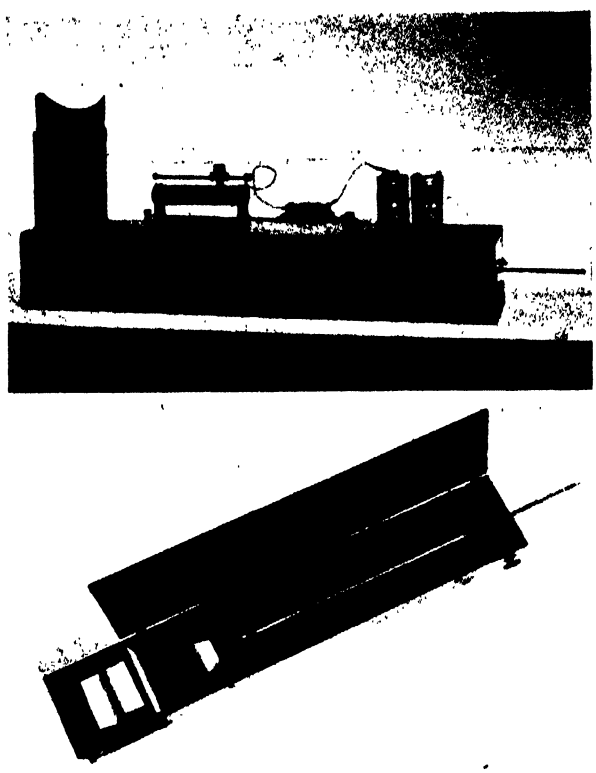
Properties of Luminescent Materials[1]

C. E. BARNETT, Research Division, The New Jersey Zinc Co. (of Pa.), Palmerton, Pa.

With wartime conditions many military and some civilian operations must be performed under materially reduced levels of illumination. The press has contained many references to loss of life and traffic snarls resulting from trial and real blackouts which, in turn, have created a widespread interest in the possibilities of luminescent materials. There are quite general misconceptions regarding the properties of fluorescent and phosphorescent substances which can lead to disappointments in their use. Many of the phosphors are advertised as continuing to emit light for 48 hours or more after excitation. Although this is true, the light emitted is quite low and, while it may seem ample in complete darkness, it must be remembered that visibility depends on the contrast with light from the environment.

Brightness and Decay of Phosphors

From a few minutes after extinguishing the exciting radiation up to two hours in darkness, the brightness of most phosphorescent materials will range between 10 and 0.1 microlamberts. Brightness measurements in this region, if color differences are involved, present a considerable problem. The luminosity curve of the eye does not remain constant when the brightness of a surface is less than a foot lambert, but becomes progressively more blue-sensitive and less red-sensitive as the brightness is reduced to 0.5 microlambert. This shift of the luminosity curve toward shorter wave lengths at low brightness, known as Purkinje's phenomenon is most pronounced between 200 and 1 microlambert. At brightnesses below 0.5 microlambert, the eye again has a constant luminosity curve corresponding to the dark-adapted or scotopic eye. As a practical example of this effect, Goulden (*5*) reports that, if a red of 670 millimicrons is viewed under conditions of light adaptation and moderate intensity of illumination and found 10 times as bright as a blue of 480 millimicrons, and then the light is decreased and the eye dark-adapted, there will be a reversal of the relative brightness and the blue will appear 16 times as bright as the red. The luminosity curves for photopic (light-adapted) and scotopic vision have been published by Taylor (*10*) among others. Common practice of showing these curves with peaks adjusted to equal luminosity is misleading since the response of the scotopic eye at maximum sensitivity is from 50,000 to 150,000 times that of the photopic eye (*7*). The British Standard Specification BS/ARP 18 (*2*) points out that, because of the existence of the Purkinje phenomenon, the relative values of the brightness of differently colored surfaces of low brightness expressed in foot lamberts have little bearing on their relative effective brightness as directly judged by the eye.



Above, Figure 1. Wide angle photometer. *Below*, Figure 2. Photometer with cover removed

Visual meters for the measurement of low brightnesses have been described by Taylor (*10*) and in British Standard Specifications (*2*). Both of these and the one about to be described depend on the simplification of the optical system to avoid loss of light and on a large field of view. For this reason the instrument described below and illustrated in Figures 1 and 2 has been called a wide angle photometer. Its design was suggested by A. H. Pfund. The light from the surface of the sample is matched in brightness with that from the photometer lamp as reflected from the front surface mirror. The lamp may be moved from 2.5 to 25 inches from the glass diffusing screen by the photometer bar which is marked off according to the inverse square law with a reading of 100 when the lamp is 2.5 inches from the screen. Holders are provided in front of the lamp for color filters to facilitate matching the light from the sample and for neutral tint filters to extend the range of the instrument. The use of filters matching the color of sample and lamp avoids some of the trouble due to the shift in the luminosity curve of the eye. The photometer lamp is a 32-candlepower automobile headlight lamp operated from a 6-volt storage battery with a current of 2.2 amperes. The arrangement of these parts is obvious from an inspection of Figure 2 which shows the instrument with the cover removed. Scale divisions on the photometer bar are converted to absolute units by calibration of the instrument against a standard lamp. The photometer calibration is made over a brightness range from approximately 100 to 5,000 microlamberts and extended into the low brightness region by extrapolation. However, the measurements with the photometer are made with the eye varying from light adaptation to complete dark adaptation according to the brightness of the phosphor. Thus the reported brightness values are the effective brightnesses as seen by the eye, and these are expressed in terms of a light-adapted eye. This instrument has since been checked against a lamp calibrated by the National Bureau of Standards for the brightness range between 4 and 0.5 microlamberts. The results of the two methods of calibration agreed within 5 per cent.

Figure 3 shows decay curves as determined with the wide angle photometer for zinc sulfide, zinc–cadmium sulfide, calcium sulfide, and strontium sulfide phosphors. In the zinc sulfide and zinc–cadmium sulfide phosphors copper was used

[1] Presented before the Paint, Varnish, and Plastics Division at the 103rd meeting of the American Chemical Society in Memphis, Tenn., April 20 to 23, 1942.

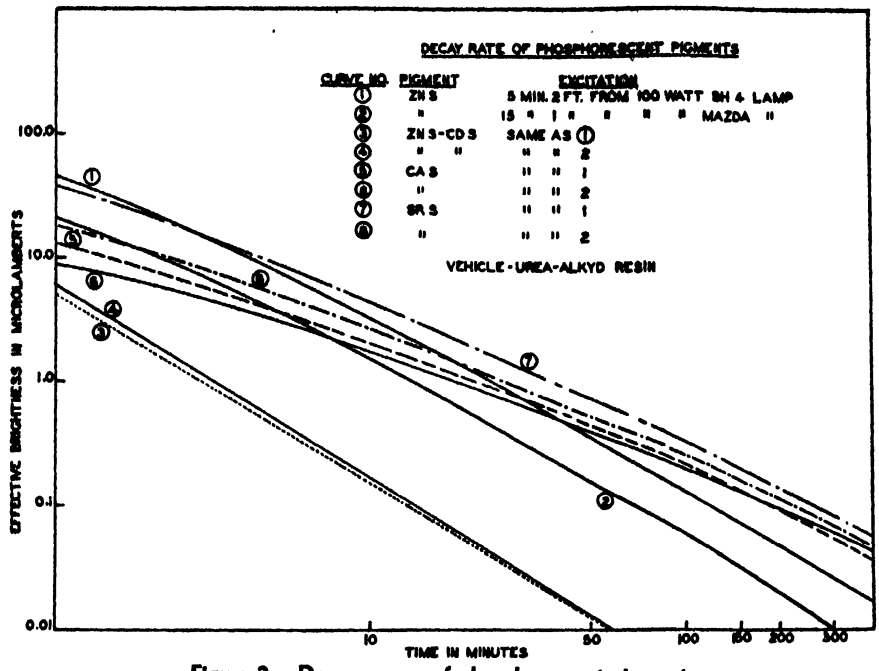


Figure 3. Decay curves of phosphorescent pigments

as the activating metal. The latter phosphor contained approximately 80 per cent zinc sulfide and 20 per cent cadmium sulfide. Bismuth was used as the activating metal in both of the alkaline earth sulfide phosphors. The calcium sulfide phosphor was a mixture of calcium and strontium sulfides in an approximate ratio of 80 parts calcium sulfide to 20 parts strontium sulfide, while the proportions of the two sulfides were approximately reversed in the strontium sulfide phosphor. The curves show the general order of the differences to be expected between these different types of phosphorescent pigments, but no claim is made that they exactly represent the respective classes. For these tests the pigment was stirred into a vehicle composed of 50 per cent American Cyanamid Co.'s Beetle resin solution No. 592, 25 per cent butanol, and 25 per cent xylene. The paint was applied to the panel and baked for 30 minutes at 225° F., then a clear coat of the vehicle was applied over the pigmented coat and the baking repeated. The decay curves have been determined for each pigment after excitation by a 100-watt Mazda filament lamp and a 100-watt B. H. 4 high-pressure mercury vapor lamp. These two lamps represent extreme differences in distribution of the exciting light since the filament lamp provides only 0.07 per cent of its energy at wave lengths less than 3,800 Å. while the mercury vapor lamp has 2.4 per cent of its total energy in this region (*1*). This difference in excitation makes little difference in the long-period decay curves with the exception of that for the zinc and strontium sulfides. It would, however, make a great difference in the fluorescence and initial short-period phosphorescence. The measurements were continued out to five hours and have been plotted on a log-log scale. Measurements with this instrument have been continued as long as 40 hours and could be carried much further but, because of the linearity of the plot, there is little point other than to show the performance of the photometer in measuring surfaces of low brightness.

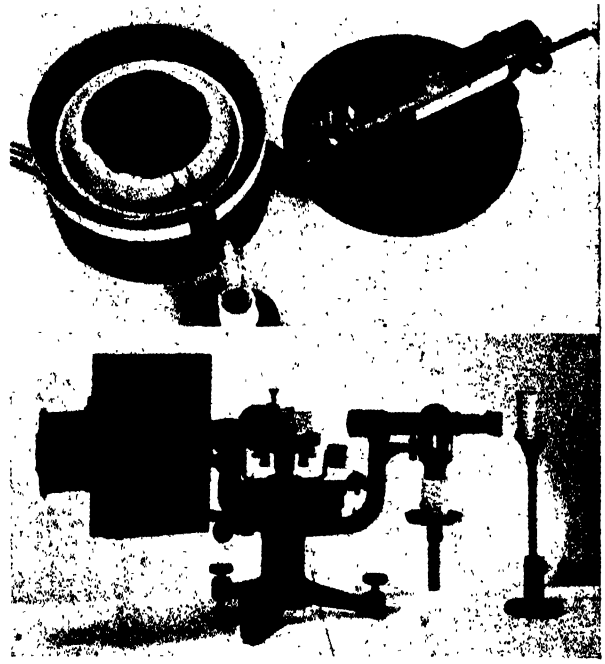
Radioactive decay is a standard example of a first order reaction, yet the long-period decay in these phosphors is of the bimolecular type. Different authors have commented on this. Curie (*3*) believes that the hyperbolic form may mean nothing more than an approximation to the development of a sum of exponential functions satisfying certain conditions. However, according to modern theory (*9*), when a quantum of light is absorbed by an atom or ion of a crystal and as a result an electron is raised into the conduction band of the solid or to an excited state, there are several possibilities:

1. It may fall directly back from the excited to the ground state with the emission of radiation and under suitable conditions the radiation will be visible. In this case, the decay after the illumination is shut off will follow the exponential law: $I = I_o e^{-\alpha t}$
2. If the electron is raised into the conduction band either directly or indirectly, it will be free to move through the crystal until trapped at one of the bound energy levels. If released from this metastable state by thermal excitation, the electron will eventually return to the ground state and under proper conditions the energy thus given up will be visible as phosphorescence. In this case the decay will follow the bimolecular law $I = I_o/(1 + \alpha t)^2$. The constant α depends on the rate of release of electrons from the metastable states and increases rapidly with temperature.

This theory satisfies the experimental data showing that the fluorescence and short-period decay vary with the kind of excitation, while the long-period phosphorescence is relatively independent of the excitation. It also accounts for the temperature sensitivity of the long-period decay. In accord with the theory the decay curve loses its bimolecular character on approaching the short decay times.

It is interesting to compare the brightness of these phosphors with the brightness of a white paint under weak illumination. In the vicinity of Palmerton on a moonless night in March with bright starlight but a slightly hazy atmosphere, the illumination from the sky was found equivalent to a brightness of 0.15 microlambert and the brightness of a white traffic paint was 0.12 microlambert. From the decay curves for Mazda (Figure 3) light excitation, the zinc–cadmium sulfide would reach the 0.12 microlambert level in 18 minutes, the zinc sulfide in 70 minutes, the calcium sulfide in 3 hours, and the strontium sulfide in 4 hours. These measurements are in good agreement with the conclusions of the British Bulletin C-17 (*6*):

With a good quality strontium or strontium–calcium sulfide the performance to be expected in practice is that a marking will be usefully visible for perhaps 4 hours after sunset on a moonless, starlight night. For several more hours, it may be discernibly brighter than a similar marking of white paint, after which the white paint



***Above*, Figure 4. Rotating type phosphoroscope. *Below*, Figure 5. Apparatus for recording fluorescent color**

is equally, if not more efficacious, depending on the relative reflection factors and on the amount of light that is being received from the night sky.

The use of an efficient phosphorescent paint will, however, ensure that the markings are visible on those few really black nights when the greatest difficulty in movement is expected.

If the illumination in the comparisons above were reduced 50 per cent by a partly cloudy sky, the phosphorescent pigments would be brighter than a white paint for 30 minutes, 2 hours, and 6 hours, corresponding respectively to the zinc–cadmium sulfide, zinc sulfide, and calcium sulfide and strontium sulfide phosphors. In comparison to the brightness of 0.12 microlambert for the white traffic paint, a value of 0.034 microlambert was obtained for a yellow traffic paint, the same value as was obtained for concrete pavement under these conditions. At the level of illumination provided by starlight the white paint was 3.5 times as bright as the yellow, while under normal illumination the brightness values relative to MgO were 80 per cent and 61 per cent for the white and yellow, respectively. This shift in relative brightness with illumination is an example of the Purkinje effect.

For many purposes the short-period phosphorescence is important and is best measured with some form of rotating phosphoroscope. A simple construction is shown in Figure 4. A phonograph motor and turntable are used as a constant-speed rotating mechanism with the drive gear of the motor changed to provide a speed which may be varied from 15 to 25 r. p. m. These are enclosed in a circular box with an adjustable opening in the side to admit the exciting light and a second opening in the movable cover. The sample is dispersed in a vehicle and brushed on the outside beveled edge of a glass pie plate which is placed, bottom side up, on the turntable. A bar photometer is mounted on the cover of the box with the photometer head sighted on the phosphor through the hole in the cover. Thus, the intensity of the luminescence can be measured while the sample is being irradiated, or by rotating the top, at any time after the excitation up to the time required for one revolution of the turntable.

Color

The color of luminescent materials is of importance in many instances and is associated with the characteristics of the eye under low illumination. From the luminosity curve for the scotopic eye it would be expected that blue-green colors would be preferable, but in many practical applications this is not the case.

The receivers of stimuli in the retina, the rods and cones, are not uniformly distributed but the latter are concentrated in the central part of the retina and are responsible for by far the most reponse to ordinary illumination. In night vision the rods located in the periphery of the retina are the most sensitive, the central region of the eye being practically "night blind". The astronomers express this paradoxically "in order to perceive a dimly lighted object, it is necessary not to look at it". Since the rods are located outside the point of most acute image formation in the retina and also since a number of rods connect with one nerve fiber, the periphery of the eye has poor perception of detail. For this reason bluish-green phosphorescent signs are difficult to read and in any case must be made with very large letters. Yellow or yellow-green luminescent letters will only obtain response from the cones in the central portion of the retina, but because of this will be in a sharp focus and often more legible even though appearing less bright. The bluish-green luminescent materials often give a feeling of discomfort akin to glare to a completely dark-adapted eye, although the brightness level may be a fraction of a microlambert. The sensation of glare with normal illumination is due to light reflected into the eye of such intensity that the pupil is contracted to such an extent that the image is thrown out of focus. Observations are made in visual glarimeters so that the light is received on the periphery of the retina by the same receivers which are responsible for vision with weak illumination. Years ago, F. Gotch (*4*) made some interesting observations on picking up lights at sea at night that bear on this:

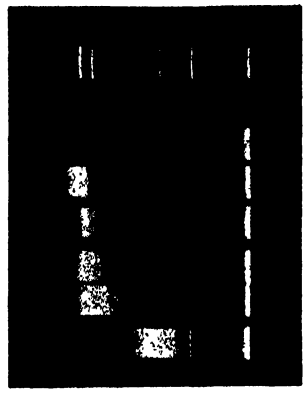


Figure 6. Fluorescence spectra

In the dark-adapted eye, red light is recognized as red over an area whose radius is three or four times that observed with green light; yet the red light is not seen at all outside this larger area. On the other hand, green or blue light, whilst it is only recognizable as green over the much more restricted central area, is seen as a bright light of a dazzling white type over a very extensive area.

The Hardy spectrophotometer (*11*) has been adapted to the measurement of the color of the light emitted by phosphors. Rothchild (*8*) located the centers of the emission bands of phosphors by recording the fluorescence spectrum on a photographic film. This method requires no unusual equipment. The sample is irradiated by a suitable source and the emitted light is passed through a filter to remove any reflected ultraviolet and then through a spectrometer, finally recording the spectrum on the photographic plate. The assembly is shown in Figure 5, and an example of the results in Figure 6. In order from top to bottom the spectra represent an unfiltered mercury arc as diffused into the spectrometer from a block of $MgCO_3$, red, yellow, yellow-green, green, blue-green, and blue fluorescent pigments. The

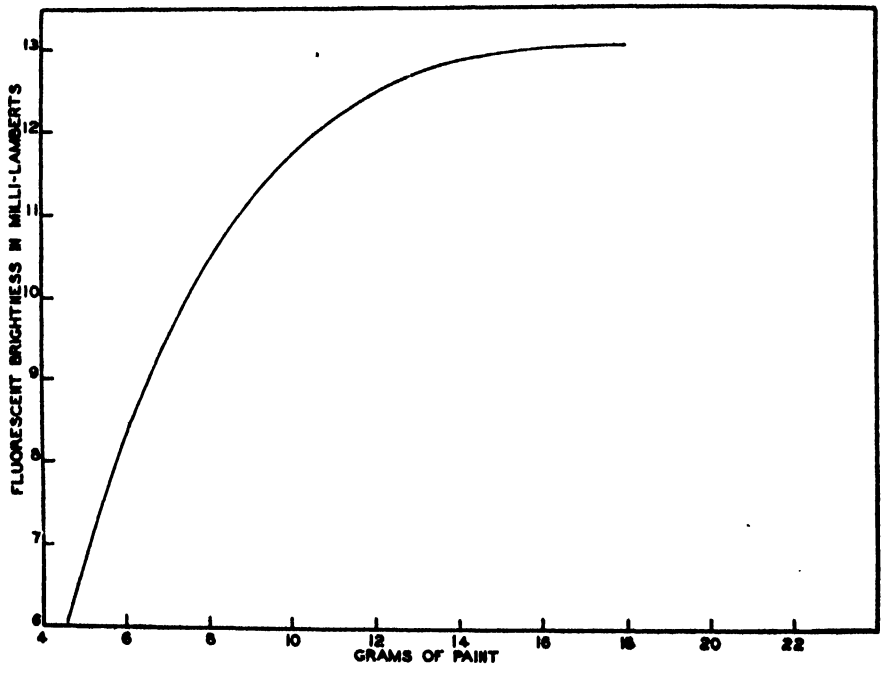


Figure 7. Fluorescent covering power

Table I

Pigment	Vehicle	Exposure	Relative Order of Fluorescence After Exposure	% of Original Fluorescence	Relative Order of Phosphorescence After Exposure	% of Original Phosphorescence
Phosphorescent ZnS	Traffic vehicle	Vertical, 14 months	2	43	2	65
Fluorescent ZnS (green)	Resin modified (nitrocellulose) lacquer	45° south, 12 months	4	50	..	..
Phosphorescent ZnS	Resin modified (nitrocellulose) lacquer	45° south, 12 months	1	35	1	40
Fluorescent ZnS (blue)	Sign enamel	45° south, 14 months	9	20	..	..
Fluorescent ZnS (green)	Sign enamel	45° south, 14 months	6	20	..	..
Fluorescent ZnS (yellow)	Sign enamel	45° south, 14 months	5	30	..	..
Fluorescent ZnS (red)	Sign enamel	45° south, 14 months	8	25	..	..
Fluorescent Zn–CdS (yellow)	Sign enamel	45° south, 14 months	3	20	..	..
Fluorescent Zn–CdS (red)	Sign enamel	45° south, 14 months	10	35	..	..
Fluorescent ZnS (yellow)	Polystyrene	45° south, 13 months	7	35	..	..

red and yellow fluorescence spectra in this figure represent essentially pure spectrum colors.

Covering Power

When the fluorescent brightness of a luminescent paint is plotted against the film thickness, the resulting curve has the same form as the brightness or contrast ratio, film thickness curves, the familiar hiding power curves, for normal paints. Figure 7 shows an example of this for a paint pigmented with phosphorescent zinc sulfide and applied over a priming coat of white paint.

The composition of this paint follows:

Pigment—62 per cent	
Phosphorescent zinc sulfide	100 per cent
Vehicle—38 per cent	
Glyptal solution (General Electric Co. No. 2475)	71.7 per cent
Mineral spirits	26.4 per cent
Drier	1.9 per cent

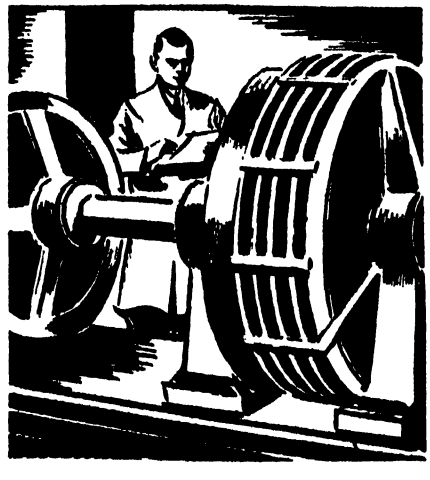
Complete luminescence was obtained under these conditions with this paint at a spreading rate of 400 square feet per gallon, corresponding to 44 square feet per pound of pigment. When a fluorescent zinc–cadmium sulfide pigment was used as the pigment in the above composition the spreading rate for complete luminescence was 1,050 square feet per gallon or 115 square feet per pound of pigment. It was not possible to make a direct substitution with an alkaline earth sulfide pigment, but when 52 per cent of a calcium sulfide pigment was mixed with 48 per cent of the above vehicle the resulting paint reached its maximum fluorescence over a white primed surface at a spreading rate of 270 square feet per gallon, corresponding to 44 square feet per pound of pigment.

Durability

Little is known about what useful life should be expected from luminescent paints under the variety of conditions of use which may be encountered. The alkaline earth sulfide phosphors, particularly the strontium sulfide type, are rapidly decomposed by moisture and must be protected by a clear top finish of some sort, if even a few months' service is to be obtained. The zinc sulfide and zinc–cadmium sulfide phosphors are subject to light darkening, but otherwise are highly resistant to weathering. The results of some exterior exposures of paints pigmented with these pigments are summarized in Table I.

Literature Cited

(1) Barnes, Forsyth, Karasch, *G. E. Review*, 42, 540 (1939).
(2) British Standard Specification, "Fluorescent and Phosphorescent Paint for ARP Purposes", BS/ARP 18 (July 1940).
(3) Curie, M., *Trans. Faraday Soc.*, 35, 114 (1939).
(4) Gotch, F., Encyclopaedia Britannica, 14th ed., 23, 204 (1929).
(5) Goulden, C. B., *Ibid.*, 14th ed., 23, 203, 204 (1929).
(6) Ministry of Home Security, "Luminescent Materials and Their War Time Uses", Bull. C-17 (1941).
(7) Nagel, W., in "Physiological Optics" by Helmholtz, pages 313–24, translation from 3rd German ed., The Optical Society of America, 1924.
(8) Rothchild, S., *Z. Physik*, 108, 24 (1938).
(9) Seitz, F., *Trans. Faraday Soc.*, 35, 74 (1939).
(10) Taylor, A. H., *Trans. Illum. Eng. Soc.*, 37, 19 (1942).
(11) Zworykin, V. K., *J. Optical Soc. Am.*, 29, 84 (1939).



Research on Constructional Resins

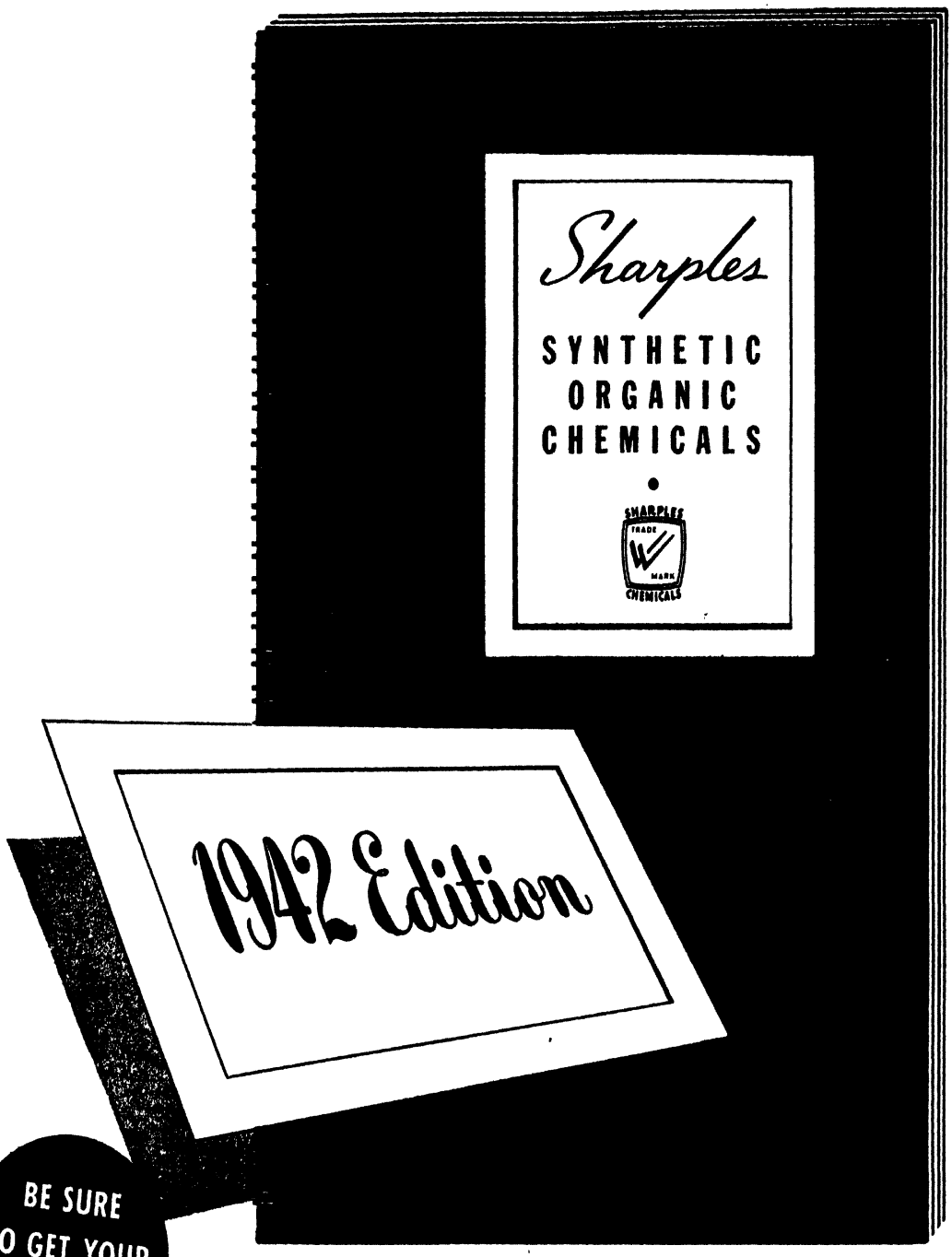
In 1939 the Westinghouse Electric & Manufacturing Co. founded at Mellon Institute an industrial fellowship to conduct investigational work on plastics, especially synthetic resins, for constructional purposes. Since then the fellowship staff has been carrying on research on new raw materials, new molded products, and new processing methods, evaluating them for commercial application. In these activities particular emphasis has been placed on the employment of plastics in those fields where the uses of resinous materials are unknown, limited, or undeveloped.

Following the completion of this basic research program two specialists, H. Ross Strohecker and William B. Johnston, will conduct the subsequent investigational and developmental work of the fellowship. Mr. Strohecker will give attention to the physical technology involved and Mr. Johnston will perfect the chemical processing. These plasticians will have the direct and constant cooperation of experts in the Westinghouse organization.

High-Tenacity Rayon in Army Tires Conserves Rubber

America's Army is rolling to war on rubber—and on rayon. Cordura rayon, an all-American development using only American raw materials, has been conserving important tonnages of the limited rubber supplies on hand. Possessing greater strength than other tire fabric beyond experimental stages and retaining its great strength under the high heat of heavy-duty driving, this rayon permits tires to have thinner but stronger walls and adds miles to their lives.

The high-strength yarn, developed by du Pont chemists is in demand in smaller diameter threads for parachutes used to drop flares, ammunition, and other military supplies. The government is taking the entire output, with producers increasing capacities as rapidly as facilities can be converted or expanded.



BE SURE TO GET YOUR COPY

The 13th Edition of "Sharples Synthetic Organic Chemicals" is just off the press. This Booklet contains useful information on more than 150 Sharples Products, presented in such a form that it should serve as a buying guide as well as for technical reference. If you have not received your copy, one will be sent on request.

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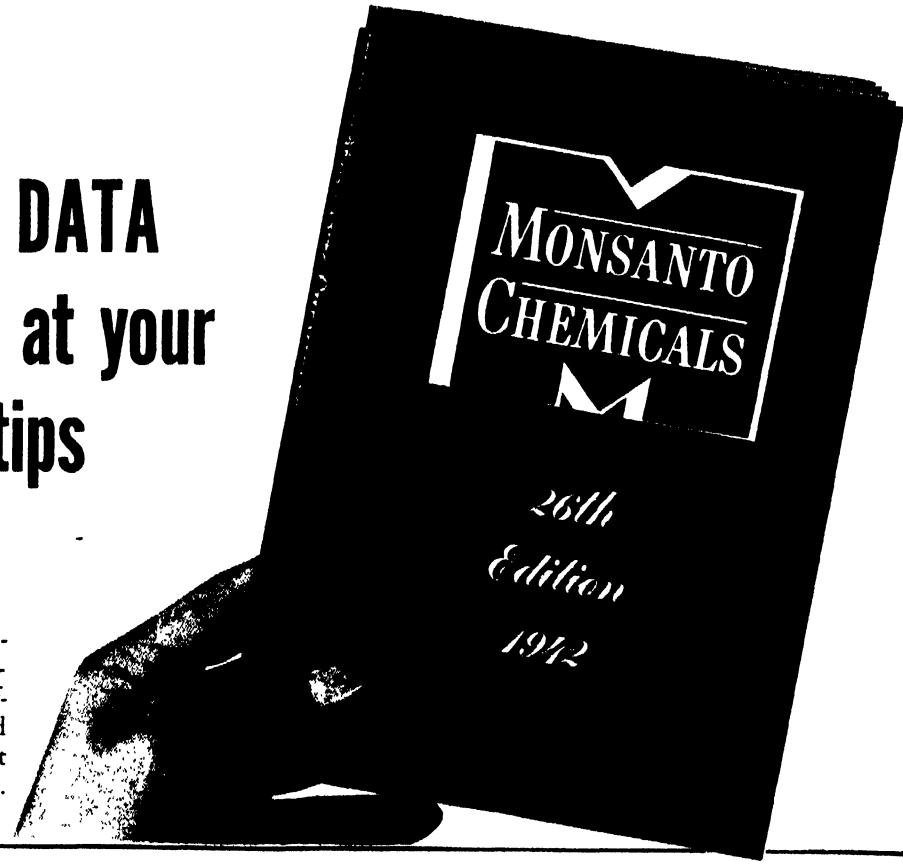
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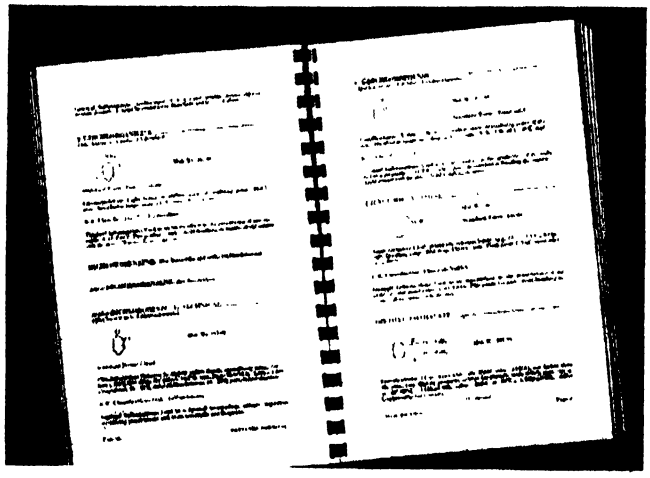
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CHEMICAL AND ENGINEERING NEWS

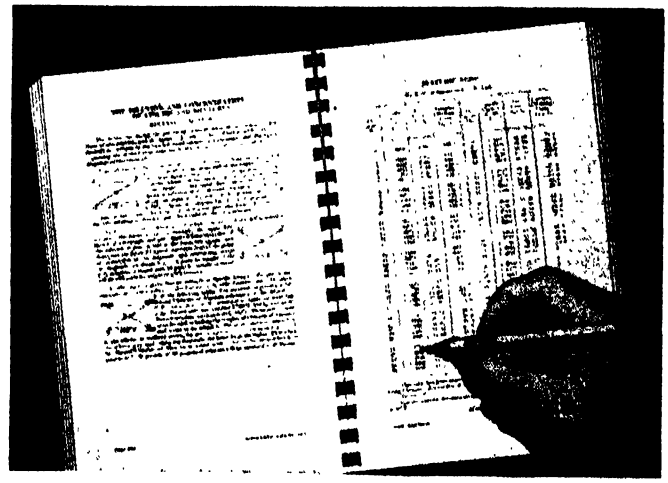
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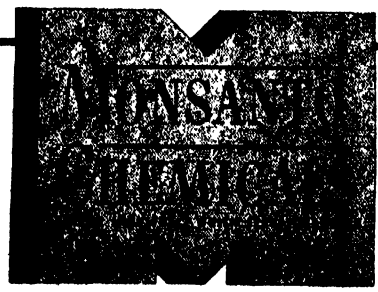
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Program of the Buffalo Meeting of the American Chemical Society

September 7 to 11, 1942

General Program

Sunday, September 6

2:00 to 9:00 P. M.—Registration, Palm Court, Hotel Statler.
4:00 to 10:00 P. M.—Social gathering, Terrace Room, Hotel Statler; movies at 4:00 and 8:00 P. M.

Monday, September 7

8:00 A. M. to 6:00 P. M.—Registration.
9:30 A. M.—Council meeting (for Councilors only), Ballroom, Hotel Statler.
2:00 P. M.—Divisional meetings.
6:30 P. M.—Group dinners.
8:30 P. M.—Public meeting, Kleinhans Music Hall (see page 1018). Transportation by bus from Genesee Street entrance, Hotel Statler. Fare, 10 cents or three tokens for 25 cents.

Music by **Buffalo Philharmonic Orchestra,** Franco Autori, conductor.
Nelson Allen, Chairman of the Buffalo Meeting, presiding.
Joseph J. Kelly, Mayor, City of Buffalo, **"Welcome to Buffalo".**
Harry N. Holmes, President of the AMERICAN CHEMICAL SOCIETY, **"National Survival through Science".**
C. M. A. Stine, E. I. du Pont de Nemours & Co., Inc., **"Molders of a Better Destiny".**
Admission by ticket (no charge) which must be obtained at registration headquarters before 6:00 P. M. Monday.

Tuesday, September 8

7:30 A. M.—Group breakfasts.
8:00 A. M. to 6:00 P. M.—Registration.
9:00 A. M.—Divisional meetings.
12:15 P. M.—Group luncheons.
2:00 P. M.—Divisional meetings.
5:00 P. M.—Social hours.
6:30 P. M.—Group dinners.
8:00 P. M.—County Fair, Memorial Auditorium. Admission by ticket (no charge) which must be obtained at registration headquarters before 6:00 P. M. Tuesday.

Wednesday, September 9

7:30 A. M.—Group breakfasts.
8:00 A. M. to 6:00 P. M.—Registration.
9:00 A. M.—Divisional meetings.
12:15 P. M.—Group luncheons.
2:00 P. M.—General meeting, Memorial Auditorium.

Presentation of the **Women's Award in Chemistry (Garvan Medal)** to **Florence B. Seibert.** Award address before the Division of Biological Chemistry, Thursday, 11:20 A. M., Chinese Room, Hotel Statler, see page 1032.
Presentation of the **AMERICAN CHEMICAL SOCIETY Award in Pure Chemistry (sponsored by Alpha Chi Sigma)** to **John Lawrence Oncley.** Award address before the Division of Physical and Inorganic Chemistry, Thursday, 2:00 P. M., Room M, Hotel Statler, see page 1048.
Edward R. Weidlein, Mellon Institute of Industrial Research, **"Progress of Synthetic Rubber Production".**
Albert L. Elder, War Production Board, **"Progress of Butadiene Production".**
Willard Dow, Dow Chemical Co., **"Progress of Styrene Production".**
"The Outlook on the Rubber Situation."

7:30 P. M.—Subscription dinner (dress optional), Ballroom, Hotel Statler. **Lieutenant-General William S. Knudsen** will speak on **"The War Production Effort".** Tickets, **$3.50** each, must be secured at registration headquarters before 12:00 M. Wednesday. Attendance limited to 800. (see page 1022).
10:00 P. M.—Dance, Ballroom, Hotel Statler. Admission by badge.

Thursday, September 10

7:30 A. M.—Group breakfasts.
8:00 A. M. to 6:00 P. M.—Registration.
9:00 A. M.—Divisional meetings.
11:30 A. M.—Automobiles leave Delaware Avenue entrance, Hotel Statler, for the A. C. S. Golf Tournament at Niagara Falls Country Club. Golfers' lunch at 12:30 P. M. Play starts at 1:30 P. M. Tickets may be obtained at registration headquarters until 6:00 P. M. Wednesday.
12:15 P. M.—Group luncheons.
2:00 P. M.—Divisional meetings.
3:00 to 10:00 P. M.—Inspection trip to Niagara Falls, including both American and Canadian Falls. Picnic supper in Queen Victoria Park, Canada. Special illumination of the Falls from 7:30 to 10:00 P. M. Tickets for transportation and supper, $2.00 each, and for special side trips must be purchased at registration headquarters not later than 6:00 P. M. Wednesday. Those taking this trip must be familiar with the pertinent regulations governing Canadian travel. For further particulars, see pages 1018 and 1020.
6:30 P. M.—Group dinner.

Friday, September 11

9:00 A. M.—Divisional meeting.
1:30 P. M.—Divisional meeting.

Local Committee Chairmen

Office, Grover Cleveland Room, Mezzanine Floor, Hotel Statler.

CHAIRMAN. Nelson Allen.
VICE CHAIRMAN. Wilmer H. Koch.
SECRETARY. Hans O. Kauffmann.
EXECUTIVE COMMITTEE. Nelson Allen, Lawrence H. Flett, Hans O. Kauffmann, Wilmer H. Koch, Howard W. Post, and J. Frederic Walker, Jr.
ENTERTAINMENT. Raymond R. Ridgway.
FINANCE. Max E. Bretschger.
GOLF. Joseph S. Reichert.
GROUP MEALS. Warren K. Eglof.
HOTELS AND HOUSING. Edward F. Wesp.
INFORMATION. James H. Crowdle.
LADIES' ENTERTAINMENT. Margaret C. Swisher.
MEETING PLACES AND EQUIPMENT. Ralph B. Elliott, Electrochemicals Department, E. I. du Pont de Nemours & Co., Inc., Niagara Falls.
PLANT VISITS. Robert L. Murray.
PRINTING. Walter M. Buehl.
PUBLICITY. Robert M. Fowler.
RECEPTION. Lester F. Hoyt.
REGISTRATION. George W. Fiero.
SIGNS. George E. Symons.
STUDENTS. Groves H. Cartledge.
SUBSCRIPTION DINNER. Albert E. Jennings, Jr.
TRANSPORTATION. Donald E. Drew.

Announcements

All events are on Eastern Wartime.

LOCATIONS OF MEETINGS. Meeting activities will center around the Hotel Statler, Delaware Avenue and Niagara Square. Registration, most divisional meetings, and certain social events will be held there. Technical sessions also are scheduled for the Lafayette Hotel, the Y. M. C. A., the University of Buffalo, and the Police Academy. The public meeting on Monday evening will be held in Kleinhans Music Hall. The Memorial Auditorium will be used for the general meeting on Wednesday afternoon and the County Fair on Tuesday; the Auditorium is eight blocks from the Hotel Statler.

REGISTRATION AND REGISTRATION FEE. The registration headquarters of the meeting will open at 2:00 P. M. Sunday

in the Hotel Statler. The procedure starts in the Palm Court on the main floor and is completed on the mezzanine. The registration fee, required by vote of the Council to help carry local expenses, has been fixed at $3.00 for members and visitors other than American nonmember chemists and chemical engineers; $8.00 for American nonmember chemists and chemical engineers. Associate members of divisions or of local sections are not members of the AMERICAN CHEMICAL SOCIETY and, if chemists or chemical engineers, are subject to the $8.00 fee. Chemical students, both graduate and undergraduate, are given the courtesy of registration on exactly the same basis as members of the SOCIETY. All members and guests must register to help carry the expense of the meeting. Special registration facilities for the convenience of rubber chemists will be provided at the Hotel Lafayette on Wednesday and Friday from 8:30 A. M. to 12:00 M. and on Thursday from 8:30 A. M. to 5:30 P. M.

BADGES. It is important that official badges be worn at all times, since admission to divisional meetings and to certain of the events on the entertainment program is by badge only.

INFORMATION. The Information Committee will maintain a booth on the main lobby floor of the Hotel Statler. It will be open from 12:00 M. to 10:00 P. M. Sunday and from 9:00 A. M. to 6:00 P. M. daily thereafter. Information on transportation, trips, points of interest, places to eat, etc., will be available. Improperly addressed mail and telegrams will be held at this booth. A lost and found service will be maintained.

HOUSING. A representative of the Hotels and Housing Committee will be in the Information Booth, lobby floor, Hotel Statler, from 12:00 M. to 10:00 P. M. Sunday and 9:00 A. M. to 10:00 P. M. Monday through Wednesday. He will assist those without hotel reservations in finding suitable accommodations.

TRANSPORTATION. Hotels and meeting places are within walking distance of each other and adjacent to streetcar and bus lines. Bus and streetcar fares are 10 cents per ride or 25 cents for three rides to all points in the city. Taxi fares are 50 cents for the first 2 miles and 5 cents for each additional one-fourth mile and do not vary with number of passengers.

Busses leave all downtown intersections of Main Street and trains depart from the Terrace Street station at frequent intervals for Niagara Falls. Trip time is about one hour. Round trip fares are 89 cents by bus and $1.16 by train.

City maps and travel information will be available at the Information Booth in the Hotel Statler lobby.

Gasoline will be rationed in the Buffalo area before the time of the meeting.

PARKING. Open-air lots charge from 15 to 25 cents for all-day parking. Parking on the streets in the downtown area is regulated by meters which operate from 8:00 A. M. to 6:00 P. M., with a charge of 5 cents for one hour. Do not insert more than one coin in the meter, as only one hour's parking time will be obtained. Additional coins must be deposited each hour.

MAIL. Mail and telegrams should be sent to the hotel where stopping. Communications addressed in care of the AMERICAN CHEMICAL SOCIETY cannot be delivered to the individual but will be held at the A. C. S. Information Booth in the lobby of the Hotel Statler. The SOCIETY accepts no responsibility for delivery of mail. After each national meeting, some mail and telegrams remain undelivered. Therefore, as a matter of precaution, convention attendants should inquire for mail at the A. C. S. Information Booth regardless of their local address.

TICKETS. Tickets for all events should be purchased as far in advance as possible in order to permit the committee to make proper arrangements. This is especially true for transportation and events on the Ladies' Program.

LOUNGE. Because of the anticipated congestion in the lobby and public space of the Hotel Statler, the Terrace Room will be open from 5:30 until 8:00 P. M. each day for the exclusive use of registrants and their guests. This offers a splendid opportunity to get together with friends during the time between the technical sessions and the evening program. Refreshments may be purchased.

EQUIPMENT FOR MEETING ROOMS. Divisional meeting rooms will be equipped with a standard lantern-slide projector, screen, pointer, blackboard, chalk, reading stand, reading light, table, and ice water. Each divisional secretary should contact his local assistant and inspect the assigned meeting room before the first session of the division. Please direct all correspondence concerning meeting rooms to Ralph B. Elliott, Electrochemicals Department, E. I. du Pont de Nemours & Co., Inc., Niagara Falls, N. Y.

ABSTRACTS. The A. C. S. News Service, 1155 Sixteenth St., N. W., Washington, D. C., can supply a limited number of sets of abstracts of papers presented at the Buffalo meeting at 50 cents per set to those submitting receipt for divisional dues; $1.00, to others who remit with order; $1.25, to those who fail to send cash with order; and $1.50, to those requiring bills to be rendered. The abstracts will be as furnished by the authors and will be mailed as soon as possible. Copies will also be on sale at Buffalo.

PRESS. The AMERICAN CHEMICAL SOCIETY News Service will maintain press headquarters in Room 350, Hotel Statler.

OFFICES. Mezzanine Floor, Hotel Statler.
AMERICAN CHEMICAL SOCIETY, National Secretary, Room 15.
INDUSTRIAL AND ENGINEERING CHEMISTRY, Room 15.
LOCAL COMMITTEE, Grover Cleveland Room.

WOMEN CHEMISTS. Headquarters for the women chemists will be in the Ballroom Foyer, Main Floor, Hotel Statler. An attendant will be present throughout the meeting to welcome guests, register them for the files of the Women's Service Committee, and provide information.

A luncheon in honor of Florence B. Seibert, Garvan Medalist, will be held in the Mahogany Room of the Hotel Lafayette at 12:15 P. M. Wednesday, September 9. Dr. Seibert will speak on "Experiences in the Chemistry of Disease". Because of the special nature of this luncheon, it will be open to all interested registrants, both men and women. Tickets, $1.50 each, must be secured in registration headquarters before 9:30 A. M. Wednesday.

Iota Sigma Pi will hold a breakfast in Parlor B, Hotel Statler, at 7:30 A. M. Tuesday, September 8. Tickets, $1.10 each, must be secured in registration headquarters before 6:00 P. M. Monday.

Women chemists are invited to attend all of the events scheduled on the Ladies' Program (see page 1026).

LADIES' HEADQUARTERS. Ballroom Foyer, Main Floor, Hotel Statler.

GROUP OF DIVISIONAL OFFICERS. This group will meet for breakfast Thursday at 7:30 A. M. in Parlor A of the Hotel Statler. Tickets, $1.10 each, must be purchased before 6:00 P. M. Wednesday. Howard I. Cramer, Secretary.

GROUP OF LOCAL SECTION OFFICERS. A breakfast for this group will be held Tuesday at 7:30 A. M. in the Washington Room of the Hotel Touraine. Tickets, $1.00 each, must be purchased before 6:00 P. M. Monday. F. O. Rice, Chairman; Auburn A. Ross, Secretary.

Hotels

Hotel Statler, Niagara Square, has been designated as headquarters for the meeting. Hotel Lafayette, Washington and Clinton Streets, will be headquarters for the Division of Rubber Chemistry.

All official hotels are in or near the theater, shopping, and business district. They are readily accessible to all railway stations and steamer landings by taxicab, bus, or street car.

Requests for reservations should be sent *at once* to Edward F. Wesp, Chairman, A. C. S. Hotels and Housing Committee, Buffalo Convention and Tourists Bureau, Genesee Building, Buffalo, N. Y. Please use the hotel reservation form on page 1016, giving all the data requested.

Because of the present large demand for hotel rooms in Buffalo, *it is imperative that reservations be made immediately.* For the same reason, *double occupancy* of rooms *is desirable.* Since defense activities are making a heavy call on Buffalo hotels, the convenience of a single room should be sacrificed as a patriotic contribution. It is in this spirit that the Hotels Committee asks that (1) hotel reservations be made early, giving the dates of arrival and departure, and (2) persons arrange to share double rooms.

Rooms for students will be available at $1.45 per day and up.

Hotels

	Rates		
	For One Person[a]	For Two Persons	Suites
OFFICIAL[b]			
Statler	$3.30 to $6.60	$5.50 to $11.00	$ 9.00 to $18.00
Lafayette	3.30 to 4.40	4.50 to 6.60	10.00 to 18.00
Ford	1.50 to 2.00	2.75 to 5.00	.....
Touraine	2.25 and 3.30	5.00 to 7.00	8.00 to 12.00
UNOFFICIAL			
Buffalo	2.50 to 4.00	4.00 to 7.00	.....
Graystone	1.50 to 3.00	2.50 to 4.00	.....
Lenox	3.00	4.50 to 5.00	.....
Stuyvesant	2.50 to 4.50	4.00 to 7.50	.....
Westbrook	4.00 to 5.00	6.00 to 8.00	.....

[a] Limited in number. Double occupancy desirable.

[b] A map showing location of hotels was printed in the June 25 issue of CHEMICAL AND ENGINEERING NEWS, page 795.

CONTINUED ON PAGE 1016

A STRONG CHEMICAL INDUSTRY

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A. C. S. Hotels and Housing Committee, Edward F. Wesp, Chairman

Buffalo Convention and Tourists Bureau
Genesee Building, Buffalo, N. Y.

Dear Sir: Please make hotel reservations noted below: _____ 1942

Hotel _____ First choice

Hotel _____ Second choice

Hotel _____ Third choice

If the hotel of first choice is unable to accept the reservation, the Hotel Committee will endeavor to comply with your second or third choice in the order named.

_____ Double rooms for _____ persons, double bed ☐ twin beds ☐ Rate desired $_____ to $_____ per day

_____ Single rooms (Scarce; please arrange for double occupancy) Rate desired $_____ to $_____ per day

_____ Suites - parlor _____ bedroom(s) for _____ persons Rate desired $_____ to $_____ per day

Arriving September _____, hour _____ A. M. _____ P. M. Leaving September _____

Print names and addresses of all occupants including person making reservation:

NAME	STREET ADDRESS	CITY	STATE

If necessary attach sheet listing additional names.

Signature _____

Group Meals

Quoted prices include tips; any solicitation made at the tables should be refused. The deadlines for the purchase of tickets at registration headquarters on the mezzanine floor, Hotel Statler, are as follows: breakfasts, 6:00 P. M. of the preceding day; luncheons, 9:30 A. M.; dinners and social hours, 2:00 P. M. Meals will be ordered on the basis of sales before these times. In order to cover the cost of rearrangements, *a service charge of 15 cents will be added to the stated price for each meal if the ticket is not purchased before the deadline.* No refunds will be made on tickets after the deadline.

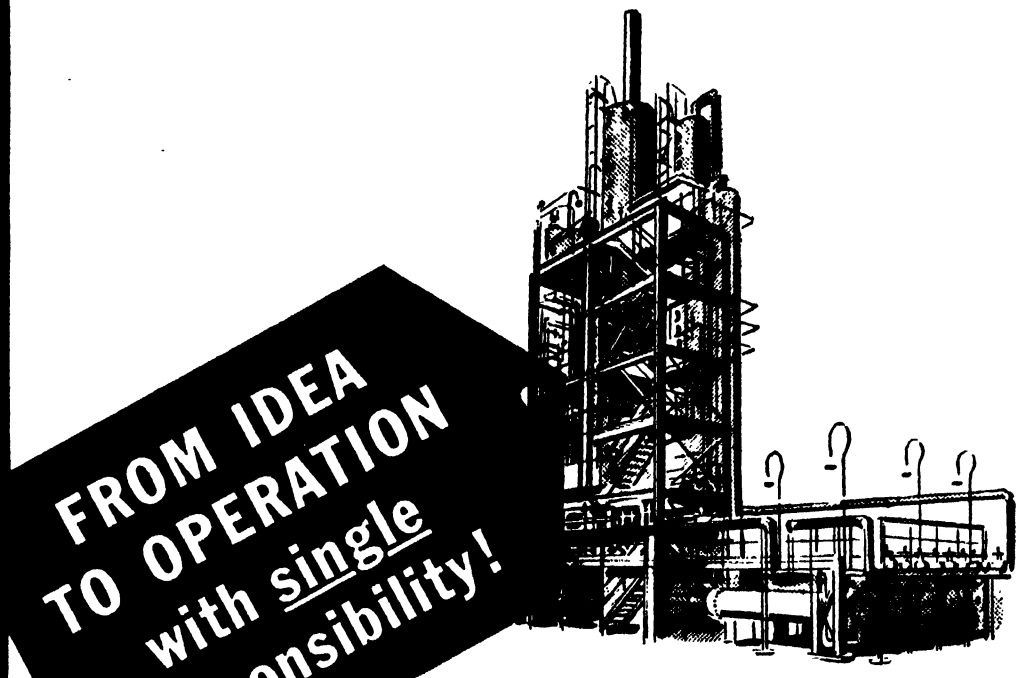
The hotels reserve the right to transfer to special tables in their regular dining rooms any group meals for which fewer than 15 tickets have been sold at the deadline hour.

ORGANIZATION	PLACE	PRICE
Monday		
Dinners, 6:30 P. M.		
A. A. A. S. Gibson Island Conferences Policy Committee	Hotel Statler, Parlor B	$2.20
Board Publication *Journal of Chemical Education*	Hotel Statler, Parlor C	2.20
Division of Physical and Inorganic Chemistry	Hotel Touraine, Washington Room	1.65
Tuesday		
Breakfasts, 7:30 A. M.		
Iota Sigma Pi	Hotel Statler, Parlor B	1.10
Local Section Officers	Hotel Touraine, Washington Room	1.00
Luncheons, 12:15 P. M.		
Chemical Abstracts	Hotel Statler, Parlor B	1.35
Division of Analytical and Micro Chemistry	Hotel Statler, Fillmore Room	1.35
Division of Chemical Education	MacDoel's Restaurant, Raleigh Room	1.25
Division of Fertilizer Chemistry	Buffalo Athletic Club, Chinese Room	1.35
Division of Industrial and Engineering Chemistry	Hotel Lafayette, Ballroom	1.35
Harvard University	Hotel Lafayette, Mahogany Room	1.35
Indiana University	Hotel Touraine, Lake Erie Room	1.15
Oklahoma A. and M. College	Hotel Statler, Parlor C	1.35
Polytechnic Institute of Brooklyn	Hotel Lafayette, Parlor C	$1.35
Purdue University	Hotel Statler, Parlor G	1.35
Union College	Hotel Touraine, Chapel Room	1.15
University of Chicago	Buffalo Athletic Club, Rooms ABC	1.35
University of Iowa	Hotel Touraine, Gerrans Room	1.15
University of Maryland	Hotel Statler, Parlor A	1.35
University of Pittsburgh	Hotel Statler, Room 308	1.35
University of Wisconsin	Hotel Touraine, Washington Room	1.15
Social Hours, 5:00 P. M.[a]		
Cornell University	Hotel Statler, Room 306	0.50
Dartmouth College	Hotel Statler, Room 420	0.50
Massachusetts Institute of Technology	Hotel Lafayette, Orchard Room	0.50
New York University	Hotel Statler, Room 418	0.50
Yale University	Hotel Statler, Room 308	0.50
Dinners, 6:30 P. M.		
Alpha Chi Sigma	Hotel Statler, Chinese Room	2.60
Division of Paint, Varnish, and Plastics Chemistry	Hotel Statler, Ballroom	3.00
Division of Water, Sewage, and Sanitation Chemistry	Hotel Touraine, Delaware Room	1.65
Hiram College	Hotel Statler, Parlor A	2.20
Jesuit Universities and Colleges	Canisius College Cafeteria	1.35
University of Washington	Hotel Touraine, Washington Room	1.65
Worcester Polytechnic Institute	Hotel Touraine, Lake Erie Room	1.65
Wednesday		
Breakfasts, 7:30 A. M.		
Duke University	Hotel Touraine, Delaware Room	1.00
Oberlin College	Hotel Touraine, Washington Room	1.00
Phi Lambda Upsilon	Hotel Touraine, Gerrans Room	1.00
Rensselaer Polytechnic Institute	Hotel Statler, Parlor G	1.10
Students[b]	Hotel Lafayette, Mahogany Room	0.50
Syracuse University	Hotel Statler, Parlor B	1.10
University of Florida	Hotel Statler, Parlor A	1.10
University of Nebraska	Hotel Statler, Parlor C	1.10

[a] Coffee, sandwiches, cookies served; cocktails extra.
[b] Interested nonstudents invited.

CONTINUED ON PAGE 1018

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Furnacing		
Cracking		

Luncheons, 12:15 P. M.

Alpha Chi Sigma Professional Conference	Hotel Lenox, East Banquet Room	$1.30
Carnegie Institute of Technology	Hotel Lenox, Colonial Room	1.10
Columbia University	Hotel Touraine, Gerrans Room	1.15
Division of Agricultural and Food Chemistry	Kathryn Lawrence Dining Room	1.10
Division of Medicinal Chemistry	Buffalo Athletic Club, Rooms GHI	1.35
Division of Sugar Chemistry and Technology	Hotel Statler, Parlor C	1.35
Iowa State College	Lorenzo's Restaurant	1.25
Johns Hopkins University	Hotel Touraine, Washington Room	1.15
Niagara Falls Electrons	Buffalo Athletic Club, Ellicott Room	1.35
Northwestern University	Hotel Statler, Parlor B	1.35
Ohio State University	Buffalo Athletic Club, Rooms ABC	1.35
Pennsylvania State College	Hotel Lafayette, Orchard Room	1.35
Princeton University	Hotel Statler, Parlor G	1.35
University of Cincinnati	Hotel Touraine, Delaware Room	1.15
University of Illinois	Hotel Statler, Ballroom	1.35
University of Kansas	Hotel Touraine, Lake Erie Room	1.15
University of Michigan	MacDoel's Restaurant, Raleigh Room	1.25
University of Pennsylvania	Buffalo Athletic Club, Chinese Room	1.35
University of Rochester	Hotel Lafayette, Parlor D	1.35
Western Reserve University	Hotel Lafayette, Parlor B	1.35
Women Chemists	Hotel Lafayette, Mahogany Room	1.50

Thursday

Breakfasts, 7:30 A. M.

Divisional Officers	Hotel Statler, Parlor A	1.10
Virginia Polytechnic Institute	Hotel Statler, Parlor B	1.10

Luncheons, 12:15 P. M.

California Universities	Hotel Touraine, Washington Room	1.15
Division of Cellulose Chemistry	Hotel Lafayette, Orchard Room	1.35
Low Temperature Group Symposium	Buffalo Athletic Club, Rooms ABC	1.35
Ohio Wesleyan University	Hotel Statler, Parlor G	1.35
University of Buffalo	Hotel Touraine, Gerrans Room	1.15
University of Minnesota	Hotel Statler, Iroquois Room	1.35

Dinner, 6:30 P. M.

Division of Petroleum Chemistry	Hotel Touraine, Gerrans Room	1.65

Public Meeting

A meeting of interest to all convention registrants has been scheduled for Monday evening. It has been planned to combine entertainment and a period of serious thought.

The session will open with music by the Buffalo Philharmonic Orchestra, Franco Autori, conductor. Nelson Allen, chairman of the Buffalo meeting, will preside over the program which follows. This will include the official welcome to the City of Buffalo by its Mayor, the Honorable Joseph J. Kelly. Harry N. Holmes will deliver his Presidential Address, "National Survival through Science". C. M. A. Stine, vice president and member of the executive committee of E. I. du Pont de Nemours & Co., Inc., will speak on "Molders of a Better Destiny". Because of the importance of this meeting, it will be open to the public.

This program will be held in the new Kleinhans Music Hall, about a mile and one half from the Hotel Statler. The building is famous among architects for its modern treatment of the functional idea in architecture. It has been designed from the standpoint of perfect acoustics and lines of sight. Its architectural beauty is not surpassed by any similar building on this continent. The committee has arranged to have the lounge facilities of the building open. From 7:00 to 8:30 o'clock opportunity will be given to the registrants to inspect the various features of the hall which include practice rooms, chamber music room, and the library.

Trips

Because of wartime regulations affecting industrial plants working on government contracts, it has been impossible to arrange plant trips for attendants at the Buffalo meeting. Rather than offer a few trips of very limited interest and omit the large plants of which every chemist has heard, no trips are scheduled. Buffalo chemists regret that they are unable to continue this interesting feature of national meetings.

Niagara Falls

NOTE. It is important that anyone planning to visit Niagara Falls read carefully all of the material that follows.

No visit to Buffalo is complete without an inspection trip to Niagara Falls. Since most registrants will wish to capitalize on their nearness to this beautiful and inspiring spot, seven trips have been arranged. Although there is a limit on the number of participants in each, it is hoped that everyone wishing to visit the Falls can be accommodated at some time during the week. Except for the trip Thursday afternoon, these expeditions are announced only in the Ladies' Program, page 1026; but it should be understood that both men and women are invited to participate in all of them. The schedule follows:

Event No.	Day	Time	Limit	Price	Ticket Deadline
50	Wednesday	10 A. M. to 4 P. M.	150	$3.00[a]	5 P. M. Tues.
75	Wednesday	4 P. M. to 10 P. M.	150	3.25[b]	5 P. M. Tues.
79	Thursday	10 A. M. to 4 P. M.	150	3.00[a]	5 P. M. Wed.
87	Thursday	3 P. M. to 10 P. M.	500	2.00[c]	5 P. M. Wed.
88	Thursday	4 P. M. to 10 P. M.	150	3.00[c]	5 P. M. Wed.
90	Friday	10 A. M. to 4 P. M.	150	3.00[a]	5 P. M. Thurs.
91	Friday	4 P. M. to 10 P. M.	150	3.25[b]	5 P. M. Thurs.

[a] Transportation and lunch.
[b] Transportation and dinner.
[c] Transportation and picnic.

All trips will be by taxicab leaving from the Delaware Avenue entrance of the Hotel Statler except No. 87; for that, busses will start from the corner of Main and Genesee Streets promptly at 3:00 P. M. Thursday. Arrival in Niagara Falls is approximately one hour later.

Because of the necessity of conserving tires, it will not be possible to provide cars for transportation at Niagara Falls to the various points of interest on the American and Canadian sides of the river on trip No. 87 leaving at 3:00 P. M. Thursday. Those who plan to take this trip should understand that it will be necessary to walk short distances. The walking will not exceed a total of four and one-half miles in short stretches with a minimum of 1.8 miles if side trips are eliminated.

The morning trips (Events No. 50, 79, and 90) will be over the Peace Bridge and down the Canadian side of the river to the Falls. The 4:00 P. M. trips (Events No. 75, 88, and 91) will go down the American side and back the Canadian. For the 3:00 P. M. Thursday trip (Event No. 87) participants will be taken to Niagara Falls and will return on the American side, but they will cross into Canada at the Falls. Luncheon will be served in the Park Restaurant in Queen Victoria Park, Niagara Falls, Ontario, Canada, to participants in Events No. 50, 79, and 90, dinner to those who select Events No. 75 and 91, and a picnic supper to persons making trips No. 87 and 88. From this point, there is a lovely view of the Falls.

All afternoon tours, Events No. 75, 87, 88, and 91, are timed so that participants may see a special illumination of the Falls from 7:30 to 10:00 P. M. planned especially for the guests of the Western New York Section of the A. C. S.

Time has been allowed so that those who wish to engage in some of the customary side trips at the Falls may do so. For these trips there are extra charges, *but* special rates have been set for registrants at this meeting. These rates are available *only* on tickets purchased at registration headquarters. Therefore, it is important that each person determine, in advance, his participation in these side trips. Prices are as follows:

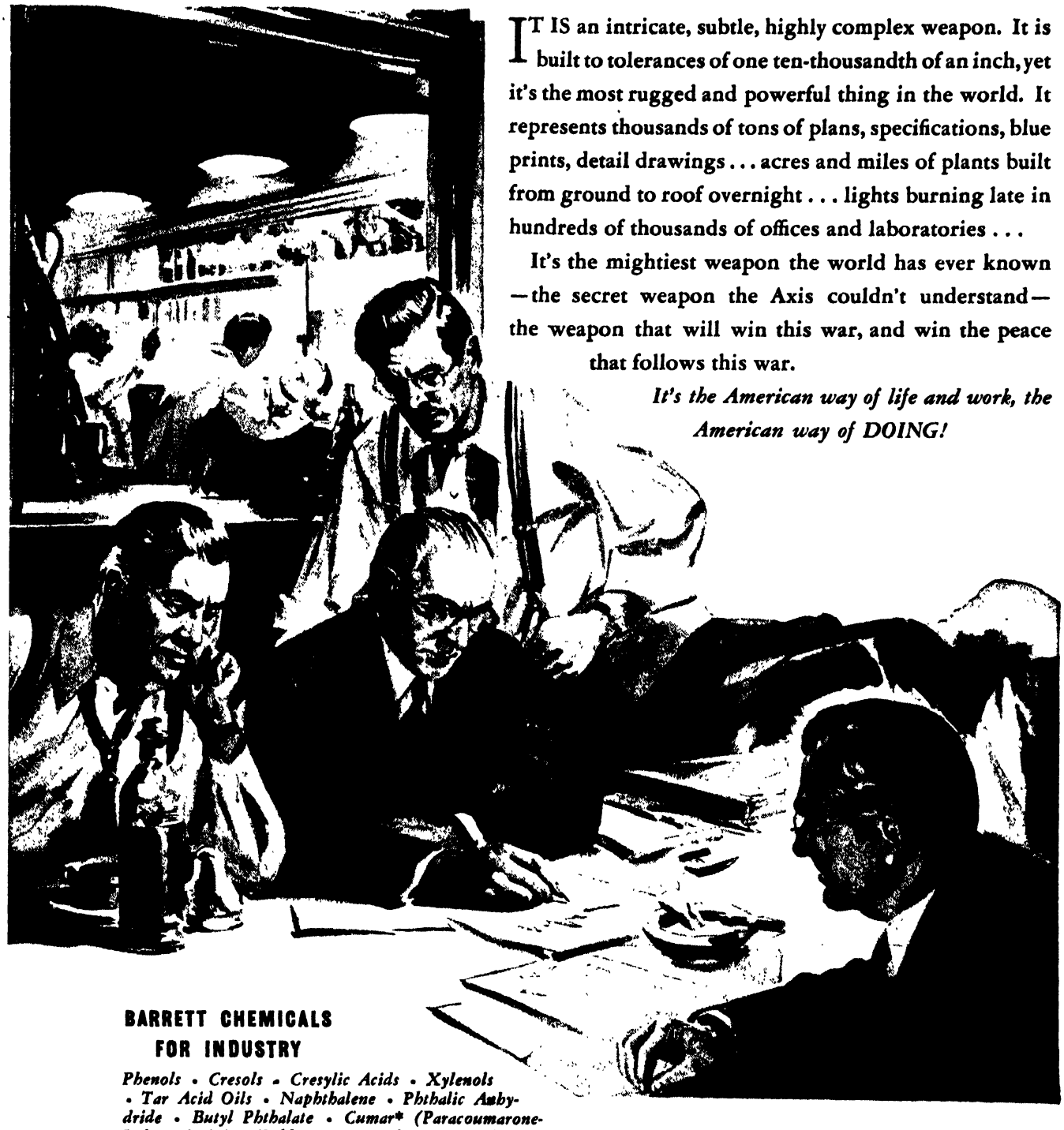
Maid of the Mist boat trip to Horseshoe Falls	65 cents
Elevator to the river's edge at Whirlpool Rapids (not on Event No. 87)	25 cents
Trip to the Cave of the Winds	75 cents

All trips include an opportunity to see the new Rainbow Bridge, the Maid of the Mist, Queen Victoria Park, Oakes Garden, and Goat Island. Additional points included in Events No. 50, 75, 79, 88, 90, and 91 are the Peace Bridge, the Whirlpool Rapids, and General Brock's monument.

The Peace Bridge across the Niagara River, connecting the heart of Buffalo with Fort Erie, Ontario, Canada, was opened by the Prince of Wales in 1927. Three decades ago the Queen Victoria Niagara Falls Park Commission, then in control of the Canadian side overlooking the Falls, took over the whole river front from Lake Erie to Lake Ontario. The boulevard drive along this river is one of the most beautiful in America, rich in both natural splendor and historic interest. Of the many small bridges

CONTINUED ON PAGE 1020

THE *Secret Weapon the Axis Couldn't Understand!*



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It's the mightiest weapon the world has ever known —the secret weapon the Axis couldn't understand— the weapon that will win this war, and win the peace that follows this war.

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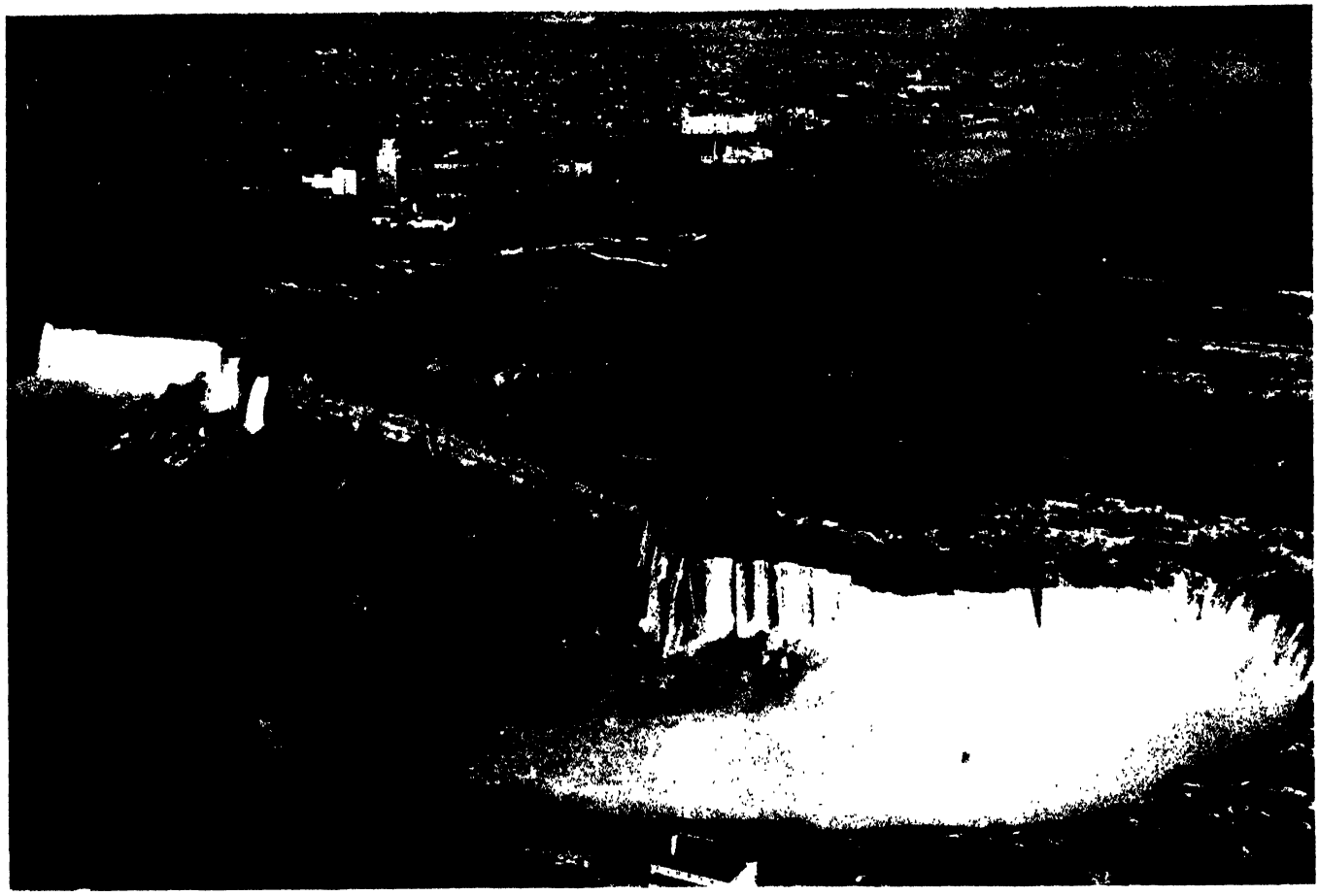
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crossing the highway, no two are of the same material and design. Although it is impossible to reach the edge of the Horseshoe Falls because of wartime restrictions, the Maid of the Mist takes passengers up the river to the foot of these falls where one can see, hear, and feel the beautiful blue green water, the mighty roar and power of the great Niagara. The Canadians have long been known for their formal gardens. Overlooking the Falls are the beautiful Queen Victoria Park and the lovely new Oakes Garden. Replacing the Honeymoon Bridge, which fell into the Niagara River in 1938, is the new Rainbow Bridge which joins Niagara Falls, N. Y., with Niagara Falls, Ontario. Using the Whirlpool Rapids Elevator or walking down a trail, one can reach the lower rapids of the river where the water is as deep as the gorge walls are high and the water boils and foams over the giant boulders beneath.

Since all of these trips include Canadian travel, everyone who contemplates participation must comply with the regulations for Canadian visitors. (See regulations for Canadian visitors below.)

Owing to present conditions, these trips are subject to cancellation or change by government order affecting transportation.

Other Inspection Trips

The Ladies' Program includes visits to the Albright Art Gallery, Buffalo Museum of Science, Buffalo Historical Society, and Lockwood Memorial Library (University of Buffalo). These are described on page 1028. All persons interested, men or women, are invited to participate. Details concerning time, transportation charge, and deadline for sale of tickets will be found in the Ladies' Program, page 1026.

Canisius College

Canisius College extends a cordial invitation to members of the AMERICAN CHEMICAL SOCIETY and their guests to visit the new Horan-O'Donnell Science Hall on the campus at Main Street and Jefferson Avenue. This modern chemistry and physics building, opened three years ago, is considered one of the finest science buildings in western New York. The building will be open during the meeting for visits and inspection. Take a No. 8 or No. 9 streetcar north on Main Street to Jefferson Avenue.

Regulations for Canadian Visitors

All persons taking any of the Niagara Falls trips or planning to enter Canada at any other time must observe the following regulations:

IMMIGRATION AND CUSTOMS. If born in the United States, no documentary evidence is necessary. If not born in the United States but a naturalized citizen of this country, the naturalization certificate must be presented at the border. If not born in the United States and not a naturalized citizen of this country but a legal resident alien, application must be made to the immigration office nearest your home and a resident border-crossing card obtained.

CAMERAS. Exposed film is collected from all persons crossing the Canadian border. It is advisable to start the trip with an empty camera and complete the roll of film before leaving Canada. The film will be developed, censored, and mailed to the owner, C. O. D. Movie film will be sent to the Eastman Kodak Co. Cameras of foreign make must be registered at the custom's office at the border.

Entertainment

The convention attendants and their guests will be welcomed on Sunday at the Hotel Statler by a Reception Committee. Movies and other entertainment features have been provided for Sunday afternoon and evening in the Terrace Room of the Hotel Statler.

The County Fair on Tuesday night will be held at the Memorial Auditorium, within easy walking distance of the Hotel Statler. With the advent of tire and gas rationing, transportation difficulties have beset the oldtime county fair. Accordingly, in the spirit of cooperation, the committee is bringing the fair to the convention, rather than taking the convention attendants to the fair. There will be shooting galleries, rides, dancers, magicians, jugglers, trained seals, freaks, and the music of a popular orchestra. The fair will start at 8:00 o'clock and will last until 12:00, after which there will be dancing with hostesses for those who do not want to go home. The committee invites the visitors to come to the Auditorium to relax or to be stimulated as the spirit moves them. There will be strenuous entertainment adjusted to suit all tastes from the highest to the lowest. Come to the fair as the guests of the local committee, knowing that amusement will not be rationed. Tickets (no charge) must be obtained at registration headquarters before 6:00 P. M. Tuesday.

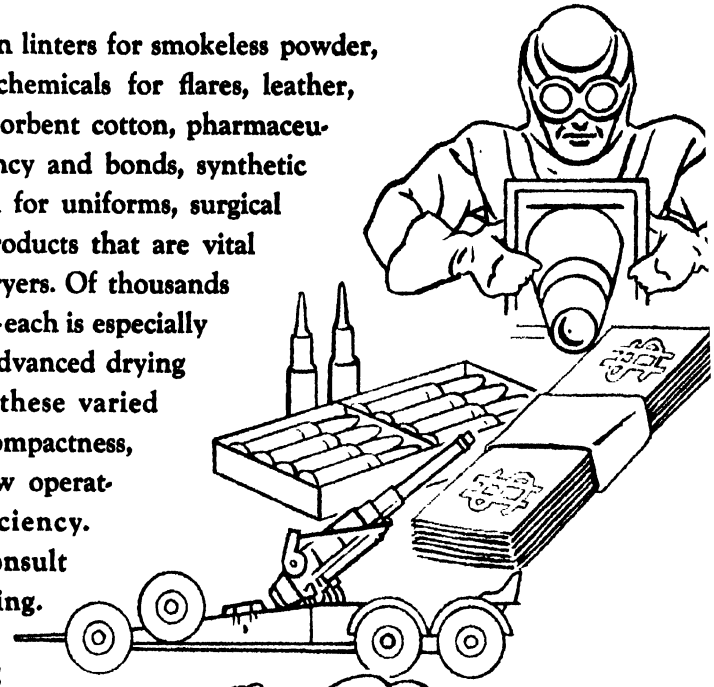
On Wednesday, following the subscription dinner, there will be dancing from 10:00 until 2:00 in the Ballroom of the Hotel Statler. All persons wearing the convention badge will be admitted. Music will be furnished by Jack Valentine's well-known orchestra. This

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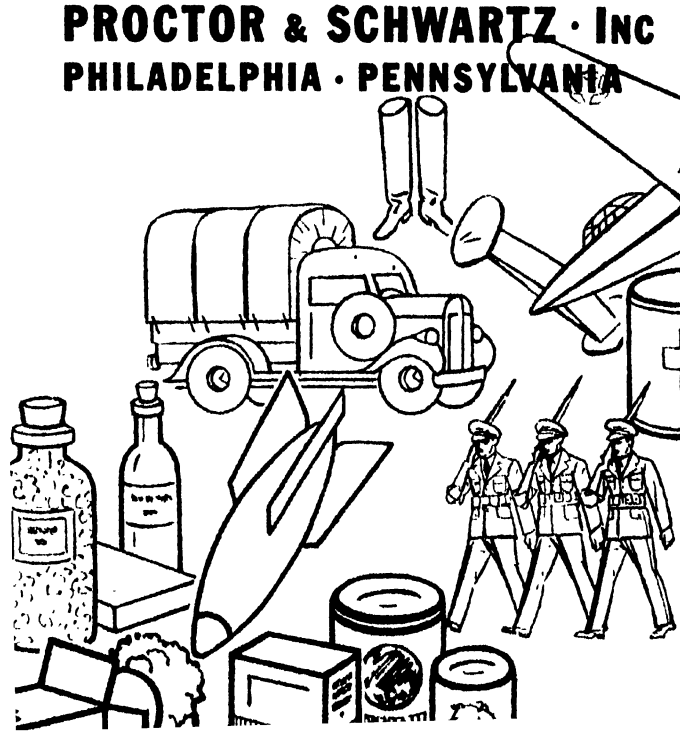
Drying

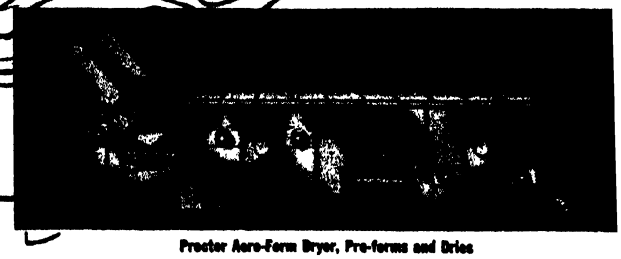
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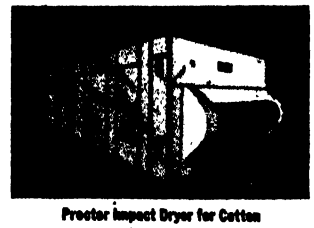


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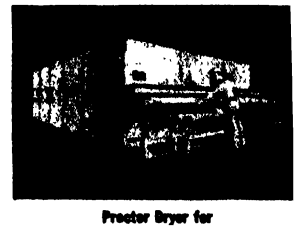




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orchestra is famous for its performance of rhumba music and there will be demonstrations of the proper rhumba technique to warm the hearts of our South American friends. A plentiful supply of charming hostesses, skilled in dancing anything from the rhumba and Viennese waltz to the conventional two step, will be provided. A feature of the party will be the institution of the "Hag Line", the women will do the cutting, let the partners fall where they may.

Subscription Dinner

Those who do not attend the subscription dinner Wednesday, September 9, will miss an event of considerable importance. It is the climax to a day filled with timely addresses of great national significance. Everyone is familiar with the interesting history and accomplishments of the speaker of the evening, Lieutenant-General William S. Knudsen, Director of Production, Office of the Under-Secretary of War. General Knudsen will talk on "The War Production Effort". No one should miss this event and the opportunity to fraternize with other registrants at the meeting.

The capacity of the main floor of the beautiful ballroom of the Hotel Statler is approximately 800. Any reservations made in excess of this number must be accommodated in the balcony. Therefore, it is highly desirable to make reservations early. Tables for groups of 10 may be reserved at a special desk in registration headquarters. Tickets, $3.50 each, must be secured before 12:00 M., Wednesday. No refunds can be made on unused tickets, because of the nature of the contract with the Hotel Statler. Dress is optional.

Golf Tournament

The AMERICAN CHEMICAL SOCIETY Golf Tournament will be held Thursday, September 10, at the Niagara Falls Country Club, about 20 miles from downtown Buffalo. The *member* of the SOCIETY with the lowest gross score will receive the Wilson Cup. Other prizes, contributed by Buffalo and Niagara Falls business firms and hotels, will be awarded.

Transportation will be provided by Buffalo and Niagara Falls members, starting from the Delaware Avenue entrance of the Hotel Statler at 11:30 A. M. Luncheon will be served at the Club House. Play will begin about 1:30 P. M. Tickets, including luncheon, $1.00, and greens fee, $1.50, must be obtained from registration headquarters before 6:00 P. M. Wednesday. Save up your golf balls for this event.

Two other Buffalo golf courses, Wanakah and Orchard Park Golf Clubs, will be open to registrants for the entire week. The greens fee will be $1.50 per day at either course. The attendant at the Information Booth will tell golfers how to reach these clubs.

Students

The Buffalo meeting offers special features of interest and importance for students of chemistry and chemical engineering. All national conventions afford an opportunity to gain further insight into the professional aspects of the vocation and to become acquainted with the men and women who have built the profession to its present status, but the program of the Buffalo meeting promises to be unique in this respect.

In addition to the usual technical sessions of the many divisions, covering all branches of chemistry, the Division of Chemical Education has arranged a special program addressed to students but which no young chemist or chemical engineer, regardless of his student status, can afford to miss. Details of this program, which is scheduled for Wednesday morning, are given on page 1034.

The subject at present uppermost in the minds of students (and professors) is the relation of their work to the national emergency. Charles L. Parsons, Secretary of the AMERICAN CHEMICAL SOCIETY, will discuss the Selective Service regulations that affect students. No one is better qualified to present this material. Secretary Parsons has been working closely with Selective Service officials in order to enable chemists and chemical engineers to make their maximum contribution to the war.

The remaining papers on the special Wednesday student program deal with problems of the young chemist and chemical engineer and will be given by speakers who have special qualifications for the discussion of their particular subjects. Harold J. Barrett, E. I. du Pont de Nemours & Co., Inc., will outline what industry expects of its new technical employees; this should orient those approaching their first position and enable them to give better service. Byron A. Soule, University of Michigan, who gives one of the few academic courses on use of chemical literature, will sketch how best to tap this storehouse of information. Women majoring in chemistry frequently ask what opportunities exist for them to practice the profession. Lois Woodford, American Cyanamid Co., will discuss this subject on the basis of personal experience. This program alone should make worth-while attendance at the meeting.

Students who contemplate teaching will be interested also in the symposium on Tuesday morning dealing with the Teaching and Practice of Analytical Chemistry. The public meeting on Monday evening (see page 1013) and the general meeting Wednesday afternoon (see page 1013) are outstanding features of the convention that will be of interest to all students.

The breakfast for students, sponsored by the Division of Chemical Education, will be held at the Hotel Lafayette at 7:30 A. M. Wednesday; tickets, $0.50 each. Fraternal, academic, and professional groups will meet for various meals (see page 1016). A number of hotel rooms will be available for students at a reduced rate of $1.45 per day per person. Be sure to use the hotel reservation request form, page 1016, and transmit it immediately.

One of the features of the meetings of the AMERICAN CHEMICAL SOCIETY for students and chemists looking for positions is the Employment Clearing House. Members and paid student affiliates of the SOCIETY registered at the meeting may avail themselves of this opportunity to make contact with employers (see below for further particulars).

The registration fee for regularly matriculated students of chemistry and chemical engineering is $3.00.

Employment Clearing House

Seventeenth Floor, Hotel Statler

At Buffalo the SOCIETY will again provide facilities to bring together employers looking for chemists and chemical engineers and *members and paid student affiliates registered at the meeting* seeking employment and wishing to make such contacts.

Beginning Sunday afternoon, candidates for employment will file records in the Clearing House on forms which provide space for a photograph, personal data, and information regarding education and experience. The records are maintained in classified files and are indexed under all fields of training and experience. This enables an employer to find quickly the records of those with the qualifications desired.

Beginning Monday morning, appointments for interviews will be made at the request of employers and at the times they specify. Private booths will be available for such conferences. No chemist or chemical engineer looking for employment and no employer looking for trained men can afford to miss this opportunity. Many personnel representatives attend each meeting solely to take advantage of the service.

Candidates for Employment

By action of the Board of Directors (December 12, 1940), the Employment Clearing House is open only to members and paid student affiliates of the AMERICAN CHEMICAL SOCIETY registered at the meeting.

The Clearing House will be open to candidates for employment at 2:00 P. M. Sunday, September 6. Since employers begin inspecting the vitae on Monday, most effective use is made of the records of those who arrive early in the week. At the most recent Clearing House, a larger proportion of interviews and offers of employment were received by those who registered during the first two days. Records filed in advance cannot be inspected by employers until after the arrival of the registrants, since all users are assured that everyone whose vita is on file is available for interview. Those who have not filed vitae by mail may fill out the forms in the Clearing House after arrival.

Amplification of the data on the forms and lists of publications cannot be accepted for filing in the Clearing House. Many employers decline to interview an individual whose photograph is not on his record; therefore, each person should bring with him two copies of a *good* picture (look pleasant; avoid flashlight photographs), not larger than 2.5 × 3 inches, and attach them to duplicate copies of his vita.

A representative of the United States Civil Service Commission will be in the Employment Clearing House to interview any persons interested in government employment. He will furnish information and will authorize appointments to positions at the proper request of government officials, several of whom will be conducting interviews through the facilities of the Clearing House. Under present conditions a large number of women chemists are needed in the government service.

Employers

By action of the Board of Directors (December 6, 1941), the Employment Clearing House is not open to any employer or employer's representative "who, in offers made as a result of interviews in the Clearing House, is unwilling to meet the recommendations unanimously adopted at the Atlantic City meeting of the AMERICAN CHEMICAL SOCIETY in its resolution on employer-employee relationships". (See NEWS EDITION, December 25, 1941, page 1442.)

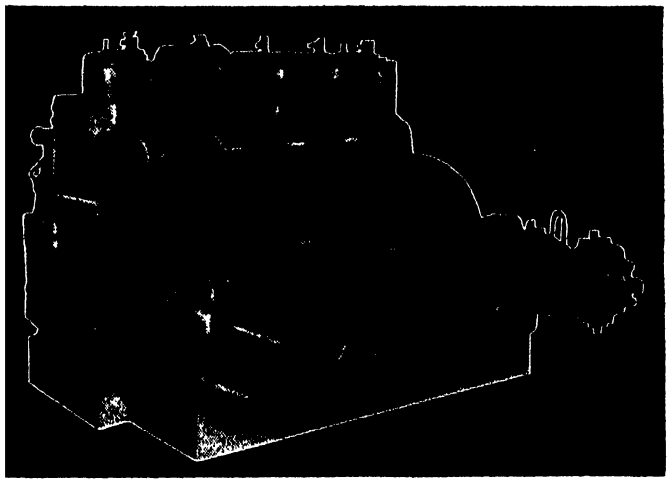
Although employment of chemists and chemical engineers is at

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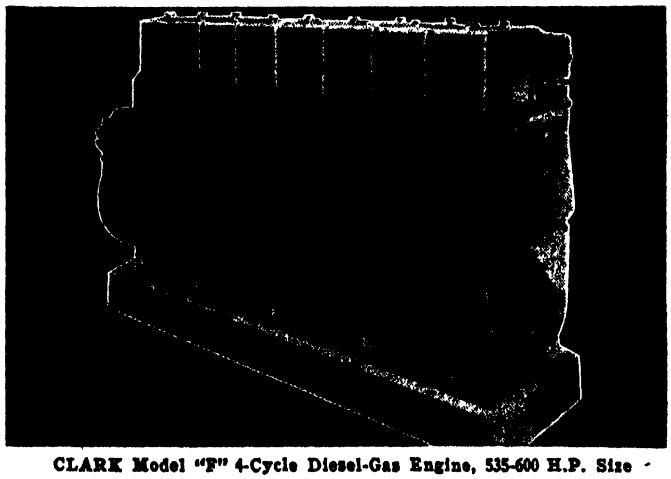
CLARK ENGINE-DRIVEN COMPRESSOR AND DIESEL ENGINES FOR CHEMICAL SERVICE



CLARK Steam-Driven "Angle" Compressor, 3,000 H.P. Size



CLARK Gas-Diesel Driven "Angle" Compressor, 500 H.P. Size



CLARK Model "F" 4-Cycle Diesel-Gas Engine, 535-600 H.P. Size

NEW CLARK STEAM-DRIVEN "ANGLE" COMPRESSOR

Available in 3, 4, 5, 6 and 8 cylinder models with a range of from 500 to 4000 H.P., the new CLARK Steam-Driven "Angle" Compressor is proving an ideal unit for chemical plants requiring an efficient compressor with built-in steam drive.

Outstanding features are compactness, low installation cost, economical steam rates, flexibility and minimum maintenance and replacement costs.

The unit is equipped with either Unaflow or Counterflow steam cylinders made of a high-grade semi-steel mixture. The cylinders are completely water jacketed, and have large, smooth gas passages to and from the valves. The valves are Clark ring type with low lift and large area.

Ample safety factors have been provided for all sections of the compressor cylinders, which are designed with clearance openings for the addition of extra clearance space when operating requirements make it advisable.

CLARK SUPER-2-CYCLE CONVERTIBLE GAS-DIESEL DRIVEN "ANGLE" COMPRESSOR

This complete, compact, engine-driven compressor unit was specifically designed to reduce initial installation costs and to keep relocation expense at a minimum.

Every part that requires inspection or adjustment is readily accessible.

Its range, used as a Diesel, is 175 to 700 H.P.; as a gas engine, 200 to 1000 H.P.

Power cylinders are arranged in a single vertical row and compressor cylinders in a single horizontal row with both connected to the same crankshaft.

Special features include the Clark Super-2-Cycle fuel injection which combines 2-cycle simplicity with fuel economy equal to, or better than, the best 4-cycle engines — Clark-designed oil-cooled pistons, and full force-feed lubrication.

CLARK MODEL F CONVERTIBLE 4-CYCLE DIESEL GAS ENGINE

Built in 3, 4, 6 and 8 cylinder sizes, this unit is an exceptionally clean design with all parts enclosed in oil-tight covers. Fuel pump and fuel lines are isolated to prevent contamination of the lube oil.

Special features are the "Cetane Selector" which permits adjustment of timing on the pumps while the engine is in operation, Clark-designed oil-cooled pistons, and full force-feed lubrication to all bearings and valve gearing, including overhead tappets and rocker-arm bearings. Complete mixing of air and fuel is assured by special Clark inlet valves and piston crown.

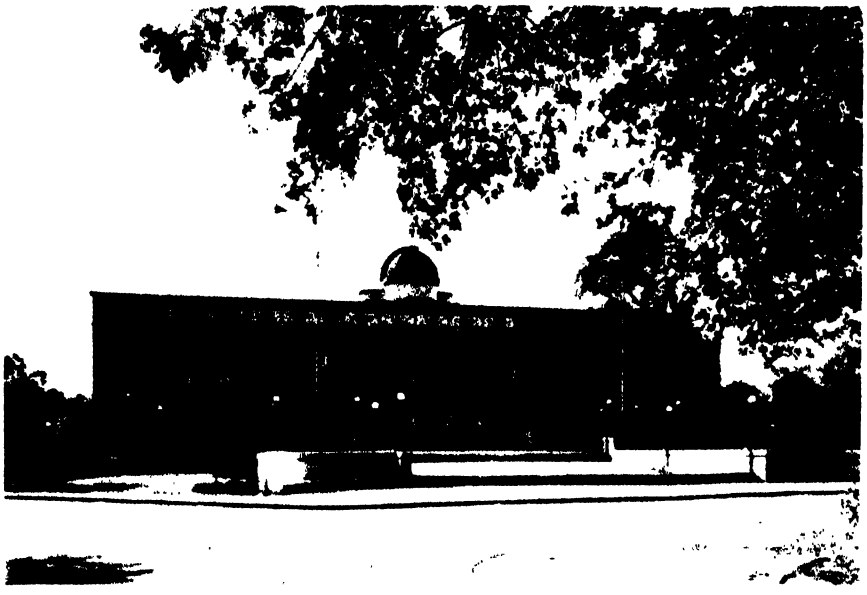
Used as a Diesel, the range is from 150 to 535 H.P. and as a gas engine from 150 to 600 H.P.

CLARK BROS. CO., INC., Olean, New York

Export Offices: 30 Rockefeller Plaza, New York. Domestic Sales Offices and Warehouses: Tulsa, Okla.; Houston, Texas; Chicago, Ill. (122 S. Michigan Ave.); Boston, Mass. (131 Clarendon St.); Huntington Park, Calif. (5715 Bicket St.). Foreign Offices: 72 Turnmill St., E. C. 1, London; Avda Roque Saenz Pena 832, Buenos Aires.

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CLARK



Buffalo Museum of Science

a high level owing to the demands of rapidly expanding industry, it is expected that employers will find in the Buffalo Clearing House registrants whose availability might not otherwise be known. They will be chiefly of two types: Summer graduates under the "speed-up program" from small colleges not scouted by industry and those individuals seeking a change of employment, especially chemists and chemical engineers in nonessential industries wishing to make new connections in order to contribute directly to the war effort. Many employers expected a small Clearing House registration at the past two meetings. Actually 421 were available for interview in Memphis, 324 in Atlantic City, and 527 in St. Louis. At each of these meetings more than 1,000 interviews were arranged, 1,721 in Memphis.

Employers who have never visited an A. C. S. Employment Clearing House will find this unique employment aid of distinct value. Many personnel department representatives attend each meeting solely to take advantage of this service. The number of employers regularly using the A. C. S. Employment Clearing House at national meetings of the SOCIETY indicates that the activity is meeting a real need.

The forms filed by candidates for employment provide space for a photograph, personal data, and information regarding education and experience. A classified index will be maintained so that one can find quickly those with the special training or experience desired. A private room will be available in which employers' representatives may inspect the index and vitae at any time from Monday through Friday. At the request of the employer, interviews will be arranged promptly with any whose records are on file. The space available in Buffalo will permit erection of 47 private interview booths.

We know of no other place at which one can find not only the records of such a diversified group of chemists and chemical engineers, but the individuals themselves. Any employer, having a vacancy to fill or anticipating one, can ill afford to pass up this opportunity to make personal contacts.

The advantages to employers are many. They may inspect these records without any of the registrants knowing they are looking for chemists. Personal interviews are always more satisfactory than correspondence; this plan makes available to each employer individuals from widely scattered localities who otherwise could be interviewed only through time-consuming and costly travel.

Plan to use the A. C. S. Employment Clearing House on the Seventeenth floor, Hotel Statler, Buffalo, September 7 to 11, 1942.

Society Regulations Governing Registration

BYLAW 2. (*a*) Attendance at meetings of the SOCIETY is limited to registered persons.

(*b*) All persons in registering at meetings of the SOCIETY shall state whether or not they are members of the SOCIETY and, if not, whether they are chemists or chemical engineers.

(*c*) American chemists or chemical engineers, nonmembers of the SOCIETY, attending meetings of the SOCIETY, shall assist in the support of the facilities which they enjoy by paying a higher registration fee than members. This differential at general meetings shall be $5.00 higher than the fee charged members; while at regional and divisional meetings it shall be at least twice the regular fee adopted. They shall be furnished with a special nonmember badge to differentiate them from members of the SOCIETY and from foreign and nonchemist guests. The differential charged shall not apply to regularly matriculated students majoring in chemistry or chemical engineering at any college or university.

(*d*) Meetings are normally open to all registrants, but any session may be closed to nonmembers of the SOCIETY by order of the President.

NOTE. Corporation members have the right to designate *one representative only* with membership privileges at each meeting. If a *corporation member* sends a substitute for the delegate of record, the Secretary's office should be informed by mail. In registering, such a representative should sign the corporation name, per his own as representative.

Associate members of local sections and of divisions are not members of the Society and have no Society privileges. All nonchemist visitors, including children, regardless of age, who participate in any trips, lunches, or other activities provided on either the men's or ladies' program, regardless of whether they are free or paid events, must pay the visitors' registration fee, $3.00, and wear the appropriate badge.

Society Regulations Governing Papers

BYLAW 3. (*a*) Papers by American chemists or chemical engineers not members of the SOCIETY shall not appear on the programs of general, divisional, or regional meetings of the SOCIETY unless they be joint papers with SOCIETY members.

(*b*) All papers presented before general, divisional, regional, group, local section, or other meetings are the property of the SOCIETY, to be published in the journals of the SOCIETY or released by the appropriate editor if not retained for such publication.

> NOTE. The editors will give prompt decisions when papers are sent to them with request for release. The editors concerned are A. B. Lamb, H. E. Howe, S. C. Lind, N. W. Rakestraw, and W. Albert Noyes, Jr.

(*c*) The SOCIETY is not responsible for statements and opinions advanced by individuals in papers or discussions before its meetings.

(*d*) Any paper, although announced in the final program, may be excluded at any time prior to delivery by order of the President.

The Board of Directors has voted the following regulations (R-55) governing papers to be presented before general, divisional, regional, or group meetings, supplementing Bylaw 3:

(*a*) Authorship of papers shall be accredited only to individuals and not to companies or laboratories.

(*b*) No paper may be presented which has been offered for publication elsewhere.

(*c*) No paper, no matter how important, may be presented, the title of which does not appear on the final program.

(*d*) If a paper is declined by any division of the SOCIETY, the secretary of that division is instructed to notify the secretary of any other division to which it is likely to be offered.

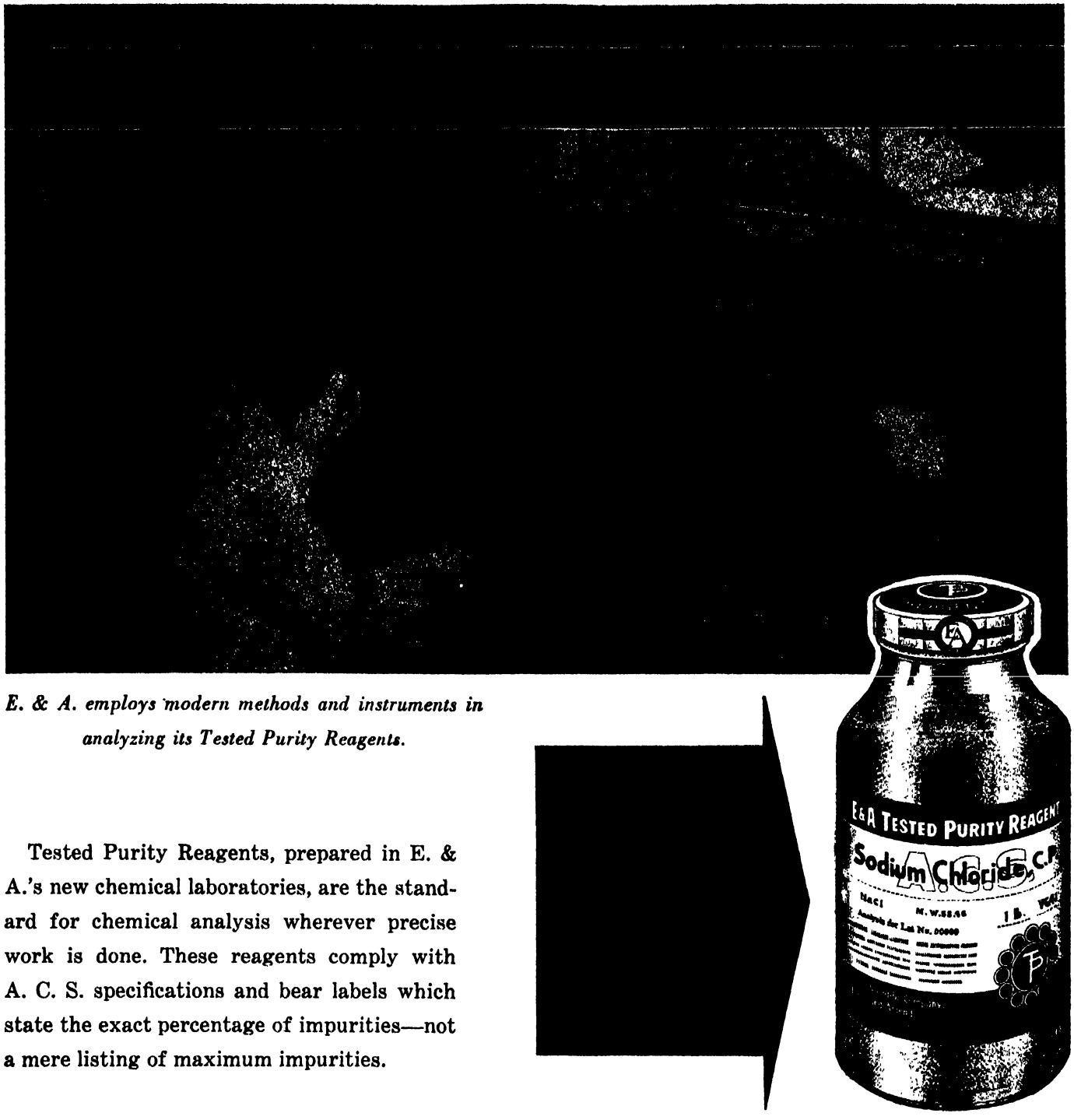
Travel Information

Buffalo is very accessible. It is served by good motor roads, by several railroad and bus lines, by two major airlines, and by passenger boats on the Great Lakes. Service by public conveyances is frequent. A change in the usual method of travel, such as a trip by boat, may add to the visitor's pleasure. Those who find it possible to drive, may be interested to know that Canada has a moderate gas allowance for visitors. Gasoline will be rationed in Buffalo before the time of the meeting.

Public transportation services are burdened by a tremendous increase in traffic and a decrease in facilities available to civilians. It is essential that those planning to attend the meeting *make reservations early* and buy tickets well in advance of departure. Otherwise, it may be impossible to secure travel accommodations. If tickets are not used, refund will be made by the railroad.

Local trains and busses to all points of the Niagara Frontier are readily accessible from the official hotels.

CONTINUED ON PAGE 1026



E. & A. employs modern methods and instruments in analyzing its Tested Purity Reagents.

Tested Purity Reagents, prepared in E. & A.'s new chemical laboratories, are the standard for chemical analysis wherever precise work is done. These reagents comply with A. C. S. specifications and bear labels which state the exact percentage of impurities—not a mere listing of maximum impurities.

In addition to the everyday needs of the laboratory for analytical reagents, standard solutions and biological preparations, Eimer and Amend is prepared to meet the need for special reagents, rare chemicals, unusual solutions and other hard-to-obtain materials.

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Canisius College

Ladies' Program

The hostesses of the Western New York Section invite their guests to choose as much or as little of the entertainment as they wish. Since many of the trips involve some walking, visitors should come prepared for foot comfort. In addition to events on the Ladies' Program, all parts of the General Program are open to ladies who wish to participate.

Ladies' headquarters, Ballroom Foyer, Main Floor, Hotel Statler, will be open from 2:00 to 5:00 P. M. Sunday and from 9:00 A. M. to 6:00 P. M. Monday through Friday. The attendant and hostesses in the headquarters will be happy to assist with plans for special trips, make shopping suggestions, and dispense information.

Tickets for all events must be obtained at the registration headquarters on the mezzanine floor of the Hotel Statler before the deadlines indicated in the program. All trips, except the one leaving Thursday at 3:00 P. M., start from and return to the Delaware Avenue entrance of the Hotel Statler.

In order to afford ladies accompanied by children more opportunity to participate in meeting activities, a nursery school will be maintained in the Hotel Statler. It will be under the direction of Mrs. Mary B. Parke, director of the Nursery School at the University of Buffalo.

Sunday, September 6

2:00 to 9:00 P. M.—Registration, Palm Court, Hotel Statler.

2:00 to 5:00 P. M.—Ladies' headquarters will be open to welcome visitors.

4:00 to 10:00 P. M.—Social gathering, Terrace Room, Hotel Statler; movies at 4:00 and 8:00 P. M.

Monday, September 7

8:00 A. M. to 6:00 P. M.—Registration.

3:00 to 5:00 P. M.—Tea and reception in honor of the wives of the officers of the AMERICAN CHEMICAL SOCIETY, Ballroom, Hotel Statler. Admission by badge.

8:30 P. M.—Public meeting, Kleinhans Music Hall (see General Program, page 1013). Admission by ticket (no charge) which must be obtained before 6:00 P. M. Monday.

Tuesday, September 8

10:00 A. M. to 4:00 P. M.—Trip to the Albright Art Gallery; luncheon at the Buffalo Museum of Science followed by a tour of the museum. Tickets, including transportation and luncheon, $1.35 each, must be obtained before 4:00 P. M. Monday.

10:00 A. M. to 1:00 P. M.—Visit to the Albright Art Gallery. Transportation tickets, $0.50 each, available until 9:00 A. M. Tuesday.

10:30 A. M. to 4:00 P. M.—Trip to the Buffalo Historical Society; luncheon at the Buffalo Museum of Science followed by a tour of the museum. Tickets, including transportation and luncheon, $1.35 each, must be obtained before 4:00 P. M. Monday.

10:30 A. M. to 1:00 P. M.—Trip to the Buffalo Historical Society. Transportation tickets, $0.50 each, must be secured before 9:00 A. M. Tuesday.

8:00 P. M.—County Fair, Memorial Auditorium (see page 1020). Admission by ticket (no charge) which must be obtained before 6:00 P. M. Tuesday.

Wednesday, September 9

10:00 A. M. to 4:00 P. M.—Inspection trip to Niagara Falls. For description of trip, available side trips, costs, and regulations for Canadian travel, see pages 1018 and 1020. Tickets for transportation and luncheon, $3.00 each, and for special side trips, must be secured before 5:00 P. M. Tuesday.

10:00 A. M. to 12:15 P. M.—Visit to the Lockwood Memorial Library on the University of Buffalo Campus. Rare first editions, including the Folio edition of Shakespeare, will be on display. Charles Abbott, the librarian, will address the visitors at 11:00 A. M. A bus will leave the corner of Main and Genesee Streets at 10:15 A. M. Transportation tickets, 15 cents each, must be obtained before 9:00 A. M. Wednesday.

1:00 P. M.—Luncheon at the Twentieth Century Club, followed by a talk and display of rare antique jewelry by Mrs. Sabine Brumberg. The beautiful Delaware Avenue shops offer an opportunity to enjoy window-shopping en route from the Hotel Statler to the Club (0.9 mile). Those planning to walk should leave the Hotel Statler not later than 12:15 P. M. Transportation will be provided, leaving at 12:45 P. M. Tickets, $1.75 each, must be obtained before 12:00 M. Tuesday. Limit, 150.

4:00 to 10:00 P. M.—Inspection trip to Niagara Falls. For description of trip, available side trips, costs, and regulations for Canadian travel, see pages 1018 and 1020. Tickets for transportation and dinner, $3.25 each, and for special side trips, must be secured before 5:00 P. M. Tuesday.

7:30 P. M.—Subscription dinner (dress, optional), Ballroom, Hotel Statler. Tickets, $3.50 each, available until 12:00 M. Wednesday. Limit, 800. (See page 1022.)

10:00 P. M.—Dance, Ballroom, Hotel Statler. Admission by badge.

Thursday, September 10

10:00 A. M. to 4:00 P. M.—Inspection trip to Niagara Falls. For description of trip, available side trips, costs, and regulations for Canadian travel, see pages 1018 and 1020. Tickets for transportation and luncheon, $3.00 each, and for special side trips, must be secured before 5:00 P. M. Wednesday.

3:00 to 10:00 P. M.—Inspection trip to Niagara Falls. For description of trip, available side trips, costs, and regulations for Canadian travel, see pages 1018 and 1020. Tickets for transportation and picnic supper, $2.00 each, and for special side trips, must be secured before 5:00 P. M. Wednesday.

4:00 to 10:00 P. M.—Inspection trip to Niagara Falls. For description of trip, available side trips, costs, and regulations for Canadian travel, see pages 1018 and 1020. Tickets for transportation and picnic supper, $3.00 each, and for special side trips, must be secured before 5:00 P. M. Wednesday.

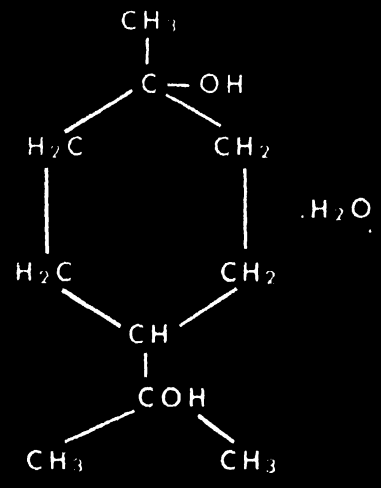
Friday, September 11

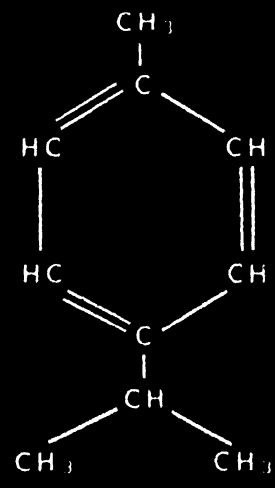
10:00 A. M. to 4:00 P. M.—Inspection trip to Niagara Falls. For description of trip, available side trips, costs, and regulations for Canadian travel, see pages 1018 and 1020. Tickets

CONTINUED ON PAGE 1028

Two Interesting Terpene Derivatives

Terpene chemicals and derivatives are structurally midway between the aliphatic and aromatic hydrocarbon derivatives. They may, therefore, present many interesting combinations of properties compromised between these groups, and in addition provide specific powers of penetration and wetting. Two of these derivatives, now available in quantity may suggest further exploration to you.







We will be glad to exchange ideas should the fact that these products are now available in quantity be of interest to you.

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for transportation and luncheon, $3.00 each, and for special side trips, must be secured before 5:00 P. M. Thursday.

4:00 to 10:00 P. M.—Inspection trip to Niagara Falls. For description of trip, available side trips, costs, and regulations for Canadian travel, see pages 1018 and 1020. Tickets for transportation and dinner, $3.25 each, and for special side trips, must be secured before 5:00 P. M. Thursday.

Albright Art Gallery

Buffalo was the third city in the country to establish a permanent art gallery. Only Boston and Philadelphia had taken such action when 26 prominent citizens in 1862 incorporated the Buffalo Fine Arts Academy. First situated in rooms downtown, the academy after several changes in location obtained its present building in 1905 through the gift of John J. Albright. The building, of Maryland marble and designed in neoclassic style by the eminent American architect, Edward B. Green, is one of the most beautiful of its type in this country. Situated in Delaware Park overlooking the lake, the gallery's main beauty lies in its large and well-proportioned sculpture court, in which the warm, natural light given by the skylighted roof, together with the fresh air and view of the lake obtained through the large doors, suggests the atmosphere of the sculpture courts of classic times. Dominating the sculpture court is a Chinese Chimera used in the 6th Century to guard the ancestral burial grounds, while close at hand is a life-sized statue of a Roman poet carved in the 2nd century B. C., thought to be one of the few surviving sculptures of that period. Among the works of contemporary sculptors is the seated figure of "Night" by Aristide Maillol, which was purchased from the artist on the eve of the present war. The gallery is well known for its modern paintings, from the brushes of the great artists of the late 19th century in France to leading living artists. Well known is the portrait study of "Elinor, Jean and Anna" by George Bellows, which has toured the country in one exhibition after another. Whatever the special art interest of the visitor, it is believed that the Albright Art Gallery will be a worth-while experience.

The Buffalo Museum of Science

Have you ever wished for a bird's-eye view of the world you live in with each part of the vast design correlated with the others? To meet your needs and that of others whose busy lives leave little time to construct the pattern of the universe for themselves, the Buffalo Museum of Science has achieved a clear and understandable story, all in three-dimensional natural color. Here trained minds and skillful hands have set forth, largely in miniature habitat groups which create the illusion of reality, the connected story of the building stones of the universe, the stars and planets in the interstellar spaces, the earth itself, the creatures that people the earth, the waters under the earth, and the heavens above it. Here are illustrated the fundamental laws of living—evolution, heredity, environment—as applied to men as well as to lower forms of living things. Here, he who walks can read the wonders that comprise man's body, how he learned the lessons that enabled him to produce the glorious civilizations of the past, and how he learned to use his hands and mind to fill his everyday needs.

The Buffalo Historical Society

The Museum of the Buffalo Historical Society tells the story of the Niagara Frontier in a scientific arrangement of objects so as to present a cultural history of the region from its first occupation to the present time. The Hall of the Woodlands relates, in artifacts arranged in chronological order, the history of the Indian cultures of New York State from the coming of the nomad Algonqian tribes to the disintegration of the great Iroquoian culture. Here, also, is shown the habitat, dress, and customs of the Indians of the woodland regions. The coming of the French, old Fort Niagara, and the occupation of the Frontier by the followers of the Bourbons next attract the attention of the visitor. The Lilies of France and the Cross of St. George pass into history and the Stars and Stripes float over the Niagara region. The surveying instruments of Ellicott place the village of Buffalo on the map, and the infant Queen of the Lakes is born. The Lake Marine Room tells in models, figureheads, and marine mementos the romance of the lakes. Complete installations reproduce the kitchen of an early pioneer of Buffalo, fully equipped with all the necessary furnishings that the good wife could have desired. A spinning room contains the old loom for weaving, the wool wheel, flax wheel, quilling wheel, and clock reel—full equipment for manufacturing yarn for knitting or weaving homespun. Most colorful of all is the blacksmith shop, with its old forge and handmade tools, of David Reese, pioneer smith of Buffalo. Near by stands a reproduction of an old cobbler's shop of Buffalo, dating about 1845, and adjacent to this, an early apothecary shop. The Hall of Transportation and Industry recalls the industrial history of the city and traces the transportation from the stagecoach to the modern airplane. Services of the men who fought that democracy might endure are retold in the Hall of Wars. Here the uniforms and equipment are displayed and the military story of the frontier revealed. A more peaceful scene is found in the Ceramics Room where Anglo-American Staffordshire and American glass and pottery are displayed. Here will be found also a wonderful collection of pewter. From this room it is but a step to Costume Hall where the changing fashions of the frontier are displayed, and the interesting gowns of bygone days are preserved. It is impossible to enumerate all of the various features—coins, stamps, comparative exhibits—but a visit to the museum will convince the most skeptical that "other Council Fires were here before ours".

Lockwood Memorial Library

The Lockwood Memorial Library on the University of Buffalo Campus, was opened in 1935, a gift from Thomas B. Lockwood and his wife, Marian Birge Lockwood. The library has three special collections of which it is justly proud: the Lockwood Collection which consists of first editions of books in English literature from the earliest time to the present; the Collection of Fine Printing, which contains beautiful books representative of the finest type of printing and examples of the best work from several private presses; and the Modern Poetry Collection, which contains 11,000 volumes of first editions of modern poets and a growing collection of manuscripts and autographed letters contributed by a number of representative modern poets. A tour, guided by members of the staff, will include visits to the principal points of interest. The visitor will also have an opportunity to see the University of Buffalo Campus.

The Twentieth Century Club

Women guests of the AMERICAN CHEMICAL SOCIETY will have the unusual privilege of lunching in the exquisite oval dining room of the Twentieth Century Club. The committee feels especially pleased to offer this luncheon since the private rooms of the club are rarely opened to the public. The Twentieth Century Club, a women's club, has played a leading part in the cultural life of Buffalo since its founding in 1894. The clubhouse, of Italian Renaissance architecture, is so beautifully detailed that it is difficult to select points of especial interest. Worthy of particular note is the mural representing the seven ages of women. This mural, located in the room bearing her name, was done by Mrs. John C. Glenny, one of the early members of the club.

After the luncheon, Mrs. Sabine Brumberg will lecture on and show a part of her 1,600-piece collection of antique jewelry. This collection, started by her father, contains a 2,000-year-old set of Roman slave rings, a cameo picture of one of Marie Antoinette's children, framed in rose diamonds, black opals and emeralds the size of robin's eggs, East Indian turquoise and pearl necklaces, and many other pieces of beauty and historical interest.

Division of Agricultural and Food Chemistry

ELLERY H. HARVEY, *Chairman*; ROGER H. LUECK, *Secretary*
O. I. STRUVE, *Local Assistant*

Monday Afternoon

Fillmore Room, Hotel Statler

SYMPOSIUM ON METHODS FOR THE PRESERVATION OF FOODSTUFFS AND THEIR APPLICATION IN THE WAR EFFORT

E. H. HARVEY, *Presiding*

2:00— 1. H. R. KRAYBILL. The Dehydration of Meat.

2:25— 2. W. V. CRUESS. The Dehydration of Fruits and Vegetables.

2:55— 3. E. J. CAMERON. Latest Developments in Canning Technology.

3:20— 4. M. E. PENNINGTON. The Conservation of Perishables by Refrigeration—a World Problem.

3:45— 5. DOMENIC DEFELICE. Recent Developments in Freezing Foods.

4:10— 6. HERMANN C. LYTHGOE. The Cold Storage of Food in The United States—a Comparison between Today's Holdings and Those of Twenty Years Ago.

Symposium continued Wednesday morning.

Tuesday Morning and Afternoon

Chinese Room, Hotel Statler

VITAMINS AND NUTRITION

Joint program with the Division of Biological Chemistry (see page 1032).

CONTINUED ON PAGE 1030



ANHYDROUS HYDROFLUORIC ACID

BORON TRIFLUORIDE

ANHYDROUS HYDROGEN CHLORIDE

Three gases used extensively in modern organic synthesis.

METALLIC SALTS & OXIDES

Many types and grades to meet war-time industrial production requirements.

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Widely used in protective coating industries—as driers, water proofers, catalysts, lubricants, fungicides and for many other specific applications.

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A material developed to meet war-time need for a short method of tin analysis in cast iron and plain steel.

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Large single crystals of sodium chloride, lithium fluoride, potassium bromide and sodium nitrate for physical testing and research in ultraviolet and infrared—especially in organic synthesis.

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Wednesday Morning

Fillmore Room, Hotel Statler

SYMPOSIUM ON METHODS FOR THE PRESERVATION OF FOODSTUFFS AND THEIR APPLICATION IN THE WAR EFFORT (*Continued*)

E. H. HARVEY, *Presiding*

9:00 7. H. S. MITCHELL AND H. C. BLACK. Stabilization of Fats and Fatty Foods.

9:25— 8. PAUL E. HOWE. Nutritional Aspects of Processing Foods.

10:00 9. VIRGIL O. WODICKA. Food Requirements for Overseas Use.

10:20 —10. ROBERT R. MELSON. Food Packaging for Overseas Use.

10:45 —11. SIDNEY H. KATZ. Protection of Foodstuffs against War Gases.

11:10 —12. A. H. WARTH. Packaging Trends during the Present Emergency.

11:35—13. W. H. CATHCART. Enrichment of Flour and Bakery Products with Reference to Their Use by the Armed Forces.

12:15 — Divisional luncheon in honor of **Lucius M. Tolman,** former chairman of the division, followed by business meeting, Kathryn Lawrence Dining Room, North Street and Delaware Avenue, $1.10.

Thursday Morning

Fillmore Room, Hotel Statler

SYMPOSIUM ON METHODS FOR THE PRESERVATION OF FOODS—THEIR WARTIME ASPECTS

R. H. LUECK, *Presiding*

9:00 —14. J. S. BLAIR AND T. B. AYRES. The Protection of Natural Green Pigment in the Canning of Peas.

9:25—15. E. L. MOORE, W. B. ESSELEN, JR., AND C. R. FELLERS. Factors Responsible for the Darkening of Packaged Orange Juice.

9:45—16. DONALD K. TRESSLER, CARL S. PEDERSON, AND HAROLD G. BEATTIE. Recent Advances in Fruit and Vegetable Juice Preparation and Preservation.

10:10—17. C. O. BALL. Principles Involved in Short-Time Pasteurization of Milk.

10:35—18. J. P. KASS AND L. S. PALMER. The Aldose-Protein Condensation in the Browning of Autoclaved Milk. Comparative Electrometric Formol Protein Titrations of Raw and Autoclaved Artificial, Skim, and Dialyzed Milks.

11:00—19. M. E. PARKER. The Role of Acid Detergents in Food Sanitation.

11:25 —20. HERMANN C. LYTHGOE AND ALICE S. ROSENTHAL. A Comparison between the Lipase Content of Goat's Milk and Cow's Milk.

Thursday Afternoon

Fillmore Room, Hotel Statler

GENERAL PAPERS

B. E. PROCTOR, *Presiding*

2:00—21. A. E. PERKINS. Dry Matter Determinations on Green Plant Material and on Silage.

2:20—22. CHARLES A. BRAUTLECHT AND A. STANLEY GETCHELL. The Chemical Composition of White Potatoes.

2:45—23. CHARLES A. BRAUTLECHT AND STANLEY P. FREEDMAN. Ash of White Potato Starch.

3:10—24. Z. I. KERTESZ. Report of Committee on Pectin Nomenclature.

3:40 —25. W. H. STARK, PAUL KOLACHOV, AND H. F. WILLKIE. Wheat as a Raw Material for Alcohol Production.

4:05—26. LYLE D. GOODHUE. Insecticidal Aerosols Produced by Spraying Solutions in Liquefied Gases.

4:30—27. H. L. CUPPLES. Colored Impurities in Commercial Phenothiazine.

Division of Analytical and Micro Chemistry

GEORGE L. ROYER, *Chairman;* FRANCIS W. POWER, S.J., *Secretary*
ALLAN A. WAHL, *Local Assistant*

Monday Afternoon

Parlors D and E, Hotel Statler

MICRO CHEMISTRY

GEORGE L. ROYER, *Presiding*

2:00— 1. CARL TIEDCKE. A Fractional Distillation Microapparatus.

2:15 — 2. E. F. WILLIAMS AND CHARLES MARESH. Microscopical Investigation of Sulfanilamide, Sulfaguanidine, and Several of the Acetyl Derivatives of These Drugs.

2:35— 3. A. R. PRAY AND E. A. ARNOLD. A Colorimetric Method for the Determination of Sodium.

2:55 — 4. LEO K. YANOWSKI AND WALTER A. HYNES. Comparison of Reaction Products Formed Microscopically by a Few Complex Cobaltammines with Various Anions.

3:10— 5. M. L. MOSS WITH M. G. MELLON. Colorimetric Determination of Cobalt with Terpyridyl.

3:30— 6. JACOB CHOLAK, DONALD M. HUBBARD, AND ROBERT V. STORY. The Determination of Aluminum in Biological Material.

3:50— 7. CHARLES E. WHITE AND M. H. NEUSTADT. A New Fluorescent Qualitative Test for Zinc.

4:05— 8. LEO K. YANOWSKI. Activities of the Metropolitan Microchemical Society.

4:20— 9. CLEMENT J. RODDEN. Report of the Divisional Committee on Microbalances. The Reproducibility of Weighings Made on Microbalances.

Tuesday Morning

Townsend Hall, University of Buffalo

SYMPOSIUM ON THE TEACHING AND PRACTICE OF ANALYTICAL CHEMISTRY

Joint symposium with the Division of Chemical Education.

GEORGE L. ROYER, *Presiding*

9:00—10. F. E. BROWN. Introductory Remarks.

9:10 —11. JULIUS A. KUCK. The Teaching of Micro Chemistry. Discussion by R. P. CHAPMAN.

10:05 —12. HARVEY DIEHL. The Teaching of Quantitative Analysis. Discussion by D. E. FOWLER.

11:00—13. SAMUEL E. Q. ASHLEY. Teaching of Analytical Chemistry from an Industrial Point of View. Discussion by PHILIP J. ELVING.

12:15— Divisional luncheon, Fillmore Room, Hotel Statler, $1.35.

Tuesday Afternoon

Parlors D and E, Hotel Statler

ANALYTICAL CHEMISTRY

HARVEY DIEHL, *Presiding*

2:00 14. I. M. KOLTHOFF AND J. I. WATTERS. The Polarographic Determination of Manganese as Tri-Dihydrogenpyrophosphatomanganiate.

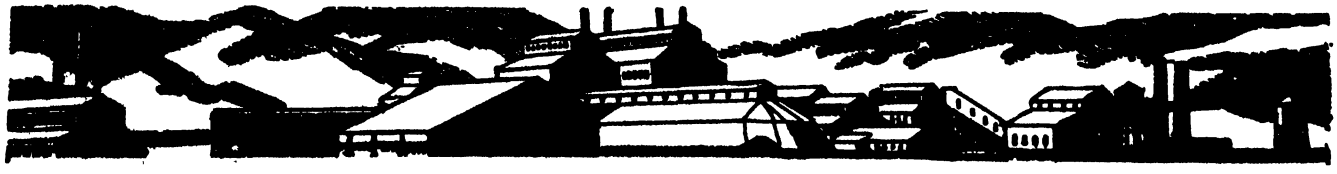
2:20 —15. GRANT WERNIMONT AND F. J. HOPKINSON. The Dead-Stop End Point Method as Applied to the Karl Fischer Method for Determining Moisture.

2:35 16. FRANK M. BIFFEN AND FOSTER DEE SNELL. Improved Methods of Analysis of Commercial Oil Emulsions and Wax Dispersions.

2:55 —17. WILLIAM SEAMAN, A. R. NORTON, AND J. J. HUGONET. The Determination of Water in Aniline by the Cloud Point with Mixed Cottonseed and Mineral Oils.

3:15—18. WILLIAM SEAMAN, A. R. NORTON, AND R. T. FOLEY.

CONTINUED ON PAGE 1032



INDUSTRIAL PRODUCTS BY FERMENTATION PROCESSES

NOAH has received credit for one of the earliest recorded chemical discoveries. He found that under some conditions grape juice underwent a change and the resulting product, when imbibed, produced a pleasant physiological effect entirely different from that which the original juice gave. Unfortunately, as a result of continuing his testing "not wisely but too well", he has received some undesirable notoriety.

It was also observed at an early date that sometimes fruit juices underwent another type of change which resulted in the development of sourness. Milk was also found to become sour on storage. Since the resulting products found practical use, empirical methods of regulating these alterations were developed.

Not until the investigation of Pasteur was it recognized that these changes were due to the growth of various microscopic organisms. It had been noticed earlier, however, that the development of visible organisms, termed molds, also resulted in changes of the medium on which they grew.

Since Pasteur a large number of experimenters have developed methods not only of preventing, but also of encouraging, the growth of these organisms, both visible and microscopic. Others have studied the chemical changes brought about by them. It is now recognized that these reactions are similar to, or in many cases the same as, those occurring during the development of a fruit or vegetable and are natural vegetative processes.

As a result of some of these researches a considerable variety of products of industrial importance is now being manufactured by the careful cultivation of a number of these organisms. Since this is a comparatively new field, it can safely be assumed that with time the number of compounds produced by such methods will be greatly enlarged. The probability of this is increased by the fact that the raw materials for such processes are generally of American agricultural origin, thus removing any dependence on foreign products.

Chas. Pfizer & Co., Inc. has been one of the leaders in this field and is at present producing Citric Acid, Gluconic Acid, Fumaric Acid, and Oxalic Acid by such methods. From these acids a wide variety of derivatives is being manufactured. A well-trained research staff is engaged in the improvement of present processes and in the development of new products. Results in many of these latter investigations indicate that products of possible importance in a variety of fields will in time be made available.



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The Determination of Ortho-Cresol in Phenol by a Cloud Point Method.

3:30—19. C. W. Caldwell, Morris Friedkin, Robert Parker, and Harvey Diehl. An Automatic Apparatus for Electrodeposition Using Controlled Cathode Potential.

3:50—20. Wilbur H. McComas, Jr., and William Rieman, III. The Effect of pH on the Solubility of Calcium Oxalate.

4:05—21. Wilbur H. McComas, Jr., and William Rieman, III. A Rapid Accurate Method for the Determination of Calcium in Presence of Aluminum, Iron, Manganese, Magnesium, Phosphorus, Sodium, and Titanium.

4:30—22. Elwyn E. Mendenhall, John L. Wilson, and Betty Lou Hevle. Neutralization Titration Reactions of Alkaline Salts Commonly Used as Detergents.

Division of Biological Chemistry

B. H. Nicolet, *Chairman;* Erwin Brand, *Secretary*
Wilson D. Langely, *Local Assistant*

Chinese Room, Hotel Statler

Monday Afternoon

GENERAL PAPERS

B. H. Nicolet, *Presiding*

2:00— 1. John R. Loofbourow, Sister Miriam Michael Stimson, and Sister Mary Jane Hart. The Blocking Effect of Methyl Groups on the Ultraviolet Absorption Spectra of Some Hydroxy Purines and Pyrimidines.

2:10— 2. Sister Miriam Michael Stimson and Sister Mary Agnita Reuter. The Effect of Change in pH on the Ultraviolet Absorption Spectrum of Uracil-5-Carboxylic Acid.

2:20— 3. Sister Miriam Michael Stimson and Sister Mary Agnita Reuter. The Effect of Hydroxy Substitutions on the Ultraviolet Absorption of the Series Hypoxanthine–Xanthine–Uric Acid.

2:40— 4. Joseph F. Treon and William E. Crutchfield, Jr. The Physiological Response of Rabbits to Cyclohexane, Methylcyclohexane, and to Certain Derivatives of These Compounds. I. Oral Administration and Cutaneous Application.

3:00— 5. Kenneth P. McConnell. Distribution of Selenium in the Various Milk Proteins of the White Rat after Subcutaneous Injection of Sodium Selenate.

3:15— 6. Harold H. Williams, Harry Galbraith, Mildred Kaucher, Virginia Button, and Icie G. Macy. The Distribution of Lipides in Animal Tissues.

3:30— 7. Warren M. Sperry and Katherine Newerly. The Enzymatic Cleavage of Phospholipides in Brain Tissue.

3:45— 8. Alfred H. Free and Jack R. Leonards. Serum Phosphorus Changes during the Absorption and Metabolism of Glucose, Galactose, and Xylose.

4:05— 9. Albert E. Sobel, Morris Rockenmacher, Jerome Weinstein, and Benjamin Kramer. The Influence of Dietary Calcium and Phosphorus on the Composition of Bone.

4:25—10. Harold C. Hodge, William F. Koss, James T. Ginn, John T. Bonner, and Gerhard Dessauer. The Nature of the "Insoluble" Sodium of Bone.

Tuesday Morning and Afternoon

VITAMINS AND NUTRITION

Joint program with the Division of Agricultural and Food Chemistry.

B. H. Nicolet, *Presiding*

9:00—11. Norman R. Joseph, Paul J. Kolachov, and Robert T. Willkie. Proteins of Grain Distillery By-Products.

9:15—12. J. M. Vandenbelt, O. D. Bird, and A. D. Emmett. Further Study of the Scudi Colorimetric Method for Pyridoxine.

9:30—13. Robert R. Sealock, Arthur H. Livermore, and Charles A. Evans. The Factor in Fresh Fish Which Causes Chastek Paralysis in the Fox by Thiamin Inactivation.

9:55—14. K. C. D. Hickman, Philip L. Harris, and Marian R. Woodside. Vitamin A and E Interrelationships.

10:15—15. A. B. McCoord, C. P. Katsampes, and S. W. Clausen. Experimental Tuberculosis in Mice and Its Effect upon the Vitamin A of the Tissues.

10:30—16. S. Kahn and Harry Sobotka. Vitamin A Content of Normal Serum.

10:45—17. T. F. Zucker and Lois Zucker. The Nutritive Value of Seed Flours from Cotton, Peanut, and Soya.

11:05—18. Esther L. Batchelder and Jane E. Ebbs. Vitamin A Requirements of Adults.

11:25—19. C. M. McCay, W. T. James, and L. L. Barnes. The Maintenance of Puppies upon High Quality, Low Calorie Diets Suitable for Human Rations.

E. H. Harvey, *Presiding*

2:00—20. W. Baumgarten, J. C. Bauernfeind, and C. S. Boruff. The Carotenoid Content of Distillers' By-Products.

2:20—21. L. O. Buxton. Vitamin A Destruction and Peroxide Formation in Carbon-Treated Fish Liver Oils.

2:40—22. J. G. Baxter, J. D. Taylor, and K. S. French. An Assay Method for Mixtures of Tocopherols.

3:00—23. C. D. Robeson and J. G. Baxter. Vitamin E. An Antioxidant in Fish Liver Oils.

3:20—24. D. T. Ewing, G. V. Kingsley, A. D. Emmett, and Raymond A. Brown. A Physicochemical Method for the Determination of the Vitamin D Potency of Fish Oils.

3:35—25. Vernon H. Cheldelin and Alethea M. Woods. Losses in B Vitamins Due to Cooking of Foods.

3:50—26. Vernon H. Cheldelin, Robert L. Lane, and Roger J. Williams. The Effect of Germination on the B Vitamin Content of Seeds.

4:10—27. Melvin Hochberg, Daniel Melnick, and Bernard L. Oser. Studies on the Photometric Determination of Total Ascorbic Acid.

Wednesday Morning

PROTEINS

B. H. Nicolet, *Presiding*

9:00—28. Johan Bjorksten and William J. Champion. Mechanical Influences on the Aging of Protein Gels.

9:20—29. D. C. Carpenter and F. E. Lovelace. The Reaction of Formaldehyde with *l*-Asparagin.

9:40—30. Walton B. Geiger. Sulfonium Derivatives of Wool.

10:00—31. L. B. Jaques. The Reaction of Heparin with Proteins and Complex Bases.

10:20— Business meeting.

10:50—32. Dan H. Moore, L. Reiner, Everett H. Lang, and Milton Green. Electrophoretic Components of Cattle Globin.

11:10—33. Elvin A. Kabat, Dan H. Moore, and Alexander B. Gutman. Physicochemical and Immunochemical Studies on the Identification of Bence Jones Proteins in Serum.

11:30—34. M. X. Sullivan and J. B. Bohannan. A Differential Test for Methylglyoxal Applicable in the Presence of Glyceraldehyde and Dihydroxyacetone.

Thursday Morning

SYMPOSIUM ON PROTEINS

V. du Vigneaud, *Presiding*

9:00—35. Max A. Lauffer. The Denaturation of Tobacco Mosaic Virus.

9:35—36. Ben H. Nicolet, Leo A. Shinn, and Leo J. Saidel. The Reaction of Phosphoproteins with Alkali and Acid. Vitellin and Cascin.

10:10—37. Erwin Brand and Beatrice Kassell. Composition of Various Serum Albumins and the Significance of Hydroxyl Groups.

10:40—38. Maurice L. Huggins. X-Ray Studies of Proteins and Related Compounds.

11:20—39. **Florence B. Seibert. Some Aspects of Protein Chemistry in Tuberculosis. Address, Women's Award in Chemistry (Garvan Medal).**

Thursday Afternoon

GENERAL PAPERS

B. H. Nicolet, *Presiding*

2:30—40. Daniel Luzon Morris. Hydrolysis of Starch and Glycogen by Blood Amylase.

2:50—41. W. L. Wasley. Effects of Certain Halogen-Con-

CONTINUED ON PAGE 1034

COLUMBIA CHEMICALS



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taining Acids, Amides, and Esters on Viability of Tumor Cells.

3:10—42. K. A. Oster and Harry Sobotka. The Oxidative Catabolism of Pressor Amines.

3:30—43. Raymond Jonnard. The Enzymatic Oxidation of the Blood Pressure Active Factors from Kidney.

3:45—44. Leon E. Tenenbaum and H. Jensen. Tyrosinase. Reversible Inactivation and Reactivation.

4:10—45. Wilbur H. Miller and Charles R. Dawson. Further Studies on the Inactivation of the Catecholase Activity of Tyrosinase.

4:30—46. Gustav J. Martin and C. Virginia Fisher. Adenine, 6-Aminopurine, as a Positive Factor in the Susceptibility of Animals to Bacterial Infections.

Division of Cellulose Chemistry

E. E. Harris, *Chairman;* C. R. Fordyce, *Secretary*
S. C. Nagel, *Local Assistant*

Townsend Hall, University of Buffalo

Thursday Morning and Afternoon

9:30— 1. W. E. Davis, A. J. Barry, F. C. Peterson, and A. J. King. X-Ray Studies of Reactions of Cellulose in Nonaqueous Systems. II. Interaction of Cellulose and Primary Amines.

10:00— 2. W. M. Hearon, Gordon D. Hiatt, and Charles R. Fordyce. Carbamates of Cellulose and Cellulose Acetate. I. Preparation.

10:30— 3. W. M. Hearon, Gordon D. Hiatt, and Charles R. Fordyce. Carbamates of Cellulose and Cellulose Acetate. II. Stability toward Hydrolysis.

10:45— Intermission.

11:00— 4. R. F. Nickerson and J. A. Habrle. Hydrolysis and Catalytic Oxidation of Cellulosic Materials. V. Structure Analysis by Progressive Hydrolysis and Reconstitution.

11:25— 5. G. Goldfinger, H. Mark, and S. Siggia. Mechanism of Oxidation of Cellulose.

12:15— Divisional luncheon, Orchard Room, Hotel Lafayette, $1.35.

2:30— 6. Carl J. Malm, Leo B. Genung, and Robert F. Williams, Jr. Analysis of Cellulose Derivatives. III. Determination of Free Hydroxyl Content.

3:00— 7. Carl J. Malm and Leo J. Tanghe. Analysis of Cellulose Esters. IV. Determination of Small Amounts of Combined Sulfur.

3:20— Report of Committee on Standards and Methods of Testing.

3:30— Business meeting.

3:40— 8. R. F. Patterson and Harold Hibbert. The Ultraviolet Absorption Spectra of Compounds Related to Lignin.

4:00— 9. R. F. Patterson and Harold Hibbert. The Ultraviolet Absorption Spectra of Ethanol Lignins.

4:15—10. Marshall Kulka and Harold Hibbert. Studies on Lignin and Related Compounds. LXIV. Isolation and Identification of (4-Hydroxy-3,5-Dimethoxyphenyl)-Propanone-2 and (4-Hydroxy-3-Methoxyphenyl)-Propanone-2 from Maple Wood.

Division of Chemical Education

F. E. Brown, *Chairman;* P. H. Fall, *Secretary*
Earl C. Spaeth, *Local Assistant*

Townsend Hall, University of Buffalo

Monday Afternoon

O. M. Smith, *Presiding*

2:30— 1. Arthur Rose, J. W. Richardson, A. W. Hutchison, and J. Clyde Underwood. Chemistry in ESMDT at The Pennsylvania State College.

2:55— 2. J. W. Richardson and Arthur Rose. Modern Plastics and ESMDT at The Pennsylvania State College.

3:20— 3. R. S. Shane and J. R. Bright. Refresher Courses in Detroit.

3:45— 4. G. W. Muhleman. Ways of Fostering Interest in the Study of Organic Chemistry.

4:00— 5. T. A. Ashford. Greater Use and More Effective Participation in the Construction of the Cooperative College Chemistry Test by Chemistry Instructors.

5:00— Meeting of the board of publication of the *Journal of Chemical Education*, followed by dinner at 6:30.

Tuesday Morning

SYMPOSIUM ON THE TEACHING AND PRACTICE OF ANALYTICAL CHEMISTRY

Joint symposium with the Division of Analytical and Micro Chemistry (see page 1030).

12:15— Divisional luncheon, N. W. Rakestraw, speaker, Raleigh Room, MacDoel's Restaurant, $1.25.

Tuesday Afternoon

F. E. Brown, *Presiding*

2:20— 6. P. J. Elving. Courses in Advanced Analytical Chemistry. I. Texts for Courses in Applied or Technical Analysis.

2:45— 7. J. T. Dobbins and Mary Eugenia Kapp. A Semimicro Scheme of Qualitative Analysis for the Anions.

3:10— 8. Ed. F. Degering and J. G. Meitner. Relative Electronegativity. IX. Oxidation-Reduction Reactions in Organic Chemistry.

3:40— 9. W. B. Meldrum and L. P. Saxer. The Molal Depression Constant for Camphor.

4:00—10. Robert Ginell. Acids and Bases. A Critical Reevaluation.

4:30—11. N. D. Cheronis, Carl Anderson, and Robert Erhardt. The Use of Dispersing Agents for Reaction between Immiscible Liquids.

5:00— Executive Committee meeting.

Wednesday Morning

G. H. Cartledge, *Presiding*

PROGRAM FOR STUDENTS

7:30— Student breakfast, Mahogany Room, Hotel Lafayette, $0.50. Attendance not limited to students; any interested registrants welcome.

9:10—12. Charles L. Parsons. Selective Service.

9:40—13. Lois Woodford. Opportunities for Women Chemists.

10:00—14. Byron A. Soule. Frozen Assets. The Problem of Putting Chemical Knowledge to Work.

10:40—15. Harold J. Barrett. What Industry Expects of Its New Technical Employees.

11:30— Business meeting.

Division of Colloid Chemistry

Fred Olsen, *Chairman;* J. W. McBain, *Secretary*
J. Lo Cicero, *Local Assistant*

Room 205, Y. M. C. A.

Wednesday Morning

9:20— 1. Fred Olsen. Introductory Remarks.

9:30— 2. Maurice L. Huggins. The Viscosity of Dilute Solutions of Long-Chain Molecules. Dependence on Concentration.

10:00— 3. Sydney Ross. Current Methods of Measuring Foam.

10:30— 4. Wilfried Heller. The Origin, the Complications, and the Applications of Electric Double Refraction and of Electric Dichroism in Dilute Dispersed Systems.

11:00— 5. M. W. Tamele, V. C. Irvine, and J. F. Mahar. Chemisorption of Sodium on Silica Gel Surface.

11:30— 6. Paul Stamberger. Technical Developments of the Electrodecantation Process.

Thursday Morning

9:30— 7. O. E. A. Bolduan and Sydney Ross. X-Ray Studies of Some Soaps.

10:00— 8. W. O. Milligan. Orientation Effects in Transparent Alumina Films.

10:15— 9. W. O. Milligan and W. C. Simpson. X-Ray Diffraction Studies on Hydrous Vanadium Pentoxide.

CONTINUED ON PAGE 1036



GLAMOUR BOY
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Maybe they used to cuss him and throw him back . . . but not any more. Because the soup-fin shark has earned Pacific coast fishermen more money than they've ever seen before. Somebody exposed the fact that his abnormally large liver has the highest Vitamin "A" content of any other in the fish liver oil industry . . . making him a bonanza to the nation . . . as well as a gold mine for the fishermen.

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10:30—10. WALTER FUCHS. Thermodynamics of Humic Acid Reactions. The Systems Humic Acid–Calcium Acetate–Water and Methoxyhumic Acid–Calcium Acetate–Water.

11:00—11. J. LEON SHEREŠHEFSKY AND ARTHUR A. WALL. Monomolecular Films of Dilauryl Maleate and Fumarate. Mixed Duplex Films.

11:15—12. ROBERT L. HARRIS, HENRY OTT, AND ORLAN M. ARNOLD. A Study of the Sorption of Vapors by Activated Alumina.

11:40—13. HAROLD F. WALTON. Equilibria in a Carbonaceous Cation Exchanger.

Thursday Afternoon

SYMPOSIUM ON REVIEWS OF APPLIED COLLOID CHEMISTRY

2:00—14. E. A. HAUSER. Colloid Chemistry Put to Technical Use.

2:40—15. H. F. WINTERKORN. Colloid Chemistry in Soil Engineering.

3:20—16. J. W. MCBAIN. Colloidal Solutions of Soaps and Modern Detergents.

4:00—17. W. M. MALISOFF. Colloidal Story of Aging.

4:40—18. A. L. JOHNSON. Colloid Chemistry in Ceramics.

Division of Fertilizer Chemistry

H. B. SIEMS, *Chairman;* CHARLES A. BUTT, *Secretary*
W. R. FLACH, *Local Assistant*

Room L, Hotel Statler

Monday Afternoon

GENERAL PAPERS

H. B. SIEMS, *Presiding*

2:00— 1. E. W. HARVEY AND L. V. ROHNER. Chemical Properties of Various Commercial Superphosphates before and after Ammoniation.

2:25 — 2. JOHN O. HARDESTY, J. RICHARD ADAMS, AND WM. H. ROSS. Factors Affecting the Availability of Ammoniated Superphosphates.

2:50— 3. P. W. ZIMMERMAN. Present Status of Plant Hormones.

3:15— 4. L. F. RADER, JR., L. M. WHITE, AND COLIN W. WHITTAKER. Effect of Mixed Fertilizers and Fertilizer Materials on the Concentration of the Soil Solution.

3:45— 5. WM. H. ROSS, J. RICHARD ADAMS, AND L. F. RADER, JR. The Relationship between the Salt Index of a Fertilizer and Its Most Efficient Placement in the Soil.

4:10— 6. M. S. ANDERSON, COLIN W. WHITTAKER, AND PAUL R. HENSON. Movement of Fertilizer in Soil from Band and Broadcast Applications.

Tuesday Morning and Afternoon

SYMPOSIUM ON POTASH

H. B. SIEMS, *Presiding*

9:00— 7. G. R. MANSFIELD. American Potash Reserves.

9:20— 8. J. W. TURRENTINE. The Wartime Contribution of the American Potash Industry.

9:45— 9. E. E. DETURK, R. H. BRAY, AND L. K. WOOD. Potassium Fixation by Corn-Belt Soils.

10:10—10. WM. A. ALBRECHT. Potassium in the Soil Colloid Complex and Plant Nutrition.

10:35—11. W. H. PIERRE AND C. A. BOWER. Potassium Absorption by Plants as Affected by Cation Interrelationships.

11:00—12. RICHARD BRADFIELD AND MICHAEL PEECH. The Effects of Lime and Magnesia on Absorption of Potassium by Soil and Plant.

11:25—13. FRANK P. CULLINAN AND L. P. BATJER. Nitrogen, Phosphorus, and Potassium Interrelationships in Young Peach and Apple Trees.

11:50—14. FIRMAN E. BEAR, STEPHEN J. TOTH, AND ALBERT S. HUNTER. Calcium and Potassium Interrelationships in Alfalfa.

12:15— Divisional luncheon, Chinese Room, Buffalo Athletic Club, $1.35.

2:00—15. G. T. NIGHTINGALE. Physiological Chemical Functions of Potassium in Crop Growth.

2:25—16. D. E. HALEY AND J. J. REID. The Bearing of Potassium on the Quality of Tobacco.

2:50—17. H. D. CHAPMAN AND S. M. BROWN. Potassium in Relation to Citrus Nutrition.

3:15—18. ALBERT ULRICH. Plant Analysis as a Diagnostic Procedure.

3:40—19. GEORGE D. SCARSETH. Tissue Testing (Quick Test) in Diagnosis.

4:05—20. L. D. BAVER. Practical Aspects of Potassium Interrelationships.

4:25—21. H. L. GARRARD. Potash Production in America. (Motion picture in color.)

Wednesday Morning

GENERAL PAPERS

H. B. SIEMS, *Presiding*

9:00—22. PHILIP MCG. SHUEY. A Short Method for the Determination of Potash in Fertilizers or Base Goods in the Absence of Ammonium Salts and Organic Matter.

9:15—23. H. L. MITCHELL AND O. W. FORD. Purity of the Potassium Chloroplatinate Obtained by the Method for Potash in Fertilizers as Affected by Concentration of Ethanol.

9:35—24. E. M. KITCHEN. Boron in Agriculture.

9:55—25. ARTHUR M. SMITH. New Horizons in Nitrogen.

10:15—26. G. L. BRIDGER AND R. M. NEEL. Phosphatic Fertilizer and Iron from Ferrophosphorus.

10:40—27. J. H. WALTHALL AND G. L. BRIDGER. Fertilizer by Fusion of Rock Phosphate with Olivine.

11:05— Business meeting and election of officers.

Division of Gas and Fuel Chemistry

ORIN W. REES, *Chairman;* G. R. YOHE, *Secretary*
FRANCIS X. NERNEY, *Local Assistant*

Perkins Hall, Y. M. C. A.

Wednesday Morning

GENERAL PAPERS

O. W. REES, *Presiding*

9:00— 1. O. W. REES. Introductory Remarks.

9:15— 2. BERNARD LEWIS AND GUENTHER VON ELBE. Stability and Structure of Burner Flames.

9:40— 3. MARCEL PRETTRE AND MICHAEL MAGAT. A Kinetic Theory for Air-Producer Gas Formation.

10:00— 4. LOUIS SHNIDMAN AND JESSE S. YEAW. Corrosion of Metals and Alloys by Flue Gases.

10:25— Business meeting.

10:50— 5. H. B. CHARMBURY, C. C. WRIGHT, A. W. GAUGER, AND J. R. LOTZ. Dyes Directly from Coal.

11:05— 6. WALTER FUCHS, T. S. POLANSKY, AND A. G. SANDHOFF. Studies on Coal Oxidation.

11:20— 7. O. W. REES AND W. F. WAGNER. Studies of the Effect of Oxidation on Ignition Temperatures and Swelling of Certain Illinois Coals.

11:40— 8. G. R. YOHE AND MYRON H. WILT. The Oxidizing Power of Illinois Coal. III. The Banded Ingredients of Franklin County (No. 6) Coal.

Thursday Morning and Afternoon

20TH ANNIVERSARY SYMPOSIUM ON USES OF COAL BY VARIOUS INDUSTRIES

H. J. ROSE, *Presiding*

9:30— 9. H. J. ROSE. Introductory Remarks.

9:45—10. J. C. WITT. Coal in the Cement Industry.

10:10—11. HUBERT G. GUY. The Agricultural Uses of Coal and Its Products.

10:45—12. H. G. TURNER. Pennsylvania Anthracite as a Filter Medium.

11:15—13. DALE BOGARD. Water Treatment by Means of Coal Products.

2:00—14. W. M. MOBLEY. Blending of Southern Coals for the Production of Foundry Coke.

2:30—15. L. D. SCHMIDT, J. L. ELDER, AND J. D. DAVIS. Influence of Storage on Caking and Coking Properties of Coal.

CONTINUED ON PAGE 1038

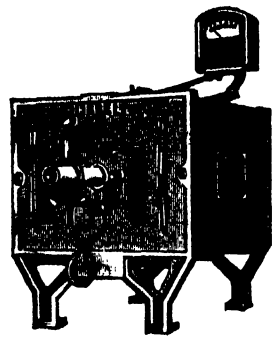
WAR SPECIFICATIONS *Can Be* MET WITH

Temperatures up to 2650°F.

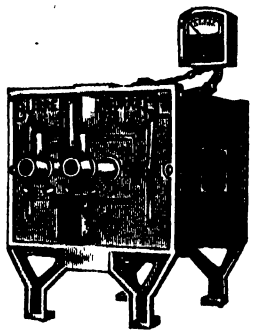
MORE SPEED—Burrell Furnaces produce the higher temperatures now necessary for fast, clean carbons in "war-steel" analyses. No accelerators are required. Tap transformers modernize heat control.

GREATER ACCURACY—Thorough burning is assured. Carbon weighings can be counted upon. Accurate carbon and sulfur determinations in "war-time" alloys are no problem.

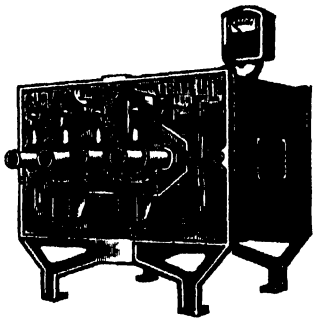
QUICK ELEMENT CHANGE—Non-metallic (no nickel or chromium) silicon carbide, rod type, heating elements are changed conveniently without dismantling the furnace.



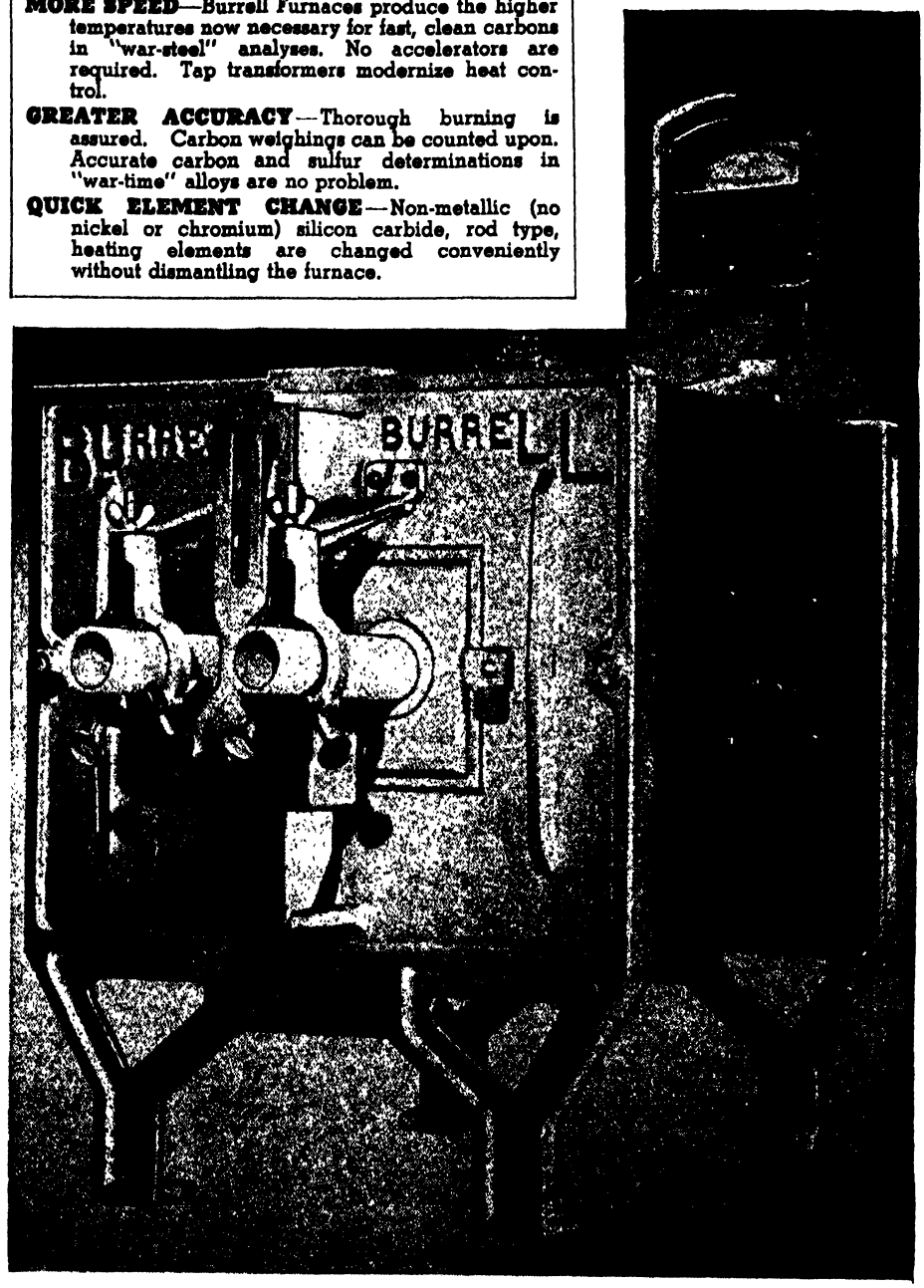
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3:00—16. Reginald L. Wakeman and B. H. Weil. Coal as a Source Material for the Plastics Industry.

3:40—17. Harry L. Fisher. Coal in the Manufacture and Use of Synthetic Rubbers.

4:10—18. H. C. Howard. Possible New Uses for Coal in the Chemical Industry.

Division of Industrial and Engineering Chemistry

L. W. Bass, *Chairman;* Whitney Weinrich, *Secretary*
M. E. Graham, *Local Assistant*

Georgian Room, Hotel Statler

Monday Afternoon

GENERAL PAPERS

L. W. Bass, *Presiding*

2:00— 1. R. T. Armstrong and Karl Kammermeyer. Countercurrent Leaching.

2:20— 2. Ed. F. Degering and George C. Gross. A Study of the Industrial Preparation of Sulfamide.

2:40— 3. John L. Wilson and Elwyn E. Mendenhall. The Measurement of Detergency. I. The Measurement on Films Formed on Glass Surfaces during Washing Processes.

3:00— 4. Arthur W. Hixson and J. Perry Morgan. The Separation of Vanadium Pentoxide from Phosphoric Acid Mixtures.

3:20— 5. Stanford W. Briggs and Edward W. Comings. Effects of Temperature on Liquid-Liquid Equilibrium.

3:40— 6. A. J. Liebmann and M. Rosenblatt. Whisky and Its Changes during Maturing.

4:00— 7. Donald F. Othmer. Composition of Vapors from Boiling Binary Liquids.

4:20— 8. Donald F. Othmer and Robert L. Ratcliffe, Jr. Recovery of Water-Soluble Organic Liquids by Solvent Extraction. Heat Economy of Subsequent Distillation as Compared to Ordinary Distillation.

Tuesday Morning

SYMPOSIUM ON RESEARCH MANAGEMENT

F. J. Curtis, *Presiding*

9:00— 9. Lincoln T. Work. What is Research?

9:30—10. C. E. K. Mees. Direction of Research.

10:00—11. Daniel M. Sheehan and F. J. Curtis. Research Accounting.

10:30—12. Bonifant Hamilton and William H. Deitch. Patents.

11:00—13. H. B. Hass. Graduate Fellowship System.

11:30—14. Eugene Ayres. Evaluation of Research.

12:15— Divisional luncheon, Ballroom, Hotel Lafayette, $1.35.

Tuesday Afternoon

SEVENTH SYMPOSIUM ON UNIT PROCESSES

R. Norris Shreve, *Presiding*

2:00—15. E. T. McBee, H. B. Hass, and Carl Bordenca. The Chlorinolysis of Hydrocarbons and Their Partially Chlorinated Derivatives.

2:30—16. Whitney Weinrich. Synthesis of Alkylated Cresols from a Refinery Butane-Butene Fraction.

3:00—17. Donald F. Othmer and George A. Fenstrom. The Destructive Distillation of Bagasse.

3:20—18. Raphael Katzen, Robert E. Muller, and Donald F. Othmer. Destructive Distillation of Lignocellulose.

3:40—19. Donald F. Othmer and Raphael Katzen. Removal of Tar-Forming Constituents from Pyroligneous Acids by Polymerization and Condensation.

4:05—20. Robert W. Merritt and Alfred H. White. The Partial Pyrolysis of Wood.

Wednesday Morning

SEVENTH SYMPOSIUM ON UNIT PROCESSES (*Continued*)

R. Norris Shreve, *Presiding*

9:00—21. Kenneth A. Kobe and Norman J. Deiglmeier. Strontium Carbonate from Strontium Sulfate by Metathesis with Alkali Carbonate Solution. III. Metathesis between Solids and Solutions.

9:25—22. R. Norris Shreve and Russell W. Welborn. Some Catalytic Vapor-Phase Oxidations in the Naphthalene Series.

9:45—23. R. Norris Shreve and John H. Lux. The Monosulfonation of 2-Methylnaphthalene.

10:05—24. Donald F. Othmer, Joseph J. Jacobs, Jr., and Wilbur J. Buschmann. Sulfonation of Naphthalene. Application of Partial-Pressure Distillation.

10:25—25. Donald F. Othmer, Joseph J. Jacobs, Jr., and Allan Hokanson. Sulfonation of Aniline. Application of Partial-Pressure Distillation.

10:45—26. W. A. Pardee and B. F. Dodge. Catalytic Vapor-Phase Alkylation of Benzene with Ethylene.

Division of Medicinal Chemistry

John H. Gardner, *Chairman;* John H. Speer, *Secretary*
James O. Ralls, *Local Assistant*

Parlors D and E, Hotel Statler

Wednesday Morning

9:00— 1. Jonas Kamlet. Yeast as a Source of Ribose.

9:12— 2. D. F. Nealon. A Method of Recording and Measuring the Color of the Skin and a Study of the Effects of Ammoniated Mercury Ointment on the Skin.

9:26— 3. W. S. Frost. Bis(Amino Acid) Halogen Acid Derivatives.

9:40— 4. A. D. Emmett, Eva R. Hartzler, and R. A. Brown. The Effect of Sodium Diphenyl Hydantoinate (Dilantin Sodium) on Utilization of Ascorbic Acid by Guinea Pigs.

9:55— 5. K. A. Oster and Harry Sobotka. Antipressor Effects of Orthoquinoid Epinephrine Derivatives in Experimental Hypertension.

10:05— 6. H. W. Rhodehamel, Jr., with Ed. F. Degering. Bacteriostatic Properties of Certain Derivatives of Thiophene.

10:13— 7. E. H. Woodruff, Brooke D. Aspergren, and F. Mantele. Germicidal Activity of Quaternary Ammonium Salts Containing an Ester Group.

10:25— 8. E. I. Valko and A. S. Dubois. The Antibacterial Action of Surface-Active Cations. I. Inhibition, Killing, and Revival by Cationic Exchange.

10:40— 9. A. S. Dubois and E. I. Valko. The Antibacterial Action of Surface-Active Cations. II. Protective Action by Harmless Cations.

10:47—10. G. O. Doak, Harry Eagle, and H. G. Steinman. Benzenearsonic Acids and Arsine Oxides Containing the Azo Linkage.

11:02—11. A. V. Tolstoouhov. The Importance of Physicochemical Characteristics of Drugs in Directing the Course of Research in Chemotherapy.

11:13—12. E. H. Northey, A. E. Pierce, and D. J. Kertesz. Sulfanilamide Derivatives. VIII. Sulfanilylamidines.

11:28—13. G. W. Anderson, H. E. Faith, H. W. Marson, P. S. Winnek, and Richard O. Roblin, Jr. Studies in Chemotherapy. VI. Sulfanilamido Heterocycles.

11:38—14. Richard O. Roblin, Jr., and Paul H. Bell. Studies in Chemotherapy. VII. A Theory of the Relation of Activity of Sulfanilamide Type Compounds.

12:00— Business meeting.

12:15— Divisional luncheon, Rooms GHI, Buffalo Athletic Club, $1.35.

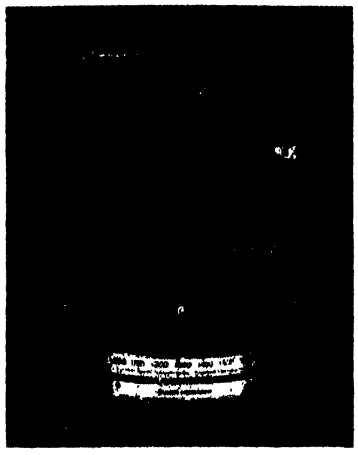
CONTINUED ON PAGE 1043



Here's what UNIVERSAL

TEMPERATURE CONTROLLERS

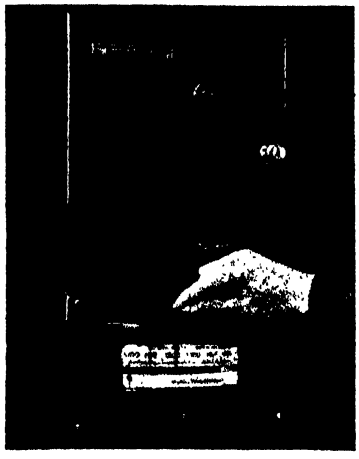
mean to you. Instantaneous control action with the famous "Electronic Principle" control system and extreme accuracy of temperature measurement, plus interchangeability of all component parts, interchangeability of scale ranges, ready accessibility of all parts for individual checking and many other features. Wheelco UNIVERSAL Controllers include Capacitrols, Potentio-trols, Limitrols and Resistance Thermo-trols.



1

UNIVERSAL Temperature Controllers may be either flush mounted, as illustrated, or surface mounted.

Wheelco Instruments Co.
851 W. HARRISON STREET CHICAGO, ILL.



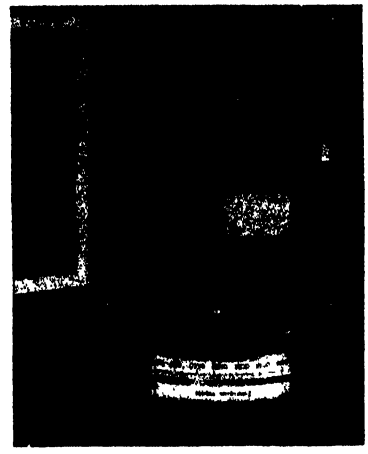
2

Temperature Control Adjustment easily made from front of Controller. Control Setting may be locked inside case if desired.



3

Controller Case has push type lock with spring catch as a precaution against sabotage.



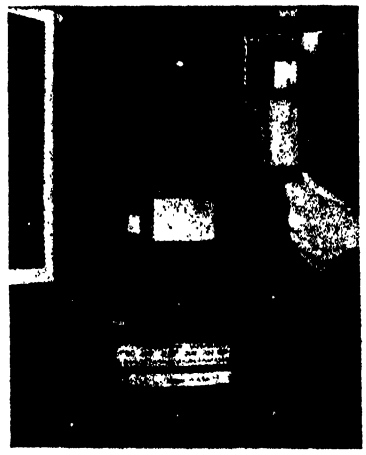
4

Open view shows simplicity and compactness of instrument construction. Auxiliary equipment may be incorporated in space at left.



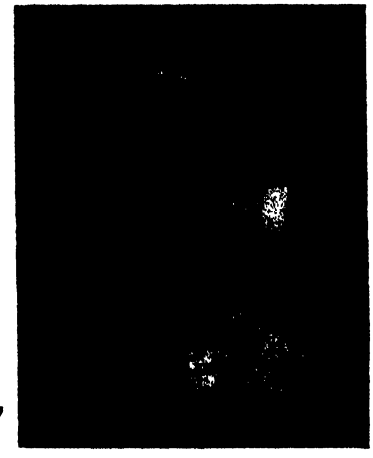
5

Removing plug-in relay. Relay interchangeability permits conversion of any type UNIVERSAL Controller to Limitrol or back.



6

Plug-in Control Chassis is easily removed for inspection or replacement. Plug sockets may be seen above relay.



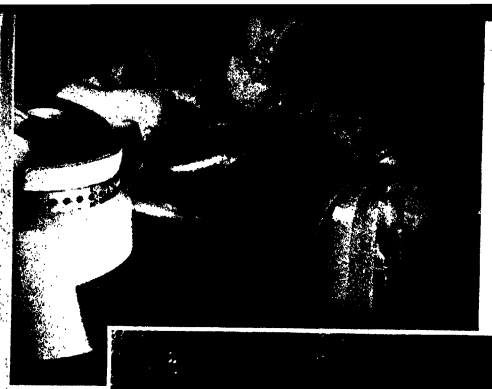
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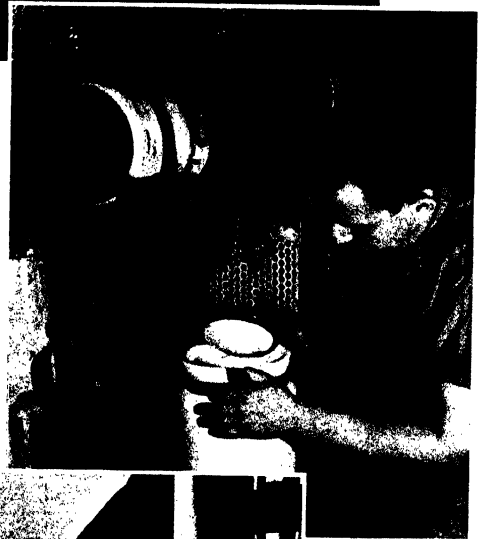
Interchangeable Measuring Sections place choice of scale range or type of millivolt measuring system at disposal of operator.

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THE CHEMICAL NEWS PARADE

See "Synthetic Resin Replaces Industrial Rubber", page 1003

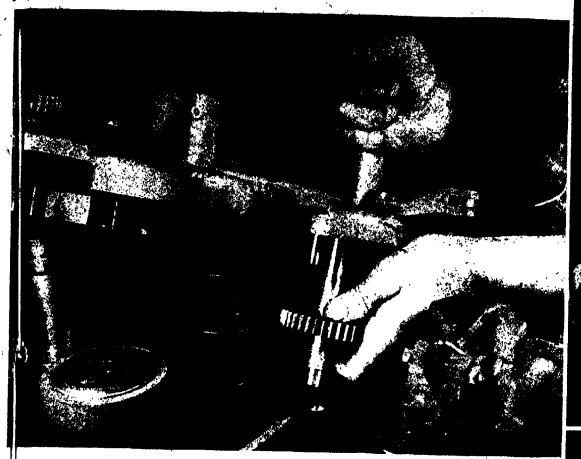








Upper left corner. Workman at RCA Manufacturing Co. cuts a ball mill gasket from a sheet of Resistoflex. The synthetic compound is far more resistant to chemicals used in the mill than the rubber and synthetic rubber gaskets previously used, besides releasing quantities of these scarcer products for other purposes. *Left.* RCA workman fixes cover on a ball mill jar prior to placing it in the rotating unit. A gasket made of Resistoflex, unaffected by chemicals ground in the mill, is used to seal the jar cover. *Lower left corner.* RCA operator shows how a Resistoflex tube made from roller sheet is used as a suction line on a sandblast machine. The Resistoflex hose has been in service for nearly three months. Previous rubber hoses had to be replaced at least weekly. *Below.* Jaws of forming press for small parts are lined with Resistoflex sheet cemented directly to the metal. Use of the synthetic compound in this one operation has resulted in tremendous savings for RCA. *Right below.* Workman installs a Resistoflex vibration block on wire cutter at RCA. The blocks can be seen at bottom of the picture. The light-colored block was made of a standard compound and had to be drilled to increase resiliency. A new compound (the dark block in the picture) was then formulated to give the exact hardness and elasticity required in this critical operation. *Right center.* A sheet Resistoflex shield protects the operator's wrists in a sandblast machine for cleaning small parts. Resistoflex resistance to abrasion and wear has made the shield far outlast its rubber predecessors. At the same time flexibility in compounding Resistoflex PVA materials has made it possible to formulate a substance which combines maximum protection and durability with the required flexibility.

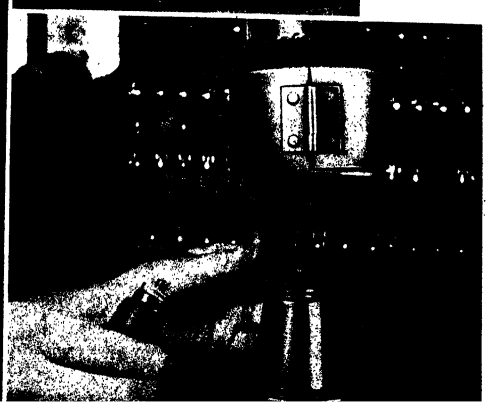


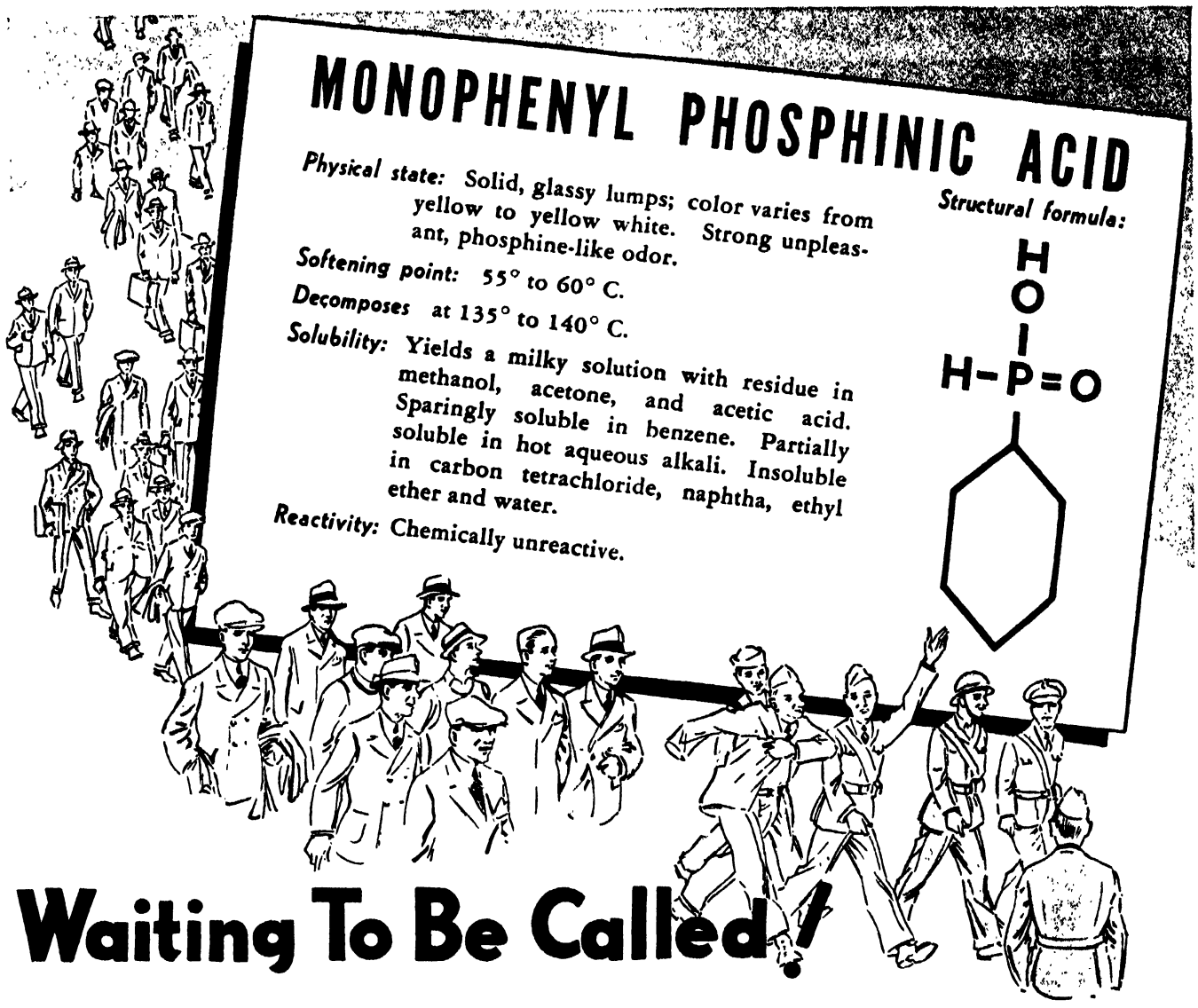




Above. Another point at which Resistoflex compounds are replacing rubber at RCA in transmission rings which rotate against metal gears to supply power for various operations. *Upper right corner.* Resistoflex hose, which has demonstrated great resistance to flexing and to vibration, is shown in use as gas and air line connectors on an automatic machine. It has a Resistoflex PVA material core and braided cotton outer jacket. *Lower right corner.* A Resistoflex aligning ring replacing rubber in an operation for clinching metal parts on RCA tubes has shown a life of three weeks compared to a few hours for rubber rings formerly used.







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- Alkyl Ammonium Phosphates
- Fireproofing Compounds
- Calcium Phosphates
- Magnesium Phosphates
- Potassium Phosphates
- Sodium Phosphates
- Sodium Pyrophosphates
- Potassium Pyrophosphate
- Alkyl Acid Pyrophosphates
- Formic Acid
- Aluminum Formate
- Sodium Formate
- Sodium Boroformate
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Division of Organic Chemistry

LEE I. SMITH, *Chairman;* ARTHUR C. COPE, *Secretary*
J. S. SEARER, *Local Assistant*

Terrace Room, Hotel Statler

Monday Afternoon

2:00— 1. STEWART E. HAZLET, LEE C. HENSLEY, AND HERMAN JASS. The Bromination of 4-Phenylphenyl Chloroacetate.

2:15— 2. R. C. HUSTON, R. L. GUILE, R. J. CURTIS, AND M. T. ESTERDAHL. Condensation of Secondary Alcohols with Phenol in the Presence of Aluminum Chloride.

2:30— 3. ARTHUR MICHAEL AND HOWARD S. MASON. The Normal Addition of Hydrogen Bromide to 3-Butenoic, 4-Pentenoic, and 5-Hexenoic Acids in Hexane.

2:45— 4. H. MARJORIE CRAWFORD, MARY ELIZABETH SAEGER, AND FLORENCE E. WARNEKE. The Reaction of *n*-Butylmagnesium Bromide with Certain Aromatic Ketones.

3:00— 5. EDITH WILSON AND E. EMMET REID. The Synthesis of the Dimethyl Ether of Hexestrol from Anethole Hydrobromide by the Wurtz-Fittig Reaction.

3:15— 6. CHARLES C. PRICE AND GEORGE P. MUELLER. The Condensation of Cyclohexene and 3-Hexene Chlorides with Anisole.

3:30— 7. PURNENDU NATH CHAKRAVORTY AND MILDRED M. WESNER. On Cafesterol.

3:45— 8. WILLIAM MARIAS MALISOFF AND PHILIP H. VAN ITALLIE. Studies in the Thiosterols. II. Thiodihydrocholesterol and Its Derivatives.

4:00— 9. O. C. DERMER AND JACK KING. *N*-Benzyl Amides as Derivatives for Identifying the Acyl Group in Esters.

4:15—10. B. H. GWYNN AND ED. F. DEGERING. Condensation Products of Ketenes with Ketones.

4:30—11. ARTHUR L. DAVIS AND WM. HOWLETT GARDNER. Nature and Constitution of Shellac. XVII. The Naegeli-Curtius Series of Degradation Reactions Applied to Shellolic Acid.

4:45—12. MARTIN S. KULPINSKI AND F. F. NORD. Studies of the Catalytic Condensation of Aldehydes.

5:00—13. EDMUND L. NIEDZIELSKI AND F. F. NORD. On the Mechanism of the Gattermann Reaction.

Tuesday Morning and Afternoon

9:00—14. V. I. KOMAREWSKY AND T. H. KRITCHEVSKY. Synthesis of Olefin Hydrocarbons by Catalytic Condensation and Dehydration of Aliphatic Aldehydes.

9:15—15. L. L. GERSHBEIN, HERMAN PINES, AND V. N. IPATIEFF. The Decomposition of Isopropyl Alcohol over Mixed Magnesium Oxide Catalyst.

9:30—16. FRANCIS OWEN RICE AND RALPH ROBERTS. The Structure of Diketene.

9:45—17. WILLIAM PENN TUTTLE, JR., AND THOMAS L. JACOBS. The Polymerization of Phenoxyacetylene.

10:00—18. ALFRED W. FRANCIS. Correlation of Physical Properties of Paraffin Hydrocarbons.

10:15—19. DAVID CRAIG. The Geometric Isomers of Piperylene.

10:30—20. G. BRYANT BACHMAN AND ROGER E. HATTON. Reactions of 4-Methyl-1,3-Pentadiene.

10:45—21. C. F. H. ALLEN AND J. W. GATES, JR. The Action of Alkaline Reagents on the Bimolecular Product Formed by the Action of Acidic Dehydrating Agents on Anhydracetonebenzil.

11:00—22. C. F. H. ALLEN AND J. W. GATES, JR. The Structure of the Bimolecular Product Formed by the Action of Acidic Dehydrating Agents on Anhydracetonebenzil.

11:15—23. C. F. H. ALLEN AND J. W. GATES, JR. The Behavior of Certain Carbonyl Bridge Compounds with Alkaline Hydrogen Peroxide.

11:30—24. EDNA M. MONTGOMERY, NELSON K. RICHTMYER, AND C. S. HUDSON. The Alkaline Degradation of Phenylglycosides; a New Method for Determining the Configuration of Phenylglycosides.

11:45—25. F. C. WHITMORE AND HARRY D. ZOOK. Action of Sodium Alkyls on Aliphatic Chlorides. Relation to the Wurtz Reaction.

2:00—26. FRANCES C. BROWN. The Friedel-Crafts Reaction with *o*-Nitrophenol and Acyl Halides.

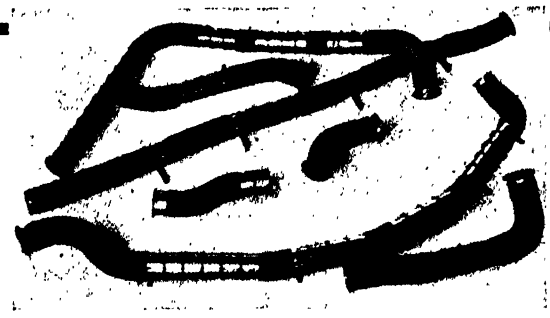
2:15—27. M. L. CROSSLEY, R. H. KIENLE, AND C. H. BENBROOK. Chemical Constitution and Reactivity. II. Decomposition of *o*-Methoxybenzenediazonium Chloride.

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The physical adaptability of REX Flexible Metal Hose simplifies design and assembly problems alike. Almost every consideration of vibration, movement, alignment, saving of space and saving of weight in fluid handling problems points to one or another of the many production types of REX Flexible Metal Hose.

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2:30—28. MELVIN S. NEWMAN. A Mechanism for the Formation of Anthraquinone from *o*-Benzoylbenzoic Acid.

2:45—29. MELVIN S. NEWMAN AND HARRY V. ZAHM. Catalytic Dehydrogenation of 2-Substituted-5,6,7,8-Tetrahydronaphthalene Derivatives.

3:00—30. WILLIAM G. YOUNG AND ART C. MCKINNIS. The Ozonization of Compounds Containing Allylic Systems.

3:15—31. F. H. WESTHEIMER, WILLIAM E. GRIGSBY, JOHN HIND, AND JACOB CHANLEY. The Malonic Ester Reaction and Walden Inversion.

3:30—32. PHILIP SKELL AND CHARLES R. HAUSER. The Use of Deuterium for Determining the Mode of Elimination of the Elements of Hydrogen Halides from Alkyl Halides in the Presence of Bases.

3:45—33. PHILIP SKELL AND CHARLES R. HAUSER. α-Elimination of Hydrogen Halide and Formation of Diradicals.

4:00—34. T. A. GEISSMAN AND LESTER MORRIS. The Reaction between Cyclic β-Diketones and Grignard Reagents. II. 8,8-Dimethylperinaphthindandione-7,9.

4:15—35. D. S. TARBELL AND MARK C. PAULSON. Attempted Asymmetric Syntheses Involving the Grignard Reagent in Optically Active Solvents.

4:30—36. S. WAWZONEK AND H. A. LAITINEN. The Reduction of Unsaturated Hydrocarbons at the Dropping Mercury Electrode. II. Aromatic Polynuclear Hydrocarbons.

4:45—37. MELVIN J. ASTLE AND WAYNE V. MCCONNELL. Polarographic Investigations of Hydrogen Bonding. I. *o*- and *p*-Nitrophenols.

Wednesday Morning

9:00—38. GEORG CRONHEIM AND OSKAR BAUDISCH. New Alkyl-Substituted *o*-Nitrosophenols and Their Metal Compounds.

9:15—39. E. R. ATKINSON, M. MANZONE, D. HOLM-HANSEN, A. NEVERS AND S. A. MARINO. Symmetrical Biaryls from Diazotized Amines. Reducing Agents. II.

9:30—40. STEWART E. HAZLET AND RAYMOND W. MORROW. Compound Formation between the Isomeric Phenylphenols and Pyridine.

9:45—41. EDWARD J. MASTERS AND MARSTON TAYLOR BOGERT. Researches on Thiazoles. XXV. Some New Thiazolinopyrimidines of Barbituric Acid Type.

10:00—42. EDWARD J. MASTERS AND MARSTON TAYLOR BOGERT. Researches on Thiazoles. XXVI. Some Acyl Derivatives of 2-Aminothiazole.

10:15—43. ROBERT L. FRANK, ROBERT W. HOLLEY, AND DONALD M. WIKHOLM. The Preparation and Some Derivatives of 3,2′-Nicotyrine.

10:30—44. J. G. BAXTER, C. D. ROBESON, J. D. TAYLOR, AND R. W. LEHMAN. Natural α-, β-, γ-Tocopherols and Certain Esters of Physiological Interest.

10:45—45. KARL J. BRUNINGS AND ALSOPH H. CORWIN. Effect of Substituents on the Structure of Dipyrrylmethene Salts. Preparation of Dipyrrylmethyl Bromides and Carbinols.

11:00—46. C. F. H. ALLEN AND F. P. PINGERT. The Chemistry of *o*-Terphenyl. II. Derivatives Prepared from the Hydrocarbon.

11:15—47. A. WEISSBERGER AND H. D. PORTER. Investigation of Pyrazole Compounds. I. The Reaction Product of Phenylhydrazine and Ethyl Cyanoacetate.

11:30—48. STANLEY E. KRAHLER AND ALFRED BURGER. The Nitration of Lepidine and 2-Chlorolepidine.

11:45—49. HELEN THAYER AND R. W. HELMKAMP. The Hofmann Degradation of Some Phenylated Acrylamides.

12:00—50. C. H. FISHER, CHESSIE E. REHBERG, AND LEE T. SMITH. Pyrolysis of Lactic Acid Derivatives. Preparation of Allyl and Methallyl Acrylates.

Division of Paint, Varnish, and Plastics Chemistry

S. L. BASS, *Chairman;* A. C. ELM, *Secretary*
C. J. WILT, *Local Assistant*

Police Academy

Tuesday Afternoon

2:00— 1. HERBERT LEADERMAN. Creep Phenomena in Filamentous Materials and Other High Polymers.

2:30— 2. T. ALFREY, A. BARTOVICS, AND H. MARK. The Thermodynamic Properties of High Polymer Solutions. I. Osmotic Pressure.

3:00— 3. T. ALFREY, J. HANSON, AND W. ZYBERT. The Thermodynamic Properties of High Polymer Solutions. II. Vapor Pressure.

3:30— 4. G. GOLDFINGER, D. JOSEFOWITZ, AND H. MARK. Measurement of the Heat of Polymerization of Styrene.

4:00— 5. MAURICE L. HUGGINS. The Viscosity of Dilute Solutions of Long-Chain Molecules. Dependence on the Solvent.

6:30— Joint dinner with the Western New York Production Club, Ballroom, Hotel Statler, $3.00.

Wednesday Morning

9:00— 6. L. L. CARRICK AND HERBERT JAMES FLETCHER. Study of the Bodying of Glyceryl Trilinoleate with Ethyl Cellulose.

9:30— 7. STEPHEN E. FREEMAN. Solvent Fractionation of Glyceride Oils.

10:00— 8. H. C. EVANS, D. W. YOUNG, AND R. L. HOLMES. Asphalt-Polybutene Paints.

10:30— 9. ROBERT W. STAFFORD. Isolation and Identification of the Resinous Binder in Water Paints.

11:00—10. HENRY F. PAYNE. The Dip-Coater, an Instrument for Making Uniform Films by the Dip Method.

11:30— Annual business meeting and election of officers.

Division of Petroleum Chemistry

J. K. ROBERTS, *Chairman;* L. M. HENDERSON, *Acting Secretary*
C. W. GEORGI, *Local Assistant*

Terrace Room, Hotel Statler

Thursday Morning and Afternoon

9:00— 1. A. C. BYRNS AND T. F. DOUMANI. Ketones by Condensation of Acid Anhydrides with Olefins.

9:20— 2. E. T. SCAFE, K. F. HAYDEN, AND V. A. KALICHEVSKY. Reduction of Ash Content of Residual Oils with Boric Acid.

9:40— 3. ROBERT R. WHITE AND GEORGE GRANGER BROWN. Phase Equilibria at High Temperatures.

10:10— 4. A. J. GOOD, W. C. ROUSSEAU, AND M. H. HUTCHINSON. Liquid Capacity of Bubble Cap Plates.

10:30— 5. R. G. LARSEN AND F. A. ARMFIELD. Catalysis of Lubricating Oil Oxidation.

11:00— 6. S. K. TALLEY AND R. G. LARSEN. Lubricating Oil Detergency.

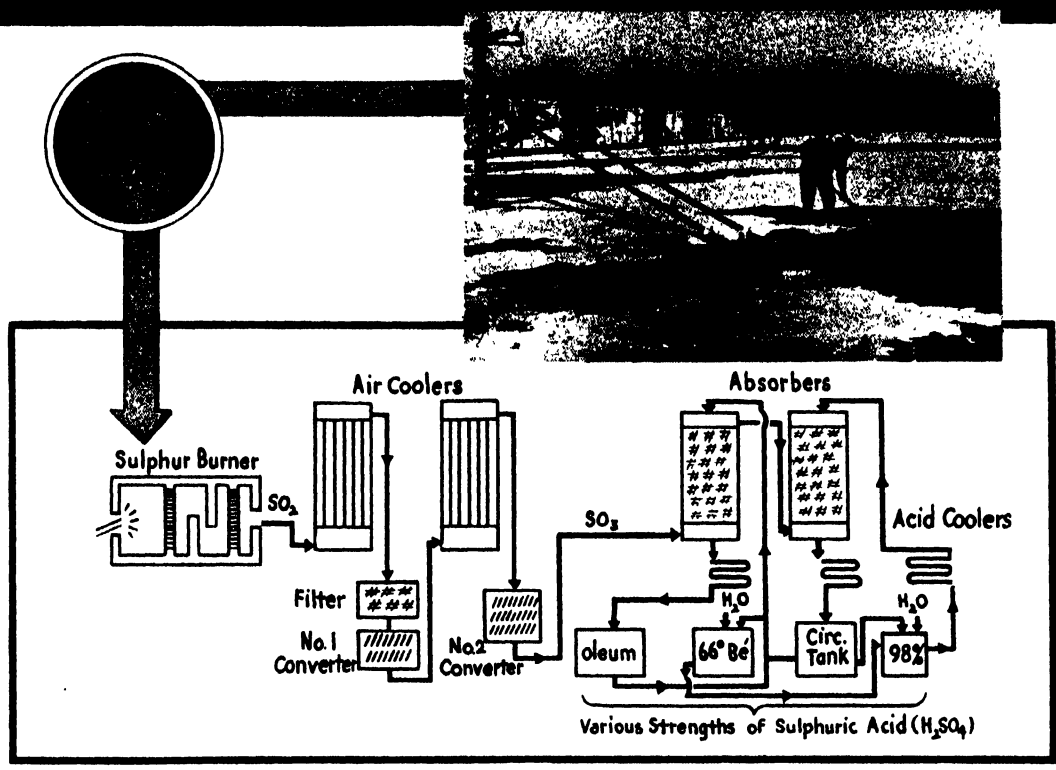
11:20— 7. E. E. NELSON AND W. S. BONNELL. Solubility of Hydrogen in *n*-Butane.

2:00— 8. M. R. LIPKIN AND C. C. MARTIN. Relation of Refractive Index Density and Molecular Weight for all Saturated Hydrocarbons.

CONTINUED ON PAGE 1046



HOW SULPHUR SERVES INDUSTRY



SULPHURIC ACID

{Contact Process}

Sulphur is burned to sulphur dioxide (SO_2). This is cooled, filtered, and passed to a converter. Here a catalyst causes the sulphur dioxide to take on an atom of oxygen to form sulphur trioxide (SO_3). Sulphur trioxide then compounds with water into sulphuric acid (H_2SO_4).

Sulphuric acid is used in the preparation of so many products—fertilizer, rayon, steel, textiles, etc.—that it has been called the "pig iron" of the chemical industry. Its consumption is the yardstick often used to gauge the volume of industrial activity. It is easily and economically made from Sulphur produced by Texas Gulf because it is 99½% pure and free from arsenic, selenium and tellurium.

Sulphuric acid is of vital importance to American industry. To the acid manufacturer, a dependable source of Sulphur is of equal importance. Texas Gulf Sulphur Company has above ground ready for shipment more than a year's supply for the entire nation. This, together with large underground reserves and efficient mining methods, is assurance of an unfailing supply.

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2:20— 9. Emma P. Carr and Lucy W. Pickett. Ultraviolet Absorption Spectra of a Series of Dienes.

2:40—10. J. H. Ottenweller, Clark Holloway, Jr., and Whitney Weinrich. Liquid-Vapor Equilibrium Composition in HCl–*n*-Butane System.

2:55—11. W. F. Seyer, R. F. Patterson, and J. L. Keays. Density and Transition Points of Straight-Chain Paraffin Hydrocarbons.

3:10—12. Charles F. Weinaug and Donald L. Katz. Surface Tensions of Methane-Propane Mixtures.

3:30—13. J. C. Dean, R. J. De Gray, and J. W. Wilson, Jr. Photoelectric Color. II. A Study of Light-Colored Petroleum Products.

3:50—14. E. P. Rittershausen and R. J. De Gray. Determination of Sucrose (in Drilling Mud).

4:10— Business meeting.

6:30— Divisional dinner, Gerrans Room, Hotel Touraine, $1.65.

Division of Physical and Inorganic Chemistry

W. C. Fernelius, *Chairman;* O. K. Rice, *Secretary*
H. R. Engle and G. B. Graham, *Local Assistants*

Monday

6:30— Divisional dinner, Washington Room, Hotel Touraine, $1.65.

Tuesday Morning

SECTION A. SYMPOSIUM ON KINETICS USING TRACER ISOTOPES

Room M, Hotel Statler

W. F. Libby, *Presiding*

9:00— 1. W. F. Libby. Introduction.

9:10— 2. Glenn T. Seaborg. Review of Artificial Radioactive Isotopes Useful as Tracers.

9:55— 3. Edwin O. Wiig. Radio-Bromine and -Iodine as Aids in the Determination of Certain Reaction Mechanisms.

10:40— 4. H. C. Anderson and R. D. Fowler. The Kinetics of Exchange Reactions of Radio-Active Bromide Ion with α-Bromo Carbonyl Compounds.

11:25— 5. W. F. Libby. Kinetics of Certain Thermal and Activated Exchange Processes.

SECTION B. PHYSICAL AND INORGANIC CHEMISTRY

Room K, Hotel Statler

W. C. Fernelius, *Presiding*

9:00— 6. I. Amdur. Average H—H_2 Repulsive Potential from Collision Cross-Section Measurements.

9:20— 7. Hugh M. Spencer and Gordon N. Flannagan. Empirical Heat Capacity Equations of Gases.

9:40— 8. R. L. Livingston and L. O. Brockway. The Structures of Dimethyl Silicon Dichloride, Methyl Silicon Trichloride, and Trifluoro Silicon Chloride.

10:00— 9. L. O. Brockway, J. H. Secrist, and C. M. Lucht. The Structures of CHF_3, $CClF_3$, CF_3CF_3, CH_2CF_2, and CHF_2CHF_2. The Effect of the CF_3 Radical on Attached Groups.

10:20—10. Harold Simmons Booth and Reuben Alexander Osten. The Fluorination of Chlorosiloxane.

10:40—11. Edwin M. Larsen, W. Conard Fernelius, and Laurence L. Quill. Concentration of Hafnium; Preparation of Hafnium-Free Zirconia.

11:00—12. D. W. Pearce and R. G. Russell. Fractionation of the Rare Earths by Zeolite Action.

11:20—13. Melvin L. Schultz and Ernest F. Lilek. Absorption Spectra of Some Double Salts Containing Cobaltous Chloride.

11:40—14. Joseph J. Burbage and W. Conard Fernelius. A Zerovalent Compound of Palladium.

Tuesday Afternoon

SECTION A. SYMPOSIUM ON KINETICS USING TRACER ISOTOPES (*Continued*)

Room M, Hotel Statler

W. F. Libby, *Presiding*

2:00—15. Victor K. La Mer and Frank Brescia. Deuterium Kinetics in Solutions.

2:45—16. A. R. Olson. A Possible Form of the Rate Equation.

3:30—17. A. Farkas. The Mechanism of the Catalytic Exchange of Hydrogen Atoms in Hydrocarbons.

4:15— General discussion of techniques.

SECTION B. SYMPOSIUM ON FLOW UNDER ABNORMAL CONDITIONS

Room K, Hotel Statler

H. Mark, *Presiding*

2:00—18. H. Mark. Introduction.

2:10—19. Robert Simha. On Anomalies of Elasticity and Flow and Their Interpretation.

3:00—20. William D. Harkins. Flow in Two-Dimensional Systems.

3:50—21. Nelson W. Taylor. Anomalous Flow in Glasses.

4:40—22. Elmer O. Kraemer. Anomalous Viscosity of Organic High Polymers.

Wednesday Morning

SECTION A. PHYSICAL CHEMISTRY

Room M, Hotel Statler

O. K. Rice, *Presiding*

9:00—23. J. E. Ricci and G. J. Nesse. Solubility of Potassium Iodate and Zinc Iodate in Dioxane-Water Mixtures. Effect of Sorting of Solvent Molecules.

9:20—24. B. A. Smith, A. L. Courtney, and Brother Columba Curran. Dielectric Properties of Butylacetylene in Oxygen-Containing Solvents.

9:40—25. Elizabeth Monroe Boggs and John G. Kirkwood. Theory of the Transitions Due to Hindered Rotation in the Solid Hydrogen Halides.

10:00—26. Robert Ginell and Robert Simha. On the Kinetics of Polymerization Reactions. I. First Order Initiation of Chains.

10:20—27. Robert Ginell and Robert Simha. On the Kinetics of Polymerization Reactions. II. Second Order Initiation and Mutual Stabilization of Chains.

10:40—28. J. Abere, G. Goldfinger, H. Mark, and H. Naidus. Kinetics of Styrene Polymerization in Various Solvents.

11:00—29. T. Alfrey, G. Goldfinger, and H. Mark. The Nature of the Second Order Transition in Polystyrene.

11:20—30. Charles P. Roe and Roswell H. Ewart. An Electrophoretic Study of the Proteins in Rubber Latex Serum.

SECTION B. INORGANIC CHEMISTRY

Room K, Hotel Statler

W. C. Fernelius, *Presiding*

9:00—31. Noel F. Albertson and W. Conard Fernelius. Addition Compounds of Sulfur Dioxide.

9:20—32. G. R. Finlay and A. W. Laubengayer. Donor-Acceptor Bonding in the Etherates of Boron Trifluoride.

9:40—33. S. H. Bauer, G. R. Finlay, and J. M. Hastings. The Structures of Substitution and Addition Compounds of Boron Trifluoride.

10:00—34. Herbert C. Brown and Richard Adams. Studies in Stereochemistry. II. Steric Strains as a Factor in the Stability of Some Etherates of Boron Fluoride.

10:20—35. Louis E. Marchi, W. Conard Fernelius, and James P. McReynolds. The Stereochemistry of Coordination Number Eight.

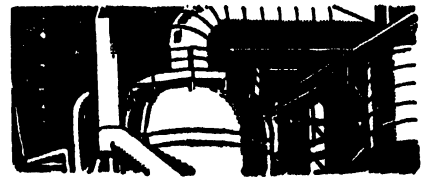
10:40—36. J. P. McReynolds and L. E. Marchi. Chemical Studies on Configuration of Inorganic Octa-Covalent Compounds: Optical Activity.

11:00—37. R. S. Weisz and A. W. Laubengayer. A Hydrothermal Study of Equilibria in the System Alumina-Water.

11:20—38. W. F. Ehret and D. H. Gurinsky. The Thermal Diagram of the System Iron-Tin.

11:40— Annual business meeting.

CONTINUED ON PAGE 1048



ROLL CALL

OF OUR SYNTHETIC RESIN PRODUCTS IN THE WAR EFFORT

☆ ☆ ☆ ☆ ☆

EVERY day our synthetic resins are helping America grow stronger in the air and on land and sea. Some are "veterans" we introduced as far back as 1926; others have been performing special jobs in industry for several years; still others are new "soldiers" developed specifically to solve war problems. In one respect, these synthetic resins are identical—all are quality products that work and fight well.



PLYWOOD ADHESIVES

Today's rapid production of plywood airplanes, motor torpedo and assault boats is largely due to the advent of TEGO phenolic resin film in 1935. This resin adhesive made possible the first completely weather-, water-, and fungus-proof plywood. The newer cold-setting resin adhesive, UFORMITE CB-551, is setting new standards in structural fabrication where extremely strong, wood-to-wood bonds are required



WOOD AND METAL COATINGS

Modern quick drying oleoresinous finishes began with the introduction of AMBEROL phenol formaldehyde resins in 1926. The DURAPLEX alkyd type finishes, UFORMITE urea formaldehyde type finishes are two other major classes of finishes developed in our laboratories which are speeding the production of wood and metal war products. For speed-of-dry, and durability, such finishes are widely used on tanks and jeeps.



RESIN EMULSION PAINTS

Over 10 years ago, work was started in the Resinous Products & Chemical Laboratories to find out how synthetic resin emulsions could be used as paints. The resin emulsion, AQUAPLEX, resulted and has become the base of many paints now used to camouflage gun emplacements, munitions depots and large war plants. Many of the government's largest building projects are using AQUAPLEX base paints for lasting protection.



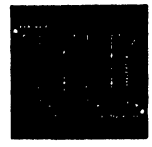
SYNTHETIC RUBBER PLASTICIZERS

Nearly all of the vitally needed synthetic rubbers work faster and better when they are plasticized or "softened" during processing. Our PARAPLEX synthetic resins perform this function of "softening" synthetic rubbers excellently, especially in the case of the buna types. The PARAPLEXES are valuable, too, in improving synthetic rubber used where high resistance to solvents and heat and low temperature flexibility are required.



GAS RESISTANT COATINGS

Cloth that resists the deadly mustard gas is one important product that is being made with the aid of our PARAPLEX and UFORMITE synthetic resins. These resins are used in combination to create a tough, permanently pliable coating. Other important and novel applications of the tough, rubbery PARAPLEX resins include permanently flexible coatings and adhesives, caulking compounds, and special coatings for rubber.



ION EXCHANGERS

The production of large amounts of very pure water is a constant problem to many war industries. In many cases a water equivalent to distilled in degree of purity is absolutely essential. To one war industry, AMBERLITE Ion Exchange Resins are now bringing a complete answer to this problem by providing very pure water at a new low cost. These new resins, first made available by us in the United States are uniquely fitted for many war jobs.

COMPLETE TECHNICAL ADVISORY SERVICE

If the development or application of synthetic resins are a part of your war production problem, our wide experience in synthetic resins may prove of value to you. For over fifteen years we have concentrated our work in the manufacture of synthetic resins and their applications. This work has taken us into almost every field of industry. Very often the wide experience developed in one field of application may prove of value in widely divergent uses. We invite your inquiry concerning wartime applications for synthetic resins.

THE RESINOUS PRODUCTS & CHEMICAL COMPANY

WASHINGTON SQUARE, PHILADELPHIA, PA.

Thursday Morning

SECTION A. SYMPOSIUM ON LOW-TEMPERATURE PHENOMENA

Room M, Hotel Statler

D. H. ANDREWS, *Presiding*

9:00—39. D. H. ANDREWS. Introduction. The Significance of Low Temperature.

9:30—40. A. D. MISENER. The Superfluid Properties of Liquid Helium.

10:30—41. E. R. BLANCHARD. The Liquefaction of Hydrogen.

11:15—42. C. C. STEPHENSON AND H. E. ADAMS. The Heat Capacity of Silver Trihydrogen Paraperiodate from 15° to 300° K. The Anomaly at the Curie Temperature.

Symposium continued Thursday afternoon.

SECTION B. PHYSICAL CHEMISTRY

Room K, Hotel Statler

R. E. GIBSON, *Presiding*

9:00—43. ROBERT L. BURWELL, JR. The Interrelations of Reactions Occurring in Mixtures of *sec*-Butyl Alcohol and Sulfuric Acid.

9:20—44. CHARLES E. RUDY, JR., AND PAUL FUGASSI. The Thermal Decomposition of *tert*-Butyl Acetate.

9:40—45. MARION D. BARNES AND VICTOR K. LA MER. Kinetics and Equilibria of the Carbinol Formation of Phenolphthalein.

10:00—46. W. J. SVIRBELY AND SELMER PETERSON. The Rate of Conversion of Ammonium Cyanate to Urea in Nonaqueous Solvents. VI.

10:20—47. MARTIN KILPATRICK AND R. DEAN EANES. Relative Acid Strengths of Formic, Acetic, and Propionic Acids in Alcohols and Dioxane-Water Mixtures.

10:40—48. KASIMIR FAJANS AND THEODORE BERLIN. Electronic Structure of Diatomic Particles Especially Those with 10 Valence Electrons.

11:00—49. KASIMIR FAJANS. Principles of the Electronic Structure of Molecules.

11:20—50. F. O. KOENIG AND S. W. GRINNELL. A Calculation of the Effect of the Magnetic Field upon the E. M. F. of Galvanic Cells.

11:40—51. F. O. KOENIG. The Gibbsian Thermodynamics of the Volta Potential and the Surface Potential.

Thursday Afternoon

SECTIONS A AND B

Room M, Hotel Statler

W. C. FERNELIUS, *Presiding*

2:00—52. **John Lawrence Oncley. Physical Chemical Properties of Crystalline Serum Albumins from Human and Bovine Plasmas. Address, AMERICAN CHEMICAL SOCIETY Award in Pure Chemistry.**

SECTION A. SYMPOSIUM ON LOW-TEMPERATURE PHENOMENA (*Continued*)

Room M, Hotel Statler

D. H. ANDREWS, *Presiding*

2:50—53. J. G. ASTON AND R. M. KENNEDY. The Evidence of Repulsion between Hydrogen Atoms in Organic Compounds from Low-Temperature and Spectroscopic Entropy Data.

3:50—54. KENNETH S. PITZER AND DONALD W. SCOTT. The Thermodynamics of the Xylenes.

SECTION B. PHYSICAL CHEMISTRY

Room K, Hotel Statler

O. K. RICE, *Presiding*

2:50—55. GEORGE SCATCHARD, ALAN C. BATCHELDER, AND ALEXANDER BROWN. Osmotic Equilibria in Aqueous Solutions of Serum Albumin and Sodium Chloride.

3:15—56. PAUL H. BELL AND RICHARD O. ROBLIN, JR. Correlation of the Antibacterial Activities of Sulfanilamides with Certain of Their Chemical and Physical Properties.

3:40—57. R. F. NEWTON AND E. SHAPIRO. The Resolution of Enantiomorphs by Countercurrent Liquid-Liquid Extraction.

4:00—58. MAXWELL L. EIDINOFF AND SIDNEY WEISS. Polarographic Study of Benzoylacetone. Relation to the Tautomeric Equilibrium.

4:20—59. H. M. HUFFMAN AND W. BAUMGARTEN. New Data on the Heats of Combustion of Oxalic Acid and a Number of its Homologs.

4:40—60. JOHN A. SPANGLER AND EARL C. H. DAVIES. Freezing Points, Densities, and Refractive Indices of the System Glycerol–Ethylene Glycol–Water.

4:55—61. WILLIAM R. MCMILLAN AND HUGH J. MCDONALD. The Vapor Pressure and Related Physical Data of the Systems Benzene–Carbon Tetrachloride–Acetic Acid and Carbon Tetrachloride–Tetrachloroethylene.

Division of Rubber Chemistry

JOHN N. STREET, *Chairman;* HOWARD I. CRAMER, *Secretary*
A. H. DAVIS, *Local Assistant*

Ballroom, Hotel Lafayette

Thursday Morning and Afternoon

GENERAL PAPERS

J. N. STREET, *Presiding*

9:00— 1. J. N. STREET. Introduction.

9:10— 2. LA VERNE E. CHEYNEY. Methyl Ethyl Ketone Extraction of Rubber.

9:25— 3. A. M. NEAL, H. G. BIMMERMAN, AND J. R. VINCENT. The Effect of Temperature and Pressure on the Oxygen Pressure Test. Part I. A Comparison of Aging at 70° and 80° C. Part II. The Effect of Oxygen Pressure on Aging at 80° C.

9:45— 4. H. L. TRUMBULL. Growing Rubber in North America.

10:20— 5. J. MCGAVACK, C. E. LINSCOTT, AND J. W. HAEFELE. USF-Rubber. A New Crude Rubber.

10:40— 6. FRANCIS F. LUCAS. A Motion Picture Study of Balata and Hevea Latices with Some Observations on Buna S and Neoprene Latices.

11:30— 7. JOHN M. BIERER AND WALTER W. EVANS. Improved Method of Reclaiming Rubber.

11:50— 8. HENRY F. PALMER AND ROBERT H. CROSSLEY. The Natural Aging of Reclaimed Rubber.

1:30— Business meeting.

2:00— 9. R. B. STAMBAUGH. Vibration Properties of Rubber. Dependence on Temperature.

2:20—10. MAURICE L. HUGGINS. The Properties of Rubber Solutions and Gels.

2:50—11. G. L. CLARK, R. L. LETOURNEAU, AND J. M. BALL. An X-Ray Study of Chemical Reactions Involving Accelerators in Rubber Compounding, and of Orientation of Crystalline Phases on Stretching of Various Stocks.

3:20—12. H. MARK. Intermolecular Forces and Mechanical Behavior of High Polymers.

3:50—13. HUBERT M. JAMES AND EUGENE GUTH. Significance of the Theory of Rubber Elasticity for the Development of Synthetic Rubbers.

4:05—14. L. E. PETERSON, R. L. ANTHONY, AND E. GUTH. Stress-Temperature Relations and Creep for Synthetic Rubbers.

4:20—15. S. L. DART, R. L. ANTHONY, AND E. GUTH. Rise of Temperature on Fast Stretching of Synthetics and Natural Rubbers.

6:30— Divisional banquet, Hotel Statler.

Friday Morning and Afternoon

SYMPOSIUM ON COMPOUNDING AND PROPERTIES OF SYNTHETIC RUBBERS

J. N. STREET, *Presiding*

9:00—16. T. ALFREY, G. GOLDFINGER, AND H. MARK. The Statistics of Cross-Linking Reactions in High Polymers.

9:15—17. PAUL J. FLORY. Molecular Weights and Intrinsic Viscosities of Polybutenes.

9:35—18. G. R. VILA. The Action of Organic Accelerators in Buna S.

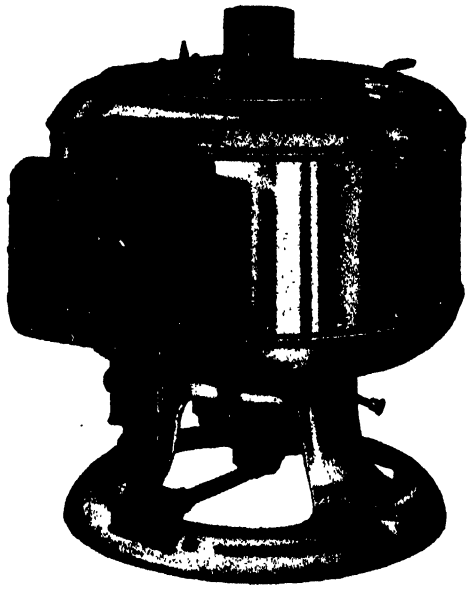
10:05—19. B. S. GARVEY, JR., AND J. A. FREESE, JR. The Effect of Different Carbon Blacks in Synthetic Tire Rubber Compounds.

10:35— Discussion on the Compounding of Butadiene-Styrene Copolymers.

11:05—20. R. A. MOLL, R. M. HOWLETT, AND D. J. BUCKLEY. Perbunan Properties and Compounding.

11:25—21. J. P. HAWORTH AND F. P. BALDWIN. Butyl Rubber Properties and Compounding.

CONTINUED ON PAGE 1050



Centrifuge, with explosion proof motor, for hazardous locations

To meet the demand of the Oil Industry for a large centrifuge with an explosion proof motor, the International Model AE Centrifuge was developed. The Model AE, equal in size and capacity to the Size 2 Centrifuge, has a maximum speed of 1,700 r.p.m. which is sufficient for the testing of oils. However, the Chemical and Paint Industries require the higher speeds of the new explosion proof motor which is now available.

INTERNATIONAL MODEL BE CENTRIFUGE

with explosion proof motor of 3,450 r.p.m.

accommodates the regular centrifuge equipment and has the safety features of the Model AE with the added advantage of higher speed for more general industrial uses. The special adjustable high speed motor is approved for Class 1—Group D locations.

A speed regulator and disconnect switch are mounted permanently in a vaporproof box on the side of the centrifuge and connected through conduit and explosion proof fittings to the motor. The sealed ball bearings of the motor require no attention. A conveniently located hand brake permits rapid stopping.

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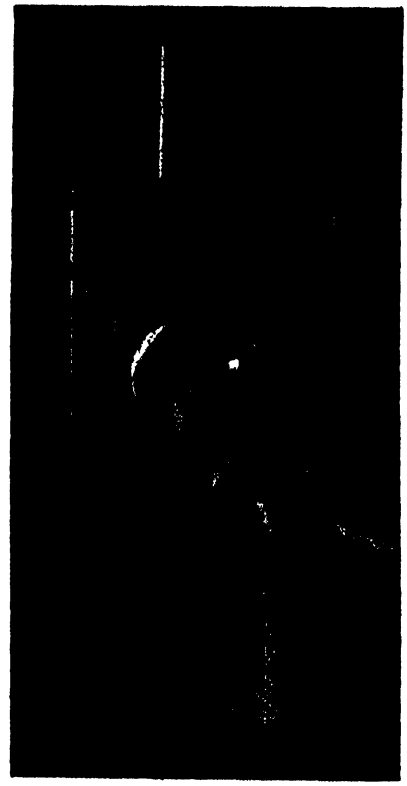
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1:30—22. B. S. Garvey, Jr., and D. V. Sarbach. Ebonite from Hycar OR.

1:45—23. C. F. Fryling. A Laboratory Technique for the Polymerization of Synthetic Rubber.

2:00—24. B. S. Garvey, Jr. The Evaluation of Small Amounts of Rubbers.

2:15—25. B. S. Garvey, Jr., M. H. Whitlock, and J. A. Freese, Jr. The Processing Characteristics of Synthetic Tire Rubber and Their Evaluation.

2:30—26. La Verne E. Cheyney and Everett J. Kelley. Unsaturation of Some Synthetic Rubberlike Materials.

2:45—27. Irven B. Prettyman. Thermal Decomposition of Natural and Synthetic Rubber Stocks.

3:00—28. Lawrence A. Wood, Norman Bekkedahl, and Frank L. Roth. Density Measurements on Synthetic Rubbers.

3:15—29. G. G. Winspear, F. S. Malm, and A. R. Kemp. Low-Temperature Testing of Rubber. Influence of Variable Stress on Brittle Point.

3:30—30. A. C. Hanson. Effect of Aniline Points of Oil on Swelling of Synthetic Rubbers.

3:45—31. Donald F. Fraser. Effect of Petroleum Products on Neoprene Vulcanizates. III. Effect of Kerosenes.

4:00—32. A. E. Juve and B. S. Garvey, Jr. Factors Influencing the Volume Change of Hycar OR Compounds in Oil.

Division of Sugar Chemistry and Technology

Sidney M. Cantor, *Chairman;* E. Whitman Rice, *Secretary*
Eunice Trim, *Local Assistant*

Iroquois Room, Hotel Statler

Wednesday Morning

S. M. Cantor, *Presiding*

9:00— 1. S. M. Cantor and Wendell W. Moyer. The Analysis of Corn Sirups.

9:30— 2. F. Leslie Bates and R. E. Rundle. A Rapid Analytical Method for the Determination of the Two Components of Starch.

10:00— 3. R. E. Rundle and F. Leslie Bates. The Relation of the Starch-Iodine Reaction to the Structure of Starch.

10:30— 4. Roy L. Whistler, Allene Jeanes, and G. E. Hilbert. Acetylation of Starch and Comparison of Common Starch Acetates.

11:00— 5. Roy L. Whistler and Allene Jeanes. Quantitative Estimation of Acetyl in Carbohydrate Acetates.

11:30— 6. Harriet L. Frush and Horace S. Isbell. An Electrolytic Oxidation of Galacturonic Acid and a Study of the Oxidation Products.

12:00— Business meeting.

12:15— Divisional luncheon, Parlor C, Hotel Statler, $1.35.

Division of Water, Sewage, and Sanitation Chemistry

C. S. Howard, *Chairman;* H. Gladys Swope, *Secretary*
George E. Symons, *Local Assistant*

Perkins Hall, Y. M. C. A.

Tuesday Morning and Afternoon

9:15— 1. H. M. Olson. Recent Developments in Water Softening.

9:55— 2. Bert Wells. Superchlorination of Water for Bottling Carbonated Beverages.

10:20— 3. G. B. Hatch and J. P. Kleber. Stabilization of Iron-Bearing Water with Molecularly Dehydrated Phosphate.

10:40— 4. Howard L. Tiger and Sidney Sussman. Demineralizing Solutions by a Two-Step Ion Exchange Process.

11:00— 5. R. C. Weast and A. M. Buswell. The Relationship between the Fusain Content and the Exchange Capacities of Sulfonated Coal Fines.

11:20— 6. J. A. Holmes. Prevention of Microbiological Slimes with Phenol Derivatives.

11:40— 7. F. K. Burr and Justin J. McCarthy. A Review of Ferrisul Applications in Water and Sewage Treatment.

2:00— 8. A. M. Buswell, C. C. Ruchhoft, O. M. Smith, and Mathew M. Braidech. Round Table Discussion. The Detection of Poisons and Chemical Warfare Agents in Water Supplies.

3:00— Business meeting.

3:20— 9. Robert S. Ingols. Activated Sludge Process Control with Dissolved Oxygen Recordings.

3:40—10. W. Allan Moore and C. C. Ruchhoft. The Effect of River Mud Deposits upon the Determination of the Biochemical Oxygen Demand of the Supernatant Liquor.

4:00—11. Willem Rudolfs. Acid Waste Treatment.

4:25—12. George E. Symons. The Sewage Treatment Works at Buffalo, N. Y.

4:45— Meeting of the Executive Committee.

6:30— Divisional dinner, Delaware Room, Hotel Touraine, $1.65.

Wednesday Morning

9:00— Start from Hotel Statler for Inspection Trip of the Buffalo Sewage Works. Admission to plant by badge only.

Kaolin Production in Sweden

Annual production of kaolin by the Swedish Kaolin Syndicate founded in 1941 at Fyledalen, Sweden, is placed at 6,000 metric tons. At Sjobo plants have been erected and equipment installed for extraction of the substance from deposits of quartz sand. Another company operating in the southeastern part of Skane Province normally produces 5,000 tons of kaolin annually.

The Fyledalen product has been found in tests to compare with kaolin imported from England, Sweden's chief source prior to the war. Annual Swedish consumption for paper and porcelain production has been 40,000 metric tons, part of which came from the Danish island, Bornholm, or from Germany and Czecho-Slovakia.



Tenite-Housed Lantern

Tennessee Eastman Tenite housing features this lantern being adopted for use by railway car inspectors, industrial plants, and servicemen throughout the country. The Tenite presents a smooth lustrous surface that is nontarnishing and rustproof. The lantern is exceptionally light in weight, easy to handle, and so strong as to be virtually unbreakable. It is available in black, red, and olive-drab. The lantern is made by the Focal Co., Downey, Calif., and the housing is molded by Modern Plastic Co., 4641 Pacific Blvd., Los Angeles, Calif.



American Chemical Society[1]

104TH MEETING. Buffalo, N. Y., September 7 to 11, 1942.

105TH MEETING. Indianapolis, Ind., April 12 to 16, 1943.

106TH MEETING. Minneapolis, Minn., fall of 1943.

NATIONAL CHEMICAL EXPOSITION and NATIONAL INDUSTRIAL CHEMICAL CONFERENCE. Sherman Hotel, Chicago, Ill., November 24 to 29, 1942.

Other Scientific Societies

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Netherland Plaza Hotel, Cincinnati, Ohio, November 16 to 18. Annual meeting.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Vancouver, B. C., September 9 to 11.

AMERICAN OIL CHEMISTS' SOCIETY. Drake Hotel, Chicago, Ill., October 7 to 9.

AMERICAN PETROLEUM INSTITUTE. Palmer House, Chicago, Ill., November 9 to 13. Annual meeting.

NATIONAL LUBRICATING GREASE INSTITUTE. New Orleans, La., October 26 to 28.

NATIONAL PETROLEUM ASSOCIATION. Hotel Traymore, Atlantic City, N. J., September 16 to 18. Annual meeting.

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY. Hotel Statler, Boston, Mass., September 29 to October 1.

[1] The list of the SOCIETY'S National Officers and Directors, Editors, members of Council, Divisional and Local Section Officers, Committees, and Chapters of Student Affiliates appears in CHEMICAL AND ENGINEERING NEWS three times a year—usually February 10, May 10, and October 10. The latest list is printed on page 601 of the May 10 issue.

Industrial Fiber Meeting Canceled

THE projected meeting of the Industrial Fiber Society in New Orleans, La., in November has been canceled. The organization's Executive Committee has made this decision in the light of requests from government authorities that travel be restricted and also because of the difficulty many persons are having in leaving their work for even a few days. The society, which held its first meeting in Atlanta last December, will not convene again for the duration.

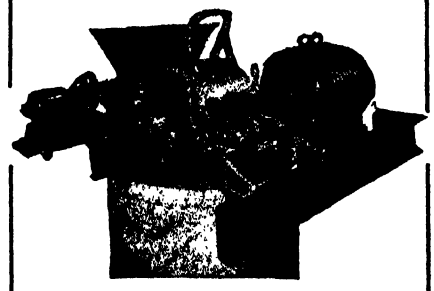


Agfa-Ansco Celebrates Centennial

In celebration of the 100th anniversary of the founding of Edward Anthony's photographic business at 308 Broadway, New York, the Agfa-Ansco Division of General Aniline & Film Corp., descendant of the Anthony enterprise, unveiled a tablet commemorating that fact at the original site. *Left to right.* J. A. Zellers, H. C. Parmelee, and H. C. Lufkin, American Institute of the City of New York, and E. R. Deats and L. W. Sipley, of the American Museum of Photography. At a banquet later in the day at the Waldorf-Astoria, R. E. McConnell, president of General Aniline & Film Corp., announced plans for organization of a research laboratory at Easton, Penna. Further announcements by the company told of new color film which can be developed under amateur darkroom conditions and of a domestic sound track on cellophane film in which the usual silver sensitive salts are replaced by light sensitive diazo dyestuffs.



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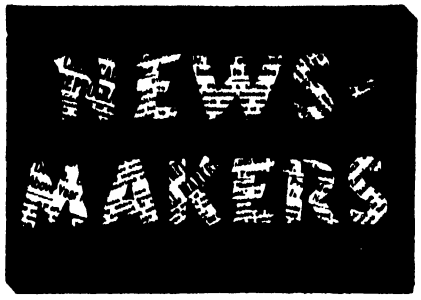
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Having received the Ph.D. degree at the State University of Iowa in May, **Eldon E. Bauer** is employed as a chemist and chemical engineer with the Department of Manufacturing Experiments, Eastman Kodak Co., Rochester, N. Y.

H. K. Clark, vice president and general manager of Norton Co., who recently returned to Worcester after nine months' service as a dollar-a-year man in OPM and WPB, is back in Washington, D. C. He has been "drafted" by the Navy and, with the rank of lieutenant commander, is a member of the Army and Navy Munitions Board.

Norman R. Davidson has been added to the chemistry staff at the Illinois Institute of Technology, Chicago, Ill., as instructor in chemistry. Dr. Davidson was a Rhodes scholar and received his Ph.D. in chemistry from the University of Chicago.

Howard M. Dawson is now in charge of the Export Department of the Jessop Steel Co., with headquarters in New York, N. Y.

John T. G. Dean has resigned his teaching position at Sarah Lawrence College, Bronxville, N. Y., to become industrial fellow at Mellon Institute, Pittsburgh, Penna., doing research for the International Nickel Co.

Elwood H. Ensor, who received his Ph.D. degree from Northwestern University in June 1942, has been added to the research staff of the Synthetics Department at the Hercules Powder Co. Experiment Station, Wilmington, Del.

Ralph W. Frey has been awarded the W. K. Alsop Award by the American Leather Chemists Association for "outstanding research work advancing the art of science of leather manufacture". Dr. Frey, a research chemist with the U. S. Department of Agriculture, has done special work on barks and materials and storage and curing of hides and skins to retard deterioration.

Bernard J. Gaffney is now chemical engineer in charge of pilot plant production of the American Oak Leather Co., Cincinnati, Ohio.

V. F. Hribar has been granted a leave of absence from his duties as chief chemist of the American Lumber and Treating Co., Chicago, Ill., to accept a commission in the U. S. Naval Research and has reported to Dartmouth College for active duty.

Herbert J. Kerr, who received his master's degree in chemical engineering at the University of Tennessee June 1, 1942, is now junior chemical engineer for the Tennessee Valley Authority at Muscle Shoals.

Faculty members recently promoted at the Michigan College of Mining and Technology are **R. F. Makens**, associate professor, who is in charge of the work in organic chemistry, and **Russell J. Smith**, assistant professor in metallurgical engineering, who is also engaged in research upon heating rate control and metallurgical tests.

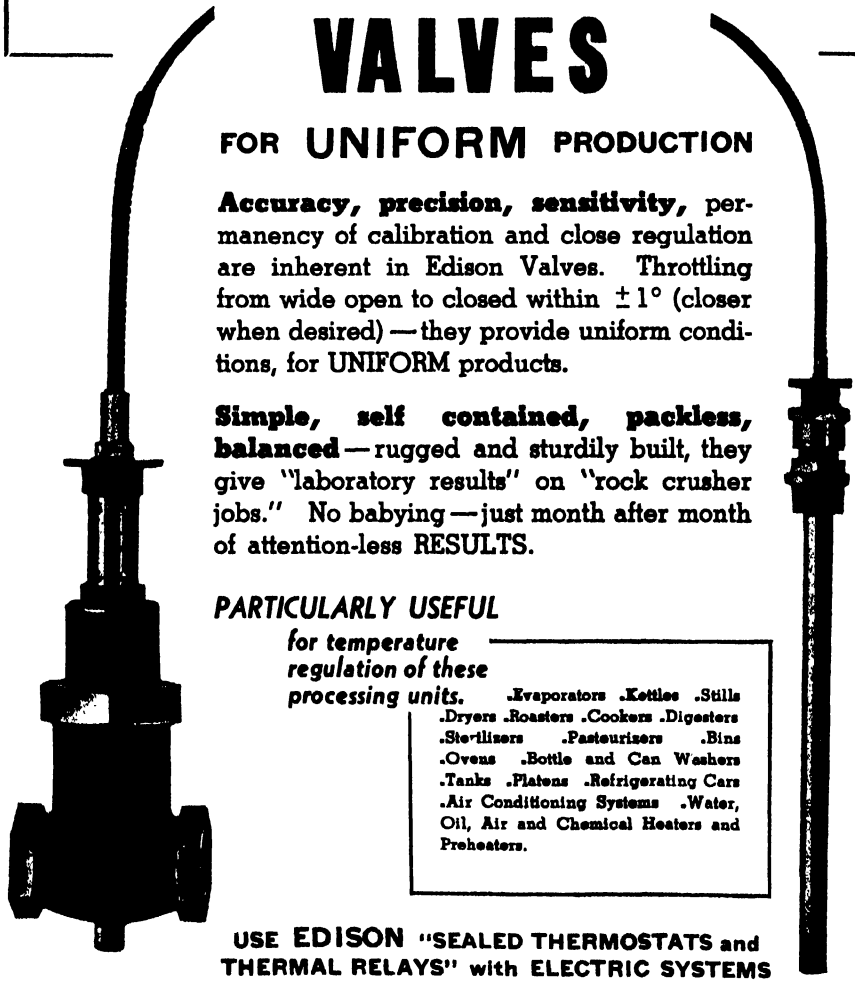
Robert W. Manuel, formerly with the Research Laboratories of the Crane Co., is now chemical engineer in the Metallurgical and Chemical Department of the Goodyear Aircraft Corp.

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F. L. Mark has been appointed head of the technical and research staff of the asphalt section of the Dicalite Co.'s laboratory, recently established at its California plant. Immediate emphasis of the work is being placed on camouflage paints.



F. L. Mark

John W. Moore, formerly tutor in physical chemistry at the University of Texas, is now junior chemical engineer, Development Section, Research and Development Division, Department of Chemical Engineering, Tennessee Valley Authority, Wilson Dam, Ala.

S. H. Mortensen has been appointed chief electrical engineer of the Allis-Chalmers Mfg. Co. plants at West Allis, Cincinnati, Boston, and Pittsburgh.

George B. Murphy, formerly manager of the research and development laboratories of Universal Oil Products Co. and more recently editor of *The Refining Technology Edition* of *National Petroleum News*, has joined the staff of E. B. Badger & Sons Co., Boston, Mass., as engineer.

Roland W. Oberholtzer, Jr., has been transferred from the Giant, Calif., plant to the Atlas, Mo., plant of the Atlas Powder Co., in the capacity of powder supervisor.

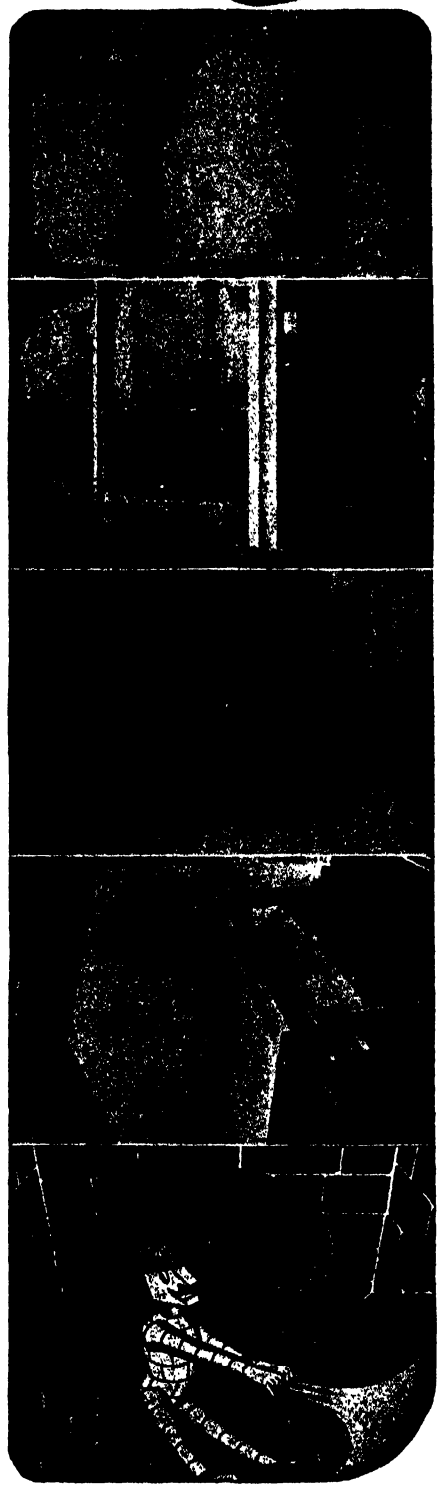
Benjamin F. Parlett, Jr., has been appointed to the sales force of the Hanson-Van Winkle-Munning Co., Matawan, N. J.

Peter I. Pollak, after leaving the Graduate School of Arts and Science of New York University, has accepted a position as research chemist and development chemist at the Warwick Chemical Corp., 221 West 57th St., New York, N. Y.

Robert H. Pyle has been appointed district representative for the McKenna Metals Co., with headquarters in Indianapolis, Ind.

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NECROLOGY

Carl F. Dahlberg

CARL F. DAHLBERG, a founder of the Celotex Corp. and a prominent New Orleans business man, died July 26 in Atlanta, Ga. Mr. Dahlberg was 63 years old.

Born in Christianstad, Sweden, he came to this country when very young. After attending elementary school he entered the Operating Department of the Northern Pacific Railroad and later served in the Traffic Department of the Northwestern Railroad. In 1921 Mr. Dahlberg joined his brother, Bror, in founding the Celotex Corp. and served as its first vice president. In 1930 he was a member of a committee to reorganize the company. During the last 10 years Mr. Dahlberg was president of the South Coast Corp., one of the largest cane sugar producing companies in the country, and vice president and a director of the South Shore Oil and Development Co. in Louisiana.

Frank S. Dunham

FRANK S. DUNHAM, associated with The Permutit Co. in the sale of water-conditioning equipment for approximately 25 years, died in Chicago on July 23, 1942.

Born in Baltimore, Md., on March 8, 1876, he studied at the Armour Institute of Technology and the University of Chicago. His early career in engineering began with the Hydrox Corp. of Chicago, which he joined following graduation from the university. Subsequently, he was a chemical engineer with the Kennicott Co., manufacturer of water-softening equipment, until he became associated with The Permutit Co. He remained with The Permutit Co. until his retirement in 1940.

Clarence A. Hall

CLARENCE A. HALL, chairman of the board of the Bartol Research Foundation, died July 20 in Chestnut Hill, Penna., at the age of 68. Mr. Hall, who had been a member of Franklin Institute for 40 years and a member of the Committee on Science and the Arts since 1906, was a graduate of the University of Pennsylvania. He had been associated with the Electric Storage Battery Co. for 22 years, and previously had been connected with the Pennsylvania Salt Manufacturing Co., the Lake Superior Carbide Co., the Union Carbide Co., and the Lake Superior Corp.

Mr. Hall had been a member of the AMERICAN CHEMICAL SOCIETY since 1895. He was also a member of the American Ceramic Society, the American Institute of Mining and Metallurgical Engineers, the Electrochemical Society, the Faraday Society, and the Chemical Society (London).

Ondress L. Inman

ONDRESS L. INMAN, director of the Kettering Foundation for research in chlorophyll and photosynthesis at Antioch College, Yellow Springs, Ohio, died July 21 in New York at the age of 51.

Richard Willstätter

RICHARD WILLSTÄTTER, winner of the 1915 Nobel Prize in Chemistry, died in Switzerland on August 3, at the age of 70.

Dr. Willstätter was born at Karlsruhe, Germany, and was educated at the University of Munich. In 1902 he succeeded Johann Thiele as extraordinary professor of organic chemistry at the University of Munich, then taught at the Technische Hochschule at Zurich and the Kaiser Wilhelm Institute in Berlin. He returned to Munich in 1916 as professor of organic chemistry and director of the chemical laboratories. He resigned in 1924, because of the anti-Semitic policy of the university, and since 1939 had been living in retirement at Berne.

Dr. Willstätter received the Nobel Prize in Chemistry for outstanding chemical research, notably his study of plant pigments. He established the identity of chlorophyll, and then turning to enzymes revolutionized research in this province of science.

In 1927 he was made an honorary member of the AMERICAN CHEMICAL SOCIETY. He was awarded the Davy Medal of the Royal Society, London, in 1932, and in 1933 the Willard Gibbs Medal of the Chicago Section, AMERICAN CHEMICAL SOCIETY.

On August 13 Dr. Willstätter would have celebrated his 70th birthday. As a tribute to this eminent scientist on this anniversary, a synopsis of his life and achievements was printed in the August 10 issue of CHEMICAL AND ENGINEERING NEWS, page 954.

WE ANNOUNCE with regret the death of the following A. C. S. members:

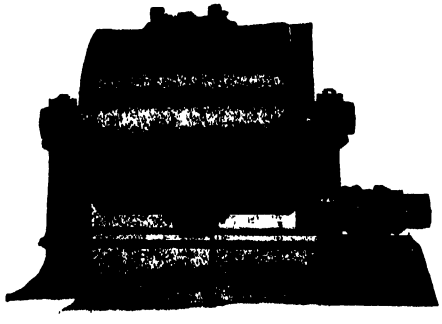
Edward C. Billheimer, Brooklyn, N. Y. Member since 1938.

Henry P. Busch, director, Shoemaker & Busch, Philadelphia, Penna. Member since 1920.

Richard M. Cone, captain, Chemical Warfare Service, U. S. Army, Syracuse, N. Y. Member since 1932.

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Ellis T. Crawford, Jr., Providence, R. I. Member since 1929.

John B. Dearden, analyst, White & Hodges, Boston, Mass, Member since 1936.

William H. Krister, graduate student, Ohio State University, Columbus, Ohio. Member since 1938.

Kenneth G. Lee, lieutenant, U. S. N. R., New London, Conn. Member since 1937.

Herbert S. Lewis, student, Iowa State College, Ames, Iowa.

Burl G. Rogers, Elizabeth, N. J. Member since 1940.

Emil Schlichting, president and director, National Brewers Academy, New York, N. Y. Member since 1899.

Charles H. Wardell, Jr., Stuart, Fla. Member since 1938.

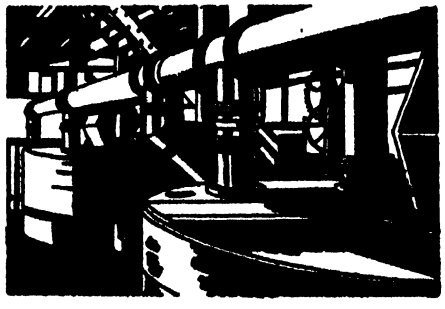
Agricultural Plastics

PLASTICS of high impact strength and low water absorption can be produced from low-cost agricultural products and by-products, it is revealed by the Iowa Engineering Experiment Station in Bulletin 154, "Plastics from Agricultural Materials".

Experiments by Drs. Sweeney and Arnold show the commercial possibilities of plastics made from such raw materials as soybean meal, furfural, corncobs, oat hulls, and cornstalks. The bulletin reports in detail the effect of varying the raw material combinations, molding conditions, time and temperature of cooking, and other procedures, together with specific recipes for the plastics judged best after many years of study and experimentation. Reactions of phenol and sulfuric acid with the individual corncob constituents are discussed in detail.

Copies of the 52-page bulletin may be obtained without charge from the Iowa Engineering Experiment Station, Iowa State College, Ames, Iowa.

AN IMPROVED echo-sounding apparatus, similar to that used in detecting submarines, is being used to detect seaweed needed for manufacture of iodine. The apparatus permits accurate soundings at ordinary ship speed. Soundings can be taken at depths as low as two fathoms below the keel, it is said.



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The Chemist's Chance

I HAVE read the original article, "The Chemist's Chance" by Otto Eisenschiml, printed on page 368 of the March 25, 1942, issue of CHEMICAL AND ENGINEERING NEWS and the comments thereon appearing on page 742 of the June 10, 1942, issue, with great interest. You should be encouraged in printing these and similar articles. CHEMICAL AND ENGINEERING NEWS could be and should be a sounding board for the views of chemists on issues which are not necessarily scientific, but which are of extreme importance nonetheless.

Mr. Eisenschiml is correct. "We may not be given another chance like this in our generation." Today we are in a seller's market. Today we have the golden opportunity to drive home the point that we are valuable members of society. Today we can sell the proposition that we, as chemists, are important units in the march of human progress.

Yet, what are we doing about it? It is true that the AMERICAN CHEMICAL SOCIETY has made and is making efforts to establish the professional status of chemists. That is all well and good, but the force of the SOCIETY is no more than the combined forces of the individual members. Without a spirit and a drive and an action for the cause by each member, the SOCIETY as a whole is impotent.

While it is dangerous to condemn the group for the shortcomings of its individual members, it is unfortunately true that too many chemists lack zeal and resourcefulness in activities other than those of their own profession. Too many chemists, often in an admirable enthusiasm for their own work, neglect the development of other qualities which make up the well-rounded individual. Too many chemists have not cultivated the art of associating easily with people. Too many chemists do not do themselves justice in the eyes of laymen. These failures as individuals are the limiting factors in the success of the efforts which the SOCIETY is attempting. How can the organization attain for us a higher place in the sun if we as individuals lack the requisite qualifications?

Well, what's to be done? Consider the members of one of the "noncreative occupations", the lawyers, who, nevertheless, draw fat salaries, fees, or other emolument, and who, for the most part, are respected members of society. Do you know a truly successful lawyer who does not know how to handle people, who is not a good mixer, who cannot sell himself? Or, consider a successful business executive, perhaps the same executive who scooped the gravy from an inventive chemist. Can you think of him as one who stands quietly, and lets the world go by him? No, he is a man who senses well his opportunities, and who exploits them to the utmost.

How, then, do these "noncreative" come to assume position and authority over the creative? How do they dominate the destinies of those who are responsible for scientific and technological progress? It certainly is not because of their superior intellectual power. No, it is because they have developed the acuity to manage relations between men, the power to put themselves across to their fellows.

Since we chemists aspire to a greater appreciation by the rest of society and to a higher level therein, it is fundamental that we master the techniques of initiating and maintaining more friendly relations with people. We must give ourselves the opportunity of letting them know us.

Not only that, but as they come to know us better, they will have a livelier interest in and appreciation of the contributions which chemists have made to the betterment of living. Then they will want to know who gave the world aspirin, ethyl gas, concrete, sulfa compounds, vitamins, plastics, and the like. Then, people will actually help us remove the chemist's light from under the bushel.

Responsibility for the achievement of this goal lies first with us as individuals. We must search ourselves for our own social shortcomings and we must correct them. Then, and only then, can we, as individuals and as an organization, spread the word until we are no longer "unknown soldiers".

SAMUEL D. KOONCE

2375 NEIL AVE.
COLUMBUS, OHIO
June 22, 1942

Editor, Chemical and Engineering News:

THE Chemist's Chance" is frequently diverted to one who is not a chemist because, in the minds of many, a chemist is an analyst, not a synthesist. If they wish to develop a product they employ one of the many kinds of engineers to put things together and keep the chemist in the background, although relying on him to point out mistakes with his analyses. This would not happen so often if the employer had a better idea of what a chemist should be expected to do, and if the chemist were given a more accurate picture of his function in the organization.

When a man applies for a position he gives details of his previous experience and training. His prospective employer usually makes vague promises of future advancement, but his past record regard-

CONTINUED ON PAGE 1058

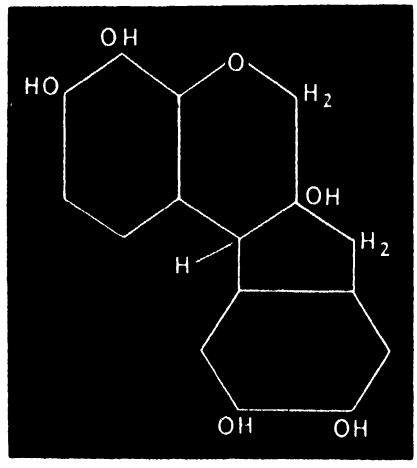
HEMATOXYLIN

TECHNICAL AND COMMERCIAL

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Available in quantities sufficient for research and development work

• • •



It is capable of typical phenol reactions such as methylation, acetylation and formation of salts with heavy metals.

Have you investigated the properties of this polyphenol in your field? Samples and information upon request.

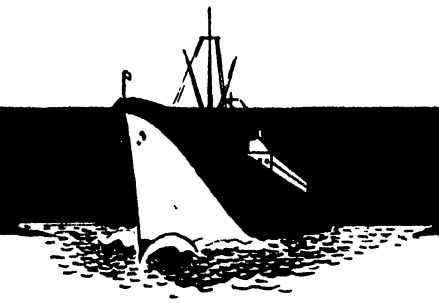
AMERICAN DYEWOOD COMPANY

Research Dept. BELLEVILLE, N. J.

Announcing Hercules' Newest Varnish Resin

PENTALYN M

FOR TOUGH THROUGH-DRY IN LINSEED OIL VARNISHES



Pentalyn M, the latest addition to Hercules' series of outstanding varnish resins,* is specifically designed to produce acceptable varnishes from linseed oil.

Tough through-dry, more complete than has heretofore been possible with other varnish resins, is developed after an overnight drying period.

Rapid top-dry is not sacrificed. Pentalyn M develops the same outstanding speed of top-dry in linseed varnishes as does Pentalyn G, with which you are no doubt familiar.

Faster cooking is also achieved with this new resin. You will find this characteristic useful in either of two ways: (1) by starting with less viscous pre-bodied oils and cooking the usual times, or (2) materially shortening the cooking period when using heavier bodied linseed oil.

Pale varnishes, suited for clears or pale tints, are readily produced.

Further information about this unusual new varnish resin is available. Write today for helpful data on Pentalyn M, or any other Hercules resin.

*HERCULES VARNISH RESINS

Lewisol 2L
Lewisol 24
Lewisol 28
Lewisol 33
Pentalyn A
Pentalyn G
Pentalyn M
Pentalyn X
Imperial Brand Ester Gums

8C-18

The Chemists Chance

CONTINUED FROM PAGE 1056

ing treatment of his employees is not open to the applicant. If the AMERICAN CHEMICAL SOCIETY would collect these data both from employers and employees who have left jobs, it would be a service to the members, the companies, and to the country. There is talk of freezing employment because men are leaving positions in one essential industry for better paid positions in other essential industries. If the change enables a man to use more of his knowledge, it means a saving and should be encouraged instead of stopped. If the change is made because of false or overoptimistic representations of the advantages of the job, it constitutes a waste and a repetition could be avoided by a word from the SOCIETY. It is questionable if these data could be collected in time to be of service in the present emergency, but whenever they are collected they will help the chemist to find his proper place in industry and thence in society.

CLARK C. LUCE

210 DAKOTA AVE.
BELLEVUE, PENNA.
June 28, 1942

Fuel Research at Illinois Institute

SCIENTISTS at Illinois Institute of Technology, Chicago, Ill., will aid in research to develop new and more powerful fuels for America's war effort.

The spectroscopy laboratory staff has been asked to cooperate in the American Petroleum Institute's research project in the Raman spectra of new hydrocarbons. The investigation is expected to result in the development of more powerful and more efficient fuels for internal combustion engines, especially aviation engines.

Illinois Tech Starts Cooperative Chemistry Program

INDUSTRY and education in Chicago will combine their resources to train chemists for a Nation at war under a new cooperative program at Illinois Institute of Technology. Fifty students, including six girls, have entered Illinois Tech classrooms in the first academic session of a new cooperative course in chemistry, after completing 16 weeks of work in industry, while a similar group will begin study in September.

The program, the first of its kind in the Chicago area, was organized this spring and recently put into complete operation. Students alternate throughout the 12-month year between 16-week periods each working in industry and studying in the classroom. Cooperating plants hire the students in pairs, so that one works while the other studies.

The cooperative plan not only allows students to earn a large part of their expenses while completing work for an engineering degree in five years, but also gives them the advantage of actual experience in industry. Academic work in the chemistry program is being done at the institute's Lewis campus, 1951 West Madison, Chicago.

Fellowship in Nutrition

THE medical school of Harvard University has received from Swift & Co., Chicago, a grant to be used in nutrition research for the current year. The award concludes the grants of fellowships in nutrition by Swift for this year.

The fellowship will be used in a study of parenteral nutrition under direction of Allan M. Butler.

Subject of the investigation is the optimal nutrition that may be provided by parenteral fluid therapy and involves the relationships of the therapy to nutritional deficiencies in children and certain surgical cases.

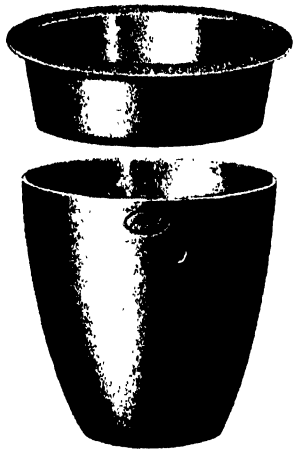
Fellowships in nutrition which Swift & Co. has established this year in American colleges and universities include those placed with Harvard, Columbia, and Cornell Universities, Kansas and Pennsylvania State Colleges, and the Universities of Pittsburgh, Texas, Nebraska, Minnesota, Chicago, California, Wisconsin, Georgia, and Rochester.

New Welding Standards

THE American Welding Society has recently published two welding standards, entitled "Standard Methods for Mechanical Testing of Welds" and "Definitions of Welding Terms and Master Chart of Welding Processes." Both were prepared by technical committees of the society and are revisions of earlier bulletins of the same title.

These standards are published in bulletin form, with a heavy paper cover, and are available at 40 cents a single copy from the American Welding Society, 33 West 39th St., New York, N. Y.

Recent additions to the staff of the Central Technical Laboratory, Armstrong Cork Co., Lancaster, Penna., included: **Irving E. Adams**, formerly with the Hazel-Atlas Glass Co.; **M. S. Lewis**, formerly with the Standard Pigment & Wallpaper Co.; **R. A. Stafford**, formerly with Spaulding & Co.; **W. S. Subblebine**, formerly a member of the faculty of the Pennsylvania State College, and **Roger S. Brown**, formerly with the Barrett Co.



The American Platinum Works
N. J. R. R. AVE. AT OLIVER ST.
Newark, N.J.
EST. 1879

VOLATILE MATTER CRUCIBLE—FIG. 76—OUR CAT. N17
CAPSULE COVER WITH OR WITHOUT FLANGE

Lubricants Developed

DEVELOPMENT of a plywood "victory drum" for use in marketing greases will enable Standard Oil Co. (Ind.) to save for war uses 2,000 tons of steel a year formerly required for packaging heavy lubricants. Although similar to steel drums in appearance, the new containers are made of wooden sheets laminated together. The only metal in them is in fasteners holding ends of sheets together and in a ring for use in lifting the removable lid. The inner surface is lined with a chemical which prevents greases from creeping through pores in the wood.

Standard's shipments of heavy lubricants, greases, and petrolatums will be made in the new containers as fast as they can be obtained. The drum was developed by the company in accordance with the Petroleum Coordinator's program for conservation in use of containers. It is being made in 100-pound, 50-pound, and 25-pound sizes.

Standard Oil Sets Safety Record

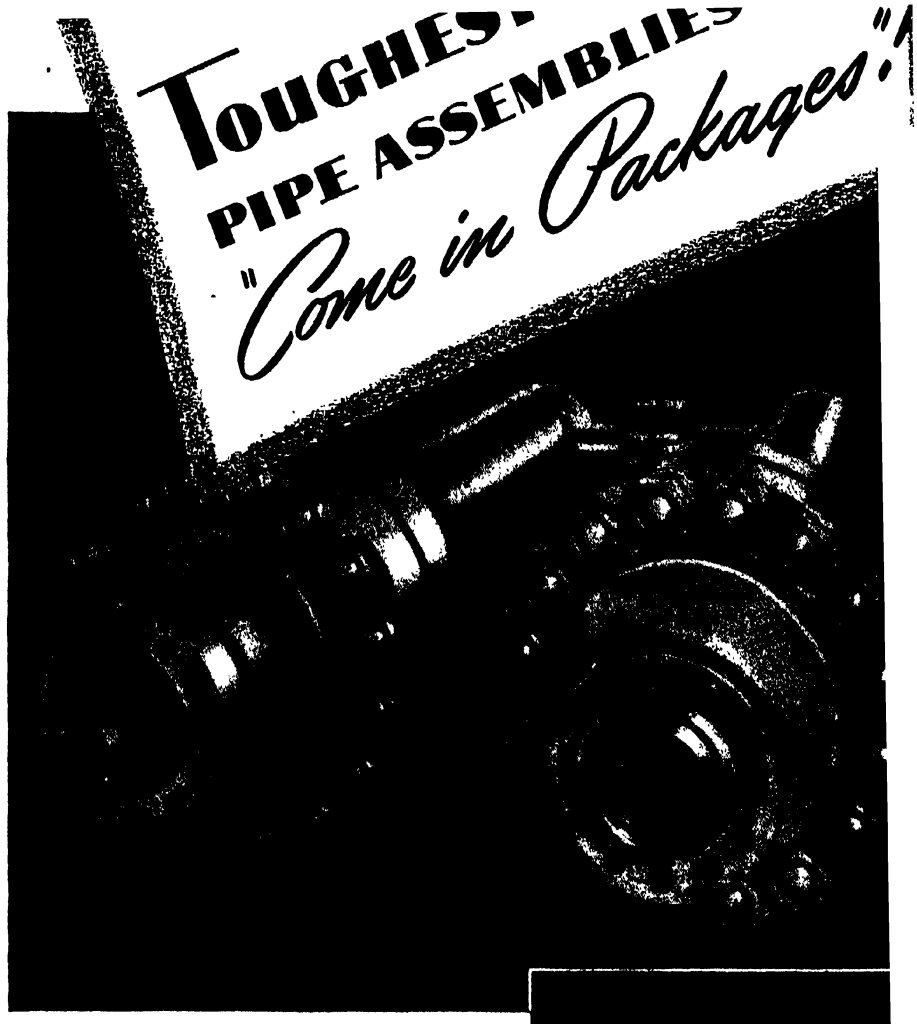
A NEW world safety record for the petroleum industry has been set by the more than 1,000 employees of the Wood River, Ill., refinery of Standard Oil Co. (Ind.), who are producing fuels and lubricants for the armed forces, war industries, and the farm front.

The record is 6,850,000 man-hours of work without loss of time or disabling injury because of accident. The record ended when a pumper helper stumbled and fell while descending the stairway on a tank where he had been taking inventory.

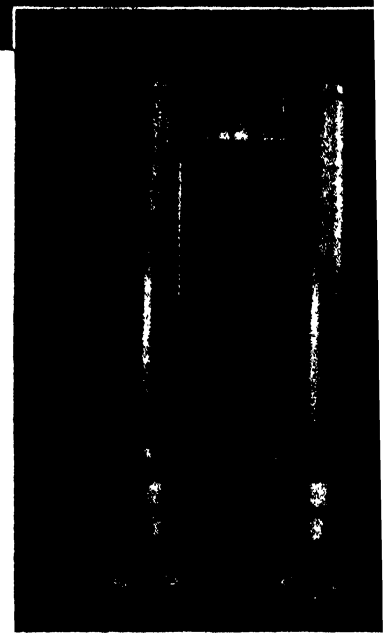
The former safety record for the petroleum industry was 5,791,899 man-hours set by the Standard of Indiana manufacturing department in 1941. The former safety record for individual refineries was 4,216,623 man-hours set by the Baton Rouge, La., refinery of Standard Oil Co. of Louisiana in 1940.

INDUSTRIAL uses of soap are being publicized in a new mimeographed bulletin issued by the Association of American Soap & Glycerine Producers, Suite 2050, 11 West 42nd St., New York, N. Y. With war restrictions on the production of many synthetic chemicals and other raw materials, the association believes technicians in a number of industries are interested in widening applications for the soap in various steps of processing. Aim of the bulletin is to report new developments noted in patent and research literature or established by experimental work.





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PREFABRICATED PIPING BY **GRINNELI**

WHENEVER **PIPING** IS INVOLVE

Du Pont Issues Statement on 1942 Activities

PRODUCTION of du Pont materials required for the war emergency, whether of chemicals or explosives, is at an all-time high, Walter S. Carpenter, Jr., president of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., announced in a statement to stockholders. Plant expansion on an unprecedented scale, largely constructed and operated for the account of the Government, has involved expenditures totaling several hundred million dollars, he said.

The six months' period just ended has marked the practical completion of a significant transition, Mr. Carpenter stated, to satisfy the imperative requirements of the military and the essential civilian needs of a nation at war. In contrast with manufactures today, sales of military products for the 20-year period prior to the present war constituted less than 2 per cent of the total, with approximately 98 per cent chemical products to meet the normal peacetime needs of the people.

Pointing out that du Pont's neoprene was the first so-called synthetic rubber to be produced on a commercial scale, he noted that in the fall of 1941 the company decided to construct a second plant in a new location. Following Pearl Harbor, the United States Government acquired this plant from the company and contracted with du Pont to complete that plant for its account, to construct three more units at the new location, and to operate the plant to produce neoprene for the Government. The first unit will be operating in a few months, and it is expected that the other three units will come successively into operation in 1943, he added.

Mr. Carpenter said that the capacity of the original nylon plant has been doubled and a further new plant has gone into production. The major portion of all vat colors used for military and naval purposes are being made by du Pont, he pointed out, with this country now "self-sufficient in all of its essential dye requirements".

Cordura rayon yarn has been adapted to use in tires for heavy duty on airplanes and mechanized military equipment. Production of cast transparent sheets of Lucite, vital to military airplane construction, during the past six months has been nearly quadruple that for the comparable period of 1941, Mr. Carpenter announced. Output of nitrogen extracted from the air likewise has been substantially expanded. Speed of construction of powder plants and production in plants already in operation have exceeded expectations. Each TNT unit of production, he declared, is now turning out three times the quantity that similar units were able to produce during the first World War.

Many du Pont patents and secret processes have been made available, royalty free, for the production of critical products for the Government during this emergency, Mr. Carpenter explained.

In the statement he noted the fact that during the past six months the company and a number of its officials have been named in six separate indictments obtained by the U. S. Department of Justice against certain units in the chemical industry charging violation of antitrust laws. "The serious import of these matters cannot be minimized", said Mr. Carpenter, "especially in as much as the Government has chosen to institute procedure under the criminal statutes, and extensive litigation may be expected before the issues raised are finally adjudicated."

"This company", he said, "through the enthusiastic and cooperative effort of its employees in all capacities is applying itself to the task of doing its part thoroughly and expeditiously."

Fused Glass Drops Replace Sapphire Jewel Bearings

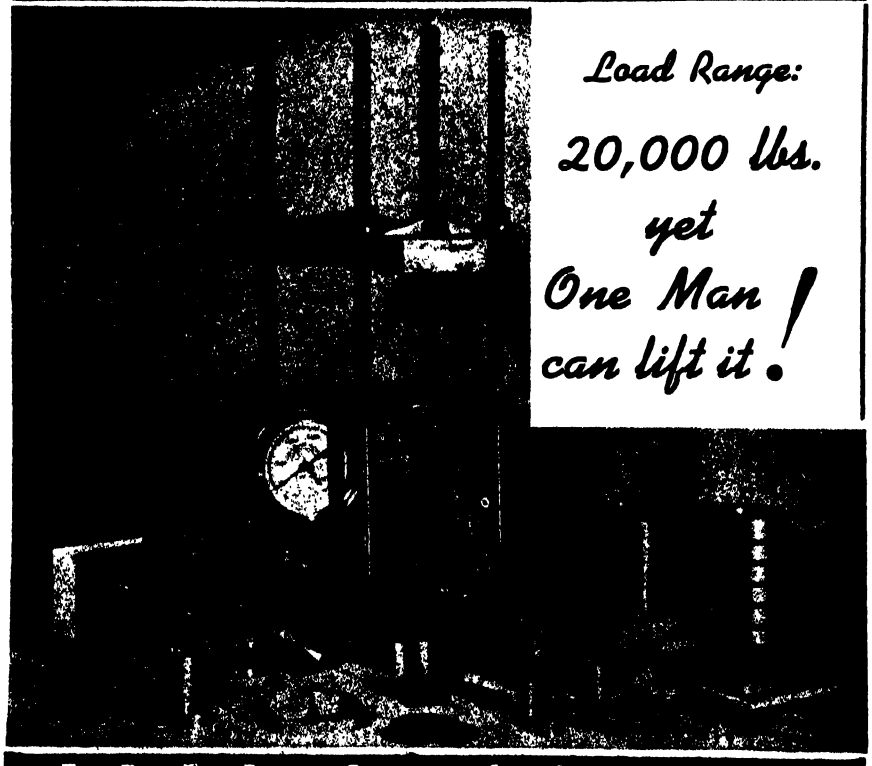
DROPS of fused hard glass are successfully replacing precious sapphires in production of war-needed electrical indicating instruments, F. K. McCune and J. H. Goss of the General Electric Co. reported before the American Institute of Electrical Engineers in Chicago June 23. The glass substitutes have been developed to the point where they can be produced in quantity and there is little to choose between the two for actual miniature instrument application, Mr. McCune said. One type of glass, called "material II", was chosen as the most satisfactory of any developed during the research since it contains a large percentage of alumina, a substance found native in sapphires which are next to diamonds in hardness.

Sapphire jewel bearings were formerly imported, principally from Switzerland. The war cut off the supply of the jewels and the personnel trained to cut them.

Alcohol Produced from Oranges

A PROCESS for production of 190-proof alcohol from waste citrus fruit for the manufacture of explosives has been announced by the Citrus Products Laboratory, U. S. Department of Agriculture, Winter Haven, Fla. Production costs are said to be approximately two thirds those of producing alcohol from blackstrap molasses. One gallon of 190-proof alcohol and about 12.5 ounces of dry yeast can be made from 25 gallons of waste juice, about 61,000,000 gallons of which are available in Florida canneries.

THE CARVER LABORATORY PRESS



Load Range:
20,000 lbs.
yet
One Man
can lift it!

FRED S. CARVER
HYDRAULIC EQUIPMENT
347A HUDSON ST., NEW YORK

Hercules Research Expanded

To HANDLE an expanded research program 90 per cent devoted to the war effort, Hercules Powder Co., has employed a group of women chemists and also instituted a night research shift at its central experiment station laboratories. There are more than 204 trained chemists and a total research staff of more than 600 men and women working in the 15 buildings located on a 300-acre plot of land in Delaware. Research expenditures at this Experiment Station in 1942 will approximate $1,500,000.

Mindful of the need to conserve building materials, no new structures are contemplated, although the station has a high priority rating because of the nature of its war work.

To handle the staff expansion, additional laboratory and office space was leased. Then the company decided to "double up" on operations by establishing a night research shift rather than increase the physical facilities of the station, believing that it can save laboratory space and equipment by assigning about 25 per cent of the staff regularly to night research, from 4:30 P. M. to midnight, without reducing the volume or quality of results. At the same time, the transfer of some men chemists to ordnance work necessitated the employment of women who have received adequate schooling.

Believed to be one of the largest groups of women chemists in any of the chemical industry's laboratories, the Hercules group of 37, many of whom are 1942 college graduates, represents a ratio of one woman to every six men chemists. With only about 300 girls graduated each June from colleges with degrees in chemistry, they also represent a ratio of one out of every 10 in this year's graduates.

High school girl graduates are working at the Experiment Station as laboratory helpers or in filing and secretarial posts. Hercules also is employing women as chemists, technicians, and helpers in two of its plants, and in at least two of the ordnance works it operates for the War Department.

Included among the women chemists at the Hercules Experiment Station is Lura Shorb, who in the last war was one of the few of her sex in the chemical industry. In 1917, she was an analytical chemist at the explosives plant run by Hercules at Kenvil, N. J.; today, she is in charge of the extensive services of the technical library at the research center.

Donna Price, a Cornell graduate; Elizabeth Osman from Bryn Mawr; and Lois Hans, one of the better known women chemical engineers in the specialized field of papermaking, are also on the staff of the Experiment Station.



Structural Members Do Double Duty on this Efficient Pump

The design of this Amsco-Nagle Pump conserves vital metal, saves unnecessary weight and makes possible its high efficiency. The two structural supports that secure the water end to floor plate also serve another purpose. The strut on the left acts as a lubrication duct conveying lubricant from above the floor plate to the submerged bearing. The strut on the right serves as the discharge pipe.

This pump, a 2". Type "SW", frame 7 unit, has another distinctive design feature—an inverted inlet. This arrangement eliminates gas-binding and causes hydraulic thrust to counterbalance the weight of the revolving parts. The steady bearing at the water end is a sleeve bearing supported in a split yoke and is replaceable without dismantling.

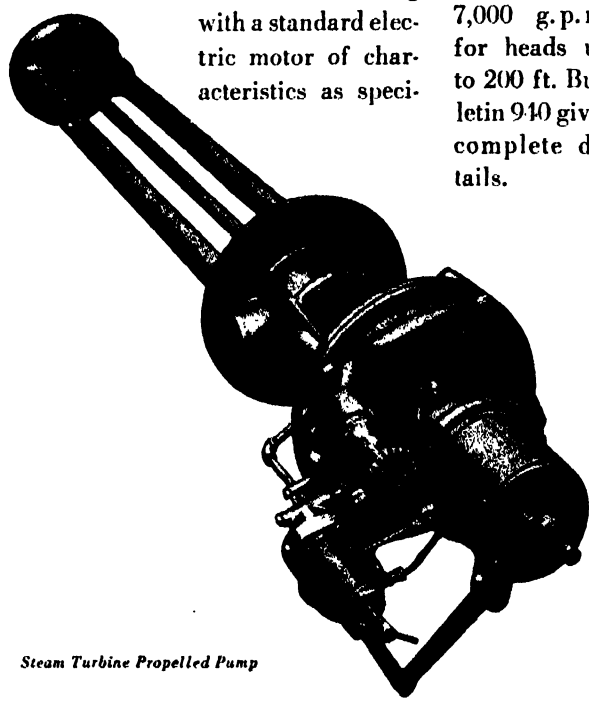
Steam Turbine Propelled Pump

Ordinarily Amsco-Nagle Vertical and Horizontal Shaft Pumps are supplied as shown in the sectional drawing with a standard electric motor of characteristics as specified by purchasers of the pump; but, on the pump pictured (below, left), a Wing Mfg. Co. steam turbine power unit is used.

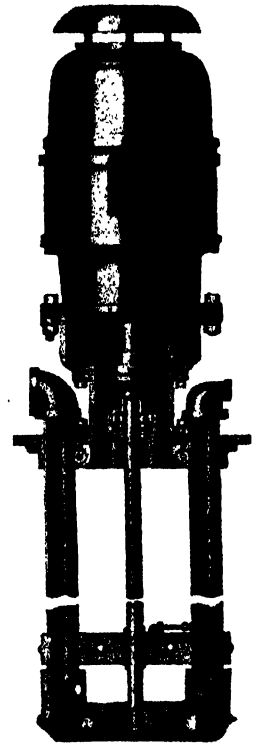
This pump was built to handle residue from a coke oven by-products chemical still, similar to the residue from petroleum stills.

While water ends can be made of impact and abrasion resistant manganese steel, Amsco Alloy, monel, bronze, and a variety of other metals, depending upon the corrosive or abrasive nature of the material handled, the water end of this particular pump is of ordinary cast iron which was most economical in this case.

War times call for maximum economy and efficiency in all operations and processes and as far as concerns pumping heavily loaded liquids or liquids carrying abrasive material in suspension, Amsco-Nagle Pumps meet the requirements. Available from ¾" to 12"; capacities to 7,000 g.p.m. for heads up to 200 ft. Bulletin 940 gives complete details.



Steam Turbine Propelled Pump



Type "SW" Amsco-Nagle Pump

Amsco

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OF THE AMERICAN BRAKE SHOE & FOUNDRY CO
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POTOMAC POSTSCRIPTS

WPB Activities

Agar. Restrictions on transactions in agar, contained in Order M-96, have been removed in the case of sales and deliveries to the Defense Supplies Corporation. Order M-96 froze agar supplies of 50 pounds or more, except for use in preparation of bacteriological media. Amendment 2 will enable the Defense Supplies Corporation to build a stock pile of agar from inventories so frozen.

Carbon Tetrachloride. A temporary surplus of carbon tetrachloride for which storage facilities are inadequate has resulted in easing of restrictions on its use. Amendment 1 to Order M-41 doubles the quantity certain users may consume before September 30. The order previously restricted deliveries to B2 users to 50 per cent of their average monthly consumption for the year ended September 30, 1941.

Caustic Soda and Soda Ash. The Director General for Operations has acted to permit unlimited storage by industrial users of caustic soda and soda ash. Increasing supplies of these materials, used in the manufacture of aluminum and other nonferrous metals, glass, soap, textiles, leather, dyes, petroleum, paper, and other products, make it advisable that wide distribution be made now against future demand.

The action adds the two commodities to Schedule A of Order M-161, which removes them from the inventory restrictions of Priorities Regulation 1.

Chlorate Chemicals. A provision that will permit stock piling of chlorate chemicals by large industrial users has been added to the chlorate chemicals order, M-171. Under the new provision, present inventories may be frozen and month-by-month consumption met by allocation. Unrestricted deliveries to any one person in any one month are increased from 10 to 25 pounds.

Chlorinated Rubber. Three changes in the chlorinated rubber order, M-46, have been made in Amendment 2 to the order. The first removes permission to use chlorinated rubber in the manufacture of electrical insulation. Substitutes are available. The second permits the use of chlorinated rubber in the manufacture of core binder cement for use in casting equipment made for the armed services. The third continues the order in effect until revoked. It had been due to expire on July 31.

Ethyl Alcohol used in the manufacture of synthetic rubber is exempted from provisions of the General Maximum Price Regulation in Amendment 18 to Supplementary Regulation 1 of the General Maximum Price Regulation. For the purpose of price flexibility during the formative period of the synthetic rubber industry, numerous chemicals needed in the manufacture of artificial rubber were exempted previously from the general regulation. This amendment applies only to ethyl alcohol covered by the General Maximum Price Regulation when used in the production of synthetic rubber. All sales and deliveries of ethyl alcohol formulas included within the provisions of Revised Price Schedule 28 still remain governed by that measure since no alcohol of these formulas is used in production of synthetic rubber.

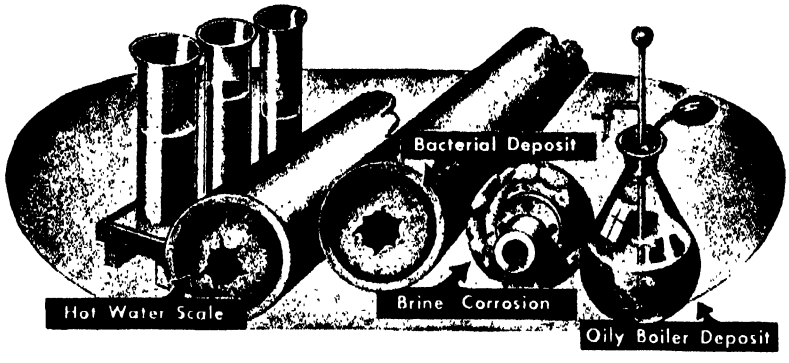
Exports to American Republics. A new list of materials for which export orders to the other American republics will be given preference over other orders has been issued as Amendment 2 to General Exports Order M-148. Within the limits of specific allocations made by the Requirements Committee of WPB and to the extent necessary to meet delivery schedules set by the Board of Economic Warfare and WPB, Latin American orders for the critical materials specified will be given preference, regardless of preference ratings on orders which they may displace.

The following products have been added to the list which was announced May 12 and will receive preference during the third quarter of 1942: mercury, platinum, zinc, cotton pulp, cryolite, diamond dies (nonstrategic), mica, belladonna, digitalis, ergot, insulin, ipecac, procaine, bauxite, beryl and beryllium, cadmium (metallic), citric acid, dynamite, naphthalene, and potassium chlorate.

These products which were on the previous list have been removed: tungsten, soda ash, tanning materials (chrome), rubber and rubber products, manila fiber and cordage, light trucks, cranes, hoists, derricks, mechanical and electric household refrigerators, cobalt (oxide), molybdenum wire, caustic soda, tricresyl phosphate, and small electrical heating appliances.

Extension Orders. Three chemicals orders which were due to expire on July 31 have been extended until revoked. The orders are M-27, on the distribution of phenols; M-71, concerning processing and distribution of fats and oils; and M-31, governing deliveries of methyl alcohol.

Machinery. Persons engaged in the freezing, dehydration or fresh packing of



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fruits and vegetables are assigned the same preference ratings as canners for material and machinery needed for repair, maintenance, and expansions of their plants in an amendment to Preference Rating Order P-115. The ratings assigned are A-1-a for emergency maintenance or repair; a-1-c for replacement, addition, or expansion; A-1-j for normal maintenance, repair, and operation, all subject to specific limitations.

Mercury. Amendments to Conservation Order M-78 make several additions to both the permitted and prohibited uses of mercury. The new restrictions include the act of redistilling within the meaning of the term "processing," add the manufacture of fireworks and film developing preparations to the list of prohibited uses, and reduce the amount which may be used in the production of cosmetics from 80 to 30 per cent of the amount used during the base period.

Added to the list of general exceptions from the restrictions imposed by the order are deliveries to laboratories for specified purposes, the manufacture of antifouling paint for use on merchant vessels of the United Nations, and the maintenance and repair of industrial control equipment.

Phthalate Plasticizers, used in the manufacture of plastics, synthetic rubber, lacquers, and smokeless powder, have been placed under complete allocation control. Form PD-606 is provided for persons seeking delivery of phthalate plasticizers, and Form PD-607 for monthly reports by producers and distributors. Deliveries to one user of 5 gallons or less of each type of phthalate plasticizers in a month are not restricted, nor are deliveries of 55 gallons of any one type or 110 gallons of different kinds to a single user. The allocation system becomes effective September 1.

Pyridine. Production and distribution of pyridine are put under complete allocation control in Conservation Order M-185. Pyridine is used in the manufacture of the sulfa drugs, of Zelan, a water repellent for tents, coats, gas masks, sleeping bags, etc., and of nicotinic acid. All producers and distributors of pyridine are required to file Form PD-604 on or before the 10th day of each month preceding the month for which authorization for use is desired. In addition, Form PD-605 will have to be filed on or before the 18th day of each month. Users of less than 10 gallons a month are exempt.

Shellac. Civilian use of shellac is practically halted in an amendment to Order M-106 which places all shellac, except for certain specified uses, under complete allocation. The previous order included seedlac in its provisions. By a change in definition, seedlac is removed from the order.

Synthetic Rubber. The War Produc-



DO YOU KNOW

1. How to extinguish Polar Organic-Solvent Fires?
2. What kind of Fires are best extinguished by Foam?
3. What is the best method to apply Foam?
4. When to use a Portable Foam Generator?
5. When to use a Built-in System?
6. When to use a Single Line Service?
7. When to use a Dual Line Service?

You will find the complete answers to these important Fire Protection Questions . . . and informative technical data, too . . . in the 32-page Bulletin.

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NATIONAL FOAM SYSTEM, INC.

Fire Protection Specialists in the Chemical and Metallurgical Industries

PHILADELPHIA NEW YORK CHICAGO

"EVERY INGREDIENT OF NATIONAL IS AMERICAN"

tion Board has approved an increase in its synthetic rubber program from 800,000 to 870,000 tons. The increase, to be obtained with no expenditure of critical materials for construction purposes, is due to advanced engineering in the production of butyl rubber which permits an increase of 70,000 tons in the formerly planned 60,000-ton capacity of plants already under construction. The expanded program is not expected to alter the projected figure of 300 tons of butyl rubber to be produced in 1942. The increase does not change the current picture, and the facts on the rubber situation still indicate that no rubber can be spared for nonessential purposes.

Price of Imported Cresylic Acid Cut

A SUBSTANTIAL reduction in the price of imported cresylic acid has been announced. A specific price measure for this type of cresylic acid—Maximum Price Regulation 192—provides an elastic pricing formula which establishes the ceiling price for sales by importers at approximately $1.10 per gallon. This price, based upon current cost conditions, is from 40 cents to 75 cents under the maximum previously established for most importers by the General Maximum Price Regulation. The new price schedule became effective August 5.

Pilot Plant to Test New Zinc Process

PAVING the way for development of large, untouched reserves of domestic zinc ores, the U. S. Bureau of Mines will establish a $350,000 pilot plant and laboratory to conduct commercial-scale tests of a gas reduction process developed by the bureau for production of the critical metal zinc. The pilot plant, which probably will be built somewhere in the south-central section of the United States, will have an output of 500 pounds of metallic zinc daily. Funds for construction have been provided in the First Supplemental National Defense Appropriation Act, 1943.

Representing a departure in metallurgical processes for treatment of zinc-bearing ores, the bureau's method uses reducing gas in several stages of a reducing cycle from which ore concentrate emerges as high-purity zinc. Experiments indicate that only 5 cubic feet of reducing gas are necessary to produce 1 pound of zinc and that as much as 95 per cent of the zinc can be extracted from the ore by the new process. The scientists have estimated that the amount of fuel required to produce a pound of zinc by using this method is approximately one half of that needed in commercial furnaces which use coal and coke.

FTC Order Names Insecticide Group

TWENTY-SIX manufacturers of insecticides, fungicides, and related products, the Agricultural Insecticide and Fungicide Association, and 11 of its officers and directors have been ordered by the Federal Trade Commission to halt certain practices "having the tendency and effect of restraining and suppressing competition in the sale and distribution of their products". The commission said the association, organized in 1934, had "acted as a clearinghouse for the exchange of statistical, price, and trade information which was submitted to it by the respondent members".

Corporations named in the order, all members of the association, were:

Acme White Lead and Color Works, American Agricultural Chemical Co., American Cyanamid and Chemical Corp., Derris, Inc., George W. Cole & Co., Inc., John Powell & Co., Inc., General Chemical Co., Inc., Stauffer Chemical Co., Inc., Phelps Dodge Refining Corp., Tennessee Corp., American Nicotine Co., Inc., California Spray-Chemical Corp., Chipman Chemical Co., Inc., Hercules Glue Co., Ltd., trading as Colloidal Products Corp., Commercial Chemical Co., Dow Chemical Co., E. I. du Pont de Nemours & Co., Inc., Latimer-Goodwin Chemical Co., Niagara Sprayer and Chemical Co., Inc., Nicotine Production Corp., Sherwin-Williams Co., Inc., Southern Acid & Sulphur Co., Inc., Tobacco By-Products and Chemical Corp., J. W. Woolfolk Co., Ansbacher-Siegel Corp., and J. M. Taylor, E. P. Brown, and E. W. Parker, trading as Taylor Chemical Works, Ltd.

Charges named in the original complaint were dismissed against the Allegheny Chemical Corp., Antiseptic Products Co., Fred L. Lavanburg, and Lucas Kil-Tone Co., all of which have ceased doing business, and the Pittsburgh Plate Glass Co., Corona Chemical Division, which, the commission said, had not cooperated with the other respondents since 1936.

Explosives Instructions Issued

RIGID instructions regarding the storage, handling, and transportation of explosives by the more than 145,000 persons licensed under the Federal Explosives Act have been issued by the Secretary of the Interior Harold L. Ickes. Anyone violating instructions may have his federal license revoked, be refused a renewal of his license, or be prosecuted under the act and thus be subject to a fine of not more than $5,000 or imprisonment for not more than one year or both.

The new instructions provide among other things that explosives must be stored in "substantially constructed and securely locked buildings or in suitable containers" and that they must be protected at all times against theft, loss, or unauthorized use. Specific instructions also are given for construction of various



Few indeed are the chemicals that have uses more widely varied than caustic soda, one of the four-score products on which HOOKER reputation is based.

HOOKER Caustic Soda, to mention but a few of its many uses, helps make the Nation's soaps; degreases bolts, nuts and other machine parts throughout the metal working industry; aids in the manufacture of rayon, petroleum products, paper, reclaimed rubber, textiles, medicinals—and is essential in the production of a large group of other chemicals which, in their turn, further help lick important war jobs.

HOOKER Caustic Soda, one of the original HOOKER products, is widely known for its purity and uniform compliance with specifications. In spite of today's demand for unprecedented quantities, the highest quality standards are being maintained.

And now as always, HOOKER technical specialists are available for consultation on production problems throughout the chemical industries essential to winning the War and the Peace.

2073

types of explosives-storage magazines. Every person licensed to manufacture or store explosives will be required to identify clearly the place where the plant or magazine is located by posting signs reading "Explosives—Keep Off".

New Process Proposed for Alumina Production

PRODUCTION of alumina from low-grade domestic bauxite and from clay, heretofore little used for aluminum metal, has been recommended to the War Production Board by the Advisory Committee on Metals and Minerals of the National Academy of Sciences. Use of a proposed new process by the alumina plants in the country will make it possible to include a substantial quantity of clay with the bauxite feed, so that less bauxite will be needed and the limited domestic reserves conserved. The committee reported on the results of a year's study of possible new sources of alumina from clay, tailings, high-silica bauxite, alunite, kaolin clay, and the like, made at request of WPB.

The committee has found that treatment of the tailings from the Bayer process, containing iron, titanium, and silicon compounds, by a recently developed sintering process will result in the recovery of substantial amounts of alumina. This process will permit the production of alumina from high-silica bauxite as well as from current accumulations of this red mud. Of several proposals to produce alumina directly from clay without the Bayer process, the committee looked with favor on a sintering process known as the modified Pedersen process, and recommends construction of a test plant for the purpose. Continuation and expansion of the current pilot-plant operations around the country, such as those being operated by the U. S. Bureau of Mines and by Kalunite, Inc., in Utah, are urged.

Ordnance Sets Up New Field Offices

GOVERNMENT-OWNED, contractor-operated ammunition factories, producing explosives under direction of the Chief of Ordnance, Services of Supply, had their activities further coordinated August 1 when field directors were appointed in important production centers.

A field director of ammunition plants has been located in St. Louis, Mo., to coordinate and direct activities of the ammunition plants. The Production Section, Small Arms Branch, and the Gage and Gage Facilities Section of the Office of the Chief of Ordnance, now in Washington, has been transferred to Philadelphia, Penna.

"In this manner the administration of ammunition production will be carried directly to the manufacturing plants,"



What Beckman pH Control is Doing to Speed Up America's Production!

MORE production! . . . *Faster!* . . . *Better!* That's the big cry today. And here's what Beckman pH Control is doing—*right now*—to speed up production from plants in industry after industry . . . electroplating airplane parts to producing chemicals, from turning out food products to making paper . . . wherever water or water solutions are used in production processes . . .

SPEEDING PRODUCTION . . .

By Beckman-controlling the pH of their processing operations, many plant operators have been able to step up production rates without costly plant expansion. Example: Metal Plating . . . Beckman pH Control on the plating solutions has permitted faster plating at higher current densities with no sacrifice of smoothness—no peeling—no blistering. *Speeds production of critical airplane, tank, and gun parts!*

CUTTING WASTE . . .

By taking the guesswork out of process solutions, Beckman pH Control is cutting rejects and "mis-runs" to a minimum. Also is preventing "overdosing" and waste of hard-to-get chemicals. Conserves raw materials, cuts production costs, eliminates waste!

IMPROVING QUALITY . . .

Faster production often means sub-standard production . . . *but not with Beckman pH Control.* For in industry after industry Beckman pH Control, by eliminating many "unpredictables" in processing operations, has made possible a consistently better, *more uniform* product!

REDUCING MAINTENANCE . . .

Another major field where Beckman pH Control makes big savings is in reducing costly corrosion of valuable plant equipment. Example: Power . . . Beckman pH controlled feedwaters reduce scale and corrosion on boilers, heat-exchangers, piping, valves, etc. Cuts maintenance and "down time" . . . lengthens life of hard-to-replace equipment!

IF YOU USE WATER or water solutions anywhere in your plant operations . . . in processing, in boiler feedwater, waste disposal—*anywhere* . . . investigate the savings in time, materials, and production costs possible through Beckman pH Control. Our engineers will make recommendations to fit your particular operations.

There's a size and type of BECKMAN pH Equipment for every purpose—for every size plant. All embody advanced features available in no other make or type of pH equipment!



SEND FOR BOOKLET: "What Every Executive Should Know About pH" —a timely, helpful booklet on pH—what it is, how it's used—will gladly be sent on request. Send for yours!

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Beckman THE LEADING NAME IN pH



PHOTO BY U. S. ARMY SIGNAL CORPS

A burst of 40 pounds of white phosphorus, Civilian Defense School activities in Edgewood Arsenal

Major General L. H. Campbell, Jr., Chief of Ordnance, said. By moving these offices out of Washington, General Campbell expects to speed up inspection and acceptance of weapons to be supplied to fighting fronts all over the world. Nearly 70 officers and 150 civilians are to be transferred from the Washington headquarters.

Army Ordnance Establishes Explosive Safety Branch

AN EXPLOSIVE SAFETY BRANCH has been created in the Army Ordnance Department, Services of Supply, with headquarters at 333 North Michigan Ave., Chicago, Ill., to formulate, supervise, and enforce safety measures in munitions plants and establishments where explosive hazards exist. Colonel Francis H. Miles, Jr., Ordnance, is chief of the new branch.

PRODUCTION of Linseed oil during the second quarter of 1942 was 241,015,000 pounds, according to a preliminary report of the U. S. Bureau of the Census.

Most Effective War Use of Physicists Urged

RECOGNIZING that many methods and devices of modern warfare are applications of the science of physics, the American Institute of Physics has issued a statement calling for a wise and effective use of the Nation's trained manpower in this field. The statement, prepared by a War Policy Committee of leading physicists, points out that so many physicists are devoted to vital war work that not enough are left to give training in physics, both in colleges and schools and in special courses set up by the armed services themselves. It is estimated that the military operation of technical devices will require some training in physics for as many as 200,000 men and women within a year. Steps suggested as a partial solution include establishment of government-sponsored teacher training courses, adoption of wise occupational policies by the Selective Service System, provision of financial aid to well-qualified students, and use of physicists in the Army and the Navy only for work requiring their training.

Who Makes It?

SOURCES of supply for following are wanted by the National Registry of Rare Chemicals, Armour Research Foundation, 35 West 33rd St., Chicago, Ill.: Sodium 1-malate, sodium 1-glutamate, blood charcoal, mercuric fluoride, glucose 1-phosphate, hexose 6-phosphate, fructose 1,6-diphosphate, acetyl phosphate, phosphoglyceraldehyde, and guanine.

Earl L. Richardson has recently been added to the Research and Development staff of Colgate-Palmolive-Peet Co. in Jersey City, N. J. Previously he was employed as a research chemist at the Calco Chemical Division of the American Cyanamid Co., Bound Brook, N. J.

Elmer W. Silver, secretary, has been elected treasurer of the Whitehead Metal Products Co., succeeding the late **William L. Rianhard.**

STOP GAS and ACID Leaks with CHARLAB CHEMICAL PUTTY

Waterproof—Acid Resistant—Stays Plastic

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5% discount for quantities of 200 lbs. Packed in Standard 50-lb. containers

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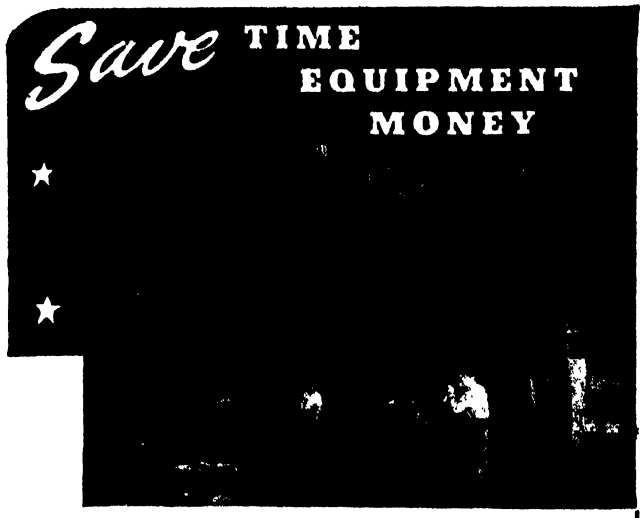
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It selectively adsorbs 4 to 20% of its weight in water, depending upon the particular application, and is regenerated by heating to 300–350°F. FLORITE is hard, stable, non-corrosive, non-poisonous, and is available in a variety of particle size classifications.

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Cholic Acid
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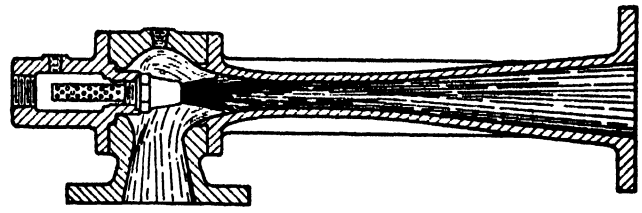
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In some cases vacuum can be increased by merely changing the nozzles. Capacity can often be increased by changing the nozzles and throats or by re-machining them. It is our policy to keep in stock rough castings for throats and suitable materials for nozzles which can be promptly machined for individual conditions on prevailing priorities. Complete new Evactors for vacuum to a small fraction of 1 mm. are still being made subject to crowded conditions on ordnance equipment.

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Total Membership August 1—31,254

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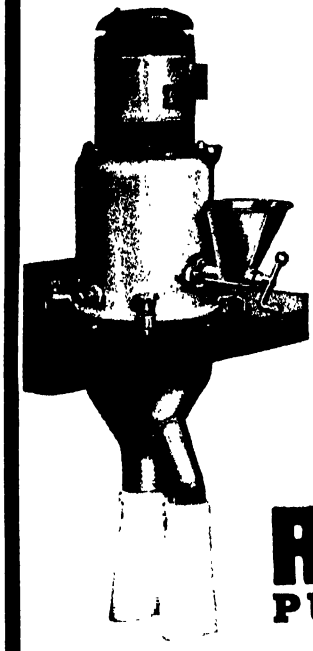
RAYMOND *Laboratory Separator*

Test Separations

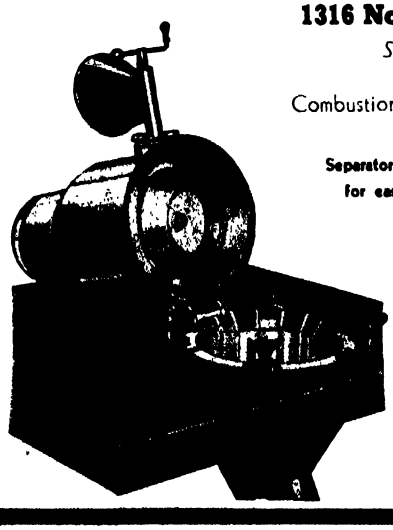
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such as chemicals, pigments, clays, talc, insecticides, cement, ceramic materials and powdered foods, can be accomplished easily and accurately with the Raymond Laboratory Separator.

1. It operates on the same principle as the large Raymond Mechanical Air Separators, and gives the same resultant material.
2. Fineness is regulated by means of a set of interchangeable whizzers and fans furnished with the machine.
3. Separator is easy to take apart for cleaning or adjustment. See illustration.
4. Complete motor-driven unit comes mounted on a metal base with sockets for pipe legs.
5. Separator will handle any fine, dry material in small amounts as required for testing purposes.



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Separator swings back for easy cleaning

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Describes Laboratory Mills and Separators

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[1] Junior member.

Illinois Tech Graduates Women in Chemistry War Course

ILLINOIS INSTITUTE OF TECHNOLOGY graduated 24 women in an industrial chemistry war-training course on August 22. The course is part of the institute's Engineering, Science and Management War Training program, and the women are going into war work immediately. Illinois Tech was the first school in the Nation to offer such courses training women for technical war jobs. Other sections in industrial chemistry will be opened later, as well as courses in ordnance inspection and industrial drafting—the other courses which are offered in the program.

CHEMISTRY AND TECHNOLOGY OF
RUBBER

Edited by: C. C. Davis and John T. Blake

Published under the Auspices of the Rubber Division of the American Chemical Society

NOTE: The prospect of a severe and long-continued shortage of rubber makes it more necessary than ever for the industrial consumers of rubber to understand its properties. Such knowledge will greatly aid them in determining what substitute materials can be used to greatest advantage.

This book is designed for all those connected with the rubber industry, whether research workers, analysts, compounders or development engineers. It is an authoritative reference work for both the theorist and the practical man.

Outside the rubber industry, this Monograph will prove invaluable to students, and to research and development men in numerous industries which supply raw materials for the manufacture of rubber goods. Engineers in the petroleum and chemical industries, on whom the responsibility of stepping up synthetic rubber production will now fall, will be greatly helped by the chapters on the physics of rubber and on substitute rubbers. Finally, this book will be useful to large-scale consumers of rubber: to textile plants, which now employ latex extensively; to the footwear and clothing industries; to automotive and other mechanical engineers; and to industrial maintenance engineers everywhere, who have become dependent on mechanical rubber goods for factory and field installations.

A. C. S. Monograph No. 74 941 Pages Profusely Illustrated Price $15.00

Reinhold Publishing Corporation, 330 W. 42nd St., New York

Danish Glass Works Resumes Operations

RESUMPTION of operations by the glass works at Kersor, Denmark, after two years' idleness because of lack of coal, is reported officially from Denmark.

The plant has a capacity to produce a considerable part of that country's requirement, approximately 6,000 tons annually, and has been put back into activity because stocks have become exhausted and the demand has risen. Some 7,000 tons of coal have been assigned to the factory. Stocks of other raw materials are said to be adequate.

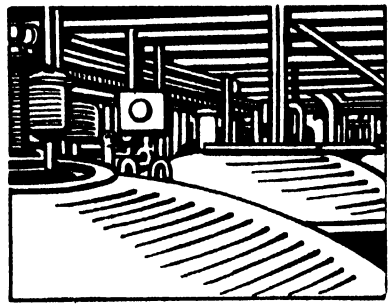
It will be several months before the new Danish glass is on the market, it is stated, as the ovens must be fired, and the initial product is likely to be defective.

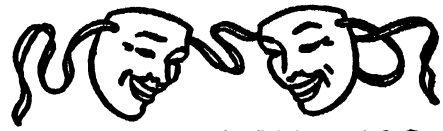
Recovery of Steel Plant By-Products Planned in Brazil

THE Brazilian Government expects to recover large quantities of chemical by-products from operation of a steel plant being constructed in that country. The plant should be in full operation by the end of 1943. Estimated by-products will be tar, 15,200,000 liters annually; benzene 3,880,000 liters; toluene, 896,000 liters; solvent naphtha, 93,000 liters; ammonium sulfate 5,200 tons.

Resistance to Heat, Fatigue Increased in New Alloys

FOUR aluminum alloys of beryllium, said to retain their high tensile strength even when subjected to the high temperatures encountered in the newest airplane engines, have been developed by the Aluminum Co. of America, New Kensington, Penna. The alloys are revealed in Patents 2,286,624 to 2,286,627, granted to Lewis W. Kempf and Walter A. Dean of Lakewood, Ohio. It is claimed that the new alloys are not weakened by temperatures as high as 600° F.





EMANATIONS

Arginine

(To be sung to the tune of "Tangerine")

ARGININE—it's got guanidine.
In the liver it gives rise to ornithine.
Arginine—it yields putrescine.
Also known as tetra methylene diamine.
There are those who say arginine,
Hasn't got a lot to do with creatine.
Now I don't intend to be mean—
But I'll say this for creatine,
It's amidines from arginine.

BENNETT L. GEMSON
CLASS OF 1945
CORNELL UNIVERSITY MEDICAL COLLEGE

"Dry" Bans Alcohol Tires

A TELLING point against alcoholic rubber is pointed out by the *New York Times* in quoting a "letter to the editor" from an ardent prohibitionist of Nashville, Tenn. He said, "Fellow prohibitionists, let us refuse to use this product of an evil industry in any way, shape, form, or fashion, as we have in the past. We had rather walk than ride on tires made of alcohol."



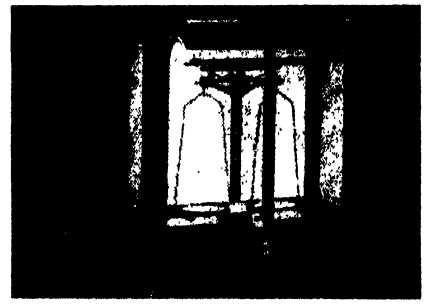
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War Gases. *Morris B. Jacobs.* 1st ed. 180 pages. Interscience Publishers, Inc., 215 Fourth Ave., New York, N.Y., 1942. Price, $3.00.

THIS book contains a collection of classified information on the war gases and other toxic gases which, under certain conditions, might have some war value. The book is confined to practical information such as is needed in civilian defense, and is addressed primarily to the gas identification officer, the war gas chemist, the decontamination officer, the health officer, and the air-raid warden. The principal subjects covered are the physical characteristics and physiological effects of the war gases, their effects on various materials including food and water, their detection, identification, and analysis, and methods of decontamination.

The author has made a careful study of contemporaneous literature on chemical warfare, including official publications of the United States and Great Britain. Many methods for doing the same thing are described, and the inexperienced air-raid worker will be embarrassed by this wealth of information unless the book has been carefully studied beforehand and some of the methods tried. However, all the methods described are well sponsored and appear to have merit, and the practical man would not go far astray in using any of them.

There are few positive errors in the book. Chemical warfare experts will not entirely agree with some of the definitions of terms on page 4. Lethal concentrations are not determined on man as suggested on page 6. Mustard gas and not phosgene was the most effective chemical war agent of 1914–18 (page 16).

The material presented is excellently organized and well indexed. The type is clear and legible. The binding and press work are good. This book should find wide circulation among those who are interested in the subject of the war gases and what to do about them if chemical warfare should be brought to our shores.

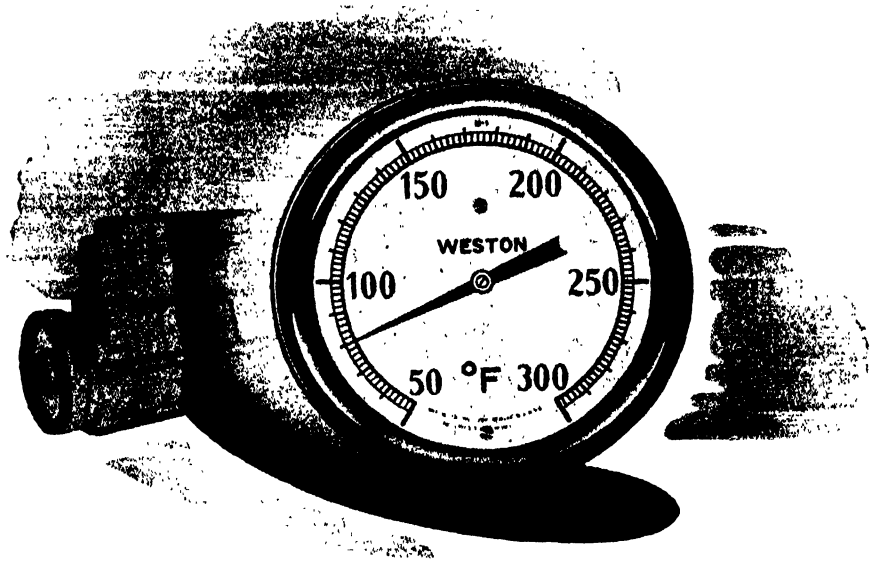
A. L. KIBLER

An Introduction to Electrochemistry. *Samuel Glasstone.* 557 pages. D. Van Nostrand Co., Inc., 250 Fourth Ave. New York, N. Y., 1942. Price, $5.00.

IN COMMON with most textbooks and courses in electrochemistry, many of the chapters deal with the constitution of solutions, acids and bases, neutralisation, and amphoteric electrolytes, with which every electrochemist should be familiar. The treatment of these subjects is thorough, clear, and modern.

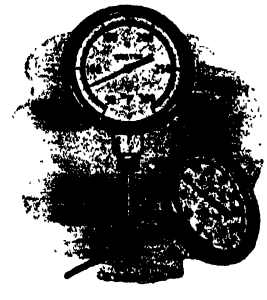
In his preface the author recognizes the importance of "phenomena at active electrodes" and devotes about 20 per cent of the volume to these topics. The presentation of polarization and overvoltage is much more complete and modern than in comparable texts. The brief space devoted to electrodeposition has prevented an adequate treatment of some important topics. For example (page 485) the impression is given that conductivity per se affects the throwing power, although the

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theory of the potential is based on the principle that, in the absence of polarisation, current distribution is solely a geometrical problem. Reference might have been made to the effect of cathode efficiency on throwing power, especially in chromium plating. In the valuable discussion of diffusion films, mention might have been made of the recent measurements by A. Brenner of their actual thickness, which was found to be only about one half of that computed by Glasstone and others. The presentation of electrokinetic phenomena is timely and helpful.

Progress in science is advanced by the acceptance of certain conventions that may be as arbitrary as driving on the right side of the road. It would be helpful if authors, especially of textbooks, would follow such conventions as the American Standard Definitions of Electrical Terms, e. g., "conductivity" and "resistivity" for the properties of a material, rather than "specific conductance" and "specific resistance". The system used by the author for signs of potentials is that used in most texts on physical chemistry, but is in conflict with the convention of most technical societies and leads to confusion in the treatment of polarization.

In the preface the author states that "the present book is more suited to the needs of students of physical chemistry, and those chemists, physicists, and physiologists whose work brings them in contact with a variety of electrochemical problems..... The book should also serve as an introductory text for those who intend to specialize in either the theoretical or practical applications of electrochemistry." The author has accomplished this goal so well that we hope some day he will write a book more largely devoted to the needs of industrial electrochemists, who are especially concerned with the departures from equilibrium conditions.

WILLIAM BLUM



Die Methoden der Fermentforschung. *E. Bamann* and *K. Myrbäck.* 3,321 pages. Georg Thieme Verlag, Leipsig, 1940 and 1941.

THIS work, written in German, contains 204 contributions by 131 prominent chemists and biologists from many countries. It was planned before the present war and appeared in nine consecutive sections during 1940 and 1941. It is the most unique book that has ever been published in this rapidly expanding field of chemistry. In spite of its size, theoretical discussions are limited to practical applications only. A considerable part of the book deals with the preparation and description of the substrates such as the synthetic esters, natural glycerides (olive oil, ricinus oil, soya oil), tannins, chlorophylls, numerous organic phosphoric acid esters, lipoids, carbohydrates, nucleic acids, proteins, and the derivatives of all these compounds as well as other organic substances important in enzyme chemistry.

An interesting chapter by Hirst and Peat deals with the synthesis and physiology of ascorbic acid. Barrenscheen and Pany are the authors of a chapter covering the preparation of the phosphorus-free intermediates of sugar metabolism (glycerol aldehyde, dioxyaceton, glyceric acid, pyruvic acid, methyl glyoxal, etc.), whereas Robison and Macfarlane describe the methods for the preparation of those intermediates that contain phosphorus (esters of sugars and of glycerol, and related compounds).

Highly instructive chapters are included on carbon dioxide assimilation in plants (Steiner), and in bacteria (Engel), and a chapter on nitrogen metabolism (Laine and Virtanen).

A large number of physical methods, such as the polarimetric, refractometric, spectrophotometric, colorimetric, röntgenologic, polarographic, magnetic, nephelometric, viscosimetric, and manometric, are described in great detail.

Most chemical procedures employed in the estimation of enzyme activities are included in the book. The function of enzymes in malting and brewing is reviewed by Haehn. Other chapters deal with the enzymes of flour and honey, the function of enzymes in the fat, dairy, fruit juice, textile, leather, and pharmaceutical industries. The use of enzyme tests in medical diagnosis is also discussed.

There is no subject index. There is, however, a bibliography of 7,908 references.

This work is an excellent source book of methods for the preparation of natural and synthetic substrates, of enzymes, and of procedures used in testing enzyme activity. It will be of great help to those confronted with enzyme problems.

HENRY TAUBER

Micromethods of Quantitative Organic Analysis. *Joseph B. Niederl* and *Victor Niederl.* 2nd ed. 347 pages. John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y., 1942. Price, $3.50.

IN THE preface the authors state that reviews of their first edition have encouraged them to continue the same mode of presentation. Microchemical methods are now introduced in the curricula of almost all educational chemical institutions, and the uniformity of presentation in the first edition was an instrumental factor in the adoption of these one-time research methods into industrial practice. The influence exerted by the first edition among those interested in this phase of chemical analytical methods brought about the standardization of many procedures and enabled younger men employed in industry to become more familiar with the practical application of organic analytical micromethods.

The second edition has outgrown the simple term, "laboratory manual", and can best be called a "handbook on organic microanalysis". The literature of the entire subject is well covered, and the authors' teaching experience guides elegantly every step of the various pro-

CONTINUED ON PAGE 1074

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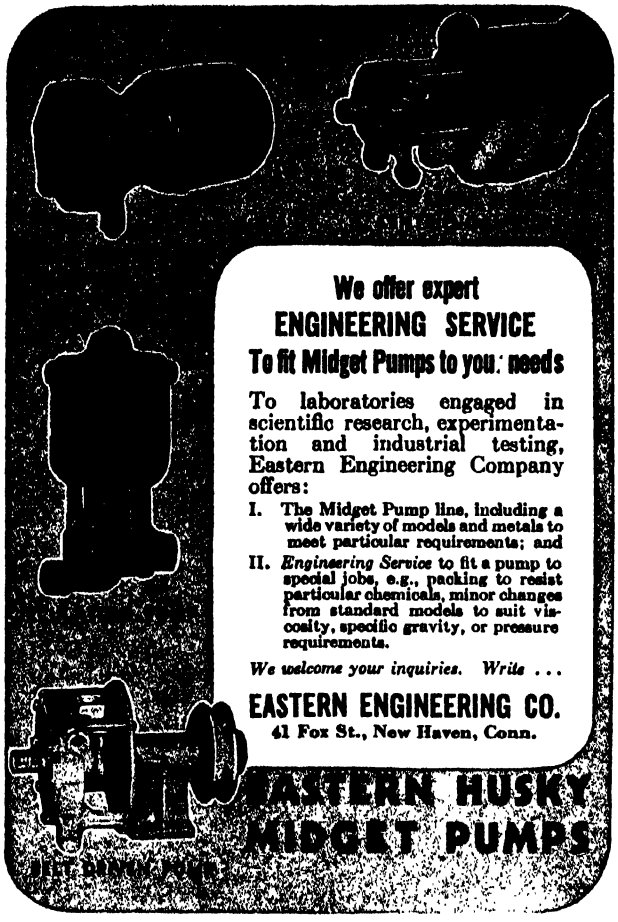
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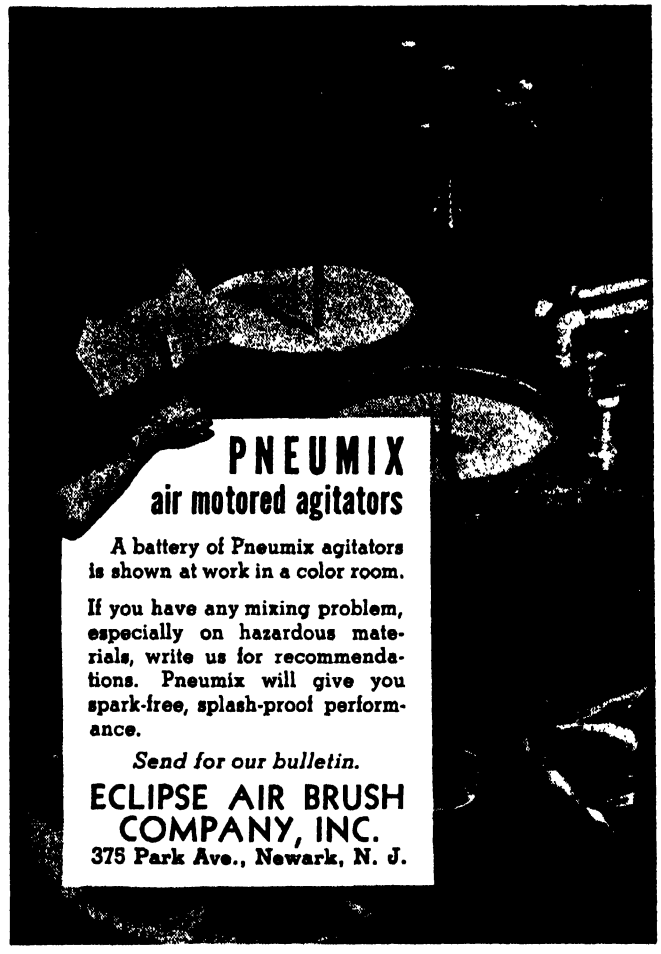
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CONTINUED FROM PAGE 1072

cedures. It helps the pupil and the instructor with less experience over the pitfalls and difficulties encountered in courses dealing with experimental methods.

One of our most active industrial microchemists has said that the progress of the research laboratory depends upon the quality and experience of its microanalyst. It is hoped that such an axiom will induce the authors, while preparing the third edition, to keep in mind a plan for enlarging the second edition to cover the entire subject of micromethods by a guarded, integrated, and coordinated system. Thus the beginner would have a more comprehensive text on principles of tested methods when entering upon his professional career; the one-time textbook would then become a more useful companion in everyday practice, and many of the published refinements of methods would be better understood by the practical man using microchemical analysis.

No book in the English language is better suited for introducing micromethods of organic analysis than the Niederl and Niederl already classical treatise. But, to maintain this high plane of presentation, the authors are urged to include in their forthcoming next edition a section on the historic aspects of microchemistry, especially as applied to America. It might be worthwhile to include in this future handbook of micromethods the more recent developments of diffusion analysis of Conway and Kirk. Also more emphasis should be given manometric micromethods. The chapter on qualitative organic analysis, now spanning only two pages, should be enlarged at least a hundred fold to cover the present status of the science and art of coordinating micromethods in the identification scheme of organic compounds. The isothermic method of molecular weight determination should also have been more comprehensively stressed.

The "balance" section would have gained in value if the various types of balances found on the American market were fully illustrated and explained as to their working mechanism, care, cleaning, and simple repair.

The chapter on Other Methods could have been enlarged and in the next edition should be given appropriate space. The inclusion of calculation tables was timely, especially since most American chemists are not acquainted with Kuesler-Thiel for the easily available nitrogen factors on pressure and temperature. That dry ice has replaced the Kipp generator is worth mentioning, even though the proper filling of a Kipp generator has a pedagogic value in thed evelopment of a microanalyst.

The section on Other Elements should also have been enlarged, especially since industry has begun to use micromethods as a tool in trouble-shooting for the pilot and production plant.

The book is a most necessary instrument for every chemist, and particularly for those who have made the study of microchemical methods their special field. Since each edition is a product of its time, the microchemically interested professional worker will give himself a professional treat if he will use the old, present, and forthcoming editions of microchemical methods as an interesting record keeper of his work.

EUGENE W. SCHOEFFEL

Convection Investigations. IV. A Contribution to the Theory of Systematic Extraction and Other Related Convection Problems. *Sverre Stene.* 170 pages. Document 1641. Report from Statens Institutt for Folkehelsa, Oslo, Norway. American Documentation Institute, 1719 N St., N. W., Washington, D. C. Microfilm, $1.90; photoprints, $17.

THIS study arose in the development of an extraction method to replace precipitation in a separation process for analytical purposes. It was found possible and very useful to apply mathematical methods of probability and statistics, beginning with the application of the binomial theorem. The decided success of this approach led to an organized study of discontinuous extraction and related processes in general with resulting mathematical systems.

All the developments assume sufficiently dilute solutions so that the distribution coefficient may be taken as constant. Many types of problems are treated. For example, in Chapter I—Discontinuous Extraction with a Quiescent Phase—the solute is considered as being introduced (a) once, (b) with every volume of raffinate phase, and (c) with m portions of the raffinate phase followed with n portions of pure raffinate phase; each of these cases is treated for the raffinate phases leaving the system and not leaving. Other problems are indicated by further chapter headings: II. Semicontinuous Extraction with a Quiescent Phase; III. Discontinuous Countercurrent Extraction; IV. Semicontinuous Countercurrent Extraction; and V. Principles of Separation. Applications are suggested to problems in adsorption and in pollution studies.

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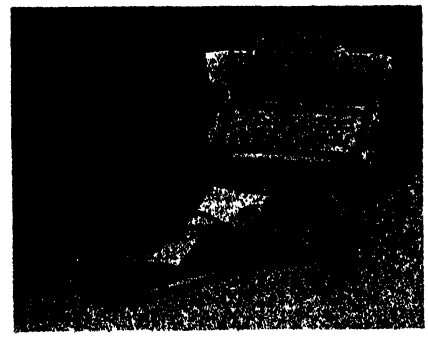
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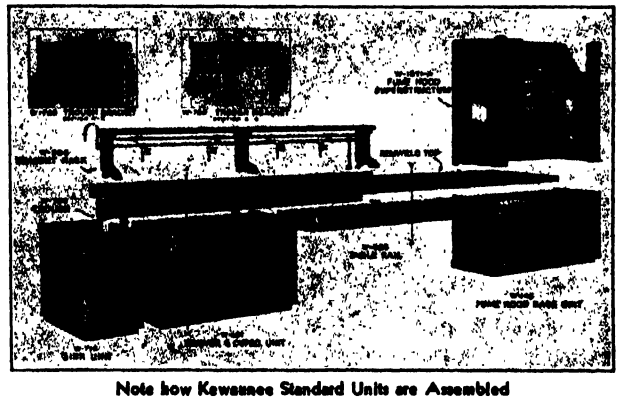
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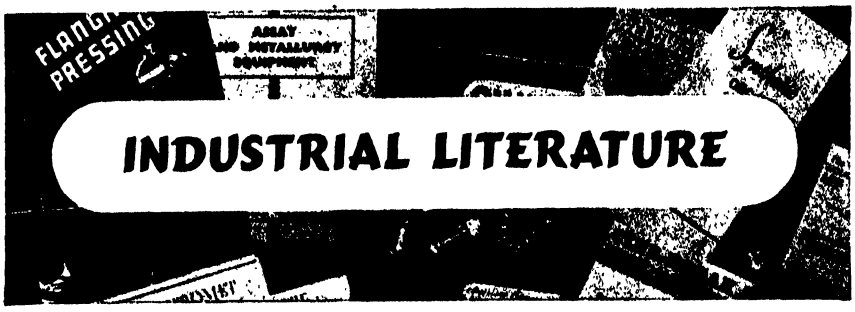
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Colloidal Graphite. An 8-page folder on natural colloidal graphite gives a brief summary of its uses in lubrication. *Folder CEN.* NASSAU LABORATORIES, Hackensack, N. J.

Water Handbook. This publication well deserves the title handbook. It not only discusses chemical analysis, but deals with the correct interpretation of these analyses. In the first section 25 different methods of water analyses are discussed at length with procedures and calculations. Such water analyses as hardness, alkalinity, phosphate, sulfite, turbidity, oil, calcium, specific conductance, etc., are covered. With but one exception, all tests are simple accurate determinations requiring little or no previous chemical background. The second section of the book is devoted to interpretations of the tests and their application to plant control. Included here are discussions of such subjects as carbonate and noncarbonate hardness, pH control, steam purity, intercrystalline cracking, corrosion, and many others. Scattered throughout the Water Handbook are 16 useful technical graphs and 15 illustrations of different pieces of testing equipment. *Water Handbook CEN.* W. H. & L. D. BETZ, Frankford, Philadelphia, Penna.

Water Purification Unit. These units are marketed under the name Ster Ozone and use ozone as the purifying element. The manufacturers point out that the machines producing ozone and purifying water are fully automatic in their operation at all rated capacities. This unit is said to filter, sterilize, control taste and odor, and reduce color in the water treated. The authors have included technical data, flow sheet, and specifications of their unit. *Model "B" Water Purification Unit Publication CEN.* TECHNICRAFT ENGINEERING CO., 5610 South Soto St., Los Angeles, Calif.

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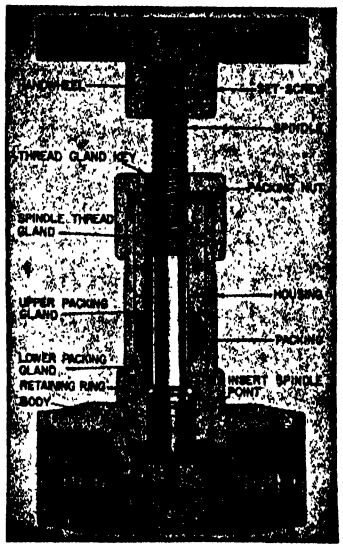
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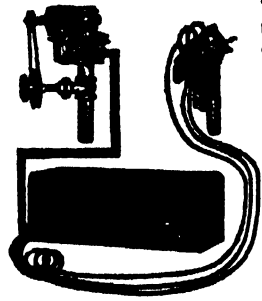
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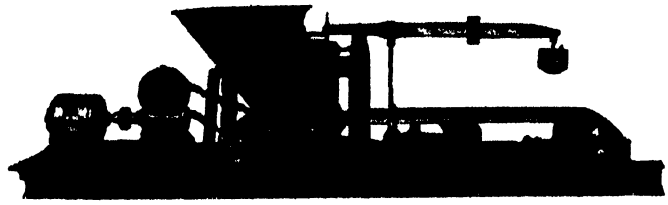
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1-chloro-3-hydroxypropane	tetrabromoethane
1,3-dibromo-2-hydroxypropane	1,3-dichloro-2-hydroxypropane

Various alkyl bromides and chlorides

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Rare & Organic Chemical Department
THE OHIO CHEMICAL & MFG. CO.
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OVER ONE THOUSAND



SCHAFFER POIDOMETERS

Designed and Built to Serve Industry

with **SPEED ECONOMY PRECISION**

In hundreds of plants throughout the world the Schaffer Poidometer has displaced the old rule-of-thumb method of proportioning raw and finished materials.

In every instance the change has resulted in greater production, assured uniformity of product and important economy.

Schaffer Poidometers are built to stand hard, continuous service. The increased tempo caused by the war emergency has further emphasized their ability to take it.

But even so, it will pay you especially during this period of high pressure production to check over your Poidometer occasionally and keep it in good condition.

Write for Catalog No. 3

Schaffer Poidometer Company
2828 Smallman St. Pittsburgh, Pa.

MANUFACTURE OF SODA

Second Edition - Revised and Enlarged
by Te-Pang Hou, Ph.D.
A. C. S. Monograph No. 65

THE PRESENT acute shortage of soda ash and the consequent rapid expansion of existing plant facilities make the publication of this volume an event of the first importance not only to the soda industry itself, but to others closely related to it. New plants will be brought into production, older ones enlarged, and every effort will be made to attain maximum operating efficiency from all. It is in this connection that this book will be of particular value, for it constantly stresses the importance of efficiency, and explains precisely the best methods of attaining it.

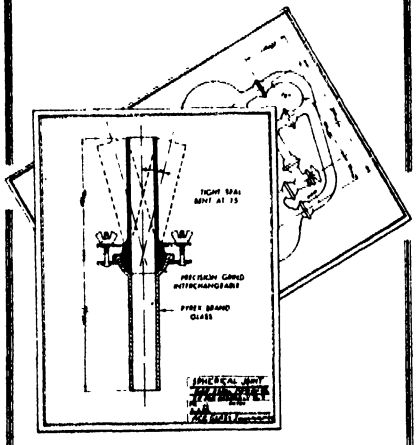
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Chemical Analyses and Tests
Behavior of Soda Ash in Storage
Layout, Design and Location of Ammonia Soda Plant
Centrifugal Pumps Applied to Ammonia Soda Industry
Appendix, Index

590 Pages *182 Tables* *149 Illustrations* *Price $9.50*

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LABORATORY
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SPHERICAL JOINTS
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Made to ACE specifications, these spherical joints will meet your performance specifications.

They permit considerable angle changes without the need for complicated adjusting devices.

They eliminate breakage of equipment and joint leakage resulting from inaccurate alignment.

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VINELAND, N. J.

Business Statistics

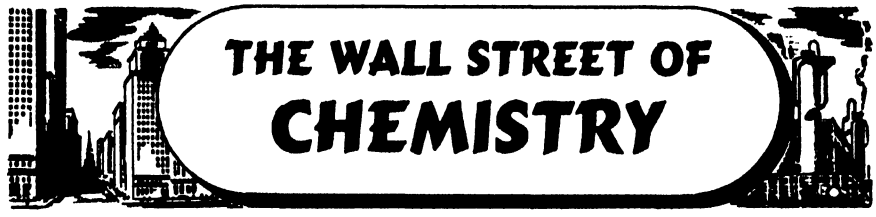
We are indebted to the Manufacturing Chemists' Association, 608 Woodward Bldg. Washington, D. C., for the following figures showing business conditions.

Monthly Statistical Report on Business Conditions

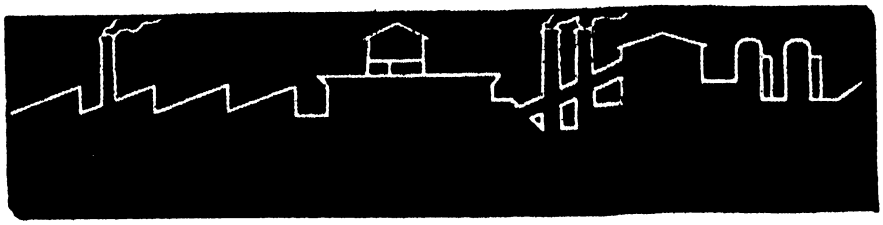
	Seasonally Adjusted			Without Adjustment		
	June 1948	May 1948	June 1941	June 1948	May 1948	June 1941
(Base 1935–39 = 100)						
Industrial production[a]	177[b]	174	159	178[b]	175	160
Chemical production	171[b]	167	144	165[b]	166	138
Steel production	215	218	195	215	218	195
Freight car loadings	141	143	139	139	138	136
(Base 1923–25 = 100)						
Construction contracts, residential	88[b]	76	101	97[b]	90	111
All other	286[b]	226	129	344[b]	275	155
Department store sales, value	104[b]	108	104	100[b]	108	100

	June 1948	May 1948	June 1941
Index of factory employment[c]:			
All manufacturing	138.4[b]	137.1	127.9
Chemicals	195.4[b]	193.5	172.2
Drugs	158.0[b]	156.7	127.3
Fertilizers	99.6[b]	125.8	92.1
Compressed gases	161.8[b]	157.8	139.5
Index of factory pay rolls[c]:			
All manufacturing	194.5[b]	191.8	152.2
Chemicals	306.4[b]	302.6	232.7
Drugs	201.5[b]	205.6	149.9
Fertilizers	117.3[b]	148.4	93.0
Compressed gases	227.4[b]	213.6	179.0
(Base 1926 = 100)			
Wholesale price indexes:			
All products (except farm products and foods)	95.6[b]	95.7	88.6
Chemicals	96.5	96.5	87.2
Drugs and pharmaceuticals	129.1	129.1	99.9
Fertilizer materials	78.4	79.0	69.2
Purchasing power of the dollar:			
All products (except farm products and foods)	$1.047	$1.045	$1.130
Chemicals	1.036	1.036	1.148
Drugs and pharmaceuticals	0.775	0.775	1.001
Fertilizer materials	1.276	1.266	1.446

[a] Source of statistics in first six items: Federal Reserve Board.
[b] Preliminary figures.
[c] U. S. Department of Labor.

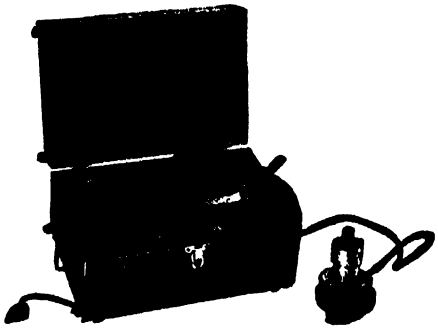


	Six Months' Earnings		Per Common Share	
	1941	1948	1941	1948
American Rolling Mill	$6,667,976	$3,334,323	$1.97	$0.81
Atlas Powder Co.	938,110	666,503	3.04	1.94
Basic Refractories	178,714	103,764	0.51	0.30
Bausch & Lomb Optical Co.	1,174,528	1,156,028	2.51	2.46
Celanese Corp.	3,149,921	3,357,820	1.66	1.57
Climax Molybdenum Co.	.....	5,494,530	...	2.18
Commercial Solvents Corp.	904,982	1,143,911	0.34	0.43
Eagle-Picher Lead Co.	960,991	923,170	1.05	1.01
Freeport Sulphur Co.	1,651,405	1,285,028	2.07	1.61
General Tire & Rubber Co.	1,004,443	642,210	1.77	1.09
Industrial Rayon Corp.	1,533,053	771,499	2.02	1.02
Jones & Laughlin Steel Corp	8,098,227	4,930,470	5.41	2.88
Libbey-Owens-Ford Glass Co.	5,377,247	754,966	...	...
National Lead Co.	3,289,000	1,977,827	0.75	0.31
Revere Copper & Brass	2,363,884	994,295	1.58	0.51
Ruberoid Co.	584,876	268,146	1.47	0.67
Westinghouse Electric and Manufacturing Co.	11,568,401	6,731,712	4.33	2.10
Westvaco Chlorine Products Corp.	632,529	501,661	1.41	1.05



Photoelectric Reflection Meters

THE photoelectric reflection meters recently put on the market by the Photovolt Corp., 95 Madison Ave., New York, N. Y., are designed for measuring the reflectance and color of solid surfaces, fabrics, pastes, powders, and opaque liquids. They are provided with a search unit which is placed on the surface to be measured so that the test specimen need not be inserted into the instrument. This is said to offer the advantage that samples can be measured in rapid succession, that the sample may be of any size, and that the operator can easily select that part of the surface on which he wishes to take readings.



The search unit is connected to the instrument proper by a flexible cable and comprises the light source and the photocell. Model 600 is operated from two dry-cell batteries which are housed in the instrument casing. Model 610 operates on 105–103 volt, 50–60 cycle alternating current. Model 600 is recommended when general reflectance is to be measured and when the instrument is to be taken to places where current is not readily available. Model 610 is usable with more selective color filters, has higher sensitivity, and registers dispersed reflection without responding to specular gloss.

Micro pH Testing Set

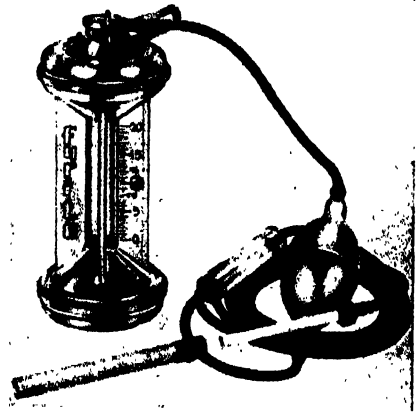
A NEW set with facilities never before offered in the colorimetric system for pH determinations has been announced by the LaMotte Chemical Products Co. of Towson, Baltimore, Md. It is said to require less than 0.5 ml. of the sample to make the determination and to be accurate to ±0.1 of a pH. Turbidity and color in the sample do not interfere with the pH determination, and the actual determination can be made in one minute or less. The standard set covers the pH range of 5.2 to 8.6 and is available in a compact case which includes all the necessary glassware, indicators, and full instructions for making the test.

EFFECTIVE August 2, the new address of the Pittsburgh branch of the York Ice Machinery Corp. became the Hostetter Building, 7 Ferry St., Pittsburgh, Penna.

Rip-Cord Bag Closure

THE rip-cord closure developed by Bemis Bag Co., St. Louis, Mo., is a new method of closing cotton and burlap bags. The rip-cord is sewn into the closure of the bag with a regular two-thread bag closing machine. A quick jerk of the rip-cord opens the bag instantly, without tearing or damaging it. Ten rip-cord closed bags can be piled on a hand truck, whereas only eight tied top bags can be loaded on the same size truck. Thus 20 per cent fewer trips from warehouse to freight car are required. Since the bags are more compact, warehouse storage space is saved. The new closure permits use of bags two inches smaller than with wire ties, thus providing an economy in bag costs. The bags can be opened and closed innumerable times without injury, helping the conservation program.

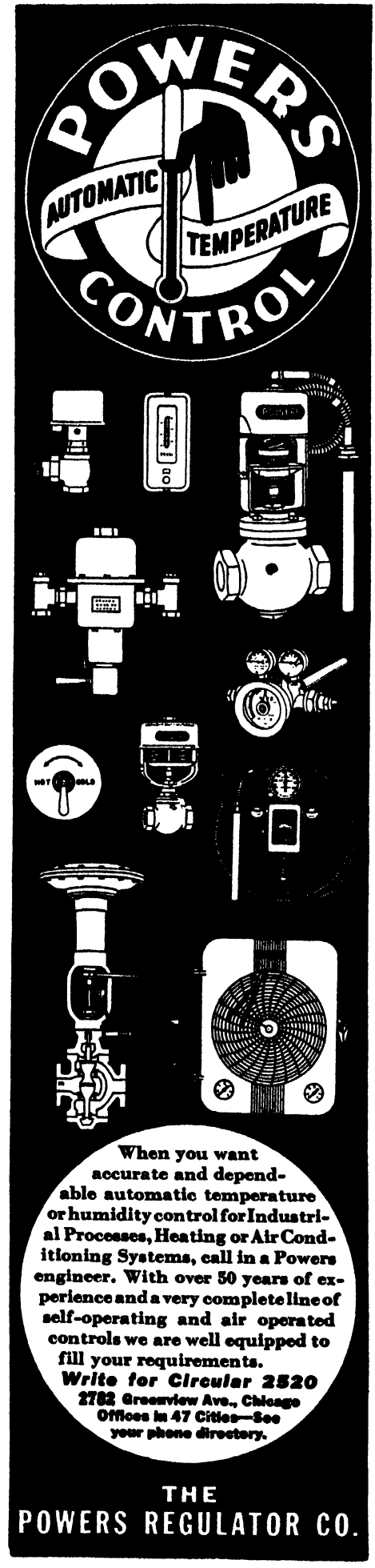
Portable Carbon Dioxide Analyzer



FUEL waste in a power plant or industrial heating furnace can be quickly detected with the Fyrite CO_2 Analyzer, according to the Bacharach Industrial Instrument Co., 7000 Bennett St., Pittsburgh, Penna. The analyzer is a portable instrument that is conveniently held in the hand while analysis is made. A complete carbon dioxide analysis can be made in 40 seconds. Descriptive Bulletin 330 can be obtained from the company.

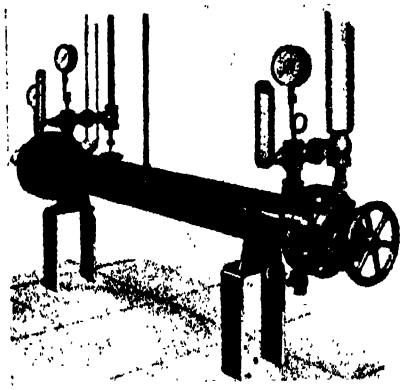
Improved General-Purpose Durez Plastic

DUREZ 11540, a general-purpose phenolic molding compound, is said by Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y., to have been made adaptable to many new uses through a minor revision in its formulation. It has already been adopted for several war production parts requiring military approval. Durez 11540 has slightly higher impact strength and greater water resistance than former top-grade general-purpose materials. It is said to deliver excellent surface finish. Field communication equipment which must withstand



hard usage as well as instrument cases, housings, and parts are molded of this material.

Self-Cleaning Tubular Heat Exchanger



THE Davis Engineering Corp., 1064 East Grand St., Elizabeth, N. J., has developed the Paracoil self-cleaning tubular heat exchanger. The exchanger is said to eliminate the necessity of manually or chemically cleaning the apparatus. A few turns of the hand wheel while the heat exchanger is in operation restores the surface in contact with the medium being heated or cooled to its original clean condition. The apparatus is suitable for liquids of a viscous nature containing organic or inorganic substances. It can be supplied in various commercial sizes and of materials to resist corrosive action. There is no internal mechanism to get out of order or require replacement due to normal wear. If replacement of the heating surface should be necessary, a new tube bundle can be supplied and installed.

New Wrapping Material for Armaments

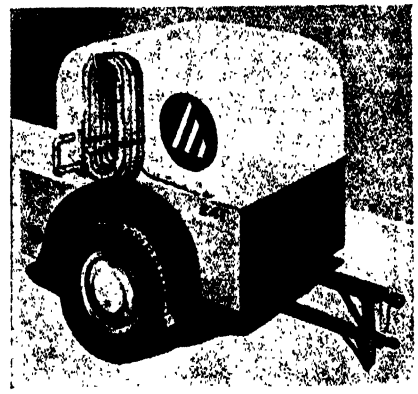
TRADITIONAL protector against rust-inducing moisture during the fabrication and shipping of ammunition, guns, range-finders, tanks, planes, and spare parts has been a layer of thick grease, but to save valuable man hours otherwise spent in cleaning operations to remove the grease, a number of plants engaged on war equipment work are now using a new tough, moistureproof wrapping material. The wrapper was developed by the Dearborn Chemical Co., Chicago, and comes in several types and thicknesses.

This No-Ox-Idized wrapper is being used or tested by some of the largest armament manufacturers on a variety of articles, including rifles, airplane propellors, aircraft guns, machine guns, ammunition, carburetors, bearings, gears, regular parts on way to assembly point, spare parts shipped to zones of action, machine tools, and magnetos. The finished part or article may be thoroughly cleaned of dirt and machining oils at the point of production. It may then be wrapped in the cellulose material with a light coating of oil which in many cases need not be removed, or a lump of moisture-absorbing silica gel placed inside the wrapping.



Auxiliary Water Purifier and Fire-Fighting Apparatus

A SELF-CONTAINED, trailer-type water-purification unit that serves as emergency fire-fighting apparatus has been developed by the Technicraft Engineering Co., 5610 South Soto St., Los Angeles, Calif. Operation of the unit, called the Sterozone Hydrovan, makes it possible to purify water for drinking regardless of the length of time it has been in storage. No chlorine or other chemicals are used. Ozone, generated within the unit oxidizes bacterial contamination within a very few minutes and provides pure drinking water. Water can be purified at the rate of 20 gallons per minute.



The Hydrovan is turned into a high-pressure fire-fighting engine by a simple clutch to cut out the Sterozone purification unit and deliver water at 200 pounds' pressure through the 2.5-inch hose.

The unit is mounted on a two-wheeled trailer. Equipped with 50 feet of 4.5-inch intake hose and 400 feet of 2.5-inch fire-fighting hose, the Hydrovan permits operation over nearly a 500-foot range from water storage to fire location. The enclosed gasoline engine drives the electric generator and the fire pump.

Electronic Plastics Thickness Tester

THE Model M-25 Carson electronic micrometer is designed for uniform thickness testing of all types of plastics and similar compressible materials. In this portable instrument highly sensitive electronic tubes replace the operator's judgment and skill. Thickness is read as with a hand micrometer. The instrument operates from any 110-volt 60-cycle circuit. A development of Instrument Specialties Co., 28 Peckman St., Little Falls, N. J., the Carson plastics thickness tester is fully described in a bulletin which will be sent on request.

Glass Drop Dispenser

A DROP dispenser made of glass has been introduced as a new type of closure for bottles containing liquid medicine, by Origination, Inc., 400 North Michigan Blvd., Chicago, Ill. It operates without the aid of a rubber bulb.

Plasticizer

ETHYL cellulose can be plasticized for sheeting, molding, extruding, and for use in lacquer films with a new plasticiser known as Theop, developed by the Glyco Products Co., Inc., Brooklyn, N. Y.

Chemists and Chemical Engineers Needed in the Production Army

PLANT-LABORATORY-CLASS ROOM

ARE YOU AVAILABLE?

Register in the A. C. S. EMPLOYMENT CLEARING HOUSE

Buffalo, New York **September 6–11, 1942**

Open only to members and paid student affiliates of the American Chemical Society registered at the meeting

See CHEMICAL AND ENGINEERING NEWS
This issue, page 1022

EMPLOYMENT INFORMATION

RATES to be paid in advance. Standard setting 5c a word, minimum charge $2.00 each; include 8 words for box address. Exceptions see ——▶ Display, $10.00 per column inch. 2 inches maximum, larger units at regular display unit rates. No discounts or allowances.
SEND advertisements with remittance to INDUSTRIAL AND ENGINEERING CHEMISTRY, 332 West 42nd St., New York, N. Y., to reach there not later than 10:00 A.M. on the 10th and 25th, closing dates for editions of CHEMICAL and ENGINEERING NEWS of the 25th and 10th, respectively. Insertions made in order of receipt provided necessary remittances are complete.
EMPLOYERS are requested to mention in their announcements the section of the country in which the open position is located to ensure replies only from those who are geographically available.
In printing these advertisements the SOCIETY assumes no obligations as to qualifications of prospective employees or responsibility of employers.

UNEMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking employment for themselves are allowed in one calendar year 3 announcements free (one per issue) set in standard style and limited to 50 words each, including 8-word box address, and 3 additional standard announcements at 50% of regular rate. Further announcements and excess words at full rate.

EMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking new positions are permitted 3 standard announcements during the calendar year at 50% of the regular rate—include 8 words for box address.

EMPLOYERS seeking chemists and chemical engineers are permitted 3 standard announcements, not to exceed 50 words each including box address and not more than one per issue, during the calendar year without charge, provided they agree in writing to acknowledge all replies (excess words 5c each), otherwise full rate applies.

The AMERICAN CHEMICAL SOCIETY is vitally interested in the welfare of its members and in seeing that the chemical industry is manned with competent chemists and chemical engineers. These pages are part of our service in that connection. In addition most of the larger sections of the AMERICAN CHEMICAL SOCIETY and several of the smaller ones have active employment committees. Local section secretaries in your area will inform you as to any employment aids that may be available locally.

An Employment Clearinghouse is operated at each national meeting of the SOCIETY for the purpose of bringing together representatives of industry looking for chemists and members and student affiliates in attendance wishing to make such contacts. For further details, consult the preliminary and final programs as printed in the NEWS EDITION prior to each meeting.

In the New York area, special employment facilities are offered by the Employment Bureau of the Chemists' Club, 52 East 41st St., New York, N. Y. In the Chicago area, the Chicago Section maintains an employment service at 413 Stevens Hotel, Chicago, Ill.

Those replying to announcements should be careful to send copies and not original documents. Advertising circulars will not be forwarded and to that end all letters will be opened at the forwarding office.

SITUATIONS OPEN

Those announcements in which the letter "P" is part of the address key have paid in full and are not committed to acknowledge replies. The Society regards acknowledgment by employers of all applications as an act of common courtesy but can assume no responsibility for their failure to do so.

ANALYST for RESEARCH laboratory in wood chemistry, Pacific Coast University, experience in wood chemistry desirable but not essential. Wood, organic, or biochemistry background preferred. Women eligible. $1800–$2000.
Box 20–TP–7, Ind. & Eng. Chem., Easton, Pa.

POST-DOCTORATE research fellowship in physical chemistry at large eastern university. Microcalorimetry of solutions; opportunity for other types of physico-chemical measurements applied to biochemistry. Fellowship renewable. Give details of education, experience, references, etc. $2400 per annum minimum.
Box 28–T–7, Ind. & Eng. Chem., Easton, Pa.

WANTED: METALLURGIST capable of overseeing the production of straight carbon and alloy steel castings, acid electric furnace, steel foundry located in eastern Pennsylvania. In reply state age, experience and salary desired.
Box 57–T–7, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER excellent opportunity for man of outstanding qualifications in research division of food organisation located in the East. Applicant should submit college record, experience, accomplishments, and small photo.
Box 75–TP–7, Ind. & Eng. Chem., Easton, Pa.

CHEMIST with good basic training and initiative, for work in dye laboratory in conjunction with production dyeing of stock and piece goods. Experience as dyer desirable but not essential. Must have good "color eye" and knowledge of color matching. In reply give full particulars of training, experience, draft status and salary desired. Eastern location.
Box 12–N–8, Ind. & Eng. Chem., Easton, Pa.

GRADUATE TEACHING and Research Assistantships in Chemistry (three) available. Stipend $550, September 15–June 1, from which some fees are payable. 10 hours' course work permitted each term. In applying include snapshot, list of courses with grades, references. E. C. Gilbert, Chairman, Department of Chemistry, Oregon State College, Corvallis, Oregon.

FELLOWSHIP fat research available Sept. 1–15. $100 per month with remission of tuition fees and laboratory fees in major department. Applicant with M.S. degree and well trained in organic chemistry. Submit complete data first letter including photograph, draft status, religious preference and transcript to R. Adams Dutcher, Department of Agricultural and Biological Chemistry, Pennsylvania State College, State College, Pa.

WANTED—GRADUATE Chemist with laboratory and plant experience in paper coating. Location Middle West.
Box 28–NP–8, Ind. & Eng. Chem., Easton, Pa.

FOOD TECHNOLOGIST. Applications will be welcomed from men with outstanding records to serve as junior chemists in eastern Research Laboratory. Prospects for advancement excellent for men of right qualifications. Please submit record of training and experience, personal history and recent small photo.
Box 76–TP–7, Ind. & Eng. Chem., Easton, Pa.

EDITORIAL ASSISTANT on Chemical and Engineering News to do editing, some rewriting, caption writing, proofreading, production details, and general office work. Several years' college training in journalism and chemistry desired, as well as a knowledge of typewriting and preferably of stenography. State qualifications fully and submit photo. Apply to Industrial and Engineering Chemistry, P. O. Box B, Woods Hole, Mass.

ANALYTICAL CHEMISTS. Inorganic or organic needed by a laboratory that deals with a wide variety of materials. Very large and nationally-known company engaged in War work. Both experienced and inexperienced men will be considered. Applicants should submit educational history, experience, age and a recent photograph.
Box 62–NP–8, Ind. & Eng. Chem., Easton, Pa.

WANTED GRADUATE Chemist with experience in water paste and powder paints.
Box 66–NP–8, Ind. & Eng. Chem., Easton, Pa.

A CHEMICAL SALES organisation handling chemical specialties used by numerous defense industries has an opening in New England for a salesman with a degree in chemistry. Opportunity to acquire part interest in organization. Give draft status, availability, education and sales experience.
Box 14–T–8, Ind. & Eng. Chem., Easton, Pa.

INSTRUCTOR, MAN or woman to teach physical and general chemistry in a midwest denominational college. Excellent opportunity, Ph.D. or equivalent required.
Box 17–T–8, Ind. & Eng. Chem., Easton, Pa.

CHIEF CHEMIST for a middle western defense plant which will operate after the emergency. The chief chemist will have charge of supervision of the laboratory, analytical procedures in the plant and sampling methods, B.S. degree necessary and chemical engineering training preferred. College instructors acceptable. Salary $225.00 to 275.00 per month to start, depending upon experience of applicant.
Box 18–TP–8, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST as research librarian wanted by heavy chemical manufacturer in upstate New York. Must have thorough knowledge of chemistry and ability to read scientific French and German. Library experience helpful. Work consists of literature searches, abstracting, translating, indexing, general library work.
Box 24–T–8, Ind. & Eng. Chem., Easton, Pa.

OPENING IN the middle-west for a spectrochemical analyst to carry on research investigations on the necessity of trace elements in the economy of soils, plants, and animals. Large-sized Littrow-spectrographic equipment available. Full time research. State salary expected and time available.
Box 28–T–8, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST, to develop resin bonds and glues for the plywood industry. Experience in synthetic resin technique not necessary but must be experienced in methods of plywood manufacture. Give training, experience, nationality, draft status, personal data and recent photo. Varcum Chemical Corporation, Niagara Falls, N. Y.

WANTED: ORGANIC Chemist by College for women located in South. M.S. required, Ph.D. preferred. Rank and salary dependent on qualifications. Woman desired but will consider man. State qualifications and salary expected.
Box 37–T–8, Ind. & Eng. Chem., Easton, Pa.

LARGE MIDWESTERN food manufacturer wants graduate chemist to assist in plant development work. In reply please give full details including draft status and salary expected.
Box 39–TP–8, Ind. & Eng. Chem., Easton, Pa.

CHEMIST CAPABLE of undertaking basic research work on textile fibres. Also technically trained graduate interested in textile development work. Excellent opportunities with well known New England textile company. Salary commensurate with ability and experience. Give all pertinent information and enclose recent photograph.
Box 43–TP–8, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER wanted by Mid-West manufacturer of refinery and gasoline plant equipment. Prefer man with operating or design experience. Permanent position open in company handling only high priority business. Reply stating training, experience, salary and include recent photograph. All replies confidential.
Box 49–T–8, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, CHEMICAL Engineer, graduate assistants wanted. Assistant professor of biochemistry and assistant professor of chemical engineering wanted for permanent positions beginning in September. State salary expected and draft status. Graduate assistantships available for work toward M.S. Address applications to L. C. Cady, University of Idaho, Moscow.

ANALYTICAL CHEMIST with Bachelor or Master degree, desired in research laboratory of food manufacturer located in the East. Opportunity for man with sound training and superior college record. Supply details concerning training, experience, personal history and small photo.
Box 51–TP–8, Ind. & Eng. Chem., Easton, Pa.

WANTED: MALE chemist with several years' experience in formulation of industrial enamels for position in product development laboratory at Louisville, Ky. or Malden, Mass. Must have wife and one or more children. Jones-Dabney Co., Louisville, Ky.

WANTED: MALE chemist with several years' experience in development of alkyd resins for position in product development laboratory. Must have wife and one or more children. Jones-Dabney Co., Louisville, Ky.

WANTED: MALE chemist with several years' experience in formulation of pigmented and clear lacquers for position in product development laboratory at Louisville, Ky. or Malden, Mass. Must have wife and one or more children. Jones-Dabney Company, Louisville, Ky.

DIRECTOR of CHEMICAL research and development for rapidly expanding synthetic organic chemical plant. Unusual opportunity. Give full details regarding training, experience, salary. Submit photo (not returnable).
Box 56–TP–8, Ind. & Eng. Chem., Easton, Pa.

CHEMISTS and CHEMICAL engineers for chemical production in a fast expanding chemical plant operating 100% on war production. Give complete details regarding training, experience, salary. Submit photo (not returnable).
Box 57–TP–8, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL PRODUCTION manager and also plant engineer wanted for chemical manufacturing plant. Excellent opportunity. Give full details regarding training, experience, salary. Submit photo (not returnable).
Box 58–TP–8, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 1082)

Address communications to the box number indicated and Mail to Easton, Penna.

The American Chemical Society has no information concerning the position advertised, or in regard to those seeking employment.

(Situations Open Continued)

CHEMICAL ENGINEER or chemist interested in control and development work leading to plant supervisory positions; Large plant, Aggressive Company, producing roofing felt, granules, asphalt roofing and asphalt specialties. Give details of education and past experience. Personnel Director, The Flintkote Company, New Orleans, Louisiana.

DEVELOPMENT CHEMIST practical experience manufacture sulfurized fats, soluble oils, E.P. Bases, petroleum additives and petroleum chemistry. Location midwest. Salary approximately two hundred dollars plus bonus arrangement. State experience, draft status, include snapshot, replies confidential. Our employees know of this advertisement.
Box 69–T–8, Ind. & Eng. Chem., Easton, Pa.

WANTED: SUBSTITUTE to teach physical and inorganic chemistry from Sept. 22 to Jan. 31, 1943 at a salary of $160 per month in a college in the New York metropolitan area. Sixteen hours of work per week permits pursuit of graduate work.
Box 73–T–8, Ind. & Eng. Chem., Easton, Pa.

GRADUATE ASSISTANTSHIP, half time, in General Chemistry; woman's college near New York City; prefer woman with master's degree planning graduate work in New York City colleges. Salary $800–1000. Give details of education and experience.
Box 74–T–8, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, B.S. in chemistry wanted for chemical laboratory in Niagara Falls, New York. Address: The Carborundum Company, Service Department, Niagara Falls, N. Y.

INDUSTRIAL FELLOWSHIP in lubricating oil research available immediately for M.Ch.E. candidate; stipend $600 yearly. Full time research and study. Fee exemption. Bachelor degree in chemical engineering or chemistry required. Address applications to D. F. Othmer, Dept. of Chemical Engineering, Polytechnic Institute of Brooklyn, Brooklyn, N. Y.

CHEMIST with some petroleum experience. Needed in Chicago area for development of petroleum products and rust preventives. State age, draft status, degree, and salary desired in opening letter.
Box 79–TP–8, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL and INORGANIC research Chemist, B.S. with one or two years' research experience, or recent M.S., for essential war research in industrial laboratory. Give full qualifications, training and experience, including salary expected and photograph.
Box 85–TP–8, Ind. & Eng. Chem., Easton, Pa.

WANTED: EXECUTIVE type chemist experienced in synthetic rubber in connection with adhesives. Initiative, imagination and organizing ability necessary for development with a progressive established Massachusetts company. Between 30 and 40 years of age preferred. Salary commensurate with ability.
Box 86–TP–8, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST. Experienced, diversified subjects, B.S., M.S., or Ph.D. trained men may apply. Immediate project, electrolytic oxidation, very close to war effort. Send snapshot and complete details in first letter. Midwest location. Excellent future for right man.
Box 96–TP–8, Ind. & Eng. Chem., Easton, Pa.

RESEARCH: Wanted young engineering graduate for Government sponsored research on airplane engine problems. Must be U. S. Citizen. Research experience desirable but not essential. Apply, giving full information, to Engineering Experiment Station, The Pennsylvania State College, State College, Pennsylvania.

FOOD CHEMIST with some experience in bacteriology for research on fishery products in Alaska. Candidate should have a M.Sc. and a minimum of two years' chemical work with fish or other flesh foods. Send full details as to education and experience, draft status, and recent photo to Fisheries Experimental Commission of Alaska, Box 647, Ketchikan, Alaska.

MICROANALYST: WOMAN chemist, preferably with advanced degree, for large research laboratory. Give details and send photograph. Interview can be arranged at Buffalo Meeting.
Box 103–T–8, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(A.C.S. MEMBERS)

SPECIAL LIBRARIES ASSOCIATION will recommend trained chemical and technical men and women librarians at no cost to employer or member. Competent persons are now available. Write to the Executive Office, 31 East Tenth Street, New York, New York, for additional information.

ANALYTICAL CHEMIST M.S. Michigan. Single, 41. Twelve years' experience in explosives, rubber, steel, chemicals, paper. One year government explosives inspector. Had charge of two laboratories. Eastern U.S.A. wanted but will consider other locations. Performed research on inorganic problem. Prefer war work.
Box 38–N–6, Ind. & Eng. Chem., Easton, Pa.

COLLEGE-TEACHING. Ph.D. 1935. Employed. Desires change in position where opportunities in teaching and research are available. Prefer analytical or inorganic. Also physical, organic, chemical microscopy, X-ray crystallography and metallurgy. Nine years' teaching experience. Age 37. Family.
Box 43–T–7, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, B.A., 1940, Biology and Chemistry Major; two years' graduate work in organic chemistry and biochemistry. Synthetic organic work preferred but am willing to try almost any laboratory work. Single, Protestant, age 24. Eastern states preferred but will consider other locations.
Box 45–T–7, Ind. & Eng. Chem., Easton, Pa.

RECENT B.A. Physiological chemistry: Well-grounded biochemistry, bio-assays, applied physiology, medical, x-ray technology, bacteriology, chemical microscopy, colloids, etc. Prefer to work, learn pharmaceutical-type laboratory or plant but consider others. Excellent personal references. Immediately available. Age 23. 2-A continued if chemist.
Box 78–T–7, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S., 1941. Desires position, analytical or otherwise, with plant doing essential war work. Thorough chemical training. Analytical experience in agricultural field. Honor society. Age 23, single, Jewish. Available short notice.
Box 35–N–8, Ind. & Eng. Chem., Easton, Pa.

TECHNICAL MARKET ANALYST Ph.D. 1940. Well rounded graduate training in physical, organic and inorganic chemistry. Limited training in metallurgy. Two years' industrial research experience. Desires position as market analyst for research or technical divisions of well established progressive company. Married, draft status 3-A, Phi Beta Kappa, Sigma Xi. Available on reasonable notice.
Box 37–N–8, Ind. & Eng. Chem., Easton, Pa.

RESEARCH DIRECTOR Ph.D., formerly assistant at Kaiser Wilhelm Institute of Chemistry and University of Paris. 15 years' research experience in organic chemistry, synthetic pharmaceuticals, hormones, alkaloids, microanalysis. Patents and publications. Now director of research industrial laboratory. Desires similar position in large industrial research laboratory or university. Austrian, have first citizenship papers. Married, age 38.
Box 39–N–8, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL ORGANIC Chemist. Ph.D. Nine years' of industrial experience in fundamental and applied research, semiplant operations and technical service on synthetic resins, naval stores and cellulose derivatives. Directing research at present. Trained in chemical engineering and sales. Patents and publications. Age 35, married, one child, Protestant, American, location immaterial. Will consider sales, production or research. Qualified to direct plastic and protective coating program in aviation field.
Box 42–N–8, Ind. & Eng. Chem., Easton, Pa.

SANITARY CHEMIST. M.S. Western university, course work toward doctorate; 13 years' experience sewage research, alkalies, explosives, extensive analytical experience. Prefer West, especially Rocky Mountain region. Married, Sigma Xi, deferred. Publications.
Box 52–N–8, Ind. & Eng. Chem., Easton, Pa.

RUBBER CHEMIST, university graduate. Experienced rubber teshnology, research and development. Employed. Excellent record. Prefers position chief chemist small company or head new department in company entering rubber field. East or Midwest. Initial salary $4200. Married, dependents.
Box 55–N–8, Ind. & Eng. Chem., Easton, Pa.

CHEMIST: ORGANIC and enzyme chemistry major; physical minor. Research completed at A.C.S. accredited university. Publications. Adaptable, independent, willing worker. Draft deferred.
Box 61–N–8, Ind. & Eng. Chem., Easton, Pa.

TEACHING POSITION, physical or inorganic chemistry, wanted by physical chemist, Ph.D. 1940. Teaching experience inorganic chemistry. Publications. Honor Societies. Age 27, single, draft deferred. Now employed in research, available on reasonable notice.
Box 67–N–8, Ind. & Eng. Chem., Easton, Pa.

FOOD CHEMIST with over twenty years' wide experience in the Food Industry, in direction, research, process development, quality control, and factory problems. Desires a responsible position.
Box 69–N–8, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL RESEARCH chemist now in a specialized electrochemical field seeks a wider opportunity. Has had long connection with one organization. Now in charge of a research unit. Experienced and successful in applied research and process development work. Age 44.
Box 10–T–8, Ind. & Eng. Chem., Easton, Pa.

AGRICULTURAL and BIOLOGICAL chemist, B.S. 1938, Pennsylvania State College. Employed as chemist with large food concern, experience in Bacteriology, Food Chemistry, Manufacturing methods. Desires position with opportunity. Draft deferred, Age 28, married.
Box 13–T–8, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, 10 years' experience in food inspection, research. Age 35, married one child, Gentile, employed. Available on reasonable notice, location secondary, $3600. Will consider only permanent position.
Box 16–T–8, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST Ph.D. 1940 Desires research position. Experience Petroleum Technology, Manufacture of Medicinal white oil and petroleum sulfonates. Publications. Thesis on Friedel-Crafts Reaction. Member Sigma Xi and Phi Lambda Upsilon. Employed. Single, Age 28 draft deferred. Plan attending Buffalo meeting.
Box 19–T–8, Ind. & Eng. Chem., Easton, Pa.

CHEMIST WITH twelve years experience in biochemistry and organic chemistry seeks position in defense industry or with organization intimately connected with the war effort. Employed but available on short notice.
Box 20–T–8, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. 12 years' academic and industrial experience in synthesis, hydrocarbons (Diolepies and derivatives) polymers and resins, publications, patents, languages. Employed, draft status 3-B. Desires responsible research position.
Box 23–T–8, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST, B.Sc., M.Sc., several years' industrial experience with oils, soaps, waxes, polishes. Desires industrial research or teaching position offering opportunity for research. Masters in physical chemistry. Trained in micro-techniques, physical methods and new analytical procedures. Married, age 27, prefer Northeastern area.
Box 25–T–8, Ind. & Eng. Chem., Easton, Pa.

VISITING PROFESSOR, available for the duration. Experienced teacher of organic, biochemistry, general chemistry. Author of texts and laboratory manuals in general chemistry, qualitative analysis, D.Sc. University of Geneva. See Who's Who. Geo. W. Muhleman, 1450 Englewood Ave., St. Paul, Minn.

ORGANIC CHEMIST, Ph.D. 1940 would like teaching or research position in organic or biochemistry. Experience in chemistry of microorganisms, carbohydrates, organic synthesis, azo dyes. Employed. 2 years industrial. Phi Beta Kappa, Sigma Xi. Publications. Prefer Western U. S. Married, 3-A, age 31.
Box 29–T–8, Ind. & Eng. Chem., Easton, Pa.

CHEMIST EXECUTIVE, currently employed in administrative sales and service. Seeks position as technical assistant to executive, or war production program. Past 45 years of age. Married. Present position 15 years. Minimum salary $400 per month. Location immaterial. 12 Publications. Several years' experience as chief chemist—coal; steel, steel making alloys and allied products.
Box 30–T–8, Ind. & Eng. Chem., Easton, Pa.

ORGANIC RESEARCH chemist, Ph.D., desires Midwest research position in essential industry. Several years' industrial and academic experience in carbohydrates, organic syntheses, enzymes, cereals, microchemistry. Several publications. Married. Deferred.
Box 33–T–8, Ind. & Eng. Chem., Easton, Pa.

MEDICAL CHEMIST, PH.D., Broad experience in technical and scientific research on food products, biologicals and pharmaceuticals. Ten years with medical and hospital supply firm. Research development and business knowledge. New York State or East preferred. References. Available Sept. 1. Class 3-A.
Box 40–T–8, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.Ch., and Biochemist, Ph.D., 1942 from large midwestern university. Desire academic or industrial position. Special training in Colloid chemistry. Experience with nitrocellulose and enzymes. Six publications. Age 25, Single. Available immediately.
Box 41–T–8, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL CHEMIST seeks position of greater responsibility. Now employed. Ten years varied industrial experience equally divided between production and research. Ph.D. from reputable university. Aggressive approach to problems in hand. Age 32. Married. Two children. Draft classification 3-A. Available on one month's notice. Can interview prospective employers at Buffalo convention by appointment.
Box 42–T–8, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 1083)

(Situations Wanted Continued)

INDEPENDENT THINKING, Bio-organic chemist Ph.D. Good background physical chemistry. Experienced in synthesis of vitamin E, vitamin B_2, intermediates, sulfonamides, stilbestrols, nitro compounds. Isolation and study of many enzymes and other natural products. Research in surface chemistry. Honor societies, publications. Age, 26. Draft deferred. Seek research position.
Box 44-T-8, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL and METALLURGICAL Engineer, Ph.D., age 39, married, 17 years' experience in recovery of zinc, copper, nickel, cadmium by smelting, wet chemical or electrolytic processes, and in manufacture of salts of non-ferrous metals. Employed, but available on short notice. Desires better opportunity in plant, research or development work.
Box 46-T-8, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST, Ph.D. 14 years' extensive research experience in physical chemistry and biochemistry. Several years' industrial research and development (pharmaceuticals). 26 publications. Patents. Desires more responsible and promising position. Married. 36 years. Draft deferred. Will attend ACS meeting in Buffalo.
Box 47-T-8, Ind. & Eng. Chem., Easton, Pa.

CHEMIST—ESSENTIAL oils, aromatics, etc. B.Sc. (Chem.), graduate work, publications, 8 years thorough experience in research, development, production and control. Was chemist-in-charge of the laboratory of leading essential oil company. Expert in field. Married, age 31. Draft 3-A. Available immediately.
Box 48-T-8, Ind, & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST Ch.E. Twelve years' experience in industrial research and development work. Largely responsible for development and operation of several profitable processes. Married, age 34. Available within reasonable notice.
Box 60-T-8, Ind. & Eng. Chem., Easton, Pa.

UNIVERSITY PROFESSOR experienced in teaching general chemistry and in research is willing to consider a change. Minimum acceptable salary $4000.
Box 61-T-8, Ind. & Eng. Chem., Easton, Pa.

PHARMACEUTICAL CHEMIST, B.S., M.S., just completing Ph.D. requirements. Pharmacology and physical chemistry minors. Taught four years. Rho Chi, Sigma Xi. Married, Lutheran. Attending Buffalo meeting.
Box 62-T-8, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.A. degree. 5 years' experience in development and synthesis of fine chemicals. Employed but available within reasonable notice. Married, dependents.
Box 63-T-8, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.S., 28, married, one child, 3-A. Personable, responsible. Excellent organic training. 3 years' research and industrial experience. Desires organic research or development position in Chicago area. Now available.
Box 70-T-8, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER (Ch.E.), young man, three years' laboratory and plant experience, sixteen years' industrial sales. Loyal, enthusiastic, industrious. Can translate technical data understandingly to the layman. Effective speaker, writer, organizer. Authority chemical defense. Available immediately. Desires position to serve Nation more effectively.
Box 71-T-8, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST—Chemical Engineer; B.S. 1939; M.A., 1940 in organic and analytical. Two years' graduate study toward Ph.D. including organic research. Want responsible position in an "essential industry" or university teaching. Unmarried, good health. Draft classification 2-A; available immediately.
Box 72-T-8, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., 1935, six years' hydrocarbon research and development; Gasoline finishing, blending. Product and process improvement. Semi-scale quality fractionation producing high octane blending agents. Group leader alkylation, isomerisation. Directive ability. Married, age 35. Desires responsible position.
Box 77-T-8, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, 11 years first class experience, engineering and process work in organic chemicals, petroleum refining and equipment application design. Desires responsible engineering work. Draft exempt, 33 years old, 3 dependents.
Box 80-T-8, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, B.S. Degree, 18 years' experience petroleum refining, 14 years in charge of laboratory of complete refinery. Experience ranges from gas analysis to lubricating oil and wax manufacture.
Box 78-T-8, Ind. & Eng. Chem., Easton, Pa.

SPECTROSCOPIST, experienced in spectrochemical analysis, also analytical chemistry. Capable of setting up spectrochemical laboratory for control or research. Desires position setting up new spectrochemical laboratory or supervising such a laboratory already installed.
Box 84-T-8, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL and INDUSTRIAL microscopist, and metallographist. Would like to organize or supervise a microscopical laboratory for research, new products development and application, process and product improvement. Ph.D., major in physical chemistry, minor in microscopy, Cornell. Fourteen years in research laboratories of the largest companies in two industries, five as research chemist, nine as microscopist dealing with a great variety of problems and materials; shorter periods in two other industries; experience with metals includes thesis and recent work on magnesium alloys. Sigma Xi. Married, two children, 42. Employed.
Box 87-T-8, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST, 16 years' experience industrial fermentations, foods and drugs. Desires responsible position research and development. Age 39, 3-A draft classification. Numerous publications and patents.
Box 88-T-8, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. 1938 leading mid-western university. 30, draft 3-A. Main experience synthesis of ephedrine vitamins A_1B_2. Imaginative, resourceful capable of directing work. Cooperative. Languages. Employed. Desires position where superior synthetic abilities required, preferably pharmaceutical industry. Attend Buffalo meeting.
Box 93-T-8, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, Ph.D. 1941. Diversified experience in organic and inorganic chemistry. Desires research, development or production work with progressive company along Eastern coast. Married, age 25, draft 2-B. Employed, available reasonable notice.
Box 94-T-8, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., with B.S. in chemical engineering. Seven years' diversified research and development experience in petroleum and allied fields of organic chemistry. Experience in polymerization, cracking, oxidation inhibitors, catalysis, alkylation, cresylic acids, hydrogenation, x-ray diffraction, etc. Laboratory fractional distillation and high pressure and temperature equipment design and operation. Publications and patents. Unmarried, age 30, draft 2-B. Available on reasonable notice. Will be at Buffalo Meeting.
Box 97-T-8, Ind. & Eng. Chem., Easton, Pa.

DIRECTOR, RESEARCH or laboratory. Executive ability to direct staff and to apply original work and processes, on products inorganic, organic, biological, etc., to ethical pharmaceuticals, Drugs and Allied Lines. Pharm.D. extensive training and long experience. Wishes director position or assistant to technical executive.
Box 102-T-8, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(NONMEMBERS)

CHEMICAL ENGINEER, 12 years' experience organic chemical plant planning, layout, equipment design, piping, specifications, equipment selection, supervising plant operations, etc. Capable taking complete charge of projects, or supervising production. Good practical knowledge of process operations. Desire permanent connection with responsibility. American. Protestant. Married. Age 37.
Box 66-T-7, Ind. & Eng. Chem., Easton, Pa.

ENGINEER, ELECTROCHEMICAL, M.I.T. 3 years' experience Electrochemical, Chemical and Electrical Engineering. Good working knowledge of Metallurgy, Production Methods, Time Study and Motion Economy, and Safety Engineering. Will go anywhere.
Box 15-T-8, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, MASTERS degree accredited Western college, now employed desires change. Three years' experience in raw materials and petroleum specialties. Age 27, single, white. Draft 4-F. Particularly interested in Northwest or Intermountain states.
Box 34-T-8, Ind. & Eng. Chem., Easton, Pa.

PHYSIOLOGIST, also experienced in biochemical research. Ph.D. Married. Now employed in large city. Would especially like post where it would be practical to live in suburbs or small city.
Box 67-T-8, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, 29, B.S., Ch.E. Five years' experience; organic acids; organic vapor phase catalysis, edible oils; research, analytical and plant experience; employed, seek position with some responsibility; draft deferred.
Box 92-T-8, Ind. & Eng. Chem., Easton, Pa.

CHEMIST EXPERIENCED in industrial research, development, production and control. Vitamins, oils, agricultural by-products. Broad education and mechanical background. Adaptable, energetic, pleasant. Age 30, married, child. Now employed in east, desire to return to west coast.
Box 95-T-8, Ind. & Eng. Chem., Easton, Pa.

TECHNICAL RESEARCH librarian. Young woman, age 22, graduate of recognized college (A.B.-1940). Chemistry major with two years' experience in abstracting, searching, etc. Can translate French and German; knowledge of typewriting; able to accept responsibility; accurate and conscientious worker; satisfactory references. New England preferred.
Box 101-T-8, Ind. & Eng. Chem., Easton, Pa.

Lucite Oil Viewer and Filler Cap

METAL is replaced and practical advantages offered by a one-piece oil viewer and filler cap molded of Lucite methyl methacrylate resin for the latest line of McCormick-Deering cream separators. The transparent plastic part allows the operator to see at a glance when oil should be added to lubricate the mechanism of the separator. One-piece construction eliminates the assembly of glass and metal and the possibility of leakage. The part is molded for International Harvester Co. by Chicago Molded Products Corp. from Lucite produced by the Plastics Department of the du Pont company, Wilmington, Del.

High Wet-Strength Filter Paper

A NEW high wet-strength filter paper, No. 755-2, has been developed by D. R. Sperry & Co., North Aurora, Ill. The new paper is used over filter cloth, in the same way as is the No. 755-1, but has the advantage of being suitable in cases where the filter cake or residue is saved. The trouble of lint adhering to and contaminating the cake is said to be overcome with this paper. The paper, it is claimed, will not tear or disintegrate on removal. At present it can be supplied up to 24 inches wide only.

Lucite Lens

TO ENSURE accurate cutting of tapered metal parts turned on a lathe and to boost production yields for military equipment, one company has installed a magnifying lens of Lucite methyl methacrylate resin on the taper attachment of its lathes. The Lucite lens magnifies the gradations and assists the operator in cutting tapers to within one ten thousandth of an inch or less.

It is made for Monarch Machine Tool Co., Sidney, Ohio, from Lucite produced by the Plastics Department of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

Navy "E" Awards

THE prized Navy "E" award for industrial achievement has been presented to the Bound Brook, N. J., plant of Bakelite Corp. for excellence in production of Vinylite and Bakelite resins and plastics. This honor has also been awarded to the Wyandotte, Mich., plant of Halowax Corp.

MISCELLANEOUS

BUSINESS OPPORTUNITIES • FOR SALE • WANTED • ETC.

Five cents a word, minimum charge $2.00; display available at $7.50 per inch; in advance. No discounts or allowances

MICRO-ELEMENTARY ANALYSES: C, H, N, S, P, Halogens, Methoxyl, Mol. wt., etc., U.S.P. and other official tests. Purity tests, Microinorganic assays, Spot tests, Micro-distillations, Toxicological investigations, and typical micro-chemical research work. Dr. Carl Tiedcke, 148 Fifth Avenue, New York, N. Y.

RUSSIAN and POLISH scientific literature and patents translated into first class idiomatic scientifically accurate English. Estimates cheerfully given on photostatic copies submitted. Interested librarians please contact for future reference.
Box 11-T-8, Ind. & Eng. Chem., Easton, Pa.

AN OPPORTUNITY—to purchase a small chemical company specializing in the manufacture of certain products for the leather industry. The business is highly profitable and is being placed on the market to close an estate.
Box 36-T-8, Ind. & Eng. Chem., Easton, Pa.

COLLOIDAL ASPIRIN
U. S. P. 2,293,359

The owner of this patent will entertain offers from firms having at least B-2 rating in Dunn and Bradstreet.

Box 89-T-8, Ind. & Eng. Chem., Easton, Pa.

COMPLETELY EQUIPPED analytical and research laboratory. Specializing on food, bacteriological work, brewing research and water analysis. Established clientele. Selling entire business including furniture, equipment, etc., account of illness.
Box 98-T-8, Ind. & Eng. Chem., Easton, Pa.

WANTED: Water bath and shaking mechanism for Barcroft Warburg respirometer, with or without manometers. Department of Bacteriology, New York University College of Medicine, 477 1st Ave., N. Y. C.

WANTED—VISCOSIMETER, Stormer, MacMichael or Gardner-Holt of type for heavy oils. Also will buy DeLaval Separator #600 or larger, must have separator type head giving double discharge. Thompson-Hayward Chemical Company, 2915 Southwest Boulevard, Kansas City, Missouri.

WANTED: 1 only copy Chemistry of the Pyridine Compounds by Maier-Bode. Purchasing Division c/o Post Office Box 271, Linden, New Jersey.

WANTED: INDUSTRIAL & Engineering Chemistry; Industrial edition only. Vol. 1-33 incl. Unbound. Covers may be slightly torn if inside pages are in first class condition. Shelton McAnelly, Magnolia Petroleum Co., Dallas, Texas.

WANTED TO BUY, sell your equipment you no longer need or surplus. We have hundreds of inquiries from chemists institutions, industrial and testing laboratories doing war work who are in great need for the equipment which is unavailable at present new. Why not pool all unused equipment instead of standing idle. We will gladly send you our lists of available equipment if exchange is desired or will buy outright at the very fairest possible market prices. Act now and send us your lists of all equipment which are idle. Immediate quotation will be given on all offerings. Write or wire The Laboratory Exchange, 24 E. 21st St., N. Y. C.

ANALYTICAL CHEMIST and Metallurgist has complete laboratory equipment and apparatus for sale. Write for inventory, to W. E. Grainger, % Mrs. F. T. Emory, 306 Mimosa Ave., Knoxville, Tenn.

FOR SALE: Chemical Abstracts, vols. 1-35 complete, unbound; good condition; marginal pencil marks certain sections. $350.
Box 21-T-8, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Coleman Universal Spectrophotometer complete for operation at 8 or 10 volts, with U V illuminator, battery charger, cuvettes, cuvette carriers and filters. In use only six months. Laboratory closing for duration.
Box 32-T-8, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: unbound, excellent condition Chemical Abstracts, Vol. 25, 26, 27, Journal American Chemical Society, Vol. 53, 54, 55. Separately, $6 per volume, or make me an offer on the lot.
Box 35-T-8, Ind. & Eng. Chem., Easton, Pa.

For Sale

PURE BETA CAROTENE

$E^{1\%}_{1cm.}$ (480 m u) = 2270 n Skellysolve B m.p. 180° C. (Corr.)

Contains less than 0.02% alpha carotene

10 mg. tube $5.00 100 mg. tube $40.00

Nutrition Laboratory, Auburn, Alabama

FOR SALE: 100 pounds each: Agate, Alabaster, Allanite, Arsenopyrite, Bentonite, Chalcopynite, Columbite, Hematite Massive, Malachite, Pyrrhotite, Rhodonite, Samarskite, Euxenite, Wolframite Massive, Wollastonite. 50 pounds each: Apatite, Carnotite Calamine, Cerite, Molybdenite, Monazite, Polycrase.
Box 90-T-8, Ind. & Eng. Chem., Easton, Pa.

FOR SALE. Chemical Abstracts, 1907-1940, vols. 1-34, complete with three Decennial Indexes, all bound in brown buckram, also 1941 unbound. Excellent condition. F.O.B. Cambridge, Mass. $600 cash with order. Reference furnished. Willis A. Boughton, 12 Oxford St., Cambridge, Mass.

FOR SALE: "Journal, American Chemical Society": 1901-1919, bound, bindings fair 18 years $72; "Chemical Abstracts": complete set with all 3 Decennial Indexes bound; "Cereal Chemistry": Vols. 1-11 bound; "London Chemical Society, Journal": 1890-1940; "Electronics": Vols. 1-14; "Journal of Pharmacology and Experimental Therapeutics": Vols. 1-76 bound; "Proceedings, Society for Experimental Biology and Medicine": Vols. 1-50, bound; "Chemical Reviews": Vols. 1-15; "Journal, American Ceramic Society": Vols. 1-22; "Transactions, American Ceramic Society": Vols. 1-19, bound; "Industrial and Engineering Chemistry": complete set, mostly bound. A. Calvert, 221 Seaman Avenue, New York, N. Y.

WE OFFER: 10 pounds Tungsten Metal 99.99% pure. 10 pounds Vanadium Metal 96%. 10 Kilos Germanium Metal, 5 Kilos each, Indium, Lithium, Molybdenum, Titanium, Zirconium, Metals. Kilo each, Uranium and Thorium, 100 pounds, Ferroboron, Ferrouranium.
Box 91-T-8, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Five gallon stainless steel autoclave, 2000 pounds working pressure, anchor type agitator, with 1.5 horsepower variable speed direct current motor enclosed metal cabinet; 2 horsepower automatic gas fired Dowtherm boiler; Taylor recording pressure gauge, Leeds and Northrup two point temperature recorder. Price $2500.
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CHEMICAL AND ENGINEERING NEWS

HARRISON E. HOWE, Editor

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Molders of a Better Destiny[1]

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IN FIGHTING a war, the all-absorbing intent is to win. There is little time to analyze the rush of events or to appraise their consequences beyond the war's end. The united objective is, rightly, success for our arms.

Yet under the pressures of a great war there may be compressed scientific, economic, and social developments that might have taken many decades to achieve under less urgent conditions. Their effects on our lives and all civilization may be more wide-reaching and lasting than any military conquest. They constitute one of the most imperative incentives to victory.

No American, least of all any scientist worthy the name, conceivably could endorse war as a justifiable means to progress. The destruction of life and property wrought by the present war far exceeds the havocs of a century's earthquakes. Most of mankind is burning itself on an altar of paganism.

Nonetheless, one fact is inescapable. Despite the recurrent malady of war, history's over-all course is forward. Mankind has the habit of rising phoenixlike from its own ashes to attain greater heights. Progress is immortal.

We emerged from World War I with a wholly new concept of our possibilities. For the first time we began clearly to see that when the Creator conferred upon man freedom of choice and action, there were placed in man's hands the tools with which he could shape his destiny and modify his future. We learned that it was possible not only to emulate Nature but even to excel her in certain fields of creation. We were shocked at how little we knew, and at how meagerly we had advanced in the light of what was still to be accomplished.

The new nation—and it was no less—that was built on this continent following 1918, largely as a result of the war-broadened vision, would have seemed a fantastic wonderland in 1914 had anybody then had the imagination to predict it.



The automobile came of age; aviation was established as a potent industry; the "wireless" of war days became "radio", and radio approached the miraculous in the marvel of television. Add to these the gigantic expansions realized by the telephone, the motion picture, and rayon, all three of which were undeveloped infants in 1914, and you have a combination of influences truly staggering in their effects upon American life.

One of the greatest migrations of all time took place as millions moved from farms to cities and more millions from cities to suburbs. This mighty trek, made possible by improved transport, better highways, and opportunities for more lucrative employment, paralleled further drastic changes in our traditional economy. We had led the world in agriculture; we now led it also in industry. Mass manufactures superseded the handicrafts almost to their extinction.

Meanwhile, the American woman had taken her destiny into her own hands. In 1914 she wore long skirts, cotton stockings, whalebone stays, and her "place was in the home". She came out of the war with a declaration of feminine independence that has since taken her to Congress, into the Cabinet, and into almost every activity once sacred to man, including the military. In less than a decade she cut the bonds of centuries and destroyed for all time a hundred circumscribing taboos. Only the future historian can assess the full impact of this new freedom upon the family, the community, and the Nation. It was undoubtedly speeded to fruition by World War I.

There were other advances. When we, the American people, on December 7, 1941, found ourselves again at war on a global scale, we were living on a plane that bore but little resemblance to the prewar period of a quarter century earlier. Our clothes, our food, our homes, were different. The character of our work was changed. Our environment and thinking were those of a new age.

Millions of dollars had become hundreds of millions in our national planning. Private industry risked tens of millions on ventures that earlier would have commanded hardly a tenth as much. Hosiery and furniture alike were being made from coal, water, and air; dresses from wood, farm fertilizers from the atmosphere, camphor from pine stumps. These and many other achievements of chemical synthesis had altered or made obsolete trade practices and customs as old as the race.

Moreover, the scientist was just getting started. Tens of thousands of new chemical compounds and metallic alloys awaited his full exploration. We were speculating on the eventual conquest of disease. The elimination of poverty, at least as a social problem, was considered a goal that well might be realized. And, as organic chemistry was the source spring of a major share of the infinitude of changes that inspired such hopes, the influences of World War I could be very definitely traced here also. Our organic chemical industry in the United States grew directly in answer to needs violently made evident by that war.

It is unnecessary to detail to chemists what has happened in chemistry since 1914. That year, a mere handful of 528 workers made up the Nation's total employment in the production of coal-tar chemicals. American-made dyes were not even listed in the official census reports. Our farmers had to buy German potash and Chilean nitrate. Our physicians looked to Europe for important drugs,

[1] Address delivered at the public meeting of the 104th meeting of the AMERICAN CHEMICAL SOCIETY, at Buffalo, N. Y., Monday evening, September 7, 1942.

sutures, and optical glass. All science looked to Europe for leadership.

Indeed, it was a simple, almost a scientifically primitive economy in which we Americans then lived. On all the seven seas, America-bound ships heavy with goods and raw materials testified to our dependency on foreign lands. The homes in which we lived differed little from those of our great-grandfathers; the tailors of the Cæsars knew the textiles of which we made our clothes; the finishes of our 1914-model horseless carriages dated to ancient Egypt and the building of the Pyramids. All steel rusted. The best rubber tires were worn out after about 3,000 miles of highly uncertain road service.

One shudders at what might be our plight if those were the tires of today, or if by some colossal blunder we had failed to establish an organic chemical industry in the United States as a consequence of that other war's bitter lessons.

Thank God, we did establish a chemical industry!

We did more than that. We established a nation-wide common consciousness of the power of science in every branch of American industry. Steel, textiles, transportation, foods, oil, in fact every basic producer, came to the turn in the lane where all signposts of progress pointed in one direction—to the research laboratory. We did not get there all at once, but most of us got there long before German hob-nailed boots were pounding over the streets of Warsaw.

Expenditures for industrial research in the United States rose from an inconsequential sum yearly in the pre-World-War-I period, to an amount estimated at $300,000,000 yearly in the pre-World-War-II period. The number of research laboratories grew to more than 2,000. Huge sums were spent in expanding technical and scientific schools to meet the demands of our awakened youth. The number of doctorates granted in chemistry alone was multiplied by 20 or 30 times.

I am not implying that all research is chemical or that chemistry provides the one Aladdin's lamp which all scientists must rub. However, let chemistry be ignored and the other lamps become lifeless brass. Perhaps the greatest benefit that has come to America from our chemical awakening is the renascence of all science that has accompanied it. The chemical synthesis of vitamins, for example, to say nothing of hormones and the sulfa drugs, not only is revolutionizing medicine and dietetics but putting these sciences on incomparably higher planes of performance and future promise. And at the opposite extreme of the pendulum's swing, the modern long-range bomber, while a machine, is also a composite chemical triumph expressed in metals, plastics, and liquids.

The famous tribute paid Washington—first in peace, and first in war—might be paid with equal justice to chemistry. Its record during our other world war is history. Its contributions to the Nation's progress during the peaceful years of the '20's and '30's, while the organic chemical industry grew to maturity, helped crowd into those years many of the most notable advances that mankind has gained since civilization began.

Now, we are again at war. With the full strength and vigor of its young manhood, the chemical industry is fighting again for an American victory and an American peace. To this task it has dedicated itself wholly.

And we hear questions: Is the fight worth while? Will a victorious peace be worth the price that all too evidently we will need to pay for it? After victory—what?

My answer is that now, today, even as I speak, the pressures of this war are compressing into the space of months developments that might have taken us a half century to realize if necessity had not forced the pace.

Those pressures are unprecedented. The developments are unprecedented. Give us a victorious peace and the freedom of enterprise it should guarantee, and our progress will be unprecedented!

One does not need to venture into prophecy to sketch the bold lines of what that progress can be. They have already been traced. Already our world of 1940, in which we took such pardonable if mistaken pride, is so distant in the past that it has become an antiquity, as seen through scientific eyes. The inconceivables of two years ago are today's realities.

More than a century was consumed in bringing the crude rubber production of the world up to 1,000,000 tons yearly. The United States alone is now undertaking to accomplish almost as mighty a feat in less than two years, by the manufacture of chemical rubbers from petroleum, alcohol, and coal and limestone.

By the end of 1943, our production of aluminum will be at a rate almost seven times greater than was attained in 1939 after 50 years of intensive development. And we will be recovering from brine, sea water, and other sources approximately 100 times the amount of magnesium that was produced in 1939, when the magnesium industry in America was 24 years old.

Our aviation industry is establishing facilities for the manufacture in one year of almost double the number of planes it produced throughout the 37 years of its history beginning with the Wright brothers at Kitty Hawk and culminating in the defense program. Meanwhile, largely as a result of chemical advances in fuels, plastics, and light metals, aircraft engineers are designing transoceanic planes capable of flying to Europe and back nonstop, carrying payloads of 20 tons. The projected planes are quadruple the size of the famous Clipper planes that pioneered in inaugurating trans-Atlantic commercial air service.

The Nation will emerge from this war with capacities for making plastics, synthetic fibers, nitrates, hydrocarbons, high octane gasolines, and literally scores of chemical and other raw materials on a scale that only two years ago was beyond our comprehension. The changes that have taken place in our thinking and planning approach the unbelievable when one detaches himself from the present long enough to regain the viewpoint of only the recent past. The first proposal that we build 50,000 war planes left us incredulous. We asked how could we maintain such a vast fleet even should it be built, or train the men to fly it. Now, the demand for 125,000 war planes in a single year is met with the answer, "Give us the materials and we'll give you the planes, as ordered."

In terms of dollars, the hundreds of millions of that by-gone economy stemming from World War I have suddenly become tens of billions! A million dollars is hardly pin money in our planning!

Few of us, even among scientists, grasp the technical implications of these enormous projects which are becoming facts with emergency speed. The aluminum-producing capacity being created will furnish in one year metal enough to build thrice the number of passenger cars now operating on all American railroads. To produce this aluminum will require more electricity annually than was consumed in 1940 in 27 of our 48 states. Despite wartime tax schedules and wages, aluminum ingots now cost 25 per cent less than in 1940, and further economies are forecast through savings in fabricating costs. Aluminum has become a major metal.

Magnesium is about 60 per cent the weight of aluminum and about one fifth the weight of steel. It sold, in 1915, for $5.00 per pound and until a few years ago was a structural curiosity. Today, measured by cubic feet, magnesium at 22.5 cents a pound is cheaper than aluminum selling at 15 cents a pound, and almost a half ton of it, on the average, is going into every American fighting plane that is built. After the war, the Nation's capacity for producing this lightest of all structural metals will be more than double its aluminum output of 1939.

Equally significant is the source of most of the magnesium now employed industrially. For the first time in the history of the world a structural metal is being obtained from the sea by a chemical process. Huge pumps force 300,000,000 gallons of sea water daily through intricate apparatus. At present, magnesium and bromine are the only products precipitated, but potentially the water contains traces of every element found on land. Are we opening a new field of chemistry, far more bizarre than any of the imaginings of fictionists? Nobody knows as yet.

In turn, steel is challenging the light metals. Low alloy steels and new modifications of the higher alloy steels, fresh

from the laboratory, are bidding for expanding uses in aviation and wherever lightness and strength are requisites. In steel industry today, technicians speak confidently of monster aircraft that will be largely steel. These new alloys are three times the weight of aluminum and almost five times the weight of magnesium, but their tensile strength approximates 190,000 pounds to the square inch. This advantage permits weight to be shed by reducing bulk and eliminating needless supports.

The larger planes grow in the future, say the chemists of steel, the more pronounced will be the trend to the new steel alloys. Less subject to corrosion than plain steel, they are more easily corroded than aluminum, but this problem in protection is said to be on the way to early solution. So watch steel in the mounting competition of light metals.

By all means, too, watch petroleum. Some years ago it was believed that the ultimate in motor fuel would be reached by the creation of a gasoline equivalent in power and antiknock qualities to pure iso-octane. So superior was iso-octane in these respects that it arbitrarily was given an octane number of 100, which became the standard in evaluating all gasolines. But that was before the Battle of Britain.

The epic fight of the Royal Air Force to save England, raging month upon month against odds, was also a chemists' fight to produce better fuels—fuels that would get planes into the air in a fraction of the former time, that would give greater and yet greater speeds, longer and yet longer ranges. The American chemist was in that fight because he knew more about motor fuels than any other chemist on earth. The Battle of Britain became a testing and development laboratory in which a nation's life was the stake.

The work done in that laboratory, and in our laboratories here at home as an outgrowth of that experience, has precipitated changes in motor fuel technology of which the effects will be reverberating long after the peace. Fuels now can be made that go beyond the octane scale. Their estimated octane numbers are of the order of 110 or 115 and even higher. They deliver one half again as much power as 100 octane fuel. Looking upon the situation that is indicated after the war, the petroleum chemist now sees all existing motors as out of date, with knowledge of fuels advancing so rapidly that September's motor might be out of date in October.

Let us glance at another phase of petroleum chemistry. A barrel of crude oil contains literally thousands of chemical compounds. The chemist has long been fascinated by the possibility that almost anything under the sun might be created with these chemical building blocks of hydrogen and carbon; that simply by the addition of oxygen and other elements in the proper combination he might obtain new alcohols, esters, acids, solvents, perfumes, pharmaceuticals, and organic synthetics of every type. Catalytic cracking processes and adaptations of them, brought very recently to high stages of performance, are now leading toward this goal and taking petroleum chemistry into a realm once exclusive to coal-tar chemistry.

The largest catalytic cracking capacity in the world is being operated by American oil companies. Soon this capacity will approximate some hundreds of thousands of barrels daily. The significance of this development, well underway in 1939 but expanded to gigantic size by the needs of war, is beyond all present vision. Synthetic rubber, which as every chemist knows is not rubber at all but a new material of broader and yet more promising utility, is being produced from butadiene and styrene synthesized from petroleum. Toluene, best known as the basis of one of the most important of modern high explosives but also essential in dye chemistry and many other industries, is now a petroleum product.

With almost equal facility the petroleum chemist can give us ethylene, on the one hand, or benzene on the other, and supply them in quantities measured in hundreds of tons daily. This feat might be likened to drawing wine or water at will from the same cask, or getting beef or pork from the same animal, inasmuch as ethylene and benzene are members of quite different chemical families. Practically, they are employed in such diverse uses as the manufacture of styrene plastics, both the Buna and Thiokol types of synthetic rubbers, drugs, dyes, and nylon. Moreover, acetylene can be produced from refinery gases to furnish the principal intermediate in the manufacture of neoprene.

Germany's early mastery and world monopoly of the production of benzene, toluene, and other coal-tar crudes and intermediates—her then "secret weapon"—brought her armies almost to victory in World War I. It was only by prodigious effort and at huge cost that private industry in the United States was able, during and after that war, to win independence in these chemicals, which are part and parcel of the Nation's economic life blood both in peace and war.

Today, we are doubly independent. Our coal-tar chemical industry is securely established. In addition, the possible output of benzene and toluene from petroleum is many times their peak output from coal tar. Furthermore, in super motor fuels, which may well be this war's deciding weapons, we are excelling the enemy's best in quantity and quality alike. Where Germany stood in 1914 with coal tar, the United States stands today with petroleum.

A sign of the swiftness of the pace with which the hurly-burly of change is sweeping the petroleum industry, is given by a printed card that now hangs behind the desk of the research director of one of America's greatest oil companies. The card reads: "YOU DON'T HAVE TO BE CRAZY TO WORK HERE, BUT IT SURELY HELPS!"

May I add that a similar card could be hung with profit in every American office and shop and laboratory and farm barn. We are going to need to be "crazy", as judged by 1940's thinking, to make this upset world right again. We are going to need to be visionary to the point of audacity, in the light of today's evident facts, to discharge just a fair share of the postwar opportunities and responsibilities.

Plastics were of sensational promise before Pearl Harbor. The newest and most versatile of plastics will be available after this war on a scale beyond all previous conceptions. The high-pressure synthesis of ammonia, one of the major chemical exploits of the century, will have taken on an industrial status that, in terms of new producing capacity, may be comparable to the discovery of a sixth continent. The amount of fertilizer chemicals that this new capacity will be able to supply farmers will be so large that the basic trends of agriculture might be changed. And these are but one group of a hundred or more products stemming from this high-pressure synthesis, which utilizes air, water, and coal as its building blocks.

We will have glass that is unbreakable and glass that will float, wood that will not burn, and laminations of plastics and wood that will compete with the structural metals. Hosiery derived from air, water, and coal, a wonder of prewar days, is but the forerunner of many innovations from the same source, ranging from shoes that contain no leather and window screens that contain no wire, to machinery bearings that contain no metal.

At the moment we are handicapped by shortages. Scarcity, as such, is not the reason for them, however. Never has there been so great a plenty as measured by our ability to produce, and that ability grows by the hour. The shortages are the consequences of the diversion of goods to war, and from ourselves to others. Today, we produce to destroy.

But tomorrow we will produce to build, and we will continue to invent and thus to multiply our possessions. Released by an American victory the stream of production, compared with its volume in the past, will be as a great river is to one of its tributary creeks. We will have at our command 10, 50, 100 times what we had before, chiefly of new materials.

That prospect is as certain as tomorrow's dawn. We need only to make the victory definite. Then, the choice will be ours, either boldly to harness the stream of plenty, or, if we are timid and of myopic or restricted vision, to be embarrassed by the very abundance of means we have created.

If I know the American chemist, his will be the bold course—the course to-

ward a better destiny. And all science will set its course by the same compass!

Possessing the tools, the experience, and the knowledge that we now have, we should be unfaithful servants indeed if, upon the coming of peace, we merely buried the talents charged to our keeping. Means will be at hand to perform feats that men have long dreamed of doing.

Fuels and metals and plastics are now ready to complete the revolution in transportation begun early in the century. The automobile manufacturer's slate has been wiped clean for a fresh start, which should result in new cars that will be of incredible efficiency as judged by present standards. Since motor car production stopped, the shiny new models that are now gathering dust in dealers' storerooms have aged, technically, at least two decades. We are now in the 1960's of motor cars, as measured by the old pace of development.

Sealed cooling systems, proved on large scale by aviation, may end in the postwar car the nuisance of adding water to radiators. Weights may be half what they are, saving from 1,500 to 2,000 pounds of useless load. The power output per cubic inch of piston displacement may double, treble, and even quadruple. Fuels may yield 50 miles to the gallon, or better.

In the oil industry they are speculating on fuels with octane ratings of 150, or almost twice that of the best automobile gasoline of two years ago. They say gasoline itself may be displaced by a superior petroleum product. They are talking of the practicability of midget automobiles for children.

Instead of rubber alone, there will be a hundred and one rubbers for tires and other uses. In tires, the indicated range is from all natural rubber casings, through varying combinations of natural rubber and synthetics, to the all-synthetics. When one remembers that at present the synthetics are being adapted to tire specifications written for rubber, and that the truly synthetic-type tire is yet to be engineered, the prospect is one of progressive changes.

The upsurge of automobile technology will be paralleled in aviation. Designers are thinking in terms of hemisphere-spanning freighters and of passenger air carriers in fleets numbering hundreds of planes. Transcontinental nonstop air trains of gliders, which would drop off or pick up "coaches" over the principal cities en route, are no longer figments of an imaginative air man's dreams. They are probabilities. Leaders of the industry say that technical considerations no longer limit the size of airplanes that can be built.

Now present are most of the elements essential to the wide popular ownership of planes. Small, highly efficient, almost foolproof craft can be produced at low cost. An enormous plant capacity will be awaiting utilization, tens of thousands will have been trained in flying, and the postwar land will be dotted with air fields. Only within very large cities will we be deficient in field facilities, and there, too, the signs of impending change are clear.

As never before we are conscious of the need for cheaper and better housing. Crowded city slums stand as an ugly reproach to our lack of initiative and vision in home building. The slums should be emptied after the war by the combination of forces that is being arrayed against them; and once empty, airports might well take over those bleak blocks.

Lower cost motor cars, which will draw still more thousands of city dwellers to suburbs and country, represent one of the forces that are going to help empty the slum. Public opinion, shaped by a more enlightened conception of the basic needs of healthful living, is another. The third will be the better housing that so long has been awaited. It is coming.

It is coming because in no better way will we be able to put into worthwhile service the abundance of materials suitable for building all kinds of things. The very prospect of this plenty, on the one hand, and the all too glaring lack of inexpensive modern housing on the other, have started men thinking who have given but little attention to this problem in the past. The engineer, the chemist, the production expert, and the development departments of some of our largest companies are alert to an opportunity, and will become productively interested the moment the war releases their services.

Thus far, only general objectives have taken form. They are for homes costing in the order of $500 to $800 per room. Prefabricated sections, which can be easily handled by two men, will permit flexibility in architectural designs. New insulating materials, making possible light walls that will be several times as efficient as heavy masonry ones, will allow the use of revolutionary structural principles.

Plywood, plastics, rustless steels, nonferrous alloys, various types of composition board, fire-resistant woods, ceramics, and synthetic finishes of lasting durability will be employed in profusion. For example, stainless steel is indicated as a common roofing material of the future. It will last as long as the house and require no maintenance. Lighting will be automatic, governed by electric "eyes" sensitive to outside variations in the daylight. Air-conditioning units will filter out the pollens of hay fever and asthma.

The movement for better homes marches side by side with that to educate the public in better diet. I venture to say that more popular training in the chemistry of food and its digestion has been crammed into the past two years than was given in the preceding two centuries. The knowledge of food's real values to the body that is flowing from sound scientific studies of broad scope is accumulating means of incalculable power to prolong life.

Science, too, follows the flag. This war, spreading over all zones and into all climates, presents a challenge to American medicine that is without precedent. That challenge is being met by a mobilization of all the sciences that likewise is without precedent in man's fight against disease.

The weapons being employed are unique to our time. They include the ultracentrifuge, in which there is a peripheral speed of the rotating disk comparable to the velocity of a rifle bullet. Still another is the electron microscope, the largest of which, now being built at Stanford University, is expected to magnify 150,000 times. Mention should also be made of the giant cyclotrons, sometimes referred to as atom smashers, with which it is possible to transform certain ordinary elements into wholly different elements possessing radioactivity. In addition, synthetic organic chemistry is making an ever-increasing and significant contribution to remedial medicine.

The single objective of this mobilization of science against disease is to prevent suffering and save human lives, irrespective of color or creed. The results which are certain to accrue may ultimately outweigh by many times even the staggering losses of the world-wide conflagration.

Taking an over-all look at the current press of events, one notes that, perhaps, the most important of all the signs pointing to better days is the fact that the emergency of war has dissipated innumerable inertias, each an interruptant of progress. Normally, the new is received with suspicion. People cling to the old and tried, are loath to experiment, slow to change. With peace, however, the usual slow developmental process will have been reversed. War shortages of conventional materials will have resulted n eager trials of every new material science and industry could offer. And countless of the "substitutes" will have proved their superiority. Thus, an experience with and an acceptance of the new will have been gained that ordinarily might have taken many years to achieve.

No doubt, some will become alarmed over the possible displacement of old materials and old industries. Changes of a drastic nature are inevitable but they seldom result in the hardships that the timid predict. More wrought iron is being used in the world today than when wrought iron occupied the province now held by steel. The horse and buggy vanished, but the buggy manufacturers who were alert rose to new affluence with the motor car. The coal-tar colors ended the centuries-long reign of natural dyestuffs, but the dyestuffs industry has grown to many times its former size, and spawned a dozen new industries in addition.

Progress means going forward. It must build more than is destroyed or it does not merit its name. Not only should it be of a tangible, material character, but it should contain the elements of greater spiritual growth for the individual and community alike. It should lift the chin and put a new spring into humanity's step.

The President of the United States has said that we are fighting for four freedoms —freedom from want and freedom from fear, freedom of speech and freedom of religion. A former President of the United States, Herbert Hoover, has added that a fifth freedom is also mandatory in the victory—freedom of economic enterprise.

The scientist accepts these freedoms unreservedly. To their attainment he is glad to give life itself, if that is the price. But the scientist is fighting just as wholesouledly for 500, yes, for 5,000 other freedoms.

The freedom to work, to expand the intellect, to worry through with a theory until it is validated or disproved; the freedom to banish the wasteful and enthrone the efficient; the freedom to improve, if he can, everything that exists under the sun, and beyond that to create things upon which the sun has never before shone—these, too, are freedoms for which the true scientist fights.

As a man, he fights for the freedom to better his lot and for the rewards that ability merits. As an incurable altruist—and the true scientist is one—he fights even harder for the freedom to better the lot of mankind, that each generation may rise to heights loftier than any won by its predecessor.

A soldier of peace, he fights for the freedom to mold a better destiny, both for the individual and for the race.

These freedoms have always been America's. We fight to keep them America's. Let our swords be mighty, and mighty indeed will be our plowshares.

Increased Chemical Sales in 1941

THE U. S. Tariff Commission's preliminary report on 1941 sales of synthetic organic chemicals shows that volume increased 50 per cent over the record set in 1940 and was valued at $724,000,000. Sales of finished coal-tar products and intermediates were valued at 60 per cent over the previous year, while noncoal-tar synthetics were 42 per cent higher.

Thin Polarized Plastic Film

A MEANS of producing thinner films of polarizing plastic than have hitherto been made, but without sacrifice of efficiency, is covered by U. S. Patent 2,289,-713 issued to Edwin H. Land of Boston, Mass., and assigned to the Polaroid Corp.

Data Published on Selective Service

BECAUSE of the wide interest in this subject and the need for obtaining trained men for our Production Army, we give below references to information we have published on occupational deferments, including those of men in training, and the need for technically trained persons. Future developments will be brought to the attention of our readers.

Chemical and Engineering News

(NEWS EDITION previous to 1942)

Vol. 18 (1940), pages 890, 1127

Vol. 19 (1941), pages 129, 311, 457, 459, 489, 520, 587, 681, 797, 1164, 1412, 1464

Vol. 20 (1942), pages 110, 157, 472, 579–80, 788, 812, 837–39, 985

Current issue, pages 1099 and 1100

Industrial and Engineering Chemistry

Vol. 33 (1941), pages 1, 135, 283, 561

Vol. 34 (1942), pages 2, 131, 259, 648

Junior Metallurgists Needed

INCREASING numbers of scientifically and technically trained men and women will be required for the war effort this year and next. Junior metallurgists are urgently needed to conduct investigative, developmental, or production work in various branches of metallurgy; to assist in the design, construction, installation, and operation of metallurgical equipment; or to perform metallurgical work in the recovery or fabrication of metals.

The U. S. Civil Service Commission is recruiting junior metallurgists under a new announcement (No. 254) for which the qualifications are: (1) completion of a four-year college course in metallurgy or metallurgical engineering, or (2) completion of a four year course in chemistry, geology, physics, or engineering, supplemented by (a) one year of paid experience in metallurgy (college teaching in metallurgy is acceptable), or (b) 15 semester hours in metallurgy or metallurgical engineering, or (c) completion of two war training courses in metallurgy.

Applications will be accepted from college senior or graduate students who expect to complete the required courses within 6 months after filing applications.

In addition to the positions which pay $2,000 a year, there are a large number of vacancies in subprofessional positions at $1,800 and $1,620 a year. There is no maximum age limit. No written test is required.

Announcements and application forms may be obtained at any first- or second-class post office or from the Civil Service Commission, Washington, D. C.

Sullivan Goes to Institute of Gas Technology



FREDERICK W. SULLIVAN, JR., has been appointed technical director of the Institute of Gas Technology, Chicago, effective September 1. Dr. Sullivan goes to the Gas Institute from the Barrett Division of Allied Chemical and Dye Corp. where he has been manager of chemical research since 1940. Previous to his service there, he was director of research for Standard Oil Co. of Indiana from 1931 to 1938, and assistant director from 1923 to 1931.

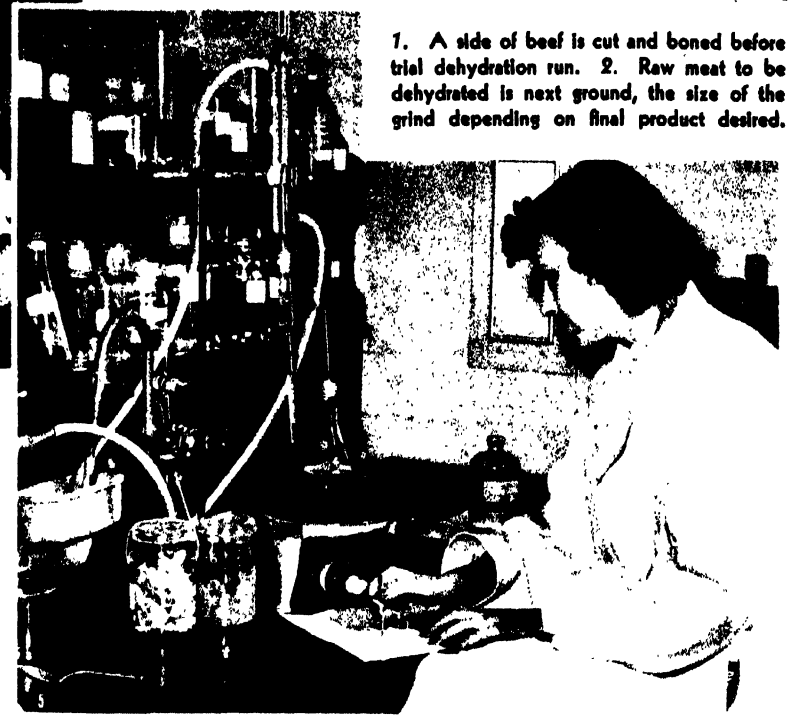
Appointment of the new technical director marks the beginning of the second year of operation for the Gas Institute, which was founded a year ago. Like the Armour Research Foundation, it is located at and affiliated with Illinois Institute of Technology. Mr. Vagtborg is director of both the Gas Institute and the Research Foundation. The Gas Institute is the only institution of its kind in the Nation, and is the only place in the country where students may work for graduate degrees in gas technology. It was founded with four principal objectives: the training of personnel for the gas industry; the prosecution of fundamental research in gas technology; the collection and dissemination of scientific information; the conduct of applied research investigations on specific industrial problems.

Dr. Sullivan will have direct supervision of all research work at the institute, both on specific projects for specific firms and on general projects which the institute carries on for the entire gas industry. With the addition of a full-time technical director, Mr. Vagtborg announced that the Gas Institute is planning an expansion of its program in both research and educational work. L. E. Thiesmeyer, student counselor, directs the latter phase of work.









1. A side of beef is cut and boned before trial dehydration run. 2. Raw meat to be dehydrated is next ground, the size of the grind depending on final product desired.

U. S. D. A. PHOTOGRAPHS BY FORSYTHE

The U. S. Department of Agriculture experiments on meat now being dehydrated for Lend-Lease and other wartime shipments abroad.



3. Dehydrated meat removed here from experimental dryer is shown before it is tested for quality. 4. *Left.* The weight and volume of meat are reduced by dehydration. *Right.* Compression still further reduces the volume for packaging. 5. Moisture content of samples is checked frequently and rapidly. 6. Ground beef already dehydrated is compared here with a small sample of raw meat (held in lower hand) that has not been dried. 7. Cans of dehydrated meat are stored at 110° F. to predetermine results of severe climatic conditions.







District of Columbia Taxation of Educational Institutions

Hearing on Senate Bill 2673

A PROPOSAL to tax the real properties owned and used by educational institutions such as the AMERICAN CHEMICAL SOCIETY has been introduced in the United States Senate. Under the terms of this bill, only those educational institutions that give classroom instruction would in the future be entitled to exemption from real estate taxation on the properties they own and use in the District of Columbia for their educational purposes.

The principle proposed by this measure is so far reaching in its ultimate effect on educational work that hearings were promptly ordered on it.

On Tuesday, August 4, 1942, the District of Columbia Committee of the Senate, Senator McCarran of Nevada, chairman, accorded a hearing to representatives of the AMERICAN CHEMICAL SOCIETY, the National Academy of Sciences, and the Carnegie Institution of Washington, all functioning under national charter and all contending that tax exemption of real estate owned by them and used for educational and scientific purposes be continued and no bill be passed that would deny them the privileges heretofore accorded.

Secretary Charles L. Parsons and Counsel Elisha Hanson appeared for the AMERICAN CHEMICAL SOCIETY and presented and filed the following statement and brief, the latter being a joint brief with the National Geographic Society for whom Mr. Hanson also acts as counsel.

Statement of Charles L. Parsons

Mr. Chairman and Members of the Committee:

My name is Charles L. Parsons. I am Secretary of the AMERICAN CHEMICAL SOCIETY, which has headquarters at 1155 Sixteenth St., N. W., Washington, D. C.

I desire to address myself to S. 2673, introduced on July 22 last by Senator Clark of Idaho for Senator McCarran. The purpose of this measure is to define the real property exempt from taxation in the District of Columbia.

The AMERICAN CHEMICAL SOCIETY is particularly interested in this measure because it seeks to repeal the present exemption from taxation of property owned and used by scientific and educational institutions in the District of Columbia and to substitute for the present statutory exemption one much narrower in scope and limited to school, college, and university buildings operated by institutions not organized or operated for private gain and embracing the relationship of teacher and student.

Perhaps I can best illustrate the difference between existing law and the proposal before you by quoting each.

The present law reads:

> Property used for educational purposes that is not used for private gain shall be exempt from taxation, and all other property used for educational purposes shall be assessed and taxed as other property is taxed and assessed. D. C. Code 1929, Title 20, par. 755.

Section (a), (5), of the measure here under discussion would exempt from taxation only

> School, college, and university buildings (including buildings and structures reasonably necessary and usual to the operation of such school, college, or university) belonging to and operated by institutions not organized or operated for private gain, and embracing the generally recognized relationship of teacher and student.

Section (b) of the pending bill proposes to exempt the grounds actually used or necessary for the enjoyment of the buildings exempted by Section (a), (5). This section has one merit in my opinion and that is its proposal for proportionate exemption of property partially used for educational purposes and partially used to secure income by an institution exempted in Section (a), (5.)

The AMERICAN CHEMICAL SOCIETY is a scientific and educational institution, originally organized in 1876.

On August 25, 1937, it was incorporated by Act of Congress, Public No. 358, 75th Congress, 1st Session. Its objects are stated in the act incorporating it as follows:

> Section 2. That the objects of the incorporation shall be to encourage in the broadest and most liberal manner the advancement of chemistry in all its branches; the promotion of research in chemical science and industry; the improvement of the qualifications and usefulness of chemists through high standards of professional ethics, education, and attainments; the increase and diffusion of chemical knowledge; and by its meetings, professional contacts, reports, papers, discussions, and publications, to promote scientific interests and inquiry, thereby fostering public welfare and education, aiding the development of our country's industries, and adding to the material prosperity and happiness of our people.

When the measure proposing to incorporate the SOCIETY was reported to the House, Committee Report No. 1508, 75th Congress, 1st Session, accompanying it said: (see page 1092 where report is printed in full).

As stated in the committee report, five members of the Cabinet, the heads of those departments which employ chemists or engage in chemical research, indorsed the measure. These indorsements were sent to the House Committee on Judiciary in response to an inquiry made of the heads of the departments by the chairman of that committee.

Prior to federal incorporation, the headquarters of the SOCIETY were in New York. After federal incorporation the SOCIETY established its headquarters in Washington and about 15 months ago moved into its present home at 1155 Sixteenth St., N. W., which it had purchased and remodeled for its uses.

There is no question that the AMERICAN CHEMICAL SOCIETY is an educational institution not operated for private gain. In its whole history, both before and since federal incorporation, it has never had any capital stock structure; it has never paid any dividends; unless its charter be amended, and it does not even contemplate such a thing, it can never operate for the private gain of any shareholder or individual. All of its income is devoted to carrying out its objects, as heretofore stated and as set forth in the act incorporating it.

The Bureau of Internal Revenue, the Bureau of Customs, and the Post Office Department under applicable laws have ruled the SOCIETY to be an educational and scientific institution not operated for private gain. The District Commissioners have ruled it exempt from personal property taxes under the exemption granted educational institutions. However, because part of its new home is rented to others, the Commissioners have refused to exempt under existing law that portion occupied and used by the SOCIETY, which is all the SOCIETY has sought.

It is quite apparent that if the pending measure should be enacted in the form here under consideration, this institution would be subjected to real estate taxes on its property used for its educational pur-

poses in the District of Columbia. Until the recent action of the District Commissioners in taxing its home, it has never been compelled to pay any taxes by any state, municipal, or federal agency incident to the carrying on of its educational and scientific work.

At the present time the SOCIETY has a membership of 31,000 chemists and chemical engineers. It has a membership in the District of Columbia of 813.

It has but two paid officers, the Secretary and Business Manager and the Treasurer. All other officers and Directors serve without compensation.

To further its dissemination of information it publishes five journals as follows:

The *Journal of the American Chemical Society* with a circulation in 1941 of 12,505; *Chemical Abstracts* with a circulation of 14,243; *Industrial and Engineering Chemistry* with a circulation of 24,030; the *Analytical Edition* with a circulation of 24,030; and CHEMICAL AND ENGINEERING NEWS, which goes to every member, with a circulation of 34,156.

Its total revenue in 1941 was $798,512.11. Its total expenditures were $874,302.28.

The AMERICAN CHEMICAL SOCIETY believes that the present exemption statute is adequate for the description of institutions to be exempted, unless it be the desire of Congress to penalize those institutions which are carrying on far-flung educational activities of the greatest importance. Education does not cease when one is graduated from grammar school, from high school or preparatory school, from college, nay, even from professional schools after an academic degree has been obtained. It is a continuing process, ever broadening throughout life. One of the greatest functions of a society such as the AMERICAN CHEMICAL SOCIETY is to bring to its members the very latest information in the entire field of chemistry, so that all, whether still student in college, teacher, or professional chemist or engineer in industry, officer in our Army, Navy, or Marine Corps, researcher in government, or wherever employed in the field of chemistry, shall constantly increase his or her knowledge of this subject.

CHARLES L. PARSONS,
Secretary and Business Manager
AMERICAN CHEMICAL SOCIETY

Following the above statement the Secretary was questioned at length by Senator McCarran as to the SOCIETY'S educational activities and functions, financial receipts, and expenditures. Full detail is available to any one when the hearings of the District of Columbia Committee are ultimately issued as a public document.

The Act of Incorporation, H. R. 7709, referred to in the Secretary's statement was printed in the NEWS EDITION for January 20, 1938, page 47.

Report No. 1508 to the House of Representatives 75th Congress, 1st Session, presented again at this hearing has heretofore been available only in the records of Congress. It is such a remarkable document, carrying as it does unstinted endorsement by five government departments and the Judiciary Committee of the House of Representatives of the AMERICAN CHEMICAL SOCIETY and its undertakings, that it is printed here in full as an official record for future easy reference.

75TH CONGRESS *1st Session* } HOUSE OF REPRESENTATIVES { REPORT No. 1508

Incorporating the American Chemical Society

AUGUST 11, 1937.—Committed to the Committee of the Whole House on the state of the Union and ordered to be printed

Mr. TOWEY, from the Committee on the Judiciary, submitted the following

Report

[To accompany H. R. 7709]

THE Committee on the Judiciary, to whom was referred the bill H. R. 7709, after consideration, report the same favorably to the House with amendments with the recommendation that the bill as amended do pass.

The committee amendments are as follows:

On page 3, line 10, after the words "United States" strike out the period and insert the following:

: *Provided*, That the title to any and all inventions and discoveries made in the course of such investigations, examinations, and experiments that, in the opinion of the Secretary of the Navy or the Secretary of War involve the national defense, shall vest in the Government of the United States, and the Government of the United States shall have unlimited license under all other such inventions and discoveries.

On page 5, after line 9, insert a new section, as follows:

SECTION 8. That the corporation shall, on or before the 1st day of December in each year, transmit to Congress a report of its proceedings and activities for the preceding calendar year, including the full and complete statement of its receipts and expenditures. Such reports shall not be printed as public documents.

On page 5, lines 10 and 12, change sections 8 and 9 to sections 9 and 10, respectively.

The committee has heretofore stated its position—that it will limit its recommendation of federal incorporations to organizations national in character, and which assist in the execution of some expressed and implied powers in the Constitution, or form governmental functions thereunder.

It is the judgment of the committee that this proposed incorporation comes within the rule stated.

The purpose of the bill is to provide a charter under the laws of the United States of America for the AMERICAN CHEMICAL SOCIETY, originally organized in 1876. It is a nonprofit, nonstock, membership corporation. The SOCIETY is the largest organization in the world devoted to science. It has a membership of 20,500, and includes in its membership nearly all prominent chemists in America, including such men as Nobel prize winners, the president of Harvard University, the president of the Massachusetts Institute of Technology, and also includes the heads of every prominent chemical industry who, being chemists, are eligible to membership; the leading research and industrial chemists of the country, National, State, and municipal; chemists in private employ; and the professors and instructors in the chemical departments of schools, colleges, and universities.

The objects of the SOCIETY, since its inception, have been to encourage the advancement of chemistry and chemical industry in all its branches; the promotion of research in chemical science and industry; and the improvement of the status of chemists through high standards of professional ethics, education, and attainments. This is accomplished specifically through the increase, diffusion, and recording of chemical knowledge.

The proposed incorporation of the SOCIETY has been approved by the War Department, Navy Department, Department of Commerce, Department of the Interior, and the Agricultural Department, as appears from the following letters received from the said Departments:

WAR DEPARTMENT
Washington, D. C., August 10. 1937

HON. HATTON W. SUMNERS
Chairman, Committee on the Judiciary
House of Representatives

Dear Mr. Sumners:

Careful consideration has been given to the bill (H. R. 7709) to incorporate the AMERICAN CHEMICAL SOCIETY, which you transmitted to the War Department under

date of July 6, 1937, with a request for the views of the department thereon.

There are no provisions of existing law relating to this subject.

With reference to the services being rendered to the War Department, as requested in your letter, the AMERICAN CHEMICAL SOCIETY has for many years cooperated with the War Department as a working organization of Nation-wide scope representing all phases of the American chemical industry. Its officers respond promptly and fully to requests for advice on chemical aspects of problems of national defense. The SOCIETY maintains a committee on cooperation with the Chemical Warfare Service, composed of authorities in the several fields of chemical research, development, and production, who consult periodically with the technical organization of the Chemical Warfare Service.

As to the views of the War Department on H. R. 7709, since the services of the AMERICAN CHEMICAL SOCIETY and its members will unquestionably be available to the War Department in the future as in the past, whenever called upon, it appears that section 4, page 3, lines 1 to 10, in H. R. 7709, is unnecessary and perhaps objectionable. It is accordingly suggested that this entire section be omitted. If thus amended the War Department will offer no objection to the legislation.

The proposed bill in itself carries no increased cost to the Government.

This report was submitted to the Bureau of the Budget which advised, under date of August 7, 1937, that there would be no objection by that office to the submission of the proposed report to the committee.

Sincerely yours,

HARRY H. WOODRING
Secretary of War

NAVY DEPARTMENT
Washington, August 10, 1937

THE CHAIRMAN
Committee on the Judiciary
House of Representatives
Washington, D. C.

My dear Mr. Chairman:

The bill (H. R. 7709) to incorporate the AMERICAN CHEMICAL SOCIETY, was referred to the Navy Department by your committee with request for views relative to this bill.

The purpose of this bill is to incorporate certain persons as the AMERICAN CHEMICAL SOCIETY. The stated objects of the incorporation are to engage in the broadest and most liberal manner the advancement of chemistry in all its branches including research, professional ethics, education, and attainments of chemists, increase and diffusion of chemical knowledge, etc., thereby fostering public welfare and education, aiding the development of the country's industries, and adding to the material prosperity and happiness of the people. The AMERICAN CHEMICAL SOCIETY would, whenever called upon by the War or Navy Departments, investigate, examine, experiment, and report upon any subject in pure or applied chemistry connected with the national defense, without compensation other than that for actual expenses. The bill further sets out the powers of the SOCIETY and other matters concerning its administration.

It is appreciated that the AMERICAN CHEMICAL SOCIETY through its membership is in a position to nominate experienced chemists for induction into reserve forces of the Navy in time of emergency. The assistance of the AMERICAN CHEMICAL SOCIETY in this manner resulted in the supply of a number of excellent officers in the recent war. Federal incorporation of the SOCIETY would accordingly appear advantageous.

It is especially noted that under section 4 of the bill the SOCIETY would, whenever called upon by the War or Navy Departments, investigate, examine, experiment, and report upon any subject in pure or applied chemistry connected with the national defense. The SOCIETY would receive its actual expenses for such assistance but would receive no other compensation for any services to the Government. While the Navy Department considers that, as a general rule of law, an unlimited license would flow to the United States for the use of any invention or discovery resulting from this assistance, it is believed that the SOCIETY will probably conduct investigations of a confidential nature which would result in inventions and discoveries which should be kept secret. This may be accomplished only if the title to the inventions and discoveries is in the United States. (See U. S. Code, title 34, section 37, providing for delay in the issuing of patents in certain cases.) The Navy Department, therefore, recommends that the following proviso be added to section 4 of the bill, H. R. 7709:

"*Provided*, That the title to any and all inventions and discoveries made in the course of such investigations, examinations, and experiments that, in the opinion of the Secretary of the Navy or the Secretary of War involve the national defense, shall vest in the Government of the United States, and the Government of the United States shall have unlimited license under all other such inventions and discoveries."

If amended as above recommended, the Navy Department recommends the enactment of the bill H. R. 7709.

Sincerely yours,

WILLIAM D. LEAHY, *Acting*

DEPARTMENT OF COMMERCE
Washington, August 9, 1937

HON. HATTON W. SUMNERS
Chairman, Committee on the Judiciary
House of Representatives
Washington, D. C.

My dear Mr. Chairman:

In your letter dated July 6, 1937, you requested the department to furnish your committee with a report concerning H. R. 7709, a bill to incorporate the AMERICAN CHEMICAL SOCIETY.

The National Bureau of Standards and the United States Patent Office of this department are vitally interested in the activities of the AMERICAN CHEMICAL SOCIETY, due to the valuable services rendered by it to these bureaus.

The Bureau of Standards has worked closely with the SOCIETY in the establishment of standards of purity for chemical reagents in other fields of standardization, and has found the SOCIETY very cooperative and helpful. One valuable service is its abstracting of papers on chemical subjects in all languages, and in publishing the same for the use of the members of the SOCIETY, and others. These abstracts are of exceptional value to chemists in keeping abreast with recent developments in the field of chemistry.

Furthermore, the SOCIETY now has in course of preparation a combined index of abstracts for the past 10 years, which will greatly aid chemists in following the development in any particular field of chemistry. Many chemists employed by the Bureau of Standards are members of the SOCIETY, and the bureau would find it difficult to carry on its chemical work without the benefit of these abstracts.

These chemical abstracts are classified, and appear in a large number of volumes. They abstract United States and foreign patents and publications relating to organic and inorganic chemistry and allied arts. This service supplies very valuable information to the examining divisions of the United States Patent Office. Ten of the 65 examining divisions are concerned with chemistry and metallurgy, and in these divisions in particular the SOCIETY'S publications are exceedingly useful.

The department favors the objects sought to be attained by H. R. 7709, and recommends its enactment, if in accord with the program of the President.

The Bureau of the Budget has advised that there would be no objection by that office to the submission of this report to your committee.

Cordially yours,

ERNEST G. DRAPER
Assistant Secretary of Commerce

DEPARTMENT OF THE INTERIOR
Washington, August 9, 1937

HON. HATTON W. SUMNERS
Chairman, Committee on the Judiciary
House of Representatives

My dear Mr. Sumners:

This will acknowledge the receipt of your letter of July 6, with which was enclosed copy of a bill (H. R. 7709) to incorporate the AMERICAN CHEMICAL SOCIETY and requesting the views of the Department of the Interior concerning this proposed legislation.

The bill was referred to the directors of the Bureau of Mines and the United States Geological Survey. These agencies employ numerous chemists and conduct chemical research in connection with studies of the Nation's mineral resources, and the preparation and utilization of mineral products.

After careful examination of the bill both directors recommend a favorable report, and I concur in this recommendation.

The AMERICAN CHEMICAL SOCIETY is a scientific society of chemists whose principal services consist in publishing chemical journals and affording regular meetings for he presentation of papers and discussion by members. Its journal, *Chemical Abstracts*, is of outstanding value to every branch of chemistry. Its other journals afford a medium of publication for reports of investigations in every field of chemical activity.

The work of the chemical laboratories of the Department of the Interior would cost much more and be much less effective if it had to be carried on without the help of the publications of the AMERICAN CHEMICAL SOCIETY and the contacts made at meetings of the SOCIETY and its local sections throughout the country. In fact, it would be impossible to carry on chemical research without access to these journals.

The Secretary's office of the SOCIETY has been in Washington for many years, so that national incorporation of the AMERICAN CHEMICAL SOCIETY would recognize the national outlook and national interest of the SOCIETY. It seems probable that such incorporation would be of value in the management of the SOCIETY and the conduct of its work and, also, it would be advantageous to the Federal departments in Washington.

During the World War the AMERICAN CHEMICAL SOCIETY rendered a very great service to the National Government in mobilizing American chemists for war work. Section 4 of the bill provides for effective future service of the SOCIETY.

I believe that in the public interest national incorporation should be granted to the AMERICAN CHEMICAL SOCIETY.

Sincerely yours,
CHARLES WEST
Acting Secretary of the Interior

DEPARTMENT OF AGRICULTURE
Washington, August 7, 1937

HON. HATTON W. SUMNERS
House of Representatives

Dear Mr. Sumners:

I have your letter of July 6, transmitting H. R. 7709, a bill to incorporate the AMERICAN CHEMICAL SOCIETY, and requesting the opinion of this department upon the proposed legislation.

I am of the opinion that the federal incorporation of this national society will serve a useful purpose and further the public welfare.

The AMERICAN CHEMICAL SOCIETY renders signal service to this department as follows:

(*a*) By the prompt publication and very wide dissemination of the results of the research of department chemists.

(*b*) By making available to the chemists of the department the results of research carried on elsewhere, both by primary publication in the two regular monthly journals of the SOCIETY and by means of brief summations in *Chemical Abstracts* of articles appearing in other journals both here and abroad.

(*c*) Through the two semiannual meetings of the AMERICAN CHEMICAL SOCIETY and the organization of local sections, it is possible for the chemists in the Department of Agriculture, both in Washington and elsewhere, to meet groups of scientists interested in the same or allied lines of research, for the purpose of technical discussion and professional contact.

Pursuant to the requirements of Budget Circular 336, the above was referred to the Bureau of the Budget for clearance and under date of August 6, 1937, the Acting Director thereof advised the Department of Agriculture that "there would be no objection by this office to the submission of your proposed report to the committee."

Sincerely,
M. L. WILSON, *Acting Secretary*

The SOCIETY has always given freely of its time and services and its loyalty and active cooperation with the Government of the United States both in war- and peacetimes, and performs a service in its particular field which no other private or governmental agency has ever performed or is equipped to perform. Without this service government bureaus and agencies engaged in many kinds and descriptions of chemical research and control, including the application of chemical knowledge to the improvement of life and health in America, would be functioning without their most important tool.

The SOCIETY abstracts and indexes all papers on chemistry published throughout the world in any language. Its index is a key that makes this great fund of knowledge, taken from more than 2,900 publications, promptly available to all American chemists. No agency of the Government is either equipped to do this work or supplied with funds for the purpose, and these abstracts are always available and are used in every Government, State, municipal, and industrial laboratory and are furnished to all at approximately one half of the cost of production by means of contributions made by American chemists.

There is not a farm in America today which is not affected in its operations by the work done by members of the AMERICAN CHEMICAL SOCIETY.

The AMERICAN CHEMICAL SOCIETY believes that it can more effectively carry on its work with a national charter, and has plans to erect imposing headquarters in Washington similar to those of the National Academy, the Carnegie Institution, and the American Pharmaceutical Association. All income of the SOCIETY is devoted exclusively to the advancement of chemistry.

Section 1 of the bill provides for the incorporation of the SOCIETY.

Section 2 states the objects of the corporation.

Section 3 states the powers of the corporation.

Section 4 states the willingness of the SOCIETY at all times to cooperate with the War and Navy Departments, and contains the amendment suggested by the Navy Department.

Section 5 provides for the necessary corporate powers to receive devises, bequests, and donations for the uses and purposes of the SOCIETY.

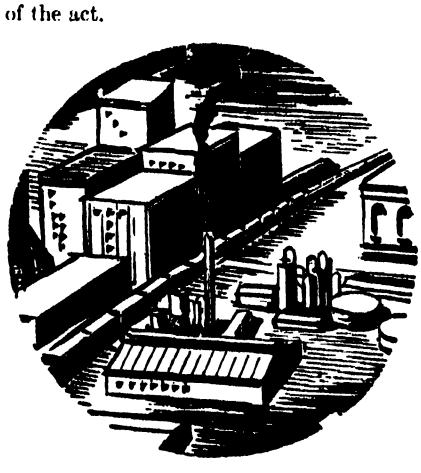
Section 6 provides for the organization meeting of the SOCIETY under the national charter.

Section 7 protects the rights of the creditors of the present corporation under the New York laws.

Section 8 requires the corporation to transmit to Congress an annual report of its proceedings, and provides that such report shall not be printed as a public document.

Section 9 preserves the right of Congress to alter, amend, or repeal the act at any time.

Section 10 provides for the effective date of the act.



Brief by Elisha Hanson, Counsel

Before the Committee on the District of Columbia, United States Senate

In re S. 2673, A Bill to Define the Real Property Exempt from Taxation in the District of Columbia

THE following brief is submitted to the Committee on the District of Columbia of the United States Senate in behalf of the National Geographic Society and the AMERICAN CHEMICAL SOCIETY, each of which is a nonprofit, educational institution organized for the purpose of increasing and diffusing knowledge.

Each of these institutions maintains its headquarters in Washington, D. C. Each owns real estate, some of which is used for its educational purposes and some of which is put to other use. Neither one at any time has ever sought any exemption from taxation of any of its property that is not being used for its own educational purposes. Therefore, in the following discussion of Senate 2673 it must be borne in mind that neither of these societies is seeking exemption or advocating exemption of properties owned by educational institutions that are not used for educational purposes.

The National Geographic Society

The National Geographic Society was originally organized and incorporated in the District of Columbia in 1888 as a nonprofit, educational institution to increase and diffuse geographic knowledge. In its original charter the society was authorized to publish the transactions of the society, to publish a periodical magazine and other works relating to the science of geography, to dispose of such publications by sale or otherwise, and to acquire a library. In 1920 the society was reincorporated under the laws of the District of Columbia with the following powers in addition to those above enumerated:

* * * to conduct and assist investigation and research in any branch of the science of geography * * *, to conduct lectures, hold meetings, and (in addition to acquiring a library) maintain a library; to purchase such property, real or personal, and construct such building or buildings as may be necessary to carry on the work of the society; and in general to do and perform all things necessary to promote the objects of the society.

The entire income of the National Geographic Society is devoted to the objects set forth in its charter. No dividends are, ever have been, or can be paid out, for there is no capital structure and all revenues must be devoted to the objects of the society.

All of the activities of the society are wholly educational in nature and do not

inure to the private benefit or gain of any individual.

The American Chemical Society

The AMERICAN CHEMICAL SOCIETY is a nonprofit scientific and educational institution originally organized in 1876 under the laws of the State of New York.

On August 25, 1937, it was incorporated by Act of Congress, Public No. 358, 75th Congress, 1st Session. Its objects are stated in the act incorporating it as follows:

Section 2. That the objects of the incorporation shall be to encourage in the broadest and most liberal manner the advancement of chemistry in all its branches; the promotion of research in chemical science and industry; the improvement of the qualifications and usefulness of chemists through high standards of professional ethics, education, and attainments; the increase and diffusion of chemical knowledge; and by its meetings, professional contacts, reports, papers, discussions, and publications, to promote scientific interests and inquiry, thereby fostering public welfare and education, aiding the development of our country's industries, and adding to the material prosperity and happiness of our people.

The entire income of the AMERICAN CHEMICAL SOCIETY is devoted to the objects set forth in its charter. No dividends are, ever have been, or can be paid out for there is no capital stock structure and all revenues must be devoted to the objects of the SOCIETY.

All of the acitivities of the SOCIETY are wholly educational in nature and do not inure to the private benefit or gain of any individual.

Reasons for Filing Brief

Since 1902 the D. C. Code has provided for the exemption of property used for educational purposes in the following provision:

Property used for educational purposes that is not used for private gain shall be exempt from taxation, and all other property used for educational purposes shall be assessed and taxed as other property is taxed and assessed. D. C. Code 1929, Title 20, Section 713.

Section (a) (5) of the measure here under discussion would exempt from taxation only

School, college, and university buildings (including buildings and structures reasonably necessary and usual to the operation of such school, college, or university) belonging to and operated by institutions not organized or operated for private gain, and embracing the generally recognized relationship of teacher and student.

Section (b) of the pending bill proposes to exempt the grounds actually used or necessary for the enjoyment of the buildings exempted by Section (a) (5). This section has the merit that it provides for proportionate exemption of property partially used to secure income by an institution exempted in Section (a) (5).

Turning the Clock Back

But a brief reference to the legislative history of the exemption of real estate owned by educational institutions in the District of Columbia will show that if Section (a) (5) of the pending measure be enacted into law, Congress will be turning the hands of the clock back to 1870 when, under the act which became effective on June 17, 1870, the exemption of real property used for educational purposes was limited to school houses and the property appurtenant thereto and used in connection therewith.

The legislative history of the exemption of real estate owned by educational institutions in the District of Columbia shows that until the present time it has been the intention of Congress to broaden rather than to narrow the scope of exemption, so as to give the benefits of exemption to all educational institutions that are not operated for private gain rather than to limit the exemption to those institutions which maintain the relationship of teacher and student.

Legislative History

In the Act of June 17, 1870, it was provided:

All churches and school houses, and all buildings, grounds, and property appurtenant thereto, and used in connection therewith * * * shall be exempt from any and all taxes and assessments, national, municipal, or county.

Following the enactment of this act with its narrow application to school properties, the taxing authorities exempted only the property of secondary schools and taxed that of colleges. Congress therefore enacted legislation in 1876, amended June 11, 1878, which reads, in part, as follows:

The term "school houses" in the Act of June 17, 1870, Chapter 30, was intended to embrace all collegiate establishments actually used for educational purposes, and not for private gain * * *. But if any portion of any such building, house, or grounds in terms excepted is used to secure a rent or income, or for any business purpose, such portion of the same, or a sum equal in value to such portion, shall be taxed.

The scope of the exemption of this act was evidently still considered too narrow, for on July 1, 1902, the present exemption provision, first above quoted, was enacted. This was, as above recited, restated without change and carried into the D. C. Code (1929), Title 20, Section 713. The Code was published in 1930 under an Act of Congress of May 29, 1928, and Public Resolution of March 2, 1929. Congress directed that there be prepared and published under the supervision of the Committee on Revision of the Laws of the House of Representatives, a consolidation and codification of the laws, general and permanent in their nature, relating to or in force in the District of Columbia. It is to be presumed that at this time Congress knew the construction which had for many years been placed on the exemption provision and the exemptions which were granted thereunder by the highest officers charged with enforcement of the tax laws. In carrying this provision into the Code, Congress indicated its approval of such construction.

A revision or codification of statutes is something more than a restatement of the substance thereof in different language. It implies a re-examination of them, and is applied to a restatement of the law in a corrected and improved form, which restatement may be with or without material change. 59 Corpus Juris, Section 480, p. 887.

It is clear from the language of the succession of statues that it was the intention of Congress to broaden rather than narrow the scope of exemption of educational institutions. A conclusion that Congress intended to limit the exemption of property to that of educational institutions such as schools, colleges, and universities where classroom instruction is given could be supported only by ignoring the exemption in Title 20, Section 713 of the D. C. Code and relying upon the Acts of April 17, 1870, and June 11, 1878.

Last year in a series of cases initiated by the Commissioners of the District of Columbia a special committee set up by the Commissioners to review the status of tax-exempt properties in effect held that the only properties of educational institutions that were entitled to exemption were those properties used for classroom instruction where the generally recognized relationship of teacher and student existed. It is respectfully submitted that such a narrow conclusion cannot be supported under the existing law, for by its several enactments Congress first exempted property of schools, then of colleges and universities, and then "property used for educational purposes that is not used for private gain".

The Issue before This Committee

The issue before this committee therefore is whether or not the Congress at this time shall narrow the scope of exemption or maintain the present exemption statute and enact proper procedural provisions for the guidance of the administrative officials charged with the enforcement of the statute so that both they and those who are entitled to the benefit of the statute shall know exactly what are the respective rights arising thereunder.

To the end of assisting this committee, the following information relating to certain of the terms in exemption statutes is given:

Meaning of "Educational"

The meaning of the word "educational" and the words "educational purposes" as

used in exemption statutes is interpreted as not restricted to schools, colleges, and institutions of that character.

In Zollman's "American Law of Charities" it is said:

In statutes exempting educational institutions, the word "educational" is used in its broader signification as the art of developing, cultivating, and maturing the physical, intellectual, and moral faculties, and thus improve the body, the mind, and the heart. * * * the New York Court has held that the Metropolitan Museum of Art is an educational corporation though it has no regular corps of teachers with regular classes of students. The Court states that appliances and restrictions essential to the stimulation to study of youthful and immature persons are not necessary, where the aim is to supply education in the higher branches to more mature students.

The author cites the case of In re Moses, 123 N. Y. Supp. 443. The question involved was whether a devise to a certain institution was exempt from a New York tax. The statute in question reads in part as follows:

But any property devised or bequeathed to any person who is a bishop, or to any religious, educational, charitable, missionary, benevolent, hospital or infirmary corporation * * * shall be exempt from and not subject to the provisions of this act.

With regard to the word "educational" the Court said:

I think that the Young Men's Christian Association falls within the definition of "educational", as the term is used in this statute. As the terms are all general, we cannot expect to find the definition as exact as if it aimed directly at any particular corporation. "Educational" is not used in its meaning of instruction by school, college, or university which is a narrower or more limited meaning of the word (Century Dictionary), but in its broader signification as the act of developing and cultivating the various physical, intellectual, and moral faculties towards the improvement of the body, the mind, and the heart. I am justified in this statement by the definition of the Century Dictionary, of Webster, and of Worcester.

In Mount Hermon Boys' School *vs.* Hill, 145 Mass. 139, the Court said:

Education is a broad and comprehensive term. * * * Education may be particularly directed to either the mental, moral, or physical powers, but in its broadest and best sense is related to them all.

In the case of In re Arnot's Estate, 130 N. Y. Supp. 197, there was a devise of real and personal property to a corporation to be formed to establish an art class to which the public was to have free access and a reference library free to all. The Court held that it was an educational corporation and exempt from the transfer tax.

In the case of In re Mergentime's Estate, 113 N. Y. S. 948, which is referred to in above quotation from "American Law of Charities", the interpretation of the word "educational" as used in an exemption statute was involved. There was a legacy to the Metropolitan Museum of Art, and the question was whether the legacy was exempt from tax under the New York statute hereinbefore quoted. The Court said in part:

I do not suppose it is essential to constitute an educational corporation that there should be furnished a regular corps of teachers, with regular classes of students. A corporation which is organized for the purpose of supplying instruction to those who are willing to accept the facilities or opportunities supplied, it seems to me, is organized for an educational purpose. Certainly education is not confined to the youthful and immature * * * when the aim of the institution is to supply education in the higher branches to more mature students.

The Court said further in this case that a corporation organized for the education of people generally in the observance of proper and sanitary rules to escape infection from disease, especially when such education was free to the public and to all who would avail themselves of the opportunities afforded, would be an educational institution, although no classes were established and no regularly paid professors employed to teach such classes.

Federal Cases

The definition of "educational" in the federal income tax law is contained in Regulations 103, Section 19.101 (6)-1. That section provides, in part:

An educational organization within the meaning of the Internal Revenue Code is one designed primarily for the improvement or development of the capabilities of the individual, but, under exceptional circumstances, may include an association whose sole purpose is the instruction of the public, or an association whose primary purpose is to give lectures on subjects useful to the individual and beneficial to the community, even though an association of either class has incidental amusement features.

The Social Security Act exempts from the definition of employment "Service performed in the employ of a corporation * * * organized and operated exclusively for * * * educational purposes". The exemption of employees in that act is substantially similar to the exemption of property used for educational purposes in the District of Columbia.

In a case that arose in the United States District Court for the Western District of Oklahoma, the Better Business Bureau sued to recover taxes paid under protest under the Social Security Act. The plaintiff, an Oklahoma corporation, was organized as a nonprofit educational corporation without capital stock. Its expenses are defrayed by annual subscriptions of persons who approve of its activities. It furnishes information to members and nonmembers of the corporation; it attempts to educate and inform merchants, manufacturers, and consumers as to honest, fair, and legitimate advertising and business methods; and attempts to discourage unfair competition and unfair dealings with the public.

The Court, in holding that the Better Business Bureau was exempt from the tax, said:

Educational training is not confined to colleges, universities, or even the public schools, but consists, in the broadest sense, of acquiring information or inspirational suggestions which cause the individual to think and act along proper lines. Certainly, the teaching of honesty, integrity, and truthfulness is the very highest objective of an education. Better Business Bureau *vs.* Jones, 34 F. Supp. 573 (D. C. W. D. Okla. 1940). (Emphasis supplied.)

In another case a taxpayer, who had contributed to the League for Industrial Democracy, claimed a deduction for income tax purposes on the ground that he had made the gifts for educational purposes. The league engages in research, gives lectures, holds debates and discussions, writes and distributes pamphlets and books giving information concerning economic and social problems. The United States Circuit Court of Appeals for the Second Circuit held that the gift was deductible and in its opinion said:

In the absence of specific definition, the words are to be given their usual and accepted meaning. * * * "Education" has been defined by the encyclopedia and dictionaries as "imparting or acquisition of knowledge; mental and moral training; cultivation of the mind, feelings, and manners." The definition given by the Funk & Wagnalls' New Standard Dictionary, Vol. 1, may be referred to:

> "Education as understood today, connotes all those processes cultivated by a given society as means for the realization in the individual of the ideals of the community as a whole. It has for its aim the development of the powers of man (1) by exercising each along its particular line, (2) by properly coordinating and subordinating them, (3) by taking advantage of the law of habit, and (4) by appealing to human interest and enthusiasm. It includes not only the narrow conception of instruction, to which it was formerly limited, but embraces all forms of human experience, owing to the recognition of the fact that every stimulus with its corresponding reaction has a definite effect on the character. It may be either mainly esthetic, ethical, intellectual, physical or technical, but to be most satisfactory it must involve and develop all these sides of human capacity."

The literature which the League distributes covers different authors, and is of interest and information to students of political subjects and political economy. All is the subject of education. Weyl *vs.* Commissioner of Internal Revenue, 48 F. (2d) 811 (C. C. A. 2d, 1931).

Rule as to Construction of Exemption Statutes

It is conceded that there is a general rule to the effect that tax exemption statutes are to be strictly construed. There is ample authority, however, supporting a liberal construction of such statutes in the exemption of the property of religious, charitable, and educational institutions.

In Cooley, "Taxation", 4th edition, that authoritative author says:

While in some states exemptions of religious, charitable, and educational property or institutions are strictly construed, the better rule seems to be that laid down in some states requiring a liberal rather than a strict construction in such cases or at least that the same strictness of construction will not be indulged where the exemption is of such institutions.

* * * statutes exempting property used for educational and charitable purposes or for public worship, under the great weight of authority, should receive a broad and more liberal construction than those exempting property used with a view to gain or profit only. Salt Lake Lodge *vs.* Groesbeck, 120 Pac. 192.

Perhaps a better wording would be to say that the courts have never been overanxious to apply the rule so as to impose burdens upon religious, scientific, literary, and educational institutions. Strict construction has largely been applied to corporations performing a public service. State ex rel. Waller *vs.* Trustees of William Jewell College, 234 Mo. 299.

In another Missouri decision the court said that such exemptions should be attributed not so much to a recognition of the value of such institutions to the state but should be considered as the product of a sense of propriety and fitness in regard to places set apart and devoted to the relief of suffering or the diffusion of light and knowledge among men. Wyman *vs.* St. Louis, 17 Mo. 335.

The general rule of strict construction does not require a limitation of the language used by the legislature to its narrowest meaning nor that the narrowest possible meaning be given to the words descriptive of the exemptions.

It is very important not to misapply the rule and thus by too great a strictness strangle the purpose of the law-making power. Courts certainly are not at liberty to defeat the legislative intent by a strict construction merely because they consider that the law is improper * * *. The rule of strict construction does not require a limitation of legislative terms to their narrowest meaning nor to any particular meaning. * * * The rule, therefore, comes into play only when the legislative language, after analysis and subjection to the ordinary rules of interpretation, presents ambiguity. The possibility of a doubt is not sufficient to bring it into operation. "American Law of Charities", by Zollman.

A fair and reasonable construction of the statute or contract must always be adopted, giving the language used its ordinary meaning, and taking into consideration the purpose and spirit of the exemption as well as the public policy entertained at the time and the history of the times when the statute was passed. Strict construction does not require that the narrowest possible meaning be given to words descriptive of the exemption. Cooley, "Taxation", 4th ed.

The language of an exemption statute must be given its ordinary meaning. * * * While tax exemption statutes should be strictly construed, that principle does not justify the interpolation of such qualifications into a statute, clear in its meaning, for the purpose of defeating the privilege granted. District of Columbia *vs.* Mount Vernon Seminary, 69 Appls. D. C. 251.

Decisions of the D. C. Court of Appeals

Many years ago the Court of Appeals for the District of Columbia, now the United States Court of Appeals for the District of Columbia, held that an incorporated institution covered by the exemption statute and having no object of private gain is exempt from all real estate taxes. District of Columbia *vs.* Sisters of Visitation, 15 Appls. D. C. 300 (1899).

In 1938 the United States Court of Appeals for the District of Columbia held that the principle that tax exemption statutes should be strictly construed does not justify interpolation of qualifications into a statute, clear in its meaning, for the purpose of defeating the privilege granted. District of Columbia *vs.* Mount Vernon Seminary, 69 Appls. D. C., 251, 254.

Meaning of "Private Gain"

It is quite possible for an educational institution that is not operated for private gain actually to make a profit on its operations in some years or from year to year. The question therefore for the courts to determine in the controversies which go before them is whether or not those earnings are devoted to the purposes for which the institution was chartered or are diverted to the private gain of some individual through the payment of dividends.

In so far as the existing law in the District of Columbia is concerned, this question of "private gain" was settled in the Mount Vernon Seminary case. The Mount Vernon Seminary is a corporation formed and existing under the laws of the District of Columbia for the purpose of operating a girls school not for private gain. The Court found that because none of the income of that school could inure to the benefit of any private shareholder or individual, the Mount Vernon Seminary had been granted exemption from federal income tax.

The Court said that

The term "private gain", as used in the statute, has reference only to gain realized by any individual or stockholder who has a pecuniary interest in the corporation and not, as appellant contends, to profits realized by the institution but turned back into the treasury or expended for permanent improvements.

The Court further held

It is the evident intention of the statute to exempt all institutions, educational in nature, which are not commercial in their purpose. (Emphasis supplied.)

The Court pointed out that Congress had long recognised the fundamental difference between income earned by an educational institution which is diverted into private use and similar income which is dedicated to the continued improvement of the institution. The Court said:

The latter is a highly desirable use from the public point of view and equally worthy of tax exemption as the property out of which the income was produced.

The Court then referred to the case of Trinidad *vs.* Sagrada Orden, 263 U. S. 578, and pointed out that

The provisions in the Federal Income Tax Act of 1913, * * * exempting any corporation "organized and operated exclusively for religious, charitable, scientific, or educational purposes, no part of the net income of which inures to the benefit of any private stockholder or individual", was intended to aid institutions *not conducted for private gain.* It would seem to follow, from the language used by the Supreme Court, that an educational institution is not conducted for private gain if no part of the net income is applied to the benefit of any individual.

The Court added:

The language of an exemption statute must be given its ordinary meaning. Moreover, when the legislative intent is plain and the language used is free from ambiguity, there is no reason for judicial construction of a statute.

The Mount Vernon Seminary had many students in attendance who were nonresidents of the District of Columbia. In its appeal from an adverse decision by the lower court, the District of Columbia urged in the Mount Vernon Seminary case, just as the officials of the District of Columbia have urged before this committee, that the benefits of the statute be withheld from institutions whose educational activities reach beyond the boundaries of the District. On this point the Court said:

There is no qualification, expressed or implied, in the statute favoring institutions which cater to all classes of persons or solely to residents of the District of Columbia. * * *

The intermingling of students from all parts of the country is one of our surest guarantees of a national culture, which, while preserving the quaint and interesting idiosyncracies of each locality, gives us a common basis of understanding, a common medium of expression, and a vital capacity for that national outlook which is so essential to the preservation and development of a democratic order. It is highly appropriate that the laws of the District of Columbia should recognize, as they do, the fundamental importance of such a policy. *It is the nation's capital, seat of the national government, temporary abode of thousands of government employees, mecca of loyal citizens throughout the United States. * * * it would be indeed a new principle in the law of taxation if exemption should be limited in favor of institutions which excluded all except resident.* (Emphasis supplied.)

The Problems of the Committee

The problem with which the Senate Committee is now dealing really has two phases. First, the committee must de-

termine whether or not it will narrow the present exemption statute so as to exempt as is provided in Section (a) (5) of the present bill only

School, college, and university buildings * * * belonging to and operated by institutions not organized or operated for private gain, and embracing the generally recognized relationship of teacher and student,

or maintain the present broad exemption statute which provides that

Property used for educational purposes that is not used for private gain shall be exempt from taxation, and all other property used for educational purposes shall be assessed and taxed as other property is taxed and assessed.

Second, whatever the committee does in respect of the matter of exemption of property itself, it is confronted with the necessity of providing in statutory form a simple and proper administrative procedure for the determination of questions that arise under the statute and for an orderly system of reporting to the Government of the District of Columbia by institutions whose property is exempted of the uses to which the exempted property is put so that the District Commissioners may have before them at all times completely adequate information on which to determine the status of any institution claiming exemption for its properties under the statute and the use to which those properties is being put.

In view of the many decisions by our courts, both state and federal, as to the meaning of the terms in the present exemption statutes which have hereinbefore been discussed, it is thought that criteria for the interpretation of the existing exemption statute are now sufficient in detail and in scope to permit the authorities of the District of Columbia properly to apply that statute to the institutions entitled to exemption thereunder. As has been pointed out hereinbefore, the terms "educational" and "private gain" have been clearly defined not only by the courts generally but specifically by our own Court of Appeals.

However, it is quite clear that some form of procedure for the administration of the law should be enacted by Congress. The District Commissioners have never set up any system under which exempted institutions periodically report on the scope and nature of their activities and the use of their properties. The National Geographic Society, for instance, in 1905, in 1915, and again in 1938, after notice and opportunity to be heard on questions arising concerning the use of its properties, was determined by the Board of Commissioners of the District of Columbia to be a nonprofit, educational institution entitled to exemption from taxation on those of its properties which it was using for its educational purposes.

On August 25, 1938, the Board of Commissioners of the District of Columbia concurred in the opinion of its corporation counsel,

that the business and objects of the society are educational and scientific, and that the real and personal property of the corporation should be exempted from taxation, and, therefore, the property of the society should be exempted from real and personal taxes.

The board further determined that

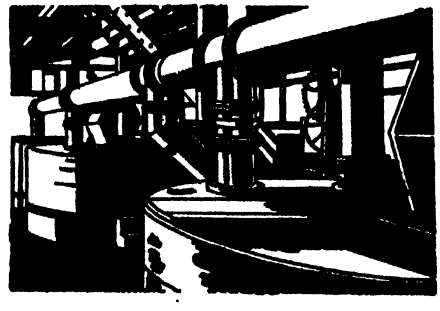
Any property not used exclusively for educational and scientific purposes should not be exempted. Whether any property of the society is not used for educational or scientific purposes is a question of fact for the assessor to determine.

The Assessor of the District of Columbia, following the entry of this order, made a survey of the properties of the society and the uses to which they were put. As a result of this survey the Board of Commissioners of the District of Columbia on September 30, 1938, entered a further order as follows:

That Lots 836, 838, 840, and 842 in Square 183, and Lot 32 in Square 3574, assessed to the National Geographic Society, be noted on the records of the Assessor's Office as exempt from the payment of general taxes, beginning July 1, 1936, and to continue as long as the property is used for educational purposes, and that no penalties be charged on Lots 839, 813, 814, and 815, and 41 and 42.

The history of what has happened to the National Geographic Society since the order of September 30, 1938, was adopted by the Board of Commissioners of the District of Columbia demonstrates the necessity of setting up certain procedural requirements governing the methods employed by the District Commissioners in their consideration of such properties.

In 1941 the Board of Commissioners of the District of Columbia ordered an investigation of all tax-exempt properties in the District of Columbia for the purpose of determining whether or not any properties theretofore exempted should continue on the exempt list. Without notice or opportunity to be heard, the National Geographic Society was notified on March 15, 1941, that the properties which the Board of Commissioners in 1938 had specifically exempted from taxation and which they had ordered to continue to be exempt "as long as the property is used for educational purposes" had been restored to the tax rolls. There was absolutely no evidence before the District Commissioners in 1941 that there had been any change in the charter, by-laws, organization, or methods of operation of the society or in the use of the properties in controversy. In fact, there had been no change either in the organization or in the use. As has been stated, the action was taken without notice or opportunity given to the SOCIETY to be heard and in the absence of any evidence that would justify the restoration of any of the property specifically exempted by the order of September 30, 1938, and ordered to continue exempt as long as the property is used for educational purposes.



For many years educational institutions such as the AMERICAN CHEMICAL SOCIETY and the National Geographic Society have been exempted from the payment of income taxes by those provisions in the respective income tax laws exempting nonprofit, educational, and scientific organizations.

Over a period of years the Bureau of Internal Revenue from time to time checked up on the operations of the various organizations and the societies claiming exemption. Recently the bureau adopted a rule requiring each of those societies or organizations claiming exemption to file a return with it each year. No one who is entitled to exemption should object to filing such a return. Any governmental agency should be entitled at all times to information concerning the activities of an organization claiming exemption and to the uses to which the exempted property is being put. Therefore, it does seem desirable that procedural provisions similar to those set forth in Sections 3, 4, and 5 of the pending bill should be enacted into law. Such provisions would not only place an obligation upon the District Commissioners to observe due process in controversies arising before them, but would also place an obligation upon those claiming exemption to furnish the necessary information to the District Commissioners for the determination of their claims.

Because many educational institutions own property which they are holding for future use or from which they receive revenues even though they may use a portion of the latter for their educational purposes, it seems desirable that the Congress should enact legislation such as is provided in Section (b) of the pending bill for proportionate exemption and taxation of property which is partially used for educational purposes and partially used to secure a rent or income or for any business purpose other than that of the exempt institution.

The foregoing suggestions are offered solely in the hope that they may be of value to the committee in its consideration of the pending problem.

Respectfully submitted,
THE AMERICAN CHEMICAL SOCIETY
NATIONAL GEOGRAPHIC SOCIETY

By_____
ELISHA HANSON
THEIR COUNSEL

Saving Technical Men for Winning the War

FRANK C. WHITMORE

State College, Penna.

THE actual and critical need in the production army for more technical men than exist or can be trained in time is now an accepted fact. Although many types of technical men, such as physicists and engineers, are finding places of usefulness in all branches of the war effort, it is now definitely clear that the armed forces do not need additional chemists or chemical engineers.

In spite of the dangerously increasing shortage of chemists and chemical engineers, there is still induction of such men into the armed forces. This leakage is a help to the Axis. It is due to a lack of understanding of the nature of this war by some local boards, some employers, and some chemists and chemical engineers. Part of the difficulty is due not to a lack of understanding but to a lack of courage of convictions and a failure to use proper aggressiveness in the winning of the war by holding technically trained men where they can best serve the cause of victory.

Proper steps for conserving a chemist or chemical engineer for the war effort are:

1. Immediately on receipt of the Selective Service Questionnaire, a sworn statement of the facts, including a request for deferment, should be filed with the local board. In the case of an employed man, this should be from his employer. In the case of a man in training, it preferably should be from a professor who understands the field thoroughly rather than from a general administrative officer. This first statement and request for deferment should be made on Form 42A, on Form 42, or on the standard form for statement by a college or university. If, for any reason, there is trouble in obtaining forms, the statement and request should be made in writing on suitable letterhead paper. At the bottom of the letter should appear the ordinary form of oath.

I, Richard Roe, do solemnly swear that the above facts are true.

.....
(Signature of Claimant)

.....
(Address of Claimant)

Subscribed and sworn to before me this ——day of——, 1942.

.....
(Signature of official administering oath)

.....
(Official designation of official administering oath)

The local board should be provided with an accurate statement of all pertinent facts. Among others, these should include place and time of training, experience, type of work, its necessity in relation to the war effort, and facts as to whether or not the man can be replaced.

A few words of caution may prove helpful. Some chemists and chemical engineers have been lost to the production army because of difficulty in obtaining proper blanks; others because the statement and request were signed but not in affidavit form. It is a safe rule to swear to everything that goes to a local or an appeal board. Many local boards and a few employers think that a man cannot be a "necessary man" unless he has had long experience with the company which fills out the statement and request. This might be true if there were plenty of chemists and chemical engineers. The important point is the replaceability of the man. At the present time, even in the rare cases where a man can be replaced, the fact of replaceability is not significant because a new man has to be taken from another position in which he is needed. The total number of chemists and chemical engineers is not nearly as large as our needs, both now and later in 1943 and 1944 when the great new plants for munitions, synthetic rubber, and the like will be ready to operate.

2. If any questions, either written or oral, come from the local board, they should be answered in writing as soon as possible.

3. If the man is placed in I-A, the following steps should be taken.

(*a*) He should immediately (necessarily within 10 days of the date of the notice) file a simple personal appeal to be placed in Class II, including a statement of his time of training and time of experience, and that he is making the request because of the need for technically trained men in the production army without which the combat army cannot hope to function. Under his signature should appear his typed name and order number. The appeal should be dated. A copy should go to the man's employer or professor and a copy should be retained. There should be no delay beyond the 10 days legally allowed.

(*b*) The man should immediately inform his employer or professor of his classification and his appeal with a copy of the appeal.

(*c*) The sponsor (employer or professor) should immediately sign and return the "Notice of Appeal" if he receives that from the local board. If not received, he should promptly ask for it.

(*d*) The sponsor should consult his copy of the original request for deferment and should make out a fuller and more detailed statement in support of the appeal of the man involved. This additional material should include any new facts which have developed. They would include a statement of the relation of the work to the war effort and the special need of the man in his position. Emphasis is often advisable that the winning of the war depends not only on actual munitions and ordnance but on almost everything else required in civilized life. A war merely requires more of almost all of these things.

The statement should be in affidavit form.

(*e*) Both the man and his sponsor should acquaint themselves with the Appeal Officer of the local board. It is becoming increasingly helpful to have this Appeal Officer make out a formal appeal on behalf of the man to supplement his brief personal appeal. It is very important to determine whether the Appeal Officer and the local board are familiar with Occupational Bulletin No. 10 (see page 837 of CHEMICAL AND ENGINEERING NEWS for July 10). A planographed copy of this bulletin will be furnished upon request to the Secretary of the AMERICAN CHEMICAL SOCIETY. As it is an official document it is more effective with local boards than a printed copy. A great deal of trouble would have been saved if every employer and every chemist or chemical engineer had kept in handy form a copy of the publication containing this material. The local boards receive so much material that the particular significance of this special Occupational Bulletin and its application to all chemists and chemical engineers and their special need in the production army have often escaped their notice. Do this diplomatically and carefully. Avoid even the appearance of giving them definite instructions. Most local boards will accord a hearing to both the man and his sponsor.

4. If the appeal to the local board is lost and the need remains, it is the duty of the man and his sponsor to appeal at once to the State Director. This is usually most effectively done through the Local Appeal Agent, although it can be done directly. For the sake of the record, it is best that the individual chemist or chemical engineer file a brief statement of his appeal. His employer should prepare an even fuller and more detailed statement of the facts than before. This should usually be prefaced by a brief paragraph summarizing the material presented earlier with dates of the documents involved. Then should follow the additional material. Of course, all this should be sworn to. At all points, care, patience, and consideration for the board's problems must be exercised in familiarising everyone involved, first of all, as regards the general situation of chemists and chemical engineers in connection with the war effort, and secondly, on the particulars of the individual case.

5. In connection with the state appeal, the man should send word that he has

lost the local appeal and is appealing to the state board to the National Roster of Scientific and Specialized Personnel, 10th & U Streets, N. W., Washington, D. C., and to the Secretary of the AMERICAN CHEMICAL SOCIETY, 1155 Sixteenth St., N. W., Washington, D. C. In each case full details should be given including the name and address of the local board, the name and address of the Government Appeal Agent if he has been called on the case, and the name, address, and order number of the man making the appeal.

Every chemist and chemical engineer of selective service age should be familiar with the material printed in CHEMICAL AND ENGINEERING NEWS, July 10, 1942, long before any question arises as to his diversion from the war effort.

6. In the very few cases where the state appeal is lost, it is important that the man and his sponsor recognize that an unusual responsibility toward the winning of the war has fallen on their shoulders. They must renew their courage and review the facts. Now is the time for the final appeal to the President. Part 628.1 of the regulations of the Selective Service System reads: "When either the State Director of Selective Service or the Director of Selective Service deems it to be in the national interest, he may appeal to the President from any determination of a Board of Appeal. He may take such an appeal at any time." Of course the State Director or the National Director can make such an appeal only if in possession of the facts. It is the patriotic duty of the man and his sponsor to put such facts effectively in the hands of the State Director with an urgent request that he either appeal the case himself to the President or request General Hershey to do so. In view of General Lewis B. Hershey's Occupational Bulletin No. 10 of June 18, 1942, reprinted on page 837 of CHEMICAL AND ENGINEERING NEWS of July 10, 1942, there can be no doubt that the induction of a competent chemist or chemical engineer into the armed forces is contrary to the national interest. Consequently, an appeal to the President not only is in order but is a matter of duty for all concerned.

7. The matter of dependency is a distinct field and has no relation to essential occupation. A man in III-A or III-B cannot be inducted without first being placed in I-A. At that point he has 10 days in which to appeal. See paragraphs 3 to 6 above.

AUSTRALIA is reported to have in operation an explosives factory extending over several square miles of what was farm land. Although 1,000 buildings are in use, more are being put up, the plants using new processes, some discovered by Australian chemists to make propellents, high explosives, and incendiaries.

Occupational Classification

IN ALL cases of reclassification, National Selective Service Headquarters has emphasized in amendments and a memorandum that consideration shall be given to deferment in Class II-A or Class II-B of the registrant who is not continued in Class III-A or Class III-B but who may be a necessary man in a critical occupation essential to the war effort or war production as defined by Selective Service Regulations.

The list of civilian activities necessary to war production and essential to the war effort, which may be used to guide local boards in considering occupational classification of registrants, specifies that such activities must meet one or more of the following tests:

(a) that the business is fulfilling a contract of the Army, Navy, Maritime Commission, or other governmental agencies engaged directly in war production;
(b) that the business is performing a governmental service directly concerned with promoting or facilitating war production;
(c) that the business is performing a service, governmental or private, directly concerned with providing food, clothing, shelter, health, safety, or other requisites of the civilian daily life in support of the war effort;
(d) that the business is supplying material under subcontracts for contracts included in a, b, or c above;
(e) that the business is producing raw materials, manufacturing materials, supplies, or equipment, or performing services necessary for the fulfillment of contracts included in a, b, c, or d above.

After it has been found that the business in which a registrant is engaged comes under some group in the attached list, the tests have been applied, and it has been determined that the business is an essential activity, consideration will be given to the occupation of the registrant, within that activity. If he is found to be a necessary man as defined by Selective Service Regulations, occupational classification may be made by the local board.

The list of essential activities, compiled by the War Manpower Commission and distributed to agencies of the Selective Service System, follows. The list was prepared to guide local boards when considering individual registrants for occupational classification but in no way alters the statutory ban on group deferments.

List of Essential Activities

Production of aircraft and parts. Production, maintenance, and repair of aircraft gliders, parachutes, dirigibles, balloons, aircraft engines, parts, pontoons, propellers, and similar products.

Production of ships, boats, and parts. Production, maintenance, and repair of ships, boats, parts, and equipment.

Production of ordnance and accessories. Production, repair, and maintenance of firearms, guns, howitzers, mortars, gun turrets, mounts, tanks, sighting and fire-control equipment, torpedo tubes, and similar products.

Production of ammunition. Bombs, mines, torpedoes, grenades, chemical-warfare projectiles, explosives, fuses, pyrotechnics as well as products such as glycerol which go into the manufacture of ammunition.

Agriculture. Dairy, livestock, poultry, truck, sugar beet, sugar cane, hay, peanut, soybean, cotton, fruit and nut, potato, dried pea and bean, crop specialty (e. g., flax, hemp), seed and general farms; agricultural and horticultural and animal husbandry services such as tree planting, cattle feed-lot operation, threshing, grist milling, grain cleaning, plowing, corn shelling. Includes also such essential assembly and marketing services as milk and cream assembly stations and cooperative marketing associations.

Food processing. Fishing, meat packing and slaughtering, production of butter, cheese, condensed and evaporated milk, canned and cured fish, canned and dried fruits and vegetables, canned soups, fruit and vegetable juices, flour and other grain mill products, prepared feeds for animals and fowls, starch, cereals, baking powder, rice, bread and other bakery products, sugar, leavening compounds, corn sirup, and edible fats and oils.

Forestry, logging, and lumbering. Timber tracts, logging camps, sawmills, and veneer, lath, shingle, cooperage-stock, planing and plywood mills, raising of tung-oil trees; fire prvention, pest control, forest nurseries and reforestation services; gathering of gums and barks for the manufacture of naval stores and medicinal purposes.

Construction. Highway and street construction, marine construction; and construction of approved industrial plants, houses, hospitals, and military projects and repair of such facilities; as well as all basically metallic materials, parts, equipment; and services necessary to complete such construction.

Coal mining. Mining of anthracite, bituminous coal, semianthracite, lignite and peat, and the operation of breakers or preparation plants. Includes also removing overburden and other such activities preparatory to coal-mining operations.

Metal mining. Mining of iron, copper, lead, zinc, aluminum, mercury, manganese, chromium, molybdenum, tungsten, vanadium, and similar ores, and the dressing of such ores. Includes also removing overburden, sinking shafts, and other such activities preparatory to metal-mining operations.

Nonmetallic mining and processing and quarrying. Mining and processing of rock salt, phosphate rock, sulfur, potash, asbestos, graphite pyrites, graphite, borates and other salines, fluorspar, mica, talc, abrasive sands, and similar products. Excludes all mined or quarried nonmetallic materials used exclusively in construction.

Smelting, refining, and rolling of metals. Primary and secondary smelting and refining, alloying, rolling, and drawing of iron, steel, copper, lead, zinc, magnesium, aluminum, brass, bronze, nickel, tin, cadmium, and any other metals used in the production of war materials.

Production of metal shapes and forgings. The manufacture of castings, die castings, forgings, wire, nails, chains, anchors, axles, pipe, springs, screws, tubing, stampings, pressings, and structural shapes.

Finishing of metal products. Enamel-

ing, japanning, lacquering, painting, and galvanising essential metal products.

Production of industrial and agricultural equipment. Power boilers; wiring devices and supplies; agricultural implements; electric lamps; storage and primary batteries; pumps, compressors, and pumping equipment; recording, controlling, and measuring instruments and meters; conveyors; industrial cars and trucks; blowers, exhaust and ventilating fans; mechanical power-transmission equipment such as clutches, drives, and shafts; mechanical stokers; tools, files, and saws; plumbers' supplies; professional and scientific instruments, photographic apparatus, and optical goods; and all equipment necessary to operate plants producing essential commodities.

Production of machinery. Engines and turbines; machine tools, equipment, and accessories; electrical generating, distribution, and industrial apparatus for electric public utility, manufacturing, mining, transportation, and construction use, for incorporation in manufactured products, or for use in service industries; construction, mining, agricultural, oil fields, food products, smelting and refining, as well as all machinery necessary to produce, equip, and maintain aircraft, ships, ordnance, and other military material.

Production of chemicals and allied products. Glycerol; turpentine, rosin, and other naval stores; wood tars, oils, acids, and alcohols; lubricating oils and greases; animal and vegetable oils; fertilizers; tanning materials; salt; synthetic rubber; primary coal-tar products; plastics; compressed and liquefied gases; refined sulfur; sulfuric and other acids; caustic and other sodas; industrial alcohols; electrochemical and electrometallurgical products such as carbide, sodium and potassium metals, and high-percentage ferroalloys; drugs and medicines; insecticides and related chemical compounds; nylon and other synthetic textile fibers used in military equipment exclusively; grease and tallow; candles. (Explosives, flares, and other fireworks, generally classified as chemical products, are included with ammunition.)

Production of rubber products. All rubber products.

Production of leather products. Sole and belting leather; industrial belting for transmission of power; boots, shoes, and gloves for military and industrial use; saddlery, harness, and accessories.

Production of textiles. Spinning and weaving of silk and nylon for parachutes and powder bags; of canvas for tents, sails, tarpaulins, and other related heavy canvas products; cotton, woolen, linen, and knit goods for military use.

Production of apparel. Apparel for the armed forces and work clothing.

Production of stone, clay, and glass products. Technical, scientific, and industrial pressed and blown ware; sand-lime and fire-brick and other heat-resisting clay products; lime; abrasive wheels, stones, paper, cloth, and related products; asbestos products including steam and other packing, pipe and boiler covering; crucibles and retorts; porcelain electrical supplies; as well as parts of military apparatus.

Production of petroleum, natural gas, and petroleum and coal products. Drilling, rig building, and maintenance service operations, and petroleum refining. Includes also production of tar and pitch, coal gas, coke.

Production of finished lumber products. Cork products such as life preservers, storage battery boxes, and insulating material; oars, matches, and wood preservation activities, as well as wooden parts of aircraft, ships, and other military equipment.

Production of transporation equipment. Motor vehicles such as trucks, ambulances, fire engines, busses, and military motorized units; essential parts and accessories of such motor vehicles; motorcycles, bicycles, and parts; locomotives and parts; railroad and street cars and equipment.

Transportation services. Line-haul railroads and railroad service; switching and terminal services; railway express service; local and street railways and bus lines; trucking; warehousing of perishable commodities, stock piles, and essential materials; pipe lines; air and water transportation including shore services such as stevedoring. Includes also services allied to transportation such as freight forwarding and packing, operation of terminals, roads, and tunnels.

Production of materials for packing and shipping products. Textile bags, vegetable and fruit baskets, cooperage, wooden boxes, excelsior, pulp and paper, paper bags, paperboard containers and boxes, glass and fiber containers, cordage and twine, metal barrels, kegs, drums, and cans.

Production of communication equipment. Including radios and radio equipment, television, telephone, and telegraph equipment, and signaling apparatus.

Communication services. Telephone, telegraph, newspaper, radio broadcasting, and television services, and the repair of facilities.

Heating, power, and illuminating services. Electric light and power and gas utilities; steam-heating companies.

Repair and hand trade services. Blacksmithing; armature rewinding; electrical and bicycle repair; automobile repair and service; harness and leather repair; clock repair; tool repair and sharpening.

Health and welfare services, facilities, and equipment. Water supply and sewerage systems; irrigation systems; dental and medical laboratories; hospitals; nursing services; fire and police protection; public health services; weather services; coast and geodetic services; engineering and other testing laboratories; offices of dentists, physicians, surgeons, osteopaths, chiropodists, and veterinarians; professional engineering services. Includes also the manufacture of x-ray and therapeutic apparatus, and of surgical, medical, and dental instruments, equipment, and supplies.

Educational services. Public and private vocational training; elementary, secondary, and preparatory schools; junior colleges, colleges, universities, and professional schools; educational and scientific research agencies.

Governmental services. Including services necessary for the maintenance of health, safety, and morale, and the prosecution of the war.

American Documentation Institute's Wartime Activities

THE American Documentation Institute, 1719 N St., N. W., Washington, D. C., is devoting its major energy to auxiliary publication, particularly as applied to the interchange of scientific and scholarly information under war conditions, to providing sets of scientific journals through microfilm, and to facilitating receipt of current scientific and scholarly journals.

Help Wanted—Instruments

REQUESTS have been received by the Committee on the Location of New and Rare Instruments for these instruments from research workers who urgently need them. If you have any available to lend, lease, or sell please write the undersigned.

Instruments Sought

Microammeters and electrical meters generally
Ultraviolet microscope
Zeiss optimeter (for measuring fine wires to 0.00001 inch)
Two-circle reflecting goniometer (Goldschmidt)
Electro encephalograph (3-channel)
Warburg apparatus

The following listed instruments are offered for use by others and inquiries for them are invited:

Instruments Offered

Zeiss-Pulfrich refractometer
Hunter reflectometer (infrared reflectance)
Coleman spectrophotometer (complete)
Capacigraph [*J. Lab. Clin. Med.*, 22, 1279 (1937); 25, 175 (1939)]
Mechanical ink writing recorder [*Am. J. Obstet. Gynecol.*, 40, 330 (1940)].
Grating spectrograph
  Focal length 2 meters
  Dispersion 8 Å./mm. first order
Grating spectrograph
  Focal length 8 meters
  Dispersion 1/4 Å./mm. fourth order

The Committee on Location of New and Rare Instruments of the Division of Chemistry and Chemical Technology, National Research Council, will be glad to put inquirers in appropriate contact with those who can supply their needs. In so doing the committee assumes no responsibility, and owners of instruments must make their own arrangements with prospective users. Correspondence should be addressed to

D. H. KILLEFFER, *Chairman*

60 East 42nd St.
New York, N. Y.

Borden Award Continued

THE five Borden awards, each consisting of a gold medal and $1,000, to foster research in milk and related fields will be made in 1943, the company has announced. Begun in 1936, the awards are administered by scientific organizations. The Borden Co. takes no part in determining the winning scientists.

One award will be given through the AMERICAN CHEMICAL SOCIETY for outstanding research in milk chemistry, another by the American Home Economics Association with problems of human nutrition as the basis, and a third by the American Poultry Science Association for distinctive contribution to poultry science advancement. The American Dairy Science Association will administer two awards, one in the field of production and the other in manufacturing.

Civilian Defense Activities of the Western Connecticut Section

WILLIAM CABLER MOORE, 41 Magee Ave., Stamford, Conn.

On April 10, nearly 11 months after the Western Connecticut Section of the American Chemical Society authorized its secretary to offer the section's services as consultants on the chemical aspects of home defense to civil authorities, the Stamford Civilian Defense Council appointed its Chemical Advisory Committee. The fundamental idea of this suggestion for cooperation with public officials was to use the knowledge of the many internationally known chemists on the section's membership list and the experience of those who, as civilians or members of the armed forces, worked with chemical defense during World War I.

William Cabler Moore, secretary of the section, was appointed chairman of the Chemical Advisory Committee. Other members are Jordan W. Lambert, chief air-raid warden; J. H. Harvey, commissioner of service for the City of Stamford; L. Bromfield, Stamford town engineer; Paul D. Brown, chief medical officer of Stamford; Paul Kingsley, business manager for the committee; and Harry L. Fisher, R. Bowling Barnes, and Theodore F. Bradley.

The committee went to work even before formal ratification of the appointments. Its first task was to select a technical staff with Mr. Moore as director. This staff was organized as two subcommittees: Education, under the general charge of Dr. Fisher, and Decontamination, directed by Mr. Bradley. In addition to these three chemists the staff consists of Pierrepont Adams, L. M. Burghart, Jack T. Cassaday, Russell Dean, Henry Dutot, J. C. Eck, Dan McLachlan, Thomas Goode Moore, William H. Patrick, Joseph Paden, D. J. Salley, Donald S. Shepherd, Roland Menard, and Herbert J. West. Most of these men are members of the section, and all are chemists except Thomas Goode Moore who is a mechanical engineer.

The Educational Committee has already given a comprehensive course on Chemical Warfare Agents to about 200 selected air-raid wardens; a four-hour course to the men's Civilian Motor Corps; a condensed, two-hour version of the four-hour course to a group of industrial air-raid wardens and to a select group of physicians, air-raid wardens, nurses, and Red Cross workers in Danbury. The committee is now conducting the two-hour course for small groups of air-raid wardens, and eventually each of the many wardens in Stamford will have an opportunity to receive instruction. The committee is training every member on its personnel in gas identification methods and, while at first this training will consist largely in developing the odor sense, some work is planned using the gas identification apparatus developed by Mr. Bradley[1]. Another job which the Educational Committee has before it is the training of the personnel of the Decontamination Squad. These men will be recruited largely from the collectors of refuse and garbage in Stamford. Committee members have spoken on their work before the industrial air-raid wardens in Danbury, a local FBI School in Stamford, a group of interns in a New York hospital, and the office and executive force of the American Cyanamid Co. in New York.

The Decontamination Committee, working through the industrial air-raid wardens, is making an inventory of all equipment and supplies in Stamford which might be pooled for decontamination purposes should a chemical attack occur. Working in close cooperation with public health authorities, hospitals, and the Red Cross, the committee has developed a mobile first-aid unit for treatment and decontamination of gas casualties. This outfit will consist of a converted steel truck which will carry about 240 gallons of hot water to the scene of a gas incident. Gas casualties will receive first-aid treatment from first-aid workers and physicians who will man the truck, after the patients have disrobed and had a hot shower from tanks on top of the unit. The labor for construction of this novel outfit will be contributed by a group of expert pipe fitters. The committee has arranged with the laundries for mass decontamination of clothing if long and heavy gas raids occur. It will direct and supervise all decontamination squads which will clean up public property after any incident requiring such work.

Neighboring towns have followed the lead of Stamford in this important work. B. L. Souther in New Canaan and S. K. Clever in Darien have charge of chemical defense activities in their localities. R. M. Carter is on Mr. Clever's staff, as is Roland Menard. These men are all members of the Western Connecticut Section, and with the examples of these three communities before them it is hoped that similar chemical groups may be organized elsewhere. In some cases, as in Norwalk, capable members of the section have already offered their services for this purpose but as of this writing the civil authorities there have not availed themselves of the opportunity to organize chemical defense on a sound basis.

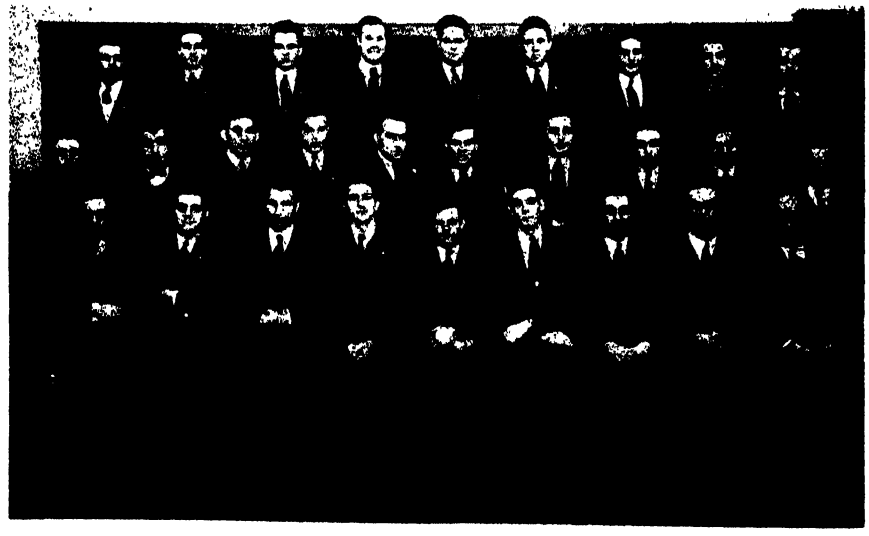
[1] Chem. Eng. News, 20, 893 (July 25, 1942).

Military Chemistry

The University of Pittsburgh will offer a course in Military Chemistry and Chemical Agents each trimester beginning September 28. It will be based on War Department Technical Manual 3-215 and will cover all of the fundamentals and principles which are required by the manual. Two fully illustrated lectures will be given weekly by A. L. Robinson of the chemistry staff. The purpose of the course is to train prospective registrants for military service.

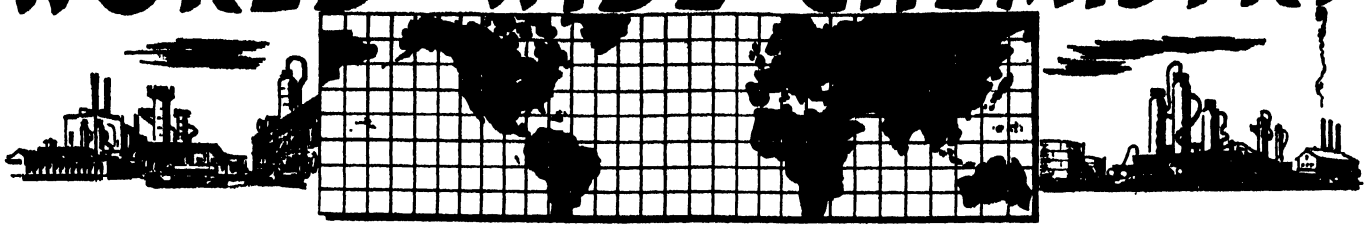
Two department managers of the Whiting Corp., Harvey, Ill., who have been promoted to vice presidencies are **H. W. Anderson** of the Aviation Division and **M. J. Rice** of the Quickwork-Whiting Division.

John P. Cunningham has been transferred by Shell Development Co., from San Francisco to its newly opened New York office in the capacity of technical assistant.



A. C. S. Student Affiliate Chapter at Northeastern University, Boston, Mass.

WORLD-WIDE CHEMISTRY



BRAZIL

The government recently signed several decrees for improvement in the mining of iron ore. In the first two decrees the Brazilian Government approved the agreement between Great Britain and Brazil in which the former country cedes to Brazil without compensation the properties belonging to the Itabira Iron Ore Co., located at Itabira, State of Minas Geraes, and ratified the agreement between Great Britain, the United States, and Brazil concerning improvements to the Estrada de Ferro Vitória a Minas as well as sales of iron ores to Great Britain and the United States.

The government also approved the organization of a new company in which the Vitória a Minas Railway was merged with the Itabira Mining Co. to form the Companhia Vale do Rio Doce S. A. with a capital of 200,000 contos de reis (about $10,000,000). The new company will develop, trade in, transport, and export the iron ores of the Itabira mines and operate the Vitória a Minas Railway. The company, divided in two departments, one controlling the railway and the other the mining operations, will be managed by a board having one Brazilian-born president, two Brazilian-born directors, and two directors from the United States. The Railway Department will be administered by Brazilian-born directors, and the Mining Department jointly by Brazilian and United States directors. Fifty-five per cent of the new company, capital will be contributed by the Brazilian Government, and the balance will be offered to public subscription.

Construction Started on Plant for Production of Cellophane

Press notices published recently in São Paulo say that the Industrias Reunidas F. Matarazzo has started building a new factory for the production of cellophane and other transparent papers. The plant's capacity will be enough to meet requirements of all South American countries. Brazilian-made machinery will be installed. The Matarazzo concern owns 286 factories, mills, and other industrial establishments producing a large variety of commodities which are both consumed locally and exported to other American countries.

Production and Exportation of Cotton Products Reported

Cotton production during 1941 amounted to 521,600 metric tons against 468,695 metric tons in 1940. Production of cottonseed showed considerable improvement over the previous years, totaling 1,217,067 metric tons in 1941 against 1,093,618 in 1940. The State of São Paulo alone contributed 74.8 per cent of the total production. Exports of cotton products, however, suffered the consequences of the war and changed radically. Cottonseed exports dropped from 55,403 metric tons in 1939 to only 2,457 in 1941, while cottonseed oil had an increase from 23,223 metric tons in 1939 to 33,458 in 1941. Exportation of cottonseed bran was reduced from 19,353 metric tons in 1939 to only 8,857 in 1941, and of cottonseed meal from 208,444 in 1939 to 31,960 metric tons in 1941. No stocks of cottonseed meal exist at present in the factories, since cottonseed meal is being largely used by Brazilian industries as fuel. The shortage of fuel oil has forced local industries to look for new sources of heating.

Brazil Reports Favorable Trade Balance Despite War Conditions

Despite abnormal conditions in foreign trade, a favorable balance of 850,217 contos de reis was recorded during the first four months of 1942 against only 368,931 contos de reis during the same period of 1941. A great number of products was responsible for the increase in export value, principally hides and leather, rubber, carnauba and ouricurí waxes, babassú nuts, castor seeds, tobacco, pine wood, cottonseed oil, rock crystals, cotton and rayon yarns, sugar, cocoa, maté, preserved and frozen meats, coffee, cotton and woolen textiles, and cotton waste.

Only a few imported goods showed increases in volume during the first four months of 1942 compared with the same period of 1941, the principal ones being asphalt, sulfur, gasoline, fuel oil, lubricating oils, kerosene, jute, wheat, tin plate, fertilizers, caustic soda, cement, and copper. However, all imported goods showed an increase in value, especially during April 1942 when import value increased in about 31 per cent over the preceding month. Many of the imported materials decreased in both tonnage and value—celluloid, scientific apparatus, sewing machines, radios and electrical appliances, motor cars, tires and inner tubes, cellulose acetate, turpentine oil, flaxseeds, coke, mineral pigments, iron bars and sheets, petroleum crude oil, silk, perfumery essences, paints, edible fruits, cork, newsprint, barbed wire, iron rails, and iron pipe lines.

Number of New Industries Opened in Brazilian States

Press notices in technical magazines indicate that several factories have been opened for production of cellulose pulp in the States of Rio Grande do Sul and Santa Catarina, for extraction of caffeine from maté in the States of Santa Catarina and São Paulo, for production of tar and other by-products from wood distillation in the State of Paraná, for the production of linseed oil in the State of Rio Grande do Sul, and for output of citric fruit essences in the State of São Paulo.

C. E. Nabuco de Araujo, Jr.
Caixa Postal 970
Rio de Janeiro
July 14, 1942

Editor's Note. Those interested in further details should address the correspondent whose name and address appear for each country, and enclose sufficient international coupons to prepay the reply. United States stamps should not be sent.

South African Fertilizer Industry Meets Demands

Careful planning by the South African fertilizer industry has so far managed to meet the country's need despite heavy demands, particularly for superphosphate. Before the war South Africa imported 100,000 tons of superphosphate annually from the Netherlands, and with this supply cut off, the industry has faced a serious shortage. Important local factories were entirely dependent in the past on imported phosphate rock for production of superphosphate, but reports on the South African industry indicate that it is overcoming such obstacles.



Operation of the various raw material controls and the policy of chemical manufacturers tend to reduce price changes to a minimum, but if present quotations are compared with those ruling at previous dates, numerous advances are noted. Potash alum, white arsenic 99–100 per cent, barium carbonate 94 per cent, barium chloride crystals, and sodium percarbonate are chemical products which have risen greatly during the first half of 1942, according to the *Chemical Trade Journal*. Price advances of chemicals by about 10 per cent were fairly numerous. In the field of coal-tar products prices increased for benzene and creosote oil. Butyl alcohol also advanced, whereas quotations of xylene and methyl ethyl ketone were slightly reduced. Prices for carbon disulfide, sodium nitrite, and dibasic sodium phosphate are also lower. Heavy price advances occurred in the field of vegetable oils. Supplies of paint oils are still well maintained, but deliveries are subject to severe restrictions so that consumption is almost entirely reserved for essential needs. Soapmakers have received smaller allocations recently, and technical consumers generally must do with the minimum of necesary supplies.

New Ministry Formed to Control Fuel and Power

Increasing industrial demands for fuel and power in the face of coal supplies limited by the calls for manpower from the army have caused the government to form a Ministry of Fuel and Power. This ministry has full control over the operation of all coal mines and, if supplies do not improve greatly or voluntary restrictions do not result in a substantial reduction of domestic consumption, may introduce a rationing system for coal, gas, and electricity. The Minister of Fuel and Power is assisted by a Controller-General, while activities of the ministry are divided into four sections, headed by directors of production, labor, services, and finance. National and regional coal boards have been formed to advise the ministry in technical and administrative matters. Part of the new ministry's task will be to encourage the use of manufactured fuels, where this is advantageous, with a view to an increase in the output of by-products for use in the chemical industries.

Government Forms Non-Ferrous Minerals Development, Limited

The Non-Ferrous Minerals Development, Ltd., has been formed with a capital of £1,000 to assist the Non-Ferrous Minerals Development Controller. The Controller plays a prominent part in utilisation of non-ferrous mineral deposits in the British Isles and has paid particular attention to the Cornish tin and tungsten mining industry. Although operations are hindered by the shortage of labor and claims of other war industries, some success has been noted.

Derbyshire Stone Goes into Fluorspar Production

The Derbyshire Stone, Ltd., has entered the production of fluorspar and will probably remain in this field after the war. Deposits of high-grade glass sands, which were discovered in Argyllshire on the banks of Loch Aline shortly before the war, are being used and have proved superior to other sands after purification.

Licensing System on Chemicals and Related Products Extended

The license system is being extended in various directions. Acquisition of refractory dolomite, including bricks, cements, and compositions, has been subject to license since June 19, but this does not apply to refractory dolomite which has been mixed with a bonding material but not further processed or manufactured. Acquisition of chromium metal is also subject to license. So are, since July 8, the acquisition, disposal, treatment, use, and consumption of dammar, gum dammar, manila, and gum manila. Licenses are required as from August 1 for imports of mica slabs, splittings, ground, and waste from the British Empire, Free French Colonies, and the Belgian Congo. No more table jellies must be made in British factories, and no more ice cream will be made in Great Britain after August 31. Export licenses are required for preparations containing isinglass, for gum copal and gum kauri, for abrasive segments consisting of grains of natural or manufactured abrasive bonded together with other material, and for articles of various descriptions made wholly or mainly of plastic material derived from cellulose, casein, or synthetic resin.

Shipping Problems Restrict Phosphatic Fertilizer Supply

The supply of phosphatic fertilizers is also limited by shipping considerations, and though more use than ever before is made of animal products like bone meal, strict allocation is necessary to ensure fair distribution of available supplies. The authorities have investigated the possibility of working certain low-grade phosphate deposits in the country, but the chief obstacle seems to be the amount of labor and transportation that would be required for their utilization.

Four Manufacturers Agree in Production of Pharmaceutical

Pethidine hydrochloride, the hydrochloride of 1-methyl-4-phenylpiperidine-4-carboxylic acid ethyl ester, which is recommended as an analgesic and antispasmodic, has been introduced in the British market under an arrangement by four leading manufacturing firms.

Potash Limited to Certain Crops

The bulk of the potash requirements of British farmers is being met by imported muriate of potash containing 60 per cent or more of K_2O. Preference is given to this highly concentrated potash salt because of the need to conserve shipping. Under a new order potash fertilizers of foreign origin must be used only for potatoes, flax, sugar beet, root and vegetable crops grown for seed, market-garden crops, black currants, and tomatoes. The amount to be used on these crops is limited to certain quantities per acre. For other crops potash fertilizers may be supplied under permits from the County War Agricultural Committees, if they are grown on land seriously deficient in potash but these permits will be issued in comparatively rare cases only.

Strategic Importance of West Africa Is Stressed

The strategic importance which is attached to West Africa as a producer of important vegetable and mineral raw materials has been stressed by the appointment of a resident minister in that area. Lord Swinton, who has held high offices in the government including that of Secretary for Air, will devote much of his time to the development of the economic resources of the countries under his charge. About the same time the West African Cocoa Control Board has been reconstituted as the West African Produce Control Board. In its new form it is responsible for the control of various vegetable products including oilseeds and vegetable oils, of which the British colonies in West Africa are important producers. The Free French National Committee has appointed observers to maintain contact with the West African Produce Control Board and has agreed to cooperate with the board in organization of the vegetable oil trade from the French colonies in West Africa. The board will use the services of existing trade organizations for the purchase and collection of oilseeds.

Mineral exports from West Africa have increased in importance as a result of recent changes in other countries. Output of tin concentrates has increased and is to be increased further in Nigeria where colum-

bite mining has also made progress as a result of larger demands from the United States. Iron ore from Sierra Leone is another mineral of considerable importance, as also is bauxite from the Gold Coast for which the Department of Scientific and Industrial Research has developed a concentration process to reduce moisture content before shipping.

Attention has also been paid lately to the possibility of tapping wild rubber in West Africa. While the quantities expected from this source may be comparatively small, they are not without value. Efforts have been made for an increase in food growing for the local market and neighboring countries. As a supplier of raw materials West Africa has the great advantage that it is favorably situated for shipments to both England and North America.

G. ABRAHAMSON

150 HALFWAY ST.
SIDCUP, KENT
ENGLAND
July 18, 1942

Shipments of Manganese and Iron Ore at Rio Port Regulated

FORMATION of a syndicate of miners, producers, and exporters of manganese and iron ore through the port of Rio de Janeiro is reported from Brazil by official sources. The syndicate is to be named Sindicato National dos Productores e Exportadores de Minerio de Ferro e Manganese.

Functions of this organization will be to sample and analyze manganese and iron ore shipped through the port, keep records of ore movements from mine to boat, and make recommendations to the Central Railroad on the allotment of cars based on available ore, boats expected, and other factors in the industry.

Zinc Refinery May Be Built in Quebec

ACCORDING to an unofficial report to the U. S. Department of Commerce, interest in the possibilities of a zinc refinery in Quebec is being revived. There is belief that sufficient deposits in the province warrant building of a refinery with the Quebec Government reported to be considering allocation of $1,000,000 as a subsidy for zinc mined and refined in the province. Most of the zinc concentrates from that area at present are sent to the United States for treatment.

Damaged Nitrogen Plant at Moscice Reported Operating

GERMAN reports indicate that damage to the nitrogen plant at Moscice has been repaired and the plant is again in full operation. These works were making ammonia, calcium nitrate, nitrophosphates, calcium carbide, ammonium nitrate, nitric acid, and calcium chloride, which as the most easterly of German chemical plants of any size, readily accessible to Germany's eastern front, have strategic importance.

India Undertakes Program for Mineral Production

STEPS are being taken by the British Indian Government for exploring that country's mineral resources, word to the U. S. Department of Commerce indicates. The program aims to indicate the practicability of establishing mineral production and use of ores not previously fully utilized. The plan will involve proving of deposits and construction and operation of experimental and pilot plants. It will continue until large-scale operations can be launched.

Hungarian Paint, Acid Companies Are Merged

MERGER of the Hungaria, Phoenix, Metallochemical, and Zorke companies of Hungary, makers of acid, paints, and other products, is reported. These companies are now located in Hungary since the Rumanian and Yugoslavian border zones changed. The Hungaria company is a subsidiary of the former Verein für Chemische and Metallurgische Produktion of Prague, now under German control. Combined output of the companies exceeds Hungarian home market demand, and markets are said to be a problem. The capital of the companies was increased in the move.

Canadian Government to Purchase Scheelite Ore

GOVERNMENT purchases of scheelite ore in lots of 100 to 1,000 pounds, as an encouragement to tungsten production and an aid to the small shipper, is reported from Canada.

The authorities, as a war conservation measure, are reported planning to restrict construction of trails and roads by mining properties engaged in production of nonessential metals.

Australian Cultivation of Tung Trees Increased

TUNG trees are believed to grow well in new South Wales, Australia, and under proper cultivation give good yields, the U. S. Department of Commerce reports. The grove reported on gave 18 per cent oil from whole fruit. The quantity of fruit has been increased annually since the first crop in 1937, it was said, with a quality of oil equal to the China product.

ENLARGEMENT of Japan's aluminum industry to develop ore deposits in Korea, Formosa, and Manchukuo is projected, according to German reports.

War Stimulates South Africa's Chemical Output

MINING, agriculture, and some secondary industries absorb the output of South Africa's chemical industry, both local production and imports being devoted almost entirely to these industries' requirements, an official survey states.

Johannesburg gold mines require approximately 200 tons of explosives per day, cyanide valued at £1,500,000 annually, 80,000,000 detonators annually, besides large quantities of other chemical products used in refractory and refining branches.

Agricultural demands, second to those in the mining industry, comprise 300,000 tons of superphosphates annually, besides organic nitrogen and potash fertilizers. Others utilizing the Union's chemical output include the tanning, paper, canning, soap, paint, and pharmaceutical industries.

Local production has been stimulated by the fact that war has interfered with the supply of raw materials largely imported, particularly superphosphates. Some production has been possible using rock from North Africa, but this supply has been cut off by war. Using just the phosphate rock available in South Africa, plants have been able to supply local requirements, and the postwar prospect is for expansion provided there is an increased domestic output of sulfuric acid. This acid already has assumed importance because of its place in explosives manufacture.

Prior to war approximately half of South Africa's cyanide requirements were filled by imports, some from Germany. Local production has increased as these imports were cut off, but the local product is said to be inferior. War conditions likewise have increased production in the Union of chrome salts, sodium silicate, and sodium sulfide, and since necessary raw materials are available, there is a prospect of this industry continuing in postwar years.

Production of Polishes Cut in United Kingdom

REDUCED production, under government limitation effective since June 1, of wax polishes, creams, and dressings for floors, furniture, and shoes has been reported from the United Kingdom. These articles come under the Limitation of Supplies Order. Producers must restrict the supply to 60 per cent by value based on the six months ended November 30, 1939.

THE Government of Eire is reported to be promoting a limited company to prospect for and develop minerals, under an act passed in June 1941. The company is now reported to be in operation under this stimulus.

India Endeavors to Become Self-Sufficient in Chemicals

THE increasing effort of the Indian Government to make the country as self-sufficient as possible in chemicals and other raw materials is reflected in the report of the Board of Scientific and Industrial Research for the year 1941, relayed through official sources to this country. The activities of the board are pictured as a major contribution to the further industrialization of India, particularly under stimulus of war conditions.

The Alipore Laboratory has followed through a number of research programs sponsored by industrial firms rather than by the government. Included among them are research on the utilization of naphthalene and its products; manufacture of phthalic anhydride in pure state, with a pilot plant under construction for large-scale experimental production; research in development of resins from bagasse, jute waste, and other waste products, with large-scale development begun (the resins are notably cheap, and impart an elastic finish to cloth, besides being used in bonding wood and cellulose matter); refinement of certain imported sulfur products; investigations on indigenous paint thinners, synthetic wool, cork substitutes, commercial use of animal wastes, and unbreakable wood substitutes.

New Zealand Looks to Increased Agar Output

ENOUGH agar to supply essential requirements of both New Zealand and Great Britain is sought in developments progressing in New Zealand, looking to an annual harvest of 10 tons of dried weed. This will produce 3 tons of agar, sufficient for the purpose. New Zealand's canning industry consumes about 18 tons annually, compared with only 400 pounds used for bacteriological purposes. Recent reports of agar production from New Zealand indicate that 15 pounds were produced in semi-official extractions under direction of the Dominion's laboratory in recent months. Official tests in Great Britain are said to have indicated that the New Zealand product compared favorably physically, chemically, and bacteriologically with the Japanese product, but has a less attractive color.

Belgian Congo to Increase Production of Copal Gum

INCREASED production of copal gum during the current year is anticipated from the Belgian Congo, which exported 15,114 metric tons in 1938 and progressively declining amounts in succeeding years, until for January to June 1941 only 3,659 tons were exported. The 1942 output, it is estimated, will reach 16,200 tons. Prior to the war virtually all this product from the area was shipped to Belgium first.

Mexico Engages in Large-Scale Production of Acid

LARGE-SCALE production of sulfuric acid from smelter gases is reported from Mexico through semiofficial sources. Sulfuric acid also is being made from sulfur by the contact process.

A plant has recently been completed for refining sulfur, and a new plant is making carbon disulfide with sulfur from the only deposits in Mexico—those in San Luis Potosi. This latter plant will supply domestic requirements, which are about 150 tons annually.

Two Mexican plants are making hydrochloric acid, while the sodium sulfate by-product is used to prepare sodium sulfide, of which the country produces all requirements of the domestic leather industry. The glass industry is aided in that several lakes in the northern part of the country furnish sodium sulfate, which is not entirely free of chlorides but which is useful in glass manufacture. Another plant that will produce chloride-free sulfate is being installed at one of the lakes, the output to be utilized at a new sulfate pulp plant.

Imported sodium nitrate supplies a dynamite plant that produces its nitric acid requirements. An output of three tons daily is reported for an electrolytic alkali plant, while other Mexican products reported include potassium chlorate, copper sulfate, and calcium arsenate, the latter from domestic arsenic. A new plant is scheduled to produce calcium carbonate.

Great Britain Seeks Lime Supply Maintenance

MAINTENANCE of a lime supply for English farmers for the 1942–43 season is an urgent consideration of the British Government, faced with possibilities of a serious shortage for the winter liming season.

This is due to labor problems in the lime industry, and also to increasing demands of other industries for lime, limestone, and chalk. A suggested remedy is that farmers take substantially larger amounts of their lime requirements during the summer, thus enabling lime producers to operate their works throughout the year at an even maximum level.

To encourage such advance buying, the government contemplates a summer delivery payment to farmers, amounting to an increase of from 50 to 75 per cent in the treasury contribution under the land fertility scheme Although an emergency measure, the payment will be made in respect to deliveries to those on the land between mid-May and the end of August. It is intended as compensation for additional costs to the farmer, and inconvenience that may be occasioned through double handling and storage of lime supplies.

Trade Agreement Signed by Uruguay, United States

UNDER a new trade agreement between the United States and Uruguay the present moderate Uruguayan duty on sulfur is bound against increase. Exports of sulfur from the United States to Uruguay have not been large in the past, but $69,000 worth was shipped in 1940, the U. S. Department of State said.

Duty on nitrocellulose and pyroxylin lacquers, typical and important United States paint products, is reduced by 30 per cent. These products are specifically included, under the agreement, in a Uruguayan tariff classification which covers varnish, clear or with the addition of any coloring matter, whether concentrated or not. A 30 per cent reduction is also obtained for medicinal petroleum jelly, for liquid insecticides with a base of pyrethrum or of ethers and hydrocarbides, and for composition-coated roofing paper. The existing rate on certain liquid roofing compounds is bound against increase.

The United States is generally the chief supplier of Uruguayan imports of nitrocellulose or pyroxylin lacquers, medicinal petroleum jelly, liquid insecticides, and roofing compounds and paper.

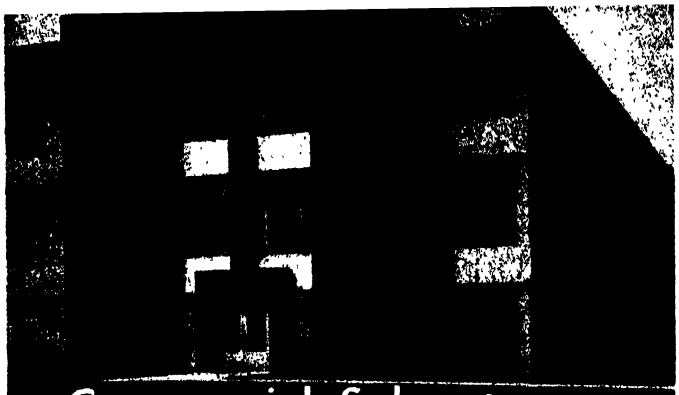
British India Utilizes Phosphate Rock Deposits

INVESTIGATIONS are reported under way in British India on production of phosphoric acid and phosphorus from phosphate rock, while fertilizers having a high citric-soluble phosphate have been made in some places from phosphatic nodules. Urea from ammonia and carbon dioxide using high pressures has been made in good quantity, together with moderate quantities of formaldehyde.

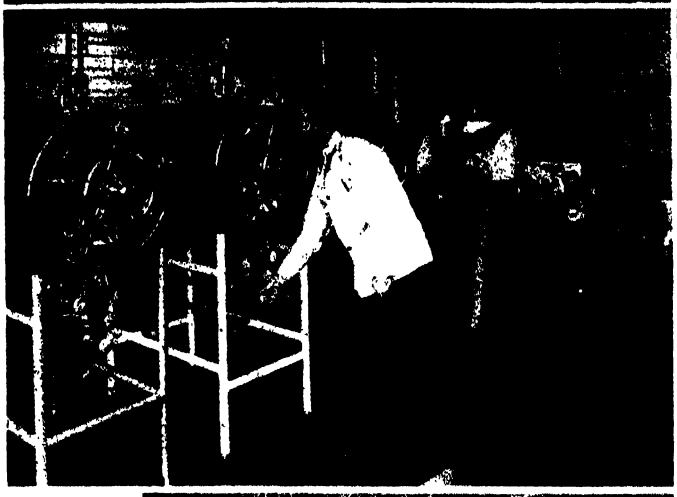
COPPER-BEARING insecticides (Bordeaux mixture, and others, except straight copper sulfate) have been placed under permit by the Ministry of Commerce of Bohemia-Moravia, consular advices reveal. The apparent object is to reduce copper consumption and conserve national stocks of this metal.

ABRASIVE production, natural and synthetic abrasives, and their products, have been placed under government control in Bohemia-Moravia, according to consular advices. Establishment of plants, recommissioning of old factories, increased output are subject to government permit.

THE government of Eire has been searching for substitute local phosphate deposits. Engaged in the search is the Mineral Exploration and Development Company, recently established under government auspices to locate and develop the country's mineral resources.

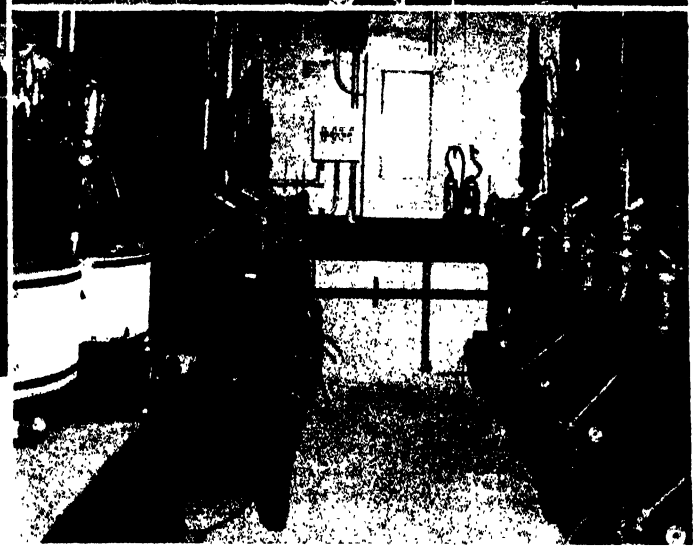


Commercial Solvents New Research Building









RESEARCH has always played an important part in the history of Commercial Solvents and, as the company expanded in both size and the number of products manufactured, the scope of activities of the Research Department was constantly increased. For many years their quarters were in a wing of the parent plant at Terre Haute, Ind., but by 1940 the elastic limit of this building had finally been reached. It was then decided to erect a new building to house the present staff and provide, at the same time, for future expansion.

Terre Haute was selected as the most advantageous location for the new research building, the deciding factor being the convenient supervision over new processes and products through laboratory and pilot-plant to full-scale production which location at this plant makes possible. The Terre Haute plant is not the largest but it is the most diverse in equipment and operations of all the Commercial Solvents plants.

The new three-story research building, completed late last year, houses the biological and chemical staffs together with the patent division and technical library. Provision has been made for addition of a fourth floor or expansion at the rear of the building. The building is divided transversely by a fire wall sealed by automatic fire doors. The front portion of each of the three floors is given over to offices, conference rooms, and the like, while all the laboratories are located back of the fire wall. The building is fireproof, and its contents are protected by a sprinkler system covering all laboratories, offices, and corridors. A carbon dioxide system protects the vaults. Provisions have been made for installation of air-conditioning equipment when it again becomes readily available, and in the meantime the building is cooled in warm weather by flooding the roof with water.

The shortage of structural steel early in 1941 when the building was started suggested the use of reinforced concrete for the frame. This type of construction required only 20 per cent of the steel needed by a conventional steel frame. Use of a patented method of floor reinforcing, known as "smooth ceiling construction", eliminated the column caps and ceiling beams characteristic of reinforced concrete frame slab construction. The erection of forms and subsequent installation of wiring, piping, and sprinkler systems were thus greatly simplified.

Exterior walls of the building are all glass block and concrete. Two types of block are used in the east and south walls to give maximum light with minimum glare. To a height of 7.5 feet from the floor a block which refracts light downward is used. Above that height a block which refracts light upward is used. Blocks in the north wall are of nondirectional diffusing type.

Fluorescent lighting ensures a minimum illumination of 25 foot candles in every office and laboratory. The interior walls in the laboratory are finished with tan glazed tile which are easy on the eyes, simple to clean, and unaffected by laboratory fumes. The interior office partitions are constructed of Haydite, a porous concrete block, painted a light green. Floors throughout are concrete covered with asphalt tile.

ESMWT Succeeds ESMDT

Austin M. Patterson

U. S. Office of Education, Washington, D. C.

DURING the past year readers have seen references in newspapers and elsewhere to short college-grade training courses being given for workers in war activities by various schools under the sponsorship of the U. S. Office of Education. In some cases it has been mentioned in addition that the program was called Engineering, Science, and Management Defense Training, or ESMDT.

The ESMDT program officially terminated June 30, 1942, although courses already begun under it may continue as late as September 30. Its successor is called Engineering, Science, and Management War Training, or ESMWT. The new program will be of the same nature in all important respects as the previous one; the four fields of training, for engineers, chemists, physicists, and production supervisors, remain the same.

Figures for ESMDT are not complete, but as of June 30 they show a net total authorization of 8,014 courses offered by 196 institutions to a net authorized enrollment of 456,439 persons (the actual enrollment as finally reported will be somewhat under this figure). That the courses are accomplishing their purpose of upgrading technical workers in industry is evidenced by much accumulated testimony. For example, from a thousand inquiries to industry as to the value of the training, only three replies were unfavorable, while many were enthusiastic. Over 90 per cent of the courses are of the in-service type, with very direct benefit to industry and little loss. While the effectiveness of the pre-employment courses is more difficult to gage and some scattering of effort has been inevitable, results also have been gratifying on the whole.

Of the total authorized enrollment of 456,439, only 9,110 were in courses classed as chemistry. However, 1,123 additional were enrolled in "chemistry for engineers" and 12,175 in chemical engineering. This makes a total of 22,408 enrolled in chemical courses. Other branches of engineering had an enrollment of 347,736, production supervision (management) 80,025, and physics 6,270. The institutions approved to give ESMDT courses numbered 213. Of these, 194 were approved for chemistry, 154 for engineering, 140 for production supervision, and 135 for physics.

The most common type of training in chemistry has been analytical, next to which has come general chemistry for workers in chemical plants. Organic chemistry ranks third, and physical fourth. In chemical engineering, training in fundamentals comes first, followed in order by explosives, plastics, inspection and testing, petroleum, and other special subjects. Training in the health field and in chemical warfare has been left for the most part to other agencies.

While the shortage of technical persons in all four of the above fields is serious, the relative need for training chemists has apparently been less than that for the other three classes; at any rate, the demand for training in the chemical field ran about as expected, while that in the other three exceeded expectations. This seems to agree with reports from other quarters that the shortage of physicists and engineers, including chemical engineers, is greatest, with that of chemists relatively less acute. According to one authority, the need for chemists of B.S. grade or beyond is relatively greater than for those who have had only one to three years of training.

An interesting recent development has been the entry of women's colleges into the program and an increase in the number of women enrollees. The number of Negroes trained is also increasing as the demand for them in industry grows. An expansion of about 50 per cent is anticipated in the ESMWT program during the year begun July 1, as compared with the ESMDT program which preceded it.

Training for War Industries

THE Chemistry Department in the University of Pittsburgh plans to offer free evening courses for the training of individuals in chemistry for war industries. The purpose of these courses is to prepare new men and women to replace those who have entered the armed forces and to train individuals already employed in industry for more advanced chemical service. The courses planned include: Introductory and Advanced Metallurgical Analysis; Microscopical Testing of Industrial Materials; Electrical and Optical Instruments for Analytical Control; Practical Food Testing and Control; Food and Water Inspection; Practical Vitamin Assaying; Industrial Quantitative Organic Analysis.

An elementary course on Chemical Fundamentals for War Workers is also planned to prepare individuals for the more advanced practical courses which are listed above.

A descriptive bulletin of courses may be obtained by writing to Herbert Spencer, Regional Coordinator of Engineering, Science, and Management War Training Courses, Pennsylvania College for Women, Pittsburgh, Penna. Fall courses are scheduled to begin October 12, and registration will take place during the preceding week.

H. V. Fairbanks has been appointed assistant professor of chemical engineering at Rose Polytechnic Institute, Terre Haute, Ind. He began his work there September 1.



WESTINGHOUSE ELECTRIC & MFG. CO.

Science Shoulders Arms

A Tool for Re-forming Two-Piece Compression Copper Tubing Couplings

J. C. WHITWELL AND W. T. McKEE, Princeton University, Princeton, N. J.

Users of the two-piece compression tubing coupling will be aware that, although it is the simplest and least expensive type of coupling, there are difficulties attendant upon its re-use. The top, or compression nut, is pressed into the tubing in such a manner as to deform the nut. As a result, direct re-use is impossible. A tool for re-forming the fittings for re-use is described. Advantages are simplicity and cheapness. By its use, purchase of new brass couplings, unobtainable except with very high priorities, is obviated.

Copper Tubing Couplings

THERE are several characteristic forms of copper tubing couplings. These may be classified in three groups: two-piece compression couplings; three-piece compression couplings; and flared tube couplings. The three types are illustrated in Figures 1, 2, and 3, respectively. The first is the cheapest and easiest to install. The square-cut tubing is slipped into the coupling and the top nut tightened in place, the seals forming at the end of the tubing and at the brass contact of the two nuts. Both other types require more handling, the second in placement of the sleeve upon the tubing requiring opening of the coupling prior to installation and the third in placing the union nut on the tubing, flaring the tubing, and fastening the two parts together. A separate tool is used for the flaring operation.

The main disadvantage to the two-piece compression coupling is the inability to re-use the top, or compression, nut. In original use the end of the compression nut is pressed into the tubing, gripping it permanently. After this initial operation, the fitting may be uncoupled and re-coupled, but the compression nut may not be removed and replaced on another piece of tubing. Re-use on another piece of tubing requires reshaping the compression nut to remove the crimp in the tapered end. A tool to perform this operation is described.

The above difficulty is not characteristic of the other two types of coupling. However, in the case of the sleeve type, the sleeve is permanently crimped onto the tubing. This single part of the fitting is not suitable for re-use. In normal times these sleeves may be purchased inexpensively. At present they are largely unobtainable. The flared tubing coupling may be re-used by cutting off the flared end and slipping the union nut from the tubing.

A second reputed objection to the double compression fitting is its unreliability under high pressure. The authors have used these fittings under 1,000 pounds per square inch without any difficulty of this nature.

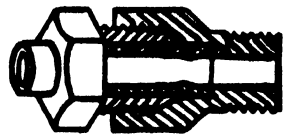


Figure 1.

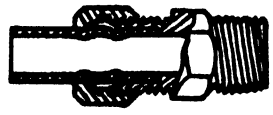


Figure 2.

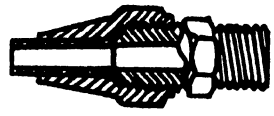


Figure 3.

Necessity for Re-forming Tool

Stringent government requirements have made it apparent that brass will be unobtainable for the remainder of the present emergency except under priority ratings which are not available to many laboratories. Until substitute plastic tubing and fittings are manufactured on large scale, recurrent demand for fittings may work a considerable hardship. With the demands of the author's laboratory in mind, the tool presented here was designed and thoroughly tested. It was found to be satisfactory, not only for one, but for successive operations on the same fitting. Since correspondence has indicated that no such tool is sold, the design is presented here for others who may find themselves in the same predicament regarding tubing and fittings as experienced by the writers. It is believed that use of the tool will be found to be so satisfactory technically and economically, that its continuation as a standard laboratory item is probable even after new fittings again become available.

Tool Design

The tool, illustrated in Figure 4, con-

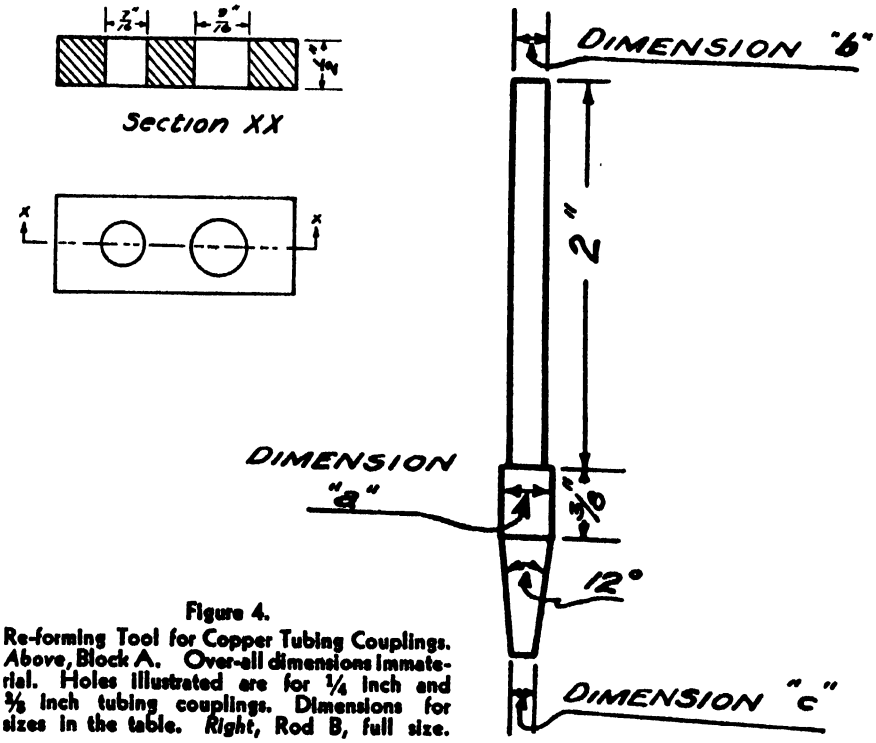


Figure 4.
Re-forming Tool for Copper Tubing Couplings. *Above*, Block A. Over-all dimensions immaterial. Holes illustrated are for ¼ inch and ⅜ inch tubing couplings. Dimensions for sizes in the table. *Right*, Rod B, full size.

Copper Tube O. D.	Outside Diameter, Nut Threads	Diameter of Drill for Hole in Block A	Diameter Tubing Hole in Compression Nut	Diameter Rod B, Dimension "a"	Diameter Rod B, Dimension "b"	Diameter Rod B, Tapered End Dimension "c"	Taper, Total Angle
Inch	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Inch*	*Degree*
1/8	5/16	5/16	0.128 to 0.132	0.128	9/32	1/16	12
3/16	3/8	3/8	0.191 to 0.195	0.191	1/8	5/32	12
1/4	7/16	7/16	0.253 to 0.257	0.253	5/16	1/8	12
5/16	1/2	1/2	0.316 to 0.320	0.316	1/4	3/16	12
3/8	9/16	9/16	0.378 to 0.382	0.378	1/4	1/4	12
7/16	5/8	5/8	0.441 to 0.446	0.441	5/16	5/16	12
1/2	11/16	11/16	0.504 to 0.508	0.504	3/8	3/8	12
9/16	3/4	3/4	0.566 to 0.570	0.566	7/16	7/16	12
5/8	7/8	7/8	0.628 to 0.632	0.628	1/2	1/2	12
3/4	1	1	0.753 to 0.757	0.753	9/16	9/16	12

sists of a block of steel, A, and tapered steel rods, B, for each size coupling handled. The steel block is drilled with several holes, again one for each size of coupling handled. Proper sizes are indicated in the appended table.

The block and rods may be of ordinary low carbon steel. For best service, the rods should be turned from tool steel and subsequently hardened. However, a low carbon steel rod will have a considerable life. The taper of 12° specified for the expanding end of the rod has been arbitrarily chosen and is not closely defined. Any moderate taper is satisfactory.

Use of the tool is as follows. The compression nut is removed from the tubing by cutting off the protruding end of copper tubing (not over 1/8 inch in length). The cut is made as near as possible to the fitting, but without burring the nut with the hacksaw teeth. The tubing is then filed flush with the nut, when the latter can be drawn from the tubing with comparative ease. If the nut fails to draw off easily, a few turns with a wrench will loosen it. Another method of loosening is clamping the nut in a vise and twisting the tubing by hand.

Fundamental to satisfactory re-forming of the nut is a heat treatment. The crimp in the nut has cold-worked the brass sufficiently to make it quite brittle. Removal of this embrittlement is essential and simply accomplished by heating the nut to a temperature somewhat below the melting point of the brass. While this operation may be performed in a furnace, a hand torch of the gas-air type is quite satisfactory for any but very large-scale reclaiming operations.

The heat-treated nut is placed in the proper hole in the block, A, where it is supported by its hexagon head. The block is most satisfactorily held in an ordinary machinist's vise. Rod B of an outside diameter corresponding to the inside diameter of the hole in the compression nut is selected. The rod is placed in the hole in the compression nut and gently tapped through with a hammer. The reduction in diameter of the upper part of the rod allows it to fall freely through the nut after the reforming operation is complete. This is an essential point in efficient operation.

The nut is now ready for reuse. The number of repetitions of this process should be unlimited.

A. A. T. C. C. Organizes New Committee

The American Association of Textile Chemists and Colorists, in its program of cooperation with the Government in defense and war programs, has recently organized a committee to study the aging of sulfur-dyed textiles. This project will include development of a reproducible accelerated aging test, to be used for predicting aging characteristics of sulfur-dyed materials.

The committee, which is in close contact with the Quartermaster Depot at Philadelphia, is composed of T. R. Smith, chairman, A. H. Gaede, R. H. Souther, J. L. Crist, O. G. Edwards, M. H. Klein, D. P. Knowland, C. A. Seibert, J. R. Bonnar, Wm. R. Moorhouse, H. G. Macdonald, and Major F. M. Steadman.

Ibert Mellan has recently joined the staff of the Armour Research Foundation, Chicago, Ill., as a research chemist.

Laboratory Testing of Magnesium Incendiary Bomb Extinguishers[1]

MICHAEL FLEISCHER AND JOSEPH J. FAHEY

Geological Survey, U. S. Department of Interior, Washington, D. C.

The problem of combating incendiary bombs has engaged the attention of a number of laboratories in this country in recent months. Many different substances, few of which are satisfactory, have been suggested as smothering agents for magnesium incendiary bombs. The ultimate test of any of these substances is their behavior when applied to actual burning bombs, but much time and material can be saved by small-scale laboratory testing. Such laboratory tests have been confined, so far as we know, to fires set in small quantities of magnesium shavings or turnings. Our experience has been that the results obtained in this way are not comparable to those obtained in tests using actual bombs. Fires set in shavings are much more easily extinguished and in addition, the reproducibility of the tests is poor.

The following simple method devised by us overcomes these difficulties. Approximately 1 ounce of magnesium, either as a solid piece or as shavings but preferably the former, is weighed and placed in an iron crucible with a closely fitting cover. The crucible is heated by means of a blast-lamp until the magnesium is melted. The cover is removed, and the molten metal is cautiously but rapidly poured out on a wooden board, preferably of the tongue-and-groove type. After a specified time interval (we wait five seconds) to give the fire a fair start, the extinguisher being tested is poured over the fire from a weighed container until it is judged that sufficient has been used. By simple proportion, this gives a rough approximation to the quantity needed for a bomb.

Our experience has been that the results obtained in such tests are closely comparable to those obtained in tests using standard test bombs. Materials which are unsatisfactory smothering agents in such tests may safely be discarded from consideration, and larger-scale testing with test bombs may then be restricted to materials which in the laboratory tests show promise of being useful.

[1] Published by permission of the Director, Geological Survey, U. S. Department of the Interior, Washington, D. C.

Recent additions to the staff of the research laboratories of General Aniline & Chemical Corp., New York, include: **John N. Cosby**, formerly with the Research Foundation, Pennsylvania State College; **William O. Ney, Jr.**, University of Texas; **Chas. W. Stein**, University of Pennsylvania; **Marvin O. Shrader**, Yale University; **John C. Lawler**, University of Illinois; **J. P. G. Beiswanger**, Northwestern University; **L. M. Schenck**, University of Texas; and **Ben H. Kirby**, University of Iowa.

Pure Mercury

EDWARD WICHERS, National Bureau of Standards, Washington, D. C.

Chemical literature contains many contributions dealing with purification of mercury but very few on criteria of its purity. It has long been known that certain impurities alter the appearance and mobility of mercury. The terms "sickening" or "deadening" were early applied to these effects. It does not appear, however, that more than a very few workers have recognized how extremely sensitive a criterion of purity the surface behavior of mercury is. Consequently, I am convinced, a great deal of time and effort are being spent in these days that are too busy for any wasted effort on the "purification" of mercury which is already pure to a degree seldom found in any other substance.

Virgin mercury, that is, mercury as produced at the mines, usually has a bright, mirrorlike surface and is clean except for traces of scum or perhaps particles of rust or other foreign matter from dirty containers. If such mercury is filtered through a pinhole in a paper cone, a glass filtering crucible, or several thicknesses of finely woven cloth into a clean, dry glass vessel and thereupon retains a bright and clean appearance, one can be sure that it does not contain so much as one part per million of any base metal. Metals more noble than mercury, that is, silver, gold, and platinum group elements, are not disclosed, but virgin mercury is not likely to contain them in amounts as great as a few parts in a million. Reclaimed mercury is generally as clean as the virgin metal, but may contain more of the noble metals because it is not always subjected to distillation in the reclaiming process.

The statement that mercury which looks clean and does not show the behavior known as tailing is at least 99.9999 per cent pure with respect to base metals may be challenged by many readers. It is indeed hard to believe that any commercial substance possesses such an exceptional degree of purity. But it can be demonstrated quite readily. To do so, drop about 0.5 mg. of tin foil into 100 grams of clean mercury in a small beaker or Erlenmeyer flask. Swirl the mercury around for a minute or so and observe the skin or crust that forms almost immediately. I think the observer will agree that the visible effect can be safely extrapolated to less than one part of tin in a million of mercury. Similar trials can be made with other base metals. The visible effects will not be exactly alike or appear equally rapidly, but they will be equally unmistakable.

The statements made here about the sensitivity and significance of this simple criterion of purity are based on observations made by the late A. Isaacs at the National Bureau of Standards (*2*) in connection with a discussion of mercury for use in dental amalgams Mr. Isaacs prepared a series of amalgams, each containing 0.001 per cent of one of the following metals: gold, silver, copper, zinc, cadmium, antimony, tin, lead, and bismuth. Weighed amounts of each metal were dissolved in the proper amounts of mercury, previously purified by approved methods, to yield amalgams of the desired concentration. The amalgams were prepared in glass ampoules, about half full, and then sealed with ordinary air over the metal. Upon agitation, the presence of each of the metals, except silver and gold, was promptly revealed by a film or skin on the surface of the mercury, by a deposit on the glass, or by a wetting of the glass. Metals such as iron, nickel, cobalt, and tungsten were not included in the tests because they are very unlikely impurities in mercury. Their amalgams, which are not easily prepared, would undoubtedly behave in the same way as those of the metals previously mentioned. Silver and gold in concentrations up to 0.1 per cent were not detectable by the appearance of their amalgams.

F. W. Schwab, also of our staff, later prepared much more dilute amalgams of zinc, antimony, copper, lead, and tin, and found that either the formation of a film or "tailing" of the mercury could readily be detected when the concentration of base metal was no greater than 1 or 2 parts in 10,000,000. This test, simple as it is, can therefore be regarded as far more sensitive than any ordinary chemical or spectrochemical test for base metal impurities.

Silver, gold, and elements of the platinum group can be readily determined by evaporating a sample of the mercury of sufficient weight to yield any desired degree of sensitivity. This should be done in a well-ventilated hood, or better in an apparatus designed to condense and recover the evaporated mercury. The residue, usually predominantly silver, can be analyzed by methods customarily used for the noble metals. A low temperature of distillation, perhaps 200° C., is desirable to minimize the slight volatilization of silver (and even slighter of gold) which is known to occur when amalgams of these metals are distilled. If the evaporation is conducted in the presence of air from a clean porcelain or glass vessel without boiling or other agitation, traces of base metals, if present, will produce a film on the surface which retards evaporation and may virtually prevent it. If the surface remains clean and mirrorlike and the nonvolatile residue is within acceptable limits, any further attempts to determine the purity of the mercury by chemical or spectrochemical analysis are meaningless. The only test that may be more sensitive, as far as the writer knows, is that described by Hulett and Minchin (*1*). It is based on the electrolytic potential of amalgams against pure mercury. By its means they were able to detect as little as 1 part of zinc in 10,000,000,000 of mercury.

It should be noted that the presence of a film on mercury, or the appearance of a dark ring on glass in which the metal is stored, is not necessarily an indication of the presence of base metals. This may occur in varying degree with the most rigorously purified mercury but usually only after storage for some time. How soon this occurs and its extent depend upon a number of conditions. An important factor appears to be the type of glass in contact with the mercury. Others may be the cleaning treatment used for the glass and the amount of moisture in the air. (In this connection it should not be overlooked that sulfur-bearing gases are an important cause of fouling of mercury.) The distinction between the behavior of pure and impure mercury is that the impure metal shows a new film or a deposit on the glass almost immediately after it is filtered into a clean vessel.

Since the surface behavior of mercury is of primary importance in most uses of the metal, other than in the preparation of mercury compounds, the condition of the surface is a very practical criterion of quality as well as a sensitive measure of chemical purity.

It is possible that some reader will know of some other criterion or test which could be used as a check on what seem to be the inescapable conclusions to be drawn from the observations of Isaacs and Schwab. If so, he will render a service by bringing it to the attention of the editor or of the writer. Meanwhile the writer hopes that some users of mercury will be stimulated to compare the service given in instruments by commercial mercury which meets the appearance test and that of mercury which has undergone the usual "purification". Before the untreated mercury is used, a desirable precaution is to heat it to about 150° C. in a porcelain dish covered with a watch glass and placed in a well-ventilated hood, so as to make sure that the metal is free from water. Practical trials of this kind may lead to considerable savings of time spent in putting the metal through a process of "purification" or of money spent for the so-called purified grades of mercury.

Numerous methods have been proposed for purification of mercury that has become contaminated with base metals. The most commonly used treatment is washing the metal with a solution containing nitric acid and mercurous nitrate. Doing this in a Meyer column, in which the metal falls in fine droplets through a long column of the acid solution, is less convenient and probably less satisfactory than the simple scheme of agitating a relatively large volume of the mercury in contact

with the acid solution by means of a stream of air. A heavy-walled filter flask is a convenient utensil for this purpose. The appearance of a sample of the mercury, after washing it thoroughly with water, drying, and filtering, can be used as a guide to determine the length of time it should be treated. Amalgams of different metals will require different lengths of treatment. If mercury has been fouled with sulfide, the cleaning is aided by adding a little hydrogen peroxide to the nitric acid wash solution.

The fact that base metal amalgams react rapidly with air is an indication that air alone can be used to purify mercury contaminated with these amalgams. This has been proposed by various workers. W. S. Clabaugh, of this bureau, uses a simple and ingenious procedure for the purpose. He puts the "dirty" mercury into a heavy-walled separatory funnel, adds a little water, and, with the stopcock slightly opened, applies suction to the upper (stopper) end of the funnel, thus drawing a lively stream of air through the mercury. After some hours not only is the metal freed of base-metal impurities, but nearly all the scum that is formed, together with the layer of water, is carried off in the air stream. A trap is placed in the suction line to catch the scum and to permit the recovery of mercury from it. When the suction is stopped, the cleaned mercury runs slowly through the slight aperture in the stopcock and is thus "filtered" from any residual scum. During the "scrubbing" the funnel is supported in a padded tripod to prevent breakage caused by the lively agitation of the mercury.

Hulett and Minchin (*1*) showed that, if mercury is to be purified by distillation, air at a low pressure should be present to eliminate base metals, especially zinc, from the distilled metal. They also studied the completeness of the removal of silver, gold, and platinum during distillation.

Literature Cited

(1) Hulett, G. A., and Minchin, H. D., *Phys. Rev.*, 21, 393 (1905).
(2) Isaacs, A., *J. Am. Dental Assoc.*, 19, 54 (1932).

Rubberlike Soybean Material→

In the search for rubber substitutes with less exacting requirements than tires and for extenders that can be mixed with natural rubber to make it go further, U. S. Department of Agriculture chemists have produced a rubberlike substance from vegetable oils that looks promising. It has passed laboratory tests successfully and is being tested in the pilot plant. If these tests are satisfactory, it will be subjected to commercial trials. *Top.* Chemists of the Northern Regional Research Laboratory, Peoria, Ill., test the stretch of a rubber substitute made from soybean oil. It has a 200 per cent stretch, compared with a 600 per cent stretch of real rubber. *Center.* A chemist and associate are milling the soybean material. *Bottom.* The substitute is tested for elasticity.



U. S. D. A. PHOTO BY FORSYTHE

Plastic for Waterproofing Fabrics

A NEW substitute for rubber in waterproof fabrics which meets specifications for natural rubber and can be handled with the same machinery and processes as rubber has been announced by the Hodgman Rubber Co., Framingham, Mass. It is Monsanto Chemical Co.'s Saflex, a vinyl acetal resin already familiar to the automotive and glass industries as the interlayer in safety glass.

The process for plasticizing and compounding Saflex for application to fabric by conventional rubberizing methods was developed by Joseph L. Haas, Hodgman technical director and fabric superintendent, in conjunction with research chemists of Monsanto's Plastics Division at Springfield, Mass. Both process and materials are available to other manufacturers, enabling the development to serve the war effort as widely as possible.

By the process, Saflex is transformed from a thermoplastic to a thermosetting material with markedly increased resistance to solvents and greatly decreased water absorption. The Saflex-coated fabrics readily meet most of the tests applied to rubber, oil, and pyroxylin coatings and in some cases are said to outstrip the materials around which the tests were written. In government tests of the raincoat material, it did not crack at −60° C. or adhere to itself at 120° C.

The modified plastic is said to lend itself to the coating of fabric by either of the two conventional rubberizing methods —spreading or calendering—more readily than any other synthetic rubber or resin. The entire processing and curing of Saflex is so analogous to that of rubber that no changes from the usual procedure are necessary, no new equipment or mechanical adjustments are needed, and no additional training is required for labor. The properly plasticized Saflex is received in cakes which can be cut into convenient slabs for milling and compounding quickly and easily, since the material does not require a "breakdown" like rubber. If the plastic is to be made into cement for spreading, it is taken from the mill and placed into churns with a solvent. If it is to be calendered, it is taken off in convenient sheets and stacked until used.

Before calendering, these sheets are warmed up in the usual manner on a mill and fed into the calender where they are joined to cloth in the same manner as rubber. The coated fabric is either draped in a heater to be cured or sent to the cutting room where it is fabricated into finished articles which are cured after fabrication. Curing is accomplished at the same temperatures at which rubberized articles are vulcanized.

Saflex-coated fabric, which the Hodgman company has christened Horco-X, has already been made into Army raincoats, hospital sheeting, gas protective fabric, life-preserver jackets, and water bags, while many other military items are awaiting final action or are in the experimental manufacturing stage. In the Army raincoat use of Saflex saves more than 1¾ pounds of crude rubber per coat, with proportionately greater savings in heavier fabrics such as the hospital sheeting and gas protective cloth. With a 10,000,000 man Army, the saving in raincoats alone would amount to as much as 17,500,000 pounds of rubber. Since it is possible to use a lighter base fabric with Saflex, the new Army raincoat weighs 2 pounds less than the present rubberized coats.

Manufacture of Saflex-coated raincoats and other products is pictured on pages 1116 and 1117.

War Gas Identification Kit

A WAR gas identification kit has been developed by Fritzsche Brothers, Inc., 76 Ninth Ave., New York, N. Y., approved by the Office of Civilian Defense, and made available without charge to state-appointed instructors in war gas identification. The kit contains five harmless compositions which have the odors characteristic of the five poison gases regarded by the Chemical Warfare Service as most likely to be used by the enemy in bombing our cities. These are phosgene, lewisite, mustard, chloropicrin, and chloroacetophenone. A blower provided with each set enables the instructor to disseminate the odors as a fine vapor which duplicates the condition under which the gas would be encountered in a real attack.

POTOMAC POSTSCRIPTS

WPB Activities

Alcohol. A decrease in the amount of ethyl alcohol that may be used in the manufacture of shoe polish and an increase in the amount for vinegar are made in a revision of the alcohol order, M-30. The increase for vinegar was made because of its demand as a food. No other changes are permitted in the amounts for the manufacture of various products, which are 70 per cent for toilet articles and similar items and unlimited for chemical and military uses.

References to isopropyl and butyl alcohol and their derivatives are removed from M-30 as these are covered by other orders. Restrictions on the use of alcohol in antifreeze also are removed for the same reason.

Borax and Boric Acid. Inventory restrictions on borax and boric acid have been removed to permit industrial stock piling of these materials. The action was taken by adding them to the materials list of Order M-161.

Chlorinated Paraffin, the entire supply of which is used by the Army, Navy, and Maritime Commission, is placed under complete allocation control in M-189. Consumers must file by the 10th of the month preceding the month in which they seek delivery requests for allocation on Form PD-619. Producers must schedule their deliveries monthly on Form PD-618 by the 15th of each month.

Chlorinated Rubber. Three changes in the chlorinated rubber order, M-46, have been made. The first removes permission to use chlorinated rubber in the manufacture of electrical insulation. Substitutes are available. The second permits use of chlorinated rubber in the manufacture of core binder cement for use in casting equipment made for the armed services. The third continues the order in effect until revoked. It had been due to expire on July 31.

Chlorine. Restrictions on the "brightness ceilings" of 100 per cent rag content paper are removed by Amendment 2 to General Limitation Order L-11, which is designed to conserve chlorine. Previously, the "brightness ceiling" of 100 per cent rag content grade paper under the chlorine conservation order had been fixed at 82 per cent. After investigation, WPB's Pulp and Paper Branch found that very slight quantities of chlorine are required for processing 100 per cent rag papers. Reducing the brightness of these papers, it was determined, contributes nothing to the conservation of chlorine.

Cobalt. Cobalt used for ground coat frit is limited, in any one quarter, to 35 per cent of the amount used in the first six months of 1941, by Amendment 2 to Conservation Order M-39-b, issued by the Director General for Operations.

Cotton Fabrics. Adequate supplies of cotton fabrics for the manufacture of industrial cloth or tape, surgical dressings, and laminated phenolic products are expected to be made available as a result of action taken recently. Order M-134 has been amended, and three schedules issued which assign a preference rating of A-2 to orders placed for fabrics suitable for manu-

CONTINUED ON PAGE 1119

NEW TOOLS FOR THE

The Shape of Things to Come"...NOW!

ALIPHATIC CARBOXYL DERIVATIVES

Processes developed and put into large-scale operation in the Armour Chemical Division will produce the *Primary, Secondary* or *Tertiary Amine* . . . the *Nitrile* . . . the *Symmetrical Aliphatic Ketone* . . . the *Amide* . . . in carload quantities from any available fatty acid.

Normally, 11 different derivatives of each of the above series of chemicals would be available, ranging in alkyl chain length from 6 to 18 carbon atoms. Current productions are centered around those materials of domestic origin, and we are limited to 5 members of each series, with the exception of high-ranking, priority-rated orders.

High Molecular Weight Carboxyl Derivatives . . . Basic Ingredients for Chemical Synthesis . . . Now Available in Carload Quantities from the ARMOUR CHEMICAL DIVISION

These new, important chemicals comprise an extensive and useful group of Carboxyl Derivatives, now ready for shipment as "CD" AMINES . . . NITRILES . . . AMIDES . . . KETONES.

Their major applications to America's war effort and to important industrial processes await your demonstration in your own operations.

The field of industrial application for these newly available chemicals is developing rapidly. A few of the diverse jobs in which their usefulness has already been proved are: Flotation re-agent for oxidized, "acidic" minerals . . . germicides . . . fungicides . . . insecticides . . . plasticizers and lubricants for synthetic rubber . . . dispersion and coagulation agents . . . improving adhesion of aggregate and asphalt . . . stabilizing hydrocarbons . . . water-proofing . . . rust-proofing . . . grease-proofing . . . plasticizing and lubricating acetate molding resins.

The Realm of New Discoveries via chemical synthesis offers limitless opportunities for using these new compounds. All of the many "CD" derivatives have challenging possibilities as basic ingredients in the production of other chemicals.

Thus they will play a vital role in hewing "The Shape of Things to Come." Let us work with you in making them produce tomorrow's developments . . . today.

The Armour Chemical Division invites research and creative chemists to investigate the versatile characteristics and development potentials of these new chemicals . . . in relation to your own present-day problems of substitution and synthesis . . . . We will gladly submit samples, complete data on physical properties, detailed information on present uses and prices.



Alkyl cyanides so high in molecular weight that they can be eaten by the pound without ill effects . . . unusual solvent characteristics . . . very heat stable . . . unreactive except under drastic treatment . . . ranging in boiling point from 165°C to 357°C at atmospheric pressure . . . melting point from —79°C to 41°C . . . ranging in molecular weight from 97 to 265.



Organic ammonia that can be flaked, and shipped in bags . . . ranging in molecular weight from 101 to 773 . . . with only one amino grouping . . . boiling points range from 133°C to more than 550°C at atmospheric pressure . . . melting points from 19°C to 65°C . . . exactly the reverse of a fatty acid . . . in reality, fatty alkalies.



Chemically very inert . . . excellent lubricity . . . absorbs onto metallic surfaces . . . exceptionally heat stable . . . ranging in molecular weight from 170 to 507 . . . melting point from 14 to 86.7 . . . boiling points ranging from 226°C to more than 550°C at atmospheric pressure.



Soft . . . plastic . . . regardless of melting point . . . unusual lubricity . . . emulsifiable in aqueous solutions . . . unreactive except under drastic conditions . . . molecular weights ranging from 115 to 704 . . . boiling points, 255°C to more than 550°C at atmospheric pressure . . . melting range 101°C to 160°C.

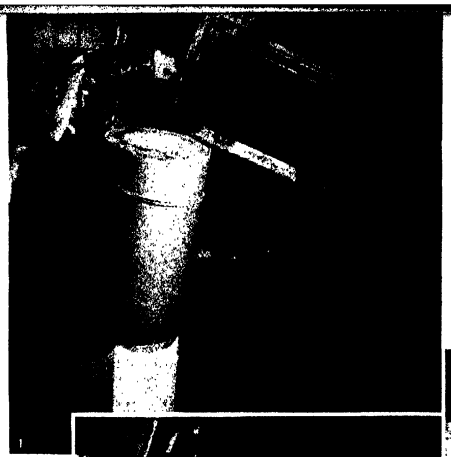
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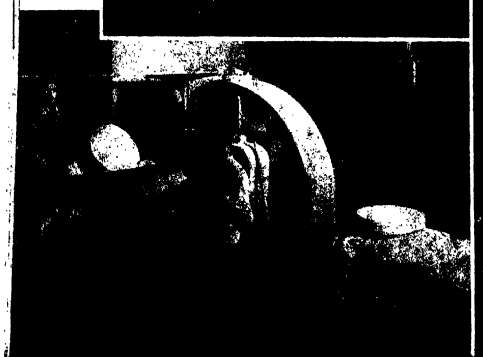
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CHEMICAL NEWS PARADE

Story on Page 1113























(1) A 129-pound drum of Saflex as it reaches the Hodgman Rubber Co., contrasted with a 200-pound bale of crude rubber in right foreground. Crude rubber must be laboriously uncrated. Saflex is quickly removed from its fiber drum with help of a block and tackle. *(2)* Saflex cake is sliced into sections for the mixing mill. In the foreground is a slab of crude rubber also sliced ready for the mill. *(3)* The slices of Saflex are ground between heated rolls of this mixing mill. Other ingredients are added and worked in and the plastic is removed in thin rubbery sheets. In the added ingredients lies the secret of the Hodgman process. Otherwise this step, like all that follow, is almost exactly analogous to those in conventional rubberizing. *(4)* Fabric for the Army raincoats is first given a thin binder coat of Saflex on a spreader. *(5)* In big calenders a thicker Saflex coat is applied and the fabric is ready for cutting and fabricating. Here the calender foreman checks the thickness of the coating. *(6)* Girls cement the raincoat seams with a special cement also made from the plastic. *(7)* Finished coats, 80 at a time, are hung inside out on racks and cured in an oven for two hours. *(8)* This water bag for the Marine Corps is made of Saflex-coated fabric. The seams are being sealed with the special cement. *(9)* The raincoat fabric, coated with Saflex, is tested for permeability. *(10)* This is the new Army raincoat. *(11)* The kapok-filled fabric inserts in this Navy life-jacket are coated with Saflex to make them waterproof.



American Chemical Society[1]

105TH MEETING. Indianapolis, Ind., April 12 to 16, 1943.

106TH MEETING. Minneapolis, Minn., fall of 1943.

NATIONAL CHEMICAL EXPOSITION and NATIONAL INDUSTRIAL CHEMICAL CONFERENCE. Sherman Hotel, Chicago, Ill., November 24 to 29, 1942.

Other Scientific Societies

AMERICAN CERAMIC SOCIETY, White Wares and Materials and Equipment Divisions. Pennsylvania State College, State College, Penna., September 18 and 19. Autumn meeting.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Netherland Plaza Hotel, Cincinnati, Ohio, November 16 to 18.

AMERICAN OIL CHEMISTS' SOCIETY. Drake Hotel, Chicago, Ill., October 7 to 9.

AMERICAN PETROLEUM INSTITUTE. Palmer House, Chicago, Ill., November 9 to 13. Annual meeting.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA. William Penn Hotel, Pittsburgh, Penna., November 9 and 10. Third annual water conference.

NATIONAL LUBRICATING GREASE INSTITUTE. New Orleans, La., October 26 to 28.

NATIONAL PETROLEUM ASSOCIATION. William Penn Hotel, Pittsburgh, Penna., September 17 and 18. Annual meeting.

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY. Hotel Statler, Boston, Mass., September 29 to October 1.

[1] The list of the SOCIETY'S National Officers and Directors, Editors, members of Council, Divisional and Local Section Officers, Committees, and Chapters of Student Affiliates appears in CHEMICAL AND ENGINEERING NEWS three times a year—usually February 10, May 10, and October 10. The latest list is printed on page 601 of the May 10 issue.

National Power Show

A WIDE variety of timely displays will feature the 1942 National Power Show which is being planned as a direct aid to war production. Scheduled for Grand Central Palace, New York, N. Y., November 30 to December 5, the 15th National Exposition of Power and Mechanical Engineering will be celebrating its 20th year of service to industry. The management announces that 170 spaces have already been definitely engaged by 137 concerns, and there will probably be at least 175 displays when the exposition opens.

Included among the products to be exhibited are valves, piping, instruments, stokers, pumps, refractories, dust collectors, steam traps and specialties, lubricants and lubricating equipment, insulation, combustion controls, boiler tubes, metals, fans and blowers, coal and ash handling equipment, engineering supplies, blueprinting machinery, metal hose, scales, packing, gaskets, electrical equipment, welding apparatus, power transmission and material handling products, tools for production and maintenance, etc.

Local Sections

SECTION AND PLACE	SEPT.	SPEAKER	SUBJECT
Milwaukee, Wis.	25	L. S. Fosdick	Dental Caries
New Haven, Conn.	29	Harry N. Holmes	Vitamins and Public Health
Northern West Virginia, Room 101, Hall of Chemistry, West Virginia University, Morgantown	25	Henry Eyring	Kinetics and Physical Properties of Some Polymerisation and Related Reactions
Pittsburgh, Penna.	24	Henry Eyring	
Western Maryland, Fort Cumberland Hotel, Cumberland	23	Henry Eyring	Liquid State
Western Vermont, Burlington	30	Harry N. Holmes	A Chemist in Medicine

Microchemical Society Elects Officers

THE Metropolitan Microchemical Society of New York at its last meeting of the year 1941–42 elected D. L. Sabine chairman, F. A. Meier vice chairman, L. K. Yanowski secretary-treasurer, and Mrs. O. R. Fry and J. Kuck members of the Executive Committee.

The secretary is endeavoring to obtain a list of specialists in the society who will volunteer consulting service gratis to local government agencies about to set up micro laboratories in the interest of the national effort. The following members have volunteered their services: J. Alicino, N. Barsel, A. A. Benedetti-Pichler, H. Ehrhardt, A. A. Elek, G. F. Hand, R. Harte, H. W. Hermance, W. A. Hynes, F. Pickel, Rev. F. W. Power, A. Steyermark, G. Weingarten, L. K. Yanowski, and D. W. Young.

Research Work under the War Production Board

THE contract between the National Academy of Sciences and the War Production Board, covering the establishment of technological committees, has been enlarged to include actual laboratory work. Up to the end of July 143 reports had been requested, 82 relating to processes and production, and 124 reports made.

The War Production Board has made extensive use of the services of the Bureau of Mines, the Geological Survey, and the National Bureau of Standards, as well as many industrial laboratories, including Bell Telephone, General Motors, Westinghouse, General Electric, Chrysler, Battelle Institute, Mellon Institute, California Institute of Technology, and many others.

The Inventors Council transmits to the War Production Board reports of inventions that should have further attention.

Gary Synthetic Rubber Project Deferred

THE Gary synthetic rubber project, according to Jesse Jones, has been deferred because it has been found that the amount of butadiene contemplated by the Gary plant can be obtained from existing equipment or by modification of plants already under construction in other parts of the country.

The deferment of this plant will result in a very substantial saving of critical materials and will not reduce the over-all synthetic rubber program of 877,000 tons annually, heretofore approved by WPB.

Sets of Abstracts

SETS of abstracts of the Buffalo meeting papers in planographed book form are now available from the A. C. S. News Service, 1155 16th St., N. W., Washington, D. C. Sets are not guaranteed to be complete, but contain abstracts from all divisions as submitted by authors.

This enterprise is undertaken in a spirit of service and not for profit. Sets are offered on the following terms:

To members of divisions who forward receipt for divisional dues with remittance and order, 50 cents.

To those without receipt for divisional dues, who remit with order, $1.00.

To those who fail to enclose remittance with order, necessitating correspondence, $1.25.

To those who require bills to be rendered, $1.50.

Potomac Postscripts

CONTINUED FROM PAGE 1113

facture into industrial tape, surgical dressings, and laminated phenolic products.

Dyes. Conservation Order M-103, as amended, limits the quantities of anthraquinone (nonfading) dyes that may be used in the third quarter as well as amounts that may be sold and delivered. The order imposes a double restriction. Certain listed anthraquinone vat dyes may not either be sold or used except for the purposes specified. The amount of other anthraquinone vat dyes which a user may receive in the third quarter is limited to 17.5 per cent of the amount of all anthraquinone vat dyes received by him in 1941. Likewise, and as a further restriction, the amount which he may use in that quarter is limited to 17.5 per cent of the amount used by him in 1941, regardless of what amounts were delivered to him in 1941. The quotas are for uses other than those specified in the order as being exempted from the restrictions. Similar provision is made with respect to all other anthraquinone dyes.

The quotas established by the order are set on a quarterly basis and if not consumed within the quarter may not be carried over to the next quarter. The Dyestuffs Section warned the industry that waste or excessive use of color might result in the reduction of dyestuffs quotas and extension of control over dyes now freely available.

Exemption Order. Companies operating under the Production Requirements Plan are given permission to purchase a number of commodities in greater quantities than authorized on their PRP certificates by Exemption 2 to Priorities Regulation 11. Materials chiefly affected are chemicals, which were omitted from the materials list of the fourth quarter PD-25A form. Among other materials exempted from PRP restrictions because they are listed in General Inventory Order M-161 are certain materials used in the manufacture of refractory brick, waste paper, bulk salt, borax, caustic soda, and soda ash. The exemption will also apply to such other materials as may be added to M-161 from time to time.

Nitrocellulose. Control over the distribution of soluble nitrocellulose has been ordered in M-196. Soluble nitrocellulose falls into four types, depending upon end use—lacquer, coated textile, film, and plastics—and the Director General now has power to direct the amounts of each type that may be produced.

Deliveries of more than 1,000 pounds a month of soluble nitrocellulose may be made only by special authorization. Deliveries of more than 232 pounds and less than 1,000 may be made without allocation, but with a certificate to the supplier that the soluble nitrocellulose is to be used to fill war orders, plus an amount not in excess of 50 per cent of the average monthly consumption of the consumer in 1941. Deliveries under 232 pounds to one person in a month are not restricted.

Form PD-609 is provided for requests for allocation of soluble nitrocellulose, and PD-610 for monthly reports by producers and distributors. Deliveries of smokeless powder scrap by the Army or Navy do not require either authorization or a purchaser's certificate. No deliveries of undissolved film scrap may be made without express authorization of the Director General.

Printing Ink. Amendment 1 to Conservation Order M-53 also permits the unrestricted uses of orange mineral (lead oxide) as a pigment in printing ink and of varnishes containing glycerol phthalate resins and phenolic resins in making gloss ink, nonscratch ink, or gloss overprint varnish, if such varnishes were manufactured prior to March 30, 1942, for use in printing ink. The original order, as amended, limited use of orange mineral to 70 per cent of 1941 consumption and forbade the use of the resins.

Easing of the lead supply situation plus the very small amount used as a pigment in printing inks now indicate that further restriction on the use of this small amount of lead in printing inks is unnecessary. Glycerol phthalate resins and phenolic resins are both scarce, all available supply being needed for essential war work, but the varnishes freed by this amendment have already been processed and cannot be used for any purpose other than ink manufacture.

Research Laboratories which put into process $5,000 worth of metals per quarter or more are required to file under the Production Requirements Plan, it has been pointed out by Amory Houghton, Director General for Operations.

Special instructions for the use of research, analytical, and testing laboratories in filling out Form PD-25A have been issued by the Safety and Technical Equipment Branch. These instructions take cognizance of the problems of laboratories in estimating requirements of most materials and fabricated parts.

Laboratories are required to show figures on anticipated requirements because such information is necessary to direct the flow of critical materials, the demand for which is far in excess of supply.

Class I producers, those who put into process in any one quarter $5,000 worth of metals in the form listed on the Metals List, must file under the Production Requirements Plan. The plan is voluntary for other producers.

Scrap Material. The Conservation Division has published an appeal by S. J. Dunaway, chief, Retail and Wholesale Trade Section of WPB's Service Branch, asking wholesalers and retailers to make a clean sweep-up of critically needed scrap material accumulated in their storerooms and shops.

"There are nearly 2,000,000 retail distributors and over 100,000 wholesale distributors of all types throughout the United States", said Mr. Dunaway, "and I am certain that every one of them has a lot of old damaged merchandise gathering dust in odd corners and an accumulation of discarded, used, and broken metal equipment which should be added to our Nation's scrap stock pile. Burlap bags, old rope, rags, and rubber hose, tires, and other salvagable articles can be found on every distributor's premises".

Salvaged material is not given to the Government. It is returned to the mills and the reclaiming plants through the usual channels of the scrap business. Merchants may sell their scrap to the junkman or give it to charitable organizations which have undertaken to collect it. In either event, it will go into war production.

Solvents. A program for reclamation of millions of gallons of war-essential chemical solvents and oils has been announced by the Conservation Division of WPB.

It is estimated that over one billion pounds of solvents are now recovered annually. Practically double this amount could be recovered if cooperation of all producers could be obtained.

Solvents which can be reclaimed include a wide variety of chemicals such as alcohols, chlorinated compounds, esters, ethers, hydrocarbons, and ketones. Under these general classifications are innumerable specific products including benzene needed to make synthetic rubber, toluene which goes into TNT, naphtha, gasoline, and other compounds used in everyday operations of many different types of industrial plants.

While the most important consideration in reclaiming solvents is that of making available essential chemicals for the war production program, there is also a substantial saving in raw material costs involved. A solvent that cost 20 cents a gallon, for example, may be reclaimed and used again at a fraction of the original cost.

Equipment for reclaiming solvents requires large amounts of steel, copper, aluminum, and other metals needed for production of war equipment. In order to obviate the need for producing new equipment to assure the success of the program, the Industrial Salvage Section

CONTINUED ON PAGE 1132

Technical Committee for Individual Awards Appointed

THE appointment of a Technical Committee for Individual Awards has been announced by War Production Drive Headquarters. The committee, composed of distinguished engineers and technicians, will select the first list of workers in war plants to be honored by the Government for contributing valuable suggestions for increasing production.

The members of the committee are: J. L. Bray, head of the School of Chemical and Metallurgical Engineering, Purdue University, Lafayette, Ind.; Whiting Williams, author, lecturer, and consultant in industrial relations; Paul H. Stanley, chief engineer, Pitcairn Auto Gyro Co., Willow Grove, Penna.; Charles B. Francis, chemical engineer and consultant, Carnegie-Illinois Steel Corp., Pittsburgh, Penna.; Henry C. Atkins, Jr., superintendent, E. C. Atkins Co., Indianapolis, Ind.; Joseph Rockoff, chief chemist, Dayton Rubber Manufacturing Co., Dayton, Ohio; William Plumer Hill, assistant superintendent, Bethlehem Steel Corp., Sparrows Point, Md.

The committee met in Washington August 20 and 21 to review approximately 100 of the best of more than 5,000 suggestions which workers have submitted to the labor-management committees in their plants.

Manpower Commission Studies Need for Chemists

BUSINESS establishments engaged in war production are going to be told soon where and how they can obtain chemists, engineers, metallurgists, and other professional and scientifically trained men, Paul V. McNutt, Chairman of the War Manpower Commission, has announced. He said that representatives of the U. S. Employment Service have been instructed to find out how many employees of this type war production plants will require before the end of the year and during 1943.

With this information in hand the Employment Service, Mr. McNutt explained, can draw upon the country's largest registration of technically trained persons, the National Roster of Scientific and Professional Personnel. This roster, to which are now being added the names of the scientifically and professionally trained persons who have registered for military service, has been placed under the direction of the War Manpower Commission.

Mr. McNutt explained that the Employment Service would not "raid" the staffs of universities in carrying out this program. The U. S. Employment Service, he said, will attempt to place only those persons who are now unemployed or not engaged in work essential to the prosecution of the war. "Scientifically trained men and women who are now engaged as educators in colleges and universities are already performing services that may be regarded as vital," Mr. McNutt said.

Third Surface Active Agent List

INDUSTRIAL AND ENGINEERING CHEMISTRY has announced several changes for the third biennial listing of Surface Active Agents to be published in the January 1943 issue.

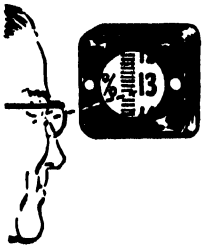
Mostly the changes will be those suggested by the desire to make the new compilation more representative of synthetic surface active agents. Plans now call for the elimination from the listing of alkaline earth cleaners, phosphate salts, sulfated castor oil, and the like.

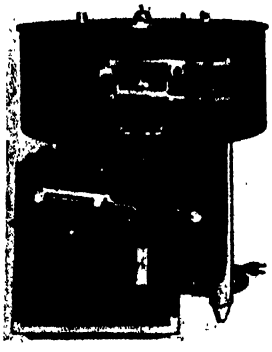
Where possible, manufacturers of surface active agents are being asked to identify the alkyl group or at least to roughly indicate its size as being longer or shorter than the keryl group. It is also hoped that the aryl portion of the agents will be defined more thoroughly.

Manufacturers represented on the former lists which appeared in January 1939 and 1941 are being canvassed by mail. Companies having new surface active agents are asked to correspond with F. J. Van Antwerpen, 60 East 42nd St., New York, N. Y.

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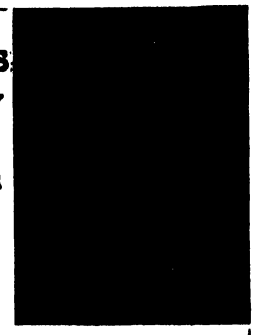
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It is soluble in most of the organic solvents; and solutions of Poly-Pale are considerably higher in viscosity than equal concentrations of ordinary rosin. It is compatible with waxes, most synthetic resins, and all of the vegetable oils used in protective coatings.

Extensive tests indicate that this new resin should be a valuable raw material in gloss oils, hardened rosin varnishes, ester gum, rosin-modified phenolic resins, spirit varnishes, and wherever rosin is used in protective coatings.

New and valuable data are contained in the revised second edition of the booklet "Poly-Pale Resin," which has just been issued. Mail the coupon for your free copy today.

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NECROLOGY

Ralph E. Case

RALPH E. CASE, retired development engineer for the International Nickel Co., died July 24 at the age of 59. He became affiliated with International Nickel in 1916, and was a consultant on metal problems until his retirement because of ill health a year ago.

Henry C. Fuller

HENRY C. FULLER, consulting chemist, died August 26, after being in ill health for some time.

Mr. Fuller was born in Worcester, Mass., November 13, 1879, and received the B.S. degree from Worcester Polytechnic Institute in 1901. From 1901 to 1907 he worked as chemist for industrial firms, from 1907 to 1911 was with the U. S. Bureau of Chemistry, and from 1911 to 1921 was drug and food investigator for the Institute of Industrial Research.

He also collaborated with Dr. Harvey W. Wiley on certain problems arising out of the Food and Drug Act of 1906 and in analytical work for *Good Housekeeping* magazine. Since 1921 he had been a consulting and research chemist in Washington, D. C. His interests included pharmaceutical chemistry, food technology and analysis, drug plant introduction and propagation, and alkaloids. In Europe between 1922 and 1924 he studied problems relating to the wine industries of Italy and France.

Mr. Fuller joined the AMERICAN CHEMICAL SOCIETY in 1909. He was also active in the Association of Official Agricultural Chemists, being referee from 1909 to 1911 and from 1914 to 1921, and was a member of the American Pharmaceutical Association (secretary in 1917 and 1918), American Institute of Chemists, Ornithological Union, Biological Society of Washington (president in 1936), the Washington Academy of Sciences (vice president in 1936), and the Society of Chemical Industry, London.

Thomas S. Grasselli

THOMAS S. GRASSELLI, former head of the Grasselli Chemical Co., died on August 22 after an illness of several months. He was 67 years old.

After the Grasselli company was absorbed by E. I. du Pont de Nemours & Co., Inc., Mr. Grasselli became vice president and director of du Pont. He retired in 1939.

Edwin L. Hulett

EDWIN L. HULETT, dean of the College of Arts and Sciences, St. Lawrence University, from 1915 to his retirement a year ago, died August 30 at the age of 72.

Dr. Hulett was born in Heuvelton, N. Y., April 30, 1870, and received his B.A. degree from St. Lawrence University in 1903. He became instructor in chemistry the following autumn, assistant professor a year later, and in 1905 was appointed professor and head of the department, holding the post until 1929. In 1925 he received from the university the honorary degree of LL.D., and on his retirement was elected a life member of the board of trustees.

He had been a member of the AMERICAN CHEMICAL SOCIETY since 1914.

Theodore F. Pappe

THEODORE F. PAPPE, 57, chief of the Buffalo office of the Federal Food and Drug Administration since 1935, died August 4. Mr. Pappe had been in charge of enforcing federal food and drug regulations in western New York and western Pennsylvania. He was formerly chief chemist at the Baltimore station and chief of the Galveston, Tex., laboratory.

Willard A. Roberts

WILLARD A. ROBERTS, engaged in research chemistry for the General Electric Co. for 23 years, died July 24 at the age of 52.

Dr. Roberts was born in Newberg, Oreg., and was educated at Earlham College and the University of Chicago, where he received his Ph.D. degree. He served in the Sanitation Division of the U. S. Army and engaged in research chemistry at Yale and the Rockefeller Institute before joining the Army Signal Corps. He had been successful in formulating and making available for use the fluorescent lamp powders that have been widely employed in recent years, and also developed the lighting of instrument dials by the chemical process described as black light.

He had been a member of the AMERICAN CHEMICAL SOCIETY since 1917.

Arthur H. Thomas

ARTHUR H. THOMAS, president of the Arthur H. Thomas Co., died August 31 at the age of 69. He had been in ill health for a considerable time.

Mr. Thomas was born in Beaver County, Penna., and attended the Westtown Boarding School. In 1892 he entered the employ of the Philadelphia firm of James W. Queen, manufacturers of optical and scientific instruments, and in 1900 founded his own company, dealing in laboratory apparatus and chemicals. He had made important contributions by way of encouraging a number of developments new to the apparatus business, through support and introduction to the trade of new sources of supply.

He had been a member of the AMERICAN CHEMICAL SOCIETY since 1909.

EXPECTATION that a South African plant soon will be producing ferromanganese, ferrochrome, and ferrosilicon, is voiced by reports from that country, where a development is projected at Vereeniging.

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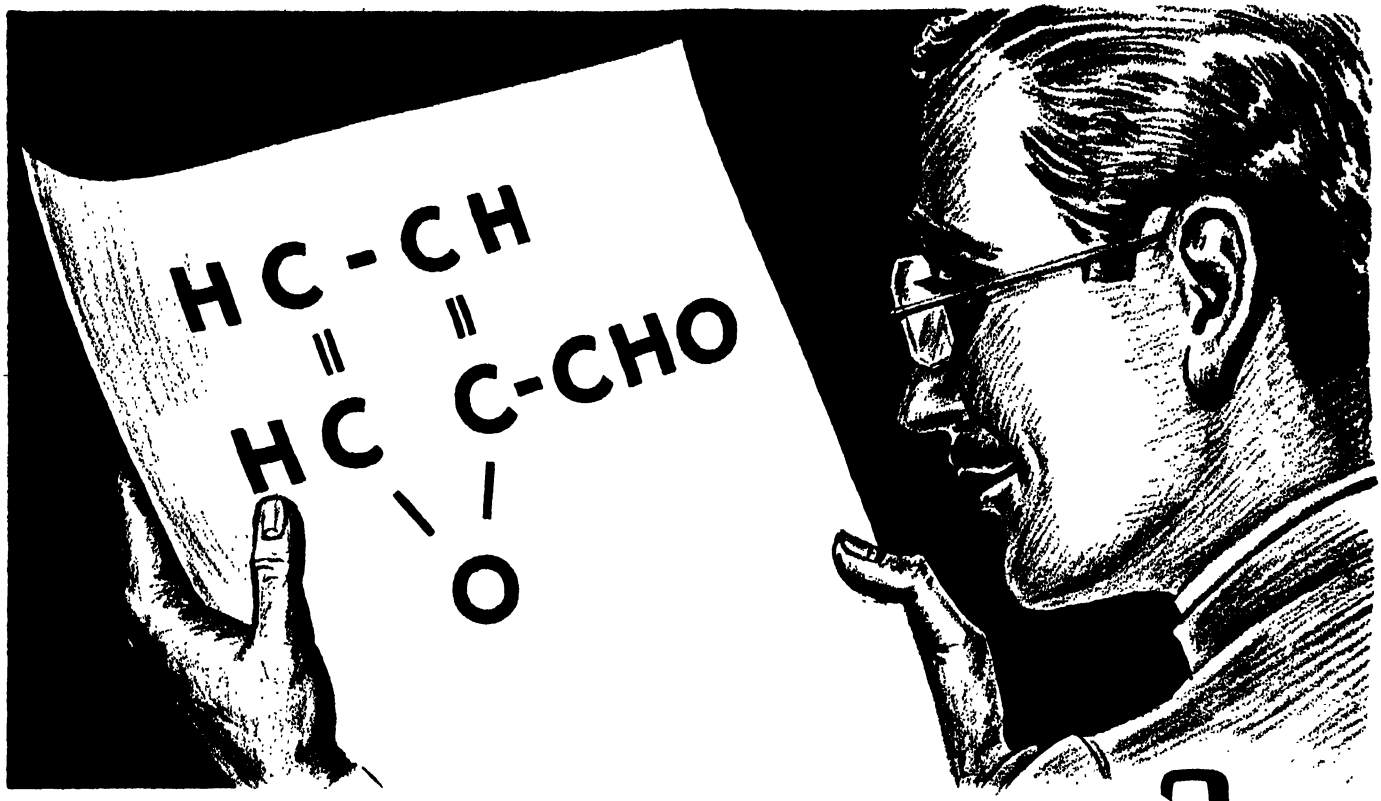
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When used as a solvent for resins, dyes, and preservatives, Furfural acts as an aid to penetration and wetting. In the resinoid bonded grinding wheel industry it has no peer and practically all wheel manufacturers use Furfural in their production.

Furfural is an aldehyde and exhibits the general properties of this class of compounds. It can be reduced to alcohols, and oxidized to acids. When treated with strong caustic, it undergoes the Cannizzero reaction, forming Furfuryl Alcohol and Sodium Furoate. The latter can be used to make Furoic Acid.

Other applications involve its use as a selective solvent in the refining of lubricating oil, diesel fuel, and crude wood rosin.

Typical properties of the commercial product are:

Specific gravity (20/20)	1.161
Boiling point	157–167°C. (99%)
Flash point (open cup)	56°C.
Surface tension (dynes/cm)	49
Viscosity at 38°C. (centipoises)	1.35

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NEWS-MAKERS

Lucius W. Elder has been appointed director of the Physical Chemistry Section, Central Research Laboratories, General Foods Corp., New York, N. Y. Dr. Elder has been engaged in research work with the company since 1932, when he joined the staff at Battle Creek, Mich.

Charles L. Gabriel has left the Commercial Solvents Corp., with which he had been associated for 22 years, and taken an executive position with the Publicker Commerical Alcohol Co., Philadelphia, Penna., where he will work on development of new products.

Paul S. Greer, formerly employed by Carbide & Carbon Chemicals Corp., South Charleston, W. Va., is now with the Chemicals Section, Office of Civilian Supply, WPB, in Washington, D. C., as senior industrial specialist.

Robert A. Harte, formerly of the Rockefeller Institute for Medical Research, has joined the staff of The Arlington Chemical Co., Yonkers, N. Y., as research biochemist.

W. H. Long, member of the Sales Promotion and Advertising Department of the York Ice Machinery Corp., York, Penna., has been commissioned an ensign in the United States Naval Reserve. He reported on August 1 to Cornell University for a training period prior to being assigned to active duty.

L. S. McCollum has been made manager of the new district office of The Dicalite Co., recently opened in Atlanta, Ga.

Robert D. Macdonald has been made research engineer on the technical staff of the Battelle Memorial Institute, Columbus, Ohio, and has been assigned to the materials beneficiation division.

Ralph B. Meisenhelder, assistant to the president of the York Ice Machinery Corp., York, Penna., has been appointed director of War Contract Progress. Duties will consist of coordination and liaison responsibilities within the Sales, Engineering, Manufacturing, Administrative and War Material Divisions.

William W. Mills, for several years head, Analytical Department, Mellon Institute of Industrial Research, and more recently plant manager of Thermal Products Corp., is now employed in the Technical Division of the Rayon Department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

Robert H. Morse, Jr., who has been branch manager successively of Fairbanks, Morse & Co.'s offices at Cincinnati, Dallas, and Boston, has recently become assistant sales manager to **A. C. Dodge,** vice president and sales manager at Chicago. **John Elmburg,** formerly manager of the Diesel Engine Department at St. Paul, Minn., fills the vacancy left by Mr. Morse, at Boston.

M. E. Parker, manager of production, Beatrice Creamery Co., Chicago, Ill., has been appointed adviser to the Resources Division, Office of the Quartermaster General, War Department, Washington, D. C., in the production and quality control of dairy products.

Ira Pullman, who received the degree of chemical engineer from Columbia University in June, is now a junior chemical engineer in the Chemical Engineering Research and Development Division of TVA at Wilson Dam, Ala.

Guillermo Rivas, Nataniel 758, Santiago, Chile, S. A., wishes to correspond with students of chemistry in the United States and to exchange stamps with them.

Daniel B. Rivkin has accepted a position in the War Department as an explosive chemist and has been granted leave of absence by Southwestern Institute of Technology, Weatherford, Okla., where he was head of the Chemistry Department. He is now stationed at the Oklahoma Ordnance Works, Pryor, Okla.

S. C. Rothman, formerly chief engineer of the Silicosis Research Division, West Virginia Workmen's Compensation Commission, has been commissioned a captain in the Sanitary Corps of the United States Army and attached to the Preventive Medicine Service, Occupational Hygiene Division of the Surgeon General's Office in Washington, D. C.

The Messel Medal was presented to **Sir John Russell,** director of the Rothamsted Experimental Station and the Imperial Bureau of Soil Science, at the annual meeting of the Society of Chemical Industry at the Royal Institution on July 10. At this meeting **William Cullen** was re-elected president.

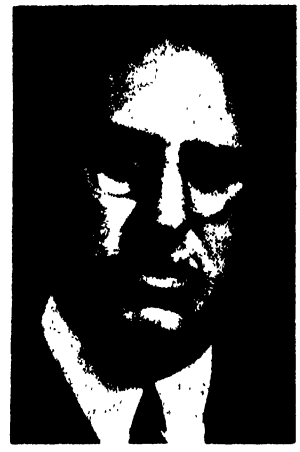


William J. Sartori

William J. Sartori has joined the staff of Mann Fine Chemicals, Inc., 2702 43rd Ave., Long Island City, N. Y., as chief chemist. He will continue active interest in the Chemistry Department of the Brooklyn Polytechnic Institute, where he has been since 1939.

Wilbur C. Shand has completed requirements for his master of science degree in chemistry at Illinois Institute of Technology. Mr. Shand is now employed at Universal Oil Products Co., Chicago.

Stephen M. Shelton has been appointed regional engineer for the eastern and southern states under the reorganisation program of the U. S. Bureau of Mines. He will have headquarters in College Park, Md., and will be in charge of one of the three new regional offices.



W. S. Shipley

William S. Shipley, chairman of the board of the York Ice Machinery Corp., York, Penna., has been appointed director and vice chairman of the WPB Small War Plants Corporation.

Alexander Silverman, head of the Department of Chemistry, University of Pittsburgh, addressed the New England Chemistry Teachers Association at Durham, N. H., August 14, on "Glass and the War".

Frank M. Stephens, Jr., has been named a research engineer on the technical staff of Battelle Memorial Institute Columbus, Ohio, and has been assigned to the Materials Beneficiation Division. Mr. Stephens is a recent graduate of the Colorado School of Mines.



K. G. Stern

Kurt G. Stern, for the past seven years a member of the Department of Physiological Chemistry, Yale University, has accepted a position as chief chemist at The Overly Biochemical Research Foundation, New York, N. Y., a nonprofit organization devoting its activities to problems related to the war effort.

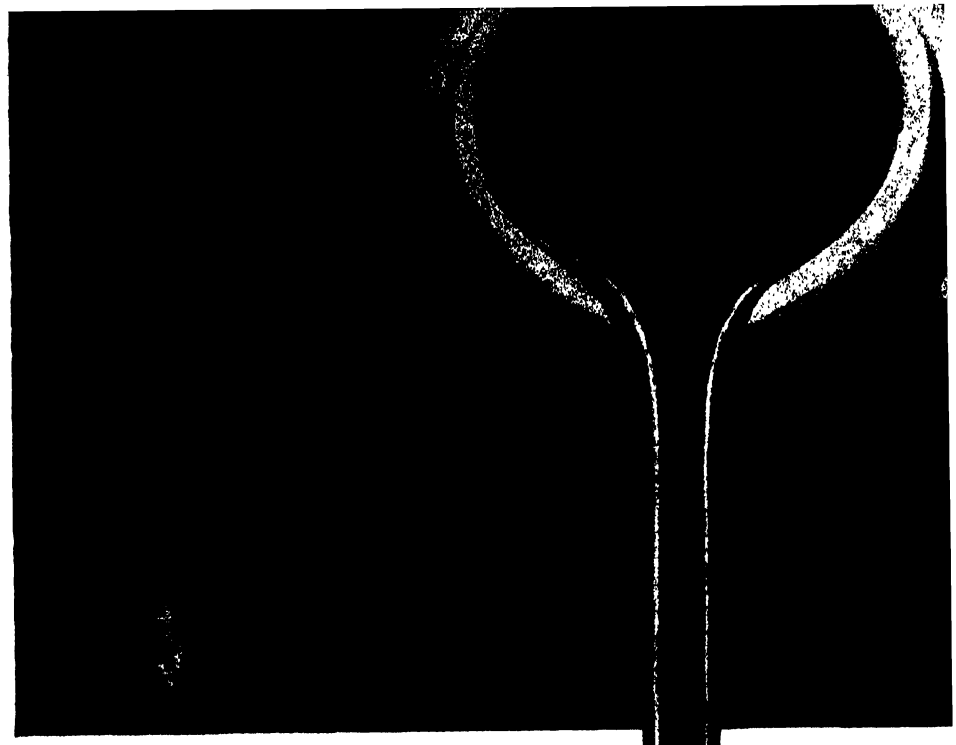


J. C. Tweedell

James C. Tweedell, export manager of the York Ice Machinery Corp., York, Penna., has been appointed general sales manager for the duration, succeeding **John R. Hertzler**, who will undertake a special assignment with the Army-Navy Munitions Board in Washington, D. C.

Junior Chemical Engineers Choose Officers

JUNIOR CHEMICAL ENGINEERS of New York City, an organization founded in 1937, have elected the following officers: president, John R. Callaham, *Chemical & Metallurgical Engineering;* vice president, Howard Ten Broeck, Socony-Vacuum Oil Co.; secretary-treasurer, Albert K. Ackoff, Westvaco Chlorine Products Corp.; and assistant secretary-treasurer, Alvin S. Weiss, Schenley Distillers Corp.



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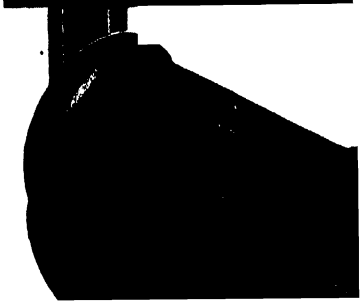


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Optical Methods of Chemical Analysis. *Thomas R. P. Gibb, Jr.* 1st ed. 391 pages. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York, N. Y., 1942. Price, $5.00.

THIS is a long-awaited volume bringing compactly into one place the description of various optical instruments used for chemical analysis, a suitable amount of the fundamental theory back of each, and a very practical explanation of how each is used in performing an analysis. Arranged as a textbook for the practical analyst and for advanced students of analytical chemistry, the contents are indicated by the following chapter titles: Spectrochemical Analysis; The Spectrophotometer; The Colorimeter, Turbidimeter, Nephelometer, and Fluorophotometer; The Microscope; Elementary Crystallography; Identification of Crystals with the Polarizing Microscope; The Refractometer; and The Polariscope.

The chapter on Spectrochemical Analysis is typical of the volume as a whole. No attempt has been made to give an exhaustive treatment of any one phase of the subject, but the necessary groundwork for an understanding of the practical aspects of the entire subject has been ably presented. A very clear treatment on spectrographs, particularly the grating spectrograph, has been given. Methods of excitation mentioned include most of those to be found in the literature, and the section on quantitative spectroscopy presents all of the accepted quantitative techniques in approximately the chronological order of their development.

The description of instruments in the two chapters on the Spectrophotometer and on the Colorimeter, Turbidimeter, etc., is rather complete but the discussion of methods and uses has been somewhat neglected. However, as can be said of the volume as a whole, the bibliography of references to more specialized texts and original papers is quite extensive. Included in the chapter on the Spectrophotometer is a discussion of infrared spectroscopy which, judged on the basis of the rapid increase in importance of this method, is painfully brief.

Elementary Crystallography is the only subject of which the discussion appears to be overlengthy in relation to what is needed for an understanding of the following chapter on identification of crystals. On the other hand, this discussion would be a very useful prelude to a treatment of the extremely powerful x-ray diffraction method of crystal analysis which, in the reviewer's opinion, constitutes the only important omission in this volume.

The book is quite authentic and accurate, although occasional small errors have been noted. The aims set forth by the author in the preface have been well achieved. The volume should serve as a compact reference for the practical analyst and student, should offer a general background in the field, and be a guide to more detailed information through a well-chosen bibliography.

N. WRIGHT

Protective and Decorative Coatings, Volume II. Edited by *Joseph J. Mattiello.* 1st ed. 658 pages. John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y., 1942. Price, $6.00.

THIS is the second volume of a projected four-volume series being prepared by collaboration of a number of specialists under the editorship of Dr. Mattiello. The first volume, covering principally the film formers and solvents of the finishes and ink industries, was reviewed in the November 25, 1941, issue of the NEWS EDITION, page 1370. The present volume deals principally with the pigments of these industries. Altogether there are 28 individual chapters, with a total of 29 collaborators. The subjects covered include discussions of pigment classification; various organic pigments; phospho-toners and lakes; phthalocyanines; iron oxide, lead, zinc, titanium, and antimony pigments; extenders; various nonmetallic blacks; metallic powders used as pigments; and metallic soaps.

Of particular interest is the chapter on the Chemistry of the Synthetic Organic Pigments by L. S. Pratt, which summarizes this complex subject in a most helpful manner.

Many of the comments in the review of the first volume apply equally to this one. Since it is a compilation and largely written from the pigment manufacturer's viewpoint, there is little comparison of means of arriving at a given end. Also there is the natural minor overlapping of subjects. At times emphasis seems misplaced.

Taken alone, this volume is an encyclopedia of modern pigments and is extremely valuable as a reference book. As a textbook on the pigment portion of the finishes industry, its value will not be completely developed until the publication of Volume III which will cover the manufacture and use of finishes and which should depend strongly on the present volume for its factual background.

JOHN MARSHALL

Alcoa Antitrust Suit

THE opinion of Hon. Francis G. Caffey in United States of America *vs.* Aluminum Co. of America *et al.*, which was filed March 12, is now available to a limited extent in the form of a reprint copyrighted by the West Publishing Co. This publication of 311 pages contains a great deal of useful information, besides being an opinion rendered in an unusual case.

This was a suit in equity under the Sherman Antitrust Act. It was tried in the United States District Court of the Southern District of New York, and the judgment was in favor of the defendants on all counts. It was the longest legal trial in history. The Government filed suit April 23, 1937, the actual trial began June 1, 1938, and the final written decision by the court was filed March 12, 1942. The actual trial of the case required 26½ months. Testimony in the case filled 40,708 pages. The 1,803 exhibits filled another 4,787 printed pages. There were 155 witnesses.

The corporate life of the Aluminum Co. of America throughout its more than 50 years of existence was thoroughly probed and, because the technical progress of the company depended to such a great extent upon the application of science, scientists generally and chemists particularly were much interested in the progress of the suit. This final opinion of Judge Caffey has been distributed to attorneys and law libraries.

Nutrition Reviews

A NEW journal in the nutrition field is *Nutrition Reviews*, established by the Nutrition Foundation, Inc., and edited by Frederick J. Stare, assistant professor of nutrition and biochemistry at Harvard University. The first issue is to appear October 15.

The purpose of the journal is "to bridge the gap between basic research findings and their acceptance with confidence, on the part of those who deal with the public, to enable them to keep abreast of current progress and to have available an unbiased, authoritative review of current research literature".

Production and Sales of Synthetic Organic Chemicals

A PRELIMINARY report on United States production and sales of synthetic organic chemicals in 1941, issued by the United States Tariff Commission, includes statistics of production and sales of coal-tar dyes, other finished coal-tar chemicals, and synthetic noncoal-tar organic chemicals. The report shows that 1941 sales of all synthetic organic chemicals were the highest on record, $724,000,000, an increase of 50 per cent over 1940 sales. The value of sales of coal-tar finished products and intermediates was 60 per cent greater than in 1940, and that of sales of noncoal-tar synthetic organic chemicals, 42 per cent greater.

Figures of production are considerably larger than those of sales because a large part of the total output of synthetic organic chemicals is consumed in further processing by the producing companies. In the more important groups, the increases in production in 1941 over 1940 were intermediates, 25 per cent; dyes, 32 per cent; coal-tar medicinals, 64 per cent; coal-tar resins, 50 per cent; and all noncoal-tar synthetic organic chemicals, 27 per cent.

Statistics concerning coal-tar crudes, plasticizers, various pharmaceuticals, intermediates, and solvents, included in the reports for previous years, are omitted from the 1941 report to avoid disclosure of information that might aid the enemy. Copies of the report may be obtained from the United States Tariff Commission, Washington, D. C., or from the commission's office in the Custom House, New York, N. Y.

Traffic in Opium

THE U. S. Treasury Department, Bureau of Narcotics, has issued a report on the traffic in opium and other dangerous drugs for the year ended December 31, 1941. Copies are available from the Superintendent of Documents, Washington, D. C., at 15 cents each.

In 59 pages the booklet gives information on laws, administration, control of international trade, international cooperation, illicit traffic, raw materials, manufactured drugs, and statistical tables, with a very complete index.

Cadmium Poisoning

A REPORT on cadmium poisoning has been prepared by the Division of Industrial Hygiene, National Institute of Health, and is available at 5 cents per copy from the Superintendent of Documents, Washington, D. C., as Reprint No. 2371 from *Public Health Reports*. It discusses industrial exposure, toxicology, therapeutic uses of cadmium, and measures for the prevention of industrial cadmium poisoning.



Carey HEAT INSULATIONS

DRAFTED FOR WAR SERVICE
in largest POWDER PLANT

In one of the nation's mammoth powder plants, CAREY Heat Insulations are rendering vital service—aiding in the efficient and economical production of explosives for our armed services.

The insulation requirements for this project included many miles of pipe covering for outside lines ranging in size from ½" to 30" in diameter, and additional miles of insulation for inside lines. Apart from the piping, numerous other pieces of processing equipment—stills, vapor columns, condensers, concentrators, etc.—required adequate insulation.

In hundreds of plants throughout the nation, CAREY Insulations are helping industry win the battle of production. Their high efficiency; their ability to withstand extreme temperatures and pressures; their toughness and durability; their variety, covering all service conditions; are qualities known to leading engineers the country over. For details, address Dept. 64.

Whatever your insulation requirements, you're SAFE *with* CAREY. *A nation-wide organization is at your service.*

THE PHILIP CAREY MFG. COMPANY • Lockland, Cincinnati, Ohio

Industry Americanized

Editor, Chemical and Engineering News:

In an editorial appearing in the April edition of *Industrial and Engineering Chemistry* (**34**, 385) you announced the seizure of the formerly I. G.-operated General Aniline & Film Corp. by the United States Treasury and the placing of the corporation under the control of the Alien Property Custodian. You have also announced the appointment of the board of directors to reorganize and operate the corporation as an American concern.

It may be of interest to your readers at this stage to know something of the scientific problems which confront those charged with this duty of reorganization.

Under the former management, as now appears, while the factories of the corporation were efficiently staffed and operated, research and development activities in their broader aspects were retained in Germany under the control of the I. G. It becomes, therefore, one of the major tasks of the new management to create, as quickly as conditions allow, an integrated research organization adequate to the immediate and future needs of the corporation as an American enterprise. This is vital not only to ensure maximum contribution by the corporation to the war effort but to prepare foundations for continuing development after the war.

The General Aniline & Film Corp. controls, among other assets, a considerable number of U. S. patents granted to the I. G., the contents and value of which are largely untested. These in themselves represent a portfolio of great potential industrial importance, as examination of only a few patents has already revealed. Many of these represent the latest products of I. G. research which have not hitherto been developed to useful ends. The scientific appraisal of these patents and the selection for early development of those which can immediately contribute to the war effort is in itself a considerable and urgent task.

It is unique in industrial history that research opportunities of such magnitude have been created by the fact of a large and efficient manufacturing organization being suddenly deprived of the scientific foundations necessary to its healthy progress and to its powers of new creation.

To rectify this is one of the urgent tasks now confronting the directors and officers of the corporation, particularly of E. C. Williams, chemical director, and of W. F. Zimmerli, vice president in charge of patents and research. It presents a challenge and an opportunity for service and accomplishment to a large number of experienced scientific workers and of those starting on their careers.

Although public announcements regarding the corporation have already led to many applications being received, it is the management's wish (in order that there may be no thought of improperly competing for men with other industries active in the war effort) that the nature and full scope of its needs be realized both by individual scientists and by company executives.

We hope that we can successfully establish in times of exceptional difficulty and with the wholehearted good will of other industries, the kind of research organization that is needed to perform the important tasks assigned to us. It is our purpose so to do.

Robert E. McConnell, *President*

General Aniline & Film Corp.
230 Park Ave.
New York, N. Y.
August 18, 1942

Registry of Rare Chemicals Grows

Approximately 2,940 rare chemicals have been registered to date by the Armour Research Foundation National Registry of Rare Chemicals, Martin H. Heeren, registry director, has announced. Two thousand of the 2,500 industrial and educational laboratories from whom file data were requested have responded.

Some of the chemicals registered are such rare organic materials that they are to be had only in quantities as small as 0.5 gram. Such rare chemicals are not on the general market and are reserved for research purposes. Dr. Heeren said that the registry is expected to include approximately double the present number of chemicals when it is finally completed.

Tobacco Diversion Program Boosts Insecticide Supplies

Diversion of low-grade tobacco to the manufacture of nicotine sulfate and other by-products is provided in a program approved by the Secretary of Agriculture. Supplies of insecticides for the 1943 Food for Freedom production goals are expected to be substantially supplemented by this diversion program.

The Agricultural Marketing Administration will make payments to nicotine producers. These payments will equal the difference between the price the processors must pay for the grades of tobacco involved and a fixed amount representing the price they can afford to pay for this raw material and still sell the finished product at ceiling prices. Payments vary on the different types of tobacco covered by the program, which applies principally to dark types. These not only have the highest nicotine content, but also have been the hardest hit by curtailment of export markets. The total quantity of tobacco to be diverted is not to exceed 25,000,000 pounds, and total expenditures under the program are not to exceed $1,750,000.

Because imports of raw materials, such as derris root and pyrethrum, for other insecticides have been materially reduced by the war, the program for diversion of low-grade tobacco to nicotine insecticides has been considerably expanded. During the 1942 fiscal year 8,500,000 pounds of tobacco were diverted to nicotine by-products.

Westvaco Chlorine Products Adds to Staff

Additions to the staff of the research and development department of Westvaco Chlorine Products Corp., 405 Lexington Ave., New York, N. Y., include:

Frank P. Byrne, M.S. in chemistry from Creighton University in 1938. Prior to coming to Westvaco, he held a position on the teaching staff of St. Joseph College, Hartford, Conn.

Richard W. Cummins, B.S. in chemistry from University of Michigan, 1942.

Bradford C. Hafford, Ph.D. in chemistry from University of Wisconsin, 1942.

Ward M. Hanson, B.S. in chemical engineering from University of Minnesota, 1942.

John M. Lenoir, B.S. in chemical engineering from University of Illinois, 1942.

Edwin P. Plueddemann, Ph.D. in organic chemistry from the Ohio State University, 1942.

William G. Strunk, B.S. in chemistry from University of South Dakota, 1942.

Robert M. Thomas, Ph.D. in chemistry from Purdue University, 1942.

Dean D. Watt, B.S. in chemistry from University of Idaho, 1942.

George S. Baldry, formerly connected with the Harvard School of Public Health, has been appointed director of the Division of Industrial Hygiene for the Province of Manitoba. He will be located with the Department of Health and Public Welfare, Division of Industrial Hygiene, Winnipeg, Manitoba, Canada.

Bernard Bettman has resigned his position of research chemist with the National Aniline Division, Allied Chemical and Dye Corp., to become senior supervisor of the inspection division, West Virginia Ordnance Works, in West Virginia.

After receiving the Ph.D. degree in chemistry at Ohio State University in June, **Irving I. Bezman** accepted a position as assistant chemist in the Research Section of the Research and Development Division, Department of Chemical Engineering, TVA, Wilson Dam, Ala.

At the annual meeting of the Society of Chemical Industry, held July 10 in London, honorary membership in the society was conferred upon **Marston Taylor Bogert** and **James Bryant Conant**. Scrolls were presented and accepted by a representative of the American Embassy for transmission to the scientists thus honored.

THE WALL STREET OF CHEMISTRY

	Annual Earnings		Per Common Share	
	1941	*1942*	*1941*	*1942*
American Agricultural Chemical Co.	$1,121,873	$1,802,101	$1.79	$2.87
Champion Paper & Fibre Co.	2,379,660	3,129,986	3.37	4.71
Crown Zellerbach Corp.	8,866,287	9,108,801	2.75	2.85
Dow Chemical Co.	7,770,547	9,221,486	6.58	7.14
Koppers Co.	4,690,805	5,688,673	3.49	4.49
Procter & Gamble Co.	27,582,081	21,469,214	4.21	3.25
United Gas Improvement Co.	25,992,554	18,338,085	0.95	0.62
	Six Months' Earnings			
Abbott Laboratories	986,181	868,406	1.27	1.07
American Potash & Chemical Corp.	72,222 (loss)	965,081	..	1.83
American Viscose Corp.	3,375,201	2,422,805	1.60	1.05
Borden Co.	3,510,581	3,378,186	0.80	0.77
Canadian Industrial Alcohol Co. (9 months)	309,767	456,771	0.28	0.41
Colgate-Palmolive-Peet Co.	2,399,074	2,241,073	1.09	1.01
Columbian Carbon Co.	1,904,036	1,546,156	3.54	2.88
Continental-Diamond Fibre Co.	345,685	228,088	0.77	0.50
General Refractories Co.	591,259	430,986	1.26	0.92
B. F. Goodrich Co.	6,646,033	3,103,087	4.31	1.59
Goodyear Tire & Rubber Co.	6,196,756	4,123,961	2.23	1.24
Hygrade Sylvania Corp.	530,693	483,062	2.19	0.79
Illinois Zinc Co. (9 months)	308,729	336,854	3.24	3.54
Interchemical Corp.	696,468	538,285	1.73	1.18
Link-Belt Co.	1,307,015	1,019,578	1.76	1.32
Merck & Co.	1,591,073	1,086,373	1.45	0.83
Monsanto Chemical Co.	3,270,943	2,133,765	2.38	1.38
Oliver United Filters	91,696	101,309	0.46	0.51
National Oil Products Co.	384,250	290,126	1.78	1.34
Parke, Davis & Co.	3,348,067	2,781,563	0.68	0.57
Pure Oil Co.	4,900,000	6,782,000	0.74	1.21
Rustless Iron & Steel Corp.	1,164,460	640,694	1.21	0.64
St. Joseph Lead Co.	2,518,957	2,142,208	1.29	1.09
Sylvania Industrial Corp.	553,891	454,454	1.32	1.10
United Carbon Co.	957,801	920,990	2.41	2.31
United Chemicals, Inc.	105,401	109,050	..	..
U. S. Gypsum Co.	3,211,826	2,445,460	2.46	1.82
U. S. Rubber Co.	6,203,314	1,554,841	2.07	..
Vanadium Corp.	703,762	152,598	1.73	0.37
	June Quarter			
American Zinc, Lead & Smelting Co.	165,843	255,461	0.12	0.25
Barber Asphalt Corp.	208,643	179,506 (loss)	0.53	..
Blaw-Knox Co.	635,643	308,810	0.47	0.23
Bristol-Myers Co.	443,967	315,792	0.66	0.47
A. M. Byers Co.	336,951	461,975	..	..
Eastman Kodak Co. (24 weeks)	10,460,425	7,462,336	4.15	2.94
Freeport Sulphur Co.	953,419	735,417	1.20	0.92
Harbison-Walker Refractories Co.	765,900	502,700	0.53	0.34
Hazel-Atlas Glass Co.	924,315	813,194	2.13	1.87
International Nickel Co.	8,075,898	7,936,648	0.52	0.51
Lambert Co.	179,634	257,223	0.24	0.34
Liquid Carbonic Corp.	902,264	511,468	1.24	0.65
Mead Corp. (24 weeks)	766,358	867,168	0.89	1.07
National Gypsum Co.	423,792	227,691	0.26	0.11
New Jersey Zinc Co.	2,700,391	2,152,984	1.37	1.09
Newport Industries	.....	104,457	..	0.17
Norwich Pharmacal Co.	181,010	142,897	0.23	0.18
Sharp & Dohme	332,514	433,539	0.17	0.30
Union Carbide & Carbon Corp.	10,796,498	7,611,940	1.16	0.82
Victor Chemical Works	314,964	192,604	0.45	0.26
Vulcan Detinning Co.	137,878	97,972	3.55	2.33
Vonite Products Corp.	18,380	65,617	0.02	0.08

Because of the large volume of war orders being handled, the Blaw-Knox Co. has arranged for a $3,000,000 bank credit which can be called upon as needed during the next two years and nine months.

CONTINUED ON PAGE 1130

New *Heatless* Method of Purifying Water

REPLACES DISTILLED WATER

at fraction of the cost in



CHEMICAL PLANTS
AIRCRAFT PLANTS
DISTILLERIES
PHARMACEUTICAL HOUSES
SYNTHETIC RUBBER PLANTS
PORCELAIN ENAMELING PLANTS

The ILLCO-WAY method of purifying water is one of ion exchange, using Amberlite synthetic resins to produce a final effluent which compares very favorably with heat distilled water. The water is not evaporated, so no heat is used in the process which is daily meeting the exacting standards of industrial and technical concerns requiring purified water.

1,000 gallons for less than a dollar!

LOW COST — The cost of the treated water is amazingly low — *less than a dollar per thousand gallons*, on the average water supply. And when the supply is low in dissolved solids, the cost may be considerably less.

No heat used—No fuel required!

Operation is completely automatic (between periodic regenerations). Pipes will not lime up. Maintenance costs are reduced to a minimum. A unit delivering 300 gallons an hour occupies a space about 4 x 10 feet. Made of finest materials to protect the purity of water. Available in units affording from 120 gallons an hour to 50,000 gallons an hour.

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845 Cedar St., Rockford, Illinois

TESTED IN THE LABORATORY · ILLCO-WAY · PROVED IN THE FIELD

Sales of the **Goodyear Tire & Rubber Co.** for the first six months of 1942 were larger than in any previous half year in the company's history. The company deducted $6,751,247 for Far East losses and $1,500,000 for contingencies, equivalent to about $4.00 a share on common stock, and has set up a reserve amounting to $13,320,855 to cover war losses in investments in Singapore, Sumatra, Java, and the Philippines. Provisions for income and excess profits taxes for the first half of 1942 amounted to $12,008,724 as compared with $11,483,840 in the first half of 1941.

The **Procter & Gamble Co.** reports that gross sales for the year ended June 30, 1942, were $282,202,502, compared with $225,116,299 in the previous year, a 4 per cent increase in tonnage and a 25 per cent increase measured in dollars. Current assets on June 30, 1942, amounted to $106,263,971 and current liabilities to $32,779,556, compared with $90,887,132 and $20,306,847 on June 30, 1941.

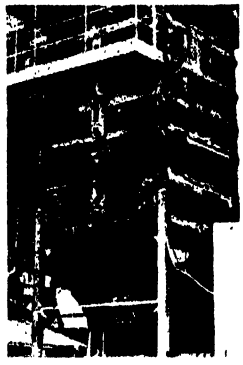
Sylvania Electric Products

THE Hygrade Sylvania Corp., 500 Fifth Ave., New York, N. Y., manufacturer of incandescent lamps, fluorescent lighting products, etc., has changed its name to Sylvania Electric Products, Inc.

New Tool Bit

A NEW line of tool bits for machining hard, tough steels and copper or aluminum alloys recently has been made available by the Black Drill Co., Cleveland, Ohio.

For *Positive* collection of gas-borne critical materials – specify COTTRELL . . .



• For more than 35 years Cottrell Electrical Precipitators have been cleaning air and commercial gases, recovering values and eliminating the nuisance of gas-borne dust. In metallurgical plants, cement plants, gas plants, paper mills, power plants, oil refineries and acid plants, Cottrell Precipitators are self-liquidating investments free from recurring maintenance charges and obsolescence reserve. Many Cottrells more than 30 years old are still in operation with efficiencies approaching 100%.

• Now more than ever before, selection of the correct collection equipment is of paramount importance in plant construction and enlargement. Critical material shortages make it imperative to specify the method which will, over a period of time, maintain the highest efficiency at lowest power, operating and maintenance costs.

• The collection problems faced by Industry today—whether simple purification, collection of values, nuisance abatement or combinations of all—can be solved quickly and efficiently by Cottrell Electrical Precipitators.

The VERSATILITY OF COTTRELLS

is shown from the following valuable materials collected in a single day's operation.

1. *6 tons of soda salts at a paper mill.*
2. *55 tons of smelter dust containing 20 per cent copper.*
3. *13 tons of sodium sulphate.*
4. *3 tons of antimony dust from a silver refinery.*
5. *208 tons of 12 per cent copper dust.*
6. *1100 pounds of dust ahead of mercury condensers.*
7. *10 tons of arsenic.*
8. *3 tons of wet tar.*
9. *800 pounds of dry tar.*
10. *4½ tons of alumina.*
11. *5500 pounds of concentrated sulphuric acid.*
12. *220 tons of cement dust.*
13. *120 tons of fly ash.*
14. *6 tons of blast furnace dust.*



Send for descriptive Bulletins.

WESTERN PRECIPITATION CORPORATION

ENGINEERS, DESIGNERS AND MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIALS FROM GASES AND LIQUIDS

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Varnish Technology Course Offered by Mattiello

JOSEPH J. MATTIELLO, technical director, Hilo Varnish Corp., and editor-in-chief of the four-volume treatise, "Protective and Decorative Coatings", is offering a course in Varnish Technology in the Evening Graduate School of the Polytechnic Institute of Brooklyn. This course, meeting on Monday evenings, will be continued throughout the year and will cover the physical-chemical theories, the application of scientific methods to the development of improved products, and the manufacture, use, and testing of all types of varnish and varnishlike materials.

The course is one of the offerings of the Department of Chemical Engineering, and further information may be obtained from the Dean of Graduate Studies. Registration week is September 14 to 25.

Ammonia in War

AMMONIA is an indispensable war material. There are at least 2,000 industrial uses for this chemical. It is an ingredient basic to the manufacture of explosives for bombs, torpedoes, shells, and cartridges. It hardens metals for vital parts of airplanes, tanks and guns; helps vulcanize important rubber articles; is used in making nylon; enters into the manufacture of fertilizers; and is employed in one process for the manufacture of Lucite methyl methacrylate plastic for the noses, gun turrets, navigation "blisters", and other transparent sections of fighting airplanes.

Data on New Products Wanted

IN A revision of the Standard Chemical and Technical Dictionary, the editor is seeking data on new products, pilot plant products, and products that are substitutes or alternatives for scarce materials. Information should be sent before October 1 to H. Bennett, 230 King St., Brooklyn, N. Y.

Who Makes It?

SOURCES of the following chemicals are wanted by Armour Research Foundation, National Registry of Rare Chemicals, 35 West 33rd St., Chicago, Ill.

Alpha-phosphoglycerol, *d*-3-phosphoglyceraldehyde, *d*-3-phosphoglyceric acid, quinone dioxime dimethyl ether, diquinoyl dioxime, diquinoyl tetroxime, 2,4,6,2′,4′,6′-hexachlorodiazoaminobenzene, quinone - *bis* - beta - naphthylimine, prophyrindien, and alpha-ketoglutaric acid.

ANALYSIS

CHAS. PFIZER & CO., INC. has always regarded the careful and intelligent examination of all products as not only a necessary but also an important part of its manufacturing processes. We believe that the uniformity and high purity of our products cannot be assured without thorough examination and that it involves more than just the routine checking of materials against certain specifications.

The personnel of our Analytical Department is of the highest caliber and every effort has been made to make the most modern equipment available. Through thorough and careful analysis it has been possible for this department to make many suggestions which have resulted in improved products and improved methods of manufacture.

The research division of this department is constantly striving to improve or devise new techniques for the examination and analysis of our materials. New products, too, have always occasioned considerable analytical research, it often having been necessary to revise existing analytical methods to a great extent, or even to devise entirely new procedures. Needless to say, all of this would be impossible if analysis were considered to be merely a routine matter.

We feel that the reputation for dependability and high quality which our products enjoy is due in no small measure to our Analytical Department.



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SARGENT
***Fluorescent* TITRATION LAMP**



Supplies soft, glareless fluorescent illumination of daylight quality, correct intensity and color characteristics to beakers in which titrations are being carried out.

A parabolic reflector in which is mounted a General Electric daylight fluorescent tube, directs light against a flat, white vitreous enameled inclined background—eliminating direct illumination and so preventing glare and undesirable illumination intensities. The outer surface of the lamp is finished in a dark blue vitreous enamel. Fitted with snapswitch, connecting cord and plug. Length, 12½"; height, 8"; depth, 4½". Complete with fluorescent tube, type T5, No. S-44285. For operation from 115 volt, 60 cycle circuits.

Fluorescent Titration Lamp S-44290 $13.00

E. H. SARGENT & COMPANY
155-165 E. Superior St., Chicago, Illinois
Michigan Division: 1959 E. Jefferson, Detroit, Mich.

Potomac Postscripts

CONTINUED FROM PAGE 1119

of the Conservation Division urges that fullest use be made of existing reclaiming facilities and has compiled a list of solvent and oil reclaimers.

Tannic Acid. To limit the use of tannic acid U. S. P. to essential purposes, the War Production Board has issued Order M-204 establishing complete control of the acid and of nutgalls, its raw material source. According to the order, nutgalls must of so processed so as to obtain the maximum production of tannic acid meeting U. S. P. specifications. Tannic acid U. S. P. may be used only for the treatment of burns or the manufacture of products used exclusively for the treatment of burns, as an analytical reagent for laboratory use, for internal administration in the treatment of poisoning, and in the extemporaneous compounding of prescriptions.

Stocks of nutgalls amounting to less than 5 pounds and nutgalls or tannic acid U. S. P. which had been combined with any other material before August 8 are exempted from the restrictions. The order does not apply to the householder who uses the acid for his own medicinal purposes, but the person who sells to the householder must observe the restrictions.

Thermoplastics. An illustration of the speed with which military production is taking available supplies of materials is provided by action of the Director General for Operations in regard to thermoplastics. M-154, which set up a ladder of uses for thermoplastics was issued on June 27 and provided for scheduling of operations by manufacturers to begin on July 15. That later was postponed until August 15 to give manufacturers time to change operation schedules. So greatly has military demand risen in the meantime that M-154 no longer provides proper control for all types of thermoplastics.

The most recent amendment changes the order to a limitations order and extends the date for scheduling until October 1, pending revision of thermoplastics control which will take into account the altered conditions in demand. Issued at the same time were two supplementary orders, M-154-a and M-154-b. M-154-a restricts the use of polyvinyl butyral, a rubber substitute, to war orders, except by special authorization of the Director General. M-154-b provides that methyl methacrylate sheet scrap cannot be disposed of except to reprocess into sheeting. The material is widely used for gun turrets and navigators' domes in military aircraft.

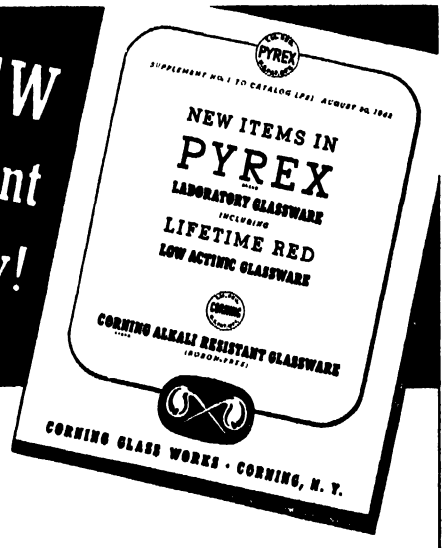
Tungsten ores or concentrates may be delivered by any producer, dealer, or processor to dealers or processors for concentration or beneficiation without specific authorization by WPB, according to Amendment 1 to General Preference Order M-29, as amended June 30, 1942. Control over tungsten is exercised by WPB when delivery is made to consumers. The amendment also extends from 60 to 120 days the period during which dealers may hold stocks of tungsten ores and concentrates.

Turbo-blowers. Strict WPB control over distribution of turbo-blowers has been ordered. Turbo-blowers, which are made largely of alloy steel and cast iron, are necessary in the operations of blast furnaces, coke furnaces, and in operations connected with the manufacture of synthetic rubber, ammonia, toluene, and other programs designed to increase the country's output of war goods. Under Limitation Order L-163 no one may place or accept orders for turbo-blowers covered by the regulations unless specific authorization is granted on Form PD-616A. Application for authorization to place orders must be made on Form PD-616.

None of the restrictions in the order apply to turbo-blowers to be delivered to the Navy or Maritime Commission for shipboard use, or to any privately owned shipyard or plant for installation in ships

CONTINUED ON PAGE 1138

NEW
Catalog Supplement
Now Ready!



Introducing
NEW ITEMS! NEW LINES!

1. "Pyrex" Blood Bank Centrifuge bottles, 600 ml.
2. "Pyrex" Lamp Sulfur Determination Apparatus with Fritted Disc—A.S.T.M. D 90-41T.
3. "Pyrex" Distilling Receivers with ⅁ Ground Joints.
4. "Pyrex" Bray Type Anaerobic Culture Dish.
5. "Pyrex" Lifetime Red Low Actinic Glassware. (43 new items).
6. "Corning" Alkali Resistant (Boron-Free) Glassware (cataloged for the first time).

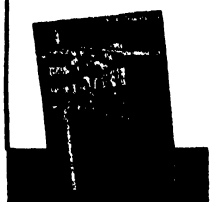
Send for your free copy of this new Supplement No. 1 (to "Pyrex" Laboratory Glassware Catalog LP21). Its 16 pages present complete information on the newest lines and the latest improvements and developments in "Pyrex" and "Corning" laboratory glassware—which are available now through your regular laboratory supply dealer.

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★ In the processing of your products, there is handling to be done. Here's where you can save time and money. Call in an American MonoRail Engineer. He can show you definite savings in any of your materials handling operations. That's his business — American MonoRail equipment is available for manual, electric or automatic operation. No job too small—none too large, and definitely suited to your individual need. No interruption to your production during installation. Stop wasting time—call in an American MonoRail Engineer today.



WRITE FOR Blue Book illustrating hundreds of MonoRail installations

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SPATULAS
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18765

Flexible Blades—Rosewood Handles

18755 Wide Blade			18765 Narrow Blade		
No.	Length Inches	Each	No.	Length Inches	Each
A	6¾	$0.40	A	7	$0.50
B	7½	.50	B	8½	.60
D	10¼	.75	C	9½	.70
E	13	1.00			

CENTRAL SCIENTIFIC COMPANY
SCIENTIFIC INSTRUMENTS CENCO TRADE MARK REG. U.S. PAT. OFF. LABORATORY APPARATUS
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Sulphur Dioxide

Versatile Reagent and Solvent . . . can be handled, metered, and applied with economy and efficiency . . . plentiful, quickly available, and inexpensive.

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Guarantee Every [illegible] Prompt shipment from all points. Tank cars, [illegible] steel cylinders.

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MANUFACTURERS OF LIQUID SULPHUR DIOXIDE FOR 25 YEARS
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You can depend on
EASTERN MIDGET PUMPS
for *Big Jobs*

Where you want a heavy duty pump to meet small-space requirements, use an Eastern Husky Midget Pump. They can often replace bulkier equipment with resulting economy and increased efficiency. Maintenance is negligible.

Eastern's small, light-weight models have the added feature of being easily portable.

• Weights range from 3¼ lbs. to 20 lbs.

For complete information, write . . .

EASTERN ENGINEERING CO.
41 Fox St., New Haven, Conn.

U. S. Sources of Aluminum

A special committee of the National Academy of Sciences has approved new processes that may make the United States independent of foreign sources of aluminum. Its advisory committee on metals and minerals has recommended that the War Production Board provide materials for more experimental work on extracting alumina from domestic ores and clays that could not be used a few years ago.

Shipments of bauxite from Dutch Guiana have declined considerably with the U-boat sinkings, and the reserves of high-grade ore in Arkansas are limited. The committee recommended a study of the tailings left when high-grade bauxite is treated in the usual way to secure additional alumina by a sintering or baking process; that a test plant be constructed to permit further work on another sintering process for extracting alumina directly from low-grade ores and clay; that the pilot plants now at work on extracting alumina from clays be expanded (one is operated in the Northwest by the Bureau of Mines and one in Utah by Kalunite, Inc.); that vigorous prospecting go forward to discover new domestic deposits of bauxite; and that the known deposits be appraised as to grade, tonnage, and minability.

Urea

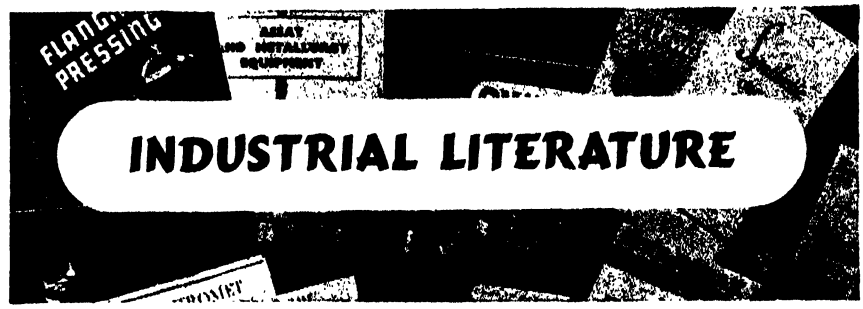
Urea, a synthetic chemical, which was not even manufactured in this country until recent years, today is helping to make an important farm-grown product more useful for both war and peacetime purposes.

It is being widely used to inhibit splitting and checking of lumber during seasoning or drying, and to treat wood so that it may be bent and shaped for specific war uses.

The Navy is using thousands of feet of treated lumber for decks, ribs, frames, and other structural parts of ships.

The Army is purchasing treated lumber in clear and structural grades for stringers, planks, and rails on Army pontoons used for bridges. Without urea it would have been almost impossible for the lumber industry to supply all the lumber requested for Army pontoons. Some mills that tried to dry this material without urea experienced seasoning degrades of 40 to 60 per cent of the stock dried, and in addition tied up their dry kilns for an unreasonably long time. These seasoning difficulties were largely solved by the use of ures, and kiln degrade of this important farm-grown crop of lumber was reduced to around 3 per cent.





Listed publications should be requested directly from the company concerned. Use business stationery, mention bulletin numbers, and refer to this journal. Publications will be sent free unless otherwise noted.

American Filter Papers. A 4-page bulletin describes a line of filter papers developed for qualitative as well as for the most accurate quantitative work. A little card in the bulletin serves as a selector guide for the proper choice of filter papers. This compares the numbers of British, Swedish, and the American line of papers. *American Filter Papers Bulletin CEN.* Carl Schleicher & Schuell Co., 116-118 West 14th St., New York, N. Y.

Bronze Valves. This 6-page bulletin presents brief working data on a line of bronze valves for Silbraz joints. The preinserted rings of Sil-Fos, a silver brazing alloy, in the port openings of these valves make it possible to braze a one-piece piping assembly between valve and pipe with an oxyacetylene flame. A table of working data and sectional pictures show the making of Silbraz joints. *Bronze Valves Bulletin CEN.* Fairbanks Co., 393 Lafayette St., New York, N. Y.

Burets. This 16-page bulletin describes a line of inter-joint burets. The types described range from the student grade to precision research models. In describing each type the manufacturers list capacity and graduated intervals as well as prices. *Bulletin 41-55 CEN.* Scientific Glass Apparatus Co., Bloomfield, N. J.

Carriers for Drums and Barrels. A well-illustrated bulletin describes the actual service use of this convenient type of carrier. The bulletin points out that the device is designed to permit easy one-man handling of even very heavy loaded containers. *Drum and Barrel Carrier Bulletin CEN.* Ernst Carrier Sales Co., 1456 Jefferson Ave., Buffalo, N. Y.

Centrimax Flowmeters. These flowmeters are designed primarily for steam and water service and are urged by the manufacturers where flow measurement of unusual accuracy is required either because of power efficiency reasons or because accounting is done on the base of flow readings. *Catalog N-28-160 CEN.* Leeds & Northrup Co., 4907 Stenton Ave., Philadelphia, Penna.

"Concealment Coatings" deals especially with the camouflage of industrial plants. Shatterproofing of glass and fire-retarding paints are also discussed. The camouflage paints meet or exceed Army specifications. *Pamphlet CEN.* Devoe & Reynolds Co., Inc., 1 West 47th St., New York, N. Y.

Coupling Head Thermoswitch. Similar to the Hex type switch, this new type is designed for insertion into a closed liquid or gas system by means of a 0.5-inch standard pipe thread. The new coupling head feature facilitates permanent wiring connection, quickly and neatly, with many types of condulets, such as waterproof or explosion-proof fittings. *Catalog Section 95 CEN.* Fenwal Inc., Ashland, Mass.

Forged Steel Fittings. A well-illustrated, complete reference book, shows the advantages of this type of fitting especially in high-pressure, high-temperature work. Section 1 includes pictures of forged steel screw fittings with information on the type of unit and uses. Section 2 performs the same function for forged steel socket welding fittings. Section 3 gives vital engineering data. *Forged Steel Fittings, Bulletin A-3 CEN.* Watson-Stillman Co., Roselle, N. J.

Fuse Clips and Screw Terminals. Made of a new beryllium-copper alloy these items give low-contact resistance and great conductivity, and possess high fatigue resistance and tensile strength plus other necessary qualities. Valuable technical information is also included. *Folder CEN.* Littlefuse, Inc., 4757 Ravenswood Ave., Chicago, Ill.

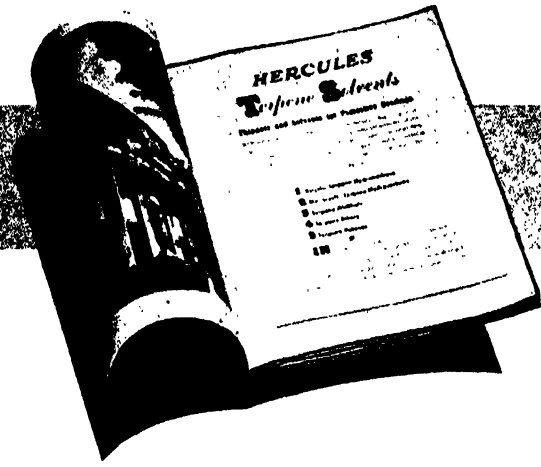
Gages. This bulletin describes a line of gages for pressure, vacuum, and compound service. Internal working mechanism of these gages is well illustrated, and the bulletin carries brief physical specifications for the various models. The manufacturers point out that they have fitted these gages with a new and improved type of gearing in the form of a patented cam and roller movement. *Gages Bulletin CEN.* Certified Gauge & Instrument Corp., 34-18 Northern Blvd., Long Island City, N. Y.

Graphic Instruments. New uses, such as checking arc welding, recording high temperatures, inspecting pipe, and spotting power disturbances are described in this bulletin which includes several charts. *Bulletin 1241 CEN.* The Esterline-Angus Co., Inc., Indianapolis, Ind.

Heat Transfer through Metallic Walls. Engineers recognize that the thermal conductivities of metals used in fabrication of various processing units are frequently poor indexes of what may actually be accepted. This 16-page catalog has been prepared by the Development and Research Division of the manufacturer to supply the information so urgently needed for successful design work. The booklet includes information in formulas for determining over-all heat-transfer rates, various factors influencing heat transfer through metallic walls, and thermal conductivities of metals and alloys commonly used in the construction of process equipment. To the original data there has been added a number of illustrations

CONTINUED ON PAGE 1136

You can blend Terpene solvents to produce the properties you need



By properly selecting and blending terpene solvents, it is possible to vary solvent strength, volatility, flash point, odor, stability, drying time, and other characteristics. Such blends may be further modified and extended with mineral thinners and other solvents, opening the way to worthwhile improvements in protective coatings.

These varied possibilities for making important new solvents

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TERPENE SOLVENTS INCLUDE
Bicyclic Terpene Hydrocarbons
Monocyclic Terpene Hydrocarbons
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Terpene Ketones

are explored in a booklet, "Hercules Terpene Solvents," just issued. It contains data on the individual terpenes and on typical blends developed by the Hercules Experiment Station. This will provide paint chemists with a starting point for their own investigations. Just mail the coupon for your copy.

HERCULES

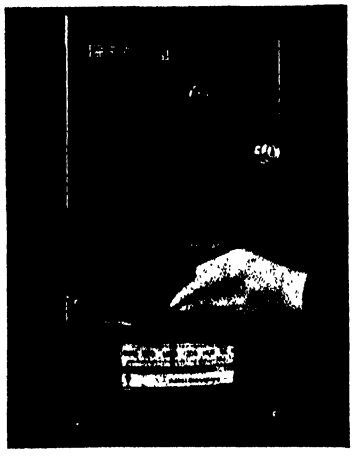
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INCORPORATED
922 Market Street, Wilmington, Delaware
Please send me a free copy of "Hercules Terpene Solvents."

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ADDRESS.....
.....TT-17

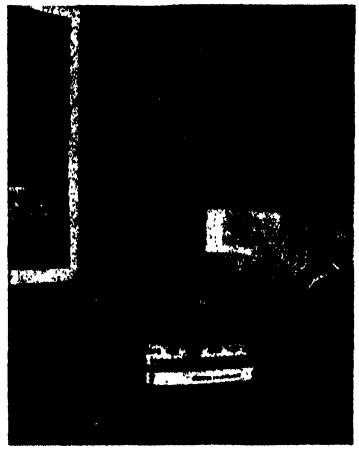
Here's what

UNIVERSAL TEMPERATURE CONTROLLERS

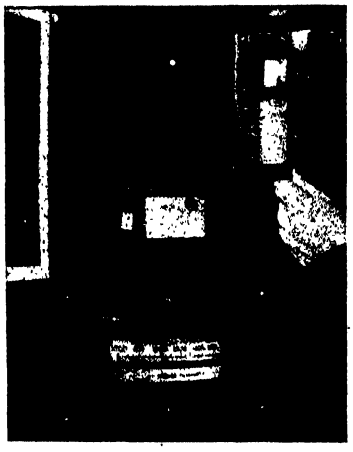
mean to you



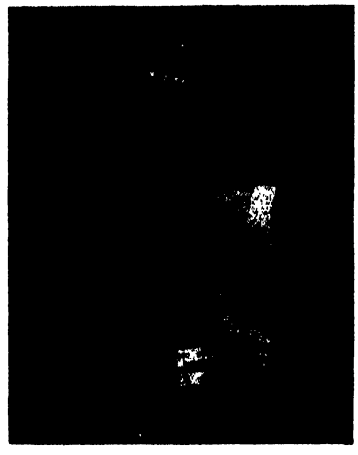
1 Temperature Control Adjustment easily made from front of Controller. Control Setting may be locked inside case if desired.



2 Removing plug-in relay. Relay interchangeability permits conversion to other types of control circuits or back.



3 Plug-in Control Chassis is easily removed for inspection, replacement or interchanging for other types of control circuits. Plug sockets may be seen above relay.



4 Interchangeable Measuring Sections permit choice of scale range or type of temperature measuring system (Potentiometer, Millivoltmeter or Resistance Thermometer).

Instantaneous control action with the famous "Electronic Principle" control system and extreme accuracy of temperature measurement, plus interchangeability of all component parts, interchangeability of scale ranges, ready accessibility of all parts for individual checking and many other features. Wheelco UNIVERSAL Controllers include Capacitrols, Potentio-trols, Limitrols and Resistance Therm-otrols.

For full details, write for free Bulletin Z6000

Wheelco Instruments Co.
851 W. HARRISON STREET CHICAGO, ILL.

Industrial Literature

CONTINUED FROM PAGE 1134

showing several types of equipment which are characteristic of process units that depend on the transfer of heat through metallic walls for normal operation. *Heat Transfer Bulletin CEN.* THE INTERNATIONAL NICKEL CO., INC., 67 Wall St., New York, N. Y.

Hydrite Lubricant. A new, all-purpose, colloidal, natural graphite, 22 per cent by weight in water suspension is described in this bulletin. This lubricant is said to be particularly adaptable where an oil-free, nondrip, long-wearing material is required. It is unaffected by acids, acid fumes, or vapors and is electrically conductive and chemically inert. *Bulletin No. 3A CEN.* NATIONAL GRAPHITE CO., INC., 17 John St., New York, N. Y.

Industrial Subzero Machines. The Kold-Hold freezing machine for maintaining predetermined temperatures as low as −90° F. is fully described in this folder. The units come in a variety of sizes and styles, all designed to withstand heavy-duty factory operation. Important applications are in the chemical and pharmaceutical processing industries and for testing instruments and materials. *Bulletin S-Z 42 CEN.* KOLD-HOLD MFG. CO., Lansing, Mich.

Kjeldahl Equipment. This new fully illustrated bulletin describes possible modifications and combinations of Kjeldahl equipment for digestions and distillations, adaptable for small and large laboratories. There are three basic models from which to choose. The fume exhausts are of tellurium lead or Duriron. The multihood digestion units are described as well as the multitube distillation apparatus. All units are available for either electricity or gas. *Bulletin 515 CEN.* PRECISION SCIENTIFIC CO., Chicago, Ill.

Koroseal, its nature and chemistry, physical properties, and mixing and processing procedures are discussed in a new handbook of technical information. Included are six charts, a flow diagram, and other important data, plus a general discussion on the many industries in which this product may be used. Physical properties, physical constants, and many photographs are included. This is the first section of a three-section handbook on this important product. *Handbook of Technical Information, Section 1 CEN.* THE B. F. GOODRICH CO., Akron, Ohio.

Mills Plastic Tubings and Fittings. A complete description of a new thermoplastic especially designed to replace metal is included in this bulletin. The tubing is practical owing to its adaptability under high-bursting and working pressures, insulation qualities, and resistance to most chemicals. Complete technical data and physical properties, effect of reagents on the material, charts on bursting and working pressures *vs.* temperature, and other interesting information are included. *Bulletin CEN.* ELMER E. MILLS CORP., 812 West Van Buren St., Chicago, Ill.

Rip-Cord Closures. A new type of closure for bags, which saves labor, bags, storage, and materials is described in a new folder. A sharp pull opens the bag,

eliminating cutting and waste. This closure may be applied to any type of textile bag and seems especially adaptable for animal foods, seeds, dry chemicals, cement, starch, and similar products. *Folder CEN.* BEMIS BRO. BAG CO., 431 Poplar St., St. Louis, Mo.

Spray Nozzles. A new, nonclogging, flat-spray nozzle for washing, cleaning, cooling, and descaling is described. These nozzles come in three sizes and in a variety of metals and are so designed as to give maximum impact and uniform spray, with a saving in the volume of water used. *Bulletin 409 CEN.* CHAIN BELT CO., 1600 West Bruce Street, Milwaukee, Wis.

Steam-Jet Ejectors. A new type CTH, double element, two-stage steam-jet ejector, with combined surface inter- and aftercondenser is described. Sectional views are given plus details of construction and dimensions. *Bulletin W-205-B5A CEN.* WORTHINGTON PUMP AND MACHINERY CORP., Harrison, N. J.

Suspended Separation Magnets. An illustrated 8-page bulletin describes the design, construction, and materials embodied in these suspended magnets and their various applications. Specifications on the circular and rectangular types also are included. *Bulletin 25-C CEN.* STEARNS MAGNETIC MFG. CO., Milwaukee, Wis.

Ultraviolet in Science and Industry. The present-day useful applications of the quarts mercury vapor lamp and ultraviolet radiation are described. Illustrations show the various types of lamps available and results of ultraviolet photography. Physical, chemical, and industrial applications are taken up fully. The use of photoelectric cells is also discussed. *Booklet CEN.* HANOVIA CHEMICAL AND MFG. CO., Newark, N. J.

Vibrating Screens. A 12-page illustrated bulletin describes Vibrex screens with dimension data and properties. *Bulletin CEN 122.* ROBINS CONVEYING BELT CO., Passaic, N. J.

Ethyl cellulose to Replace Rubber

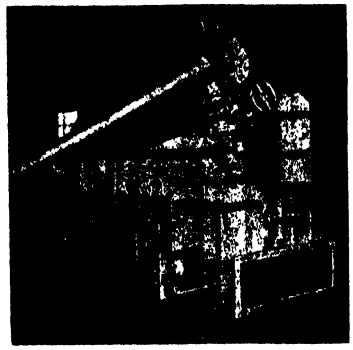
NEW formulations of ethyl cellulose plastic designed to replace rubber have been found suitable for many uses of the now scarce material, the Hercules Powder Co. has announced.

Soft formulations of this plastic can be used instead of rubber in gun covers, electrical tape or "friction tape," water tubing to replace brass, raincoats, hospital sheeting, garden hose, and other kinds of rubber hose, mason jar rings, surgical tape, wire insulation, golf balls, baby pants, gloves, impregnated fabrics, coated fabrics, washers, and footwear. It is also described as resistant to mustard gas.

Ethyl cellulose is now produced by the Hercules Powder Co. at a plant in Virginia, which is also the largest chemical cotton plant in the world.

ADMIRAL WILLIAM CARLETON WATTS, U. S. N. (retired), as a special representative of the Secretary of the Navy, made a complete inspection recently at the Jessop Steel Co., Washington, Penna., and highly praised officials for the efficiency with which the mill is being operated.

ARTISAN WORKS FOR VICTORY

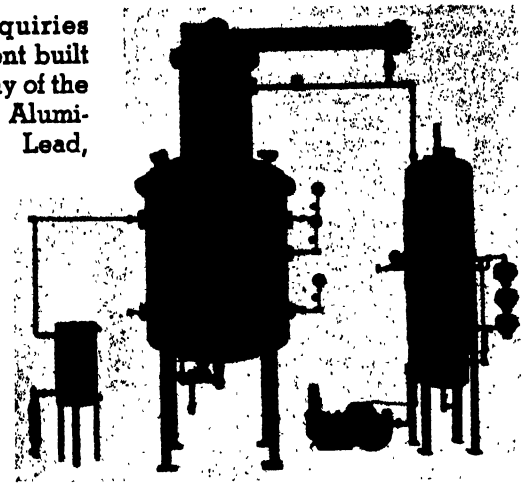


Horizontal tube evaporator — all welded construction

Artisan's complete facilities for fabricating equipment for the Chemical Process Industries are working day and night to meet wartime requirements. Artisan is proud of the esprit de corps of its workmen, engineers, and administrative staff that makes possible this service to the nation in wartime.

ARTISAN DESIGNS AND BUILDS SPECIAL EQUIPMENT FOR THE CHEMICAL PROCESS INDUSTRIES

Artisan invites your inquiries when in need of equipment built to a special design from any of the following metals or alloys: Aluminum, Copper, Everdur, Lead, Monel, Nickel, Inconel, Steel, Stainless Steel, Clad Steels, and Hastelloy. Experienced Artisan engineers are qualified to work on special problems in cooperation with your plant engineers and executives on a confidential basis.



Large continuous vacuum solvent recovery still

For Victory over your difficulties in design and fabrication . . . ***Remember***

WAR PRODUCTION FIRST

ARTISAN METAL PRODUCTS INCORPORATED

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"Saluting"...

THE FLYING FORTRESS
—BOEING'S FAMED B-17-E

Out-flying, out-fighting and out-bombing anything it meets in the air—on any front, the Flying Fortress has a reputation of proven superiority. It is a masterpiece of skillful engineering born of wide research and countless experiments. To such war equipment Americans pay thankful and admiring tribute.

But for men who build such planes, those who train to fly them—and for millions of people at home, there must be an abundance of water. To a water system the name Layne is as famed as that of Boeing to long range bombers. Layne has built thousands of water systems—the very biggest in the United States. Layne likewise builds pumps—the kind that outpump, out-last and out-perform any deep well water producing equipment in any territory—on any task.

Layne's reputation, like that of the Flying Fortress has been proven the hard way—on the field of action. Layne Wells and Pumps by the hundreds are producing millions and millions of gallons of water for manufacturers, cities, railroads and the army and navy. For late catalogs, bulletins and detail information, address

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Layne-Louisiana Company.....Lake Charles, La.
Louisiana Well Company.....Monroe, La.
Layne-New York Company.....New York City
Layne-Northwest Company.....Milwaukee, Wis.
Layne-Ohio Company.....Columbus, Ohio
Layne-Texas Company.....Houston, Texas.
Layne-Western Company.....Kansas City, Mo.
Layne-Western Co. of Minn.....Minneapolis, Minn.
International Water Supply, Ltd...London, Ont.

Potomac Postscripts

CONTINUED FROM PAGE 1132

built or repaired for the Navy or Maritime Commission. The order, although in the L series, does not limit production directly but provides for allocation of finished products.

Vegetable Oil Seeds. Allocation and other authority of the WPB has been delegated to Commodity Credit Corporation in respect to vegetable oil seeds and oil seed products in Directive 7. The purpose is to give to a single government agency necessary authority to handle problems arising out of this year's bumper crop of cottonseed, flaxseed, peanuts, and soybeans.

Procedure for Sale of Fats and Oils

PROCEDURE to be followed by importers on and after August 18, 1942, in submitting offers to sell fats, oils, and oil-bearing materials to the Commodity Credit Corporation for importation under provisions of WPB general order M-63 has been announced jointly by the Board of Economic Warfare, the War Production Board, and the Commodity Credit Corporation.

Offers will be considered only if submitted to the Director of Foreign Purchases, Commodity Credit Corporation, U. S. Department of Agriculture, Washington, D. C., by 4:00 P. M., Eastern Wartime, on designated days of the week as shown in the accompanying table. Importers or United States representatives of foreign firms must make offers via telegram or letter only, and must include the date of validity of the offer. Offers telegraphed will be subject to receipt of a letter of confirmation postmarked not later than midnight of the date of the offer.

Offers will be considered in force for acceptance or rejection until noon of the day following the date for which the offer was submitted. Free of all commissions and brokerage to the CCC, offers will be made (1) f. o. b. ship, point of shipment; or (2) cost and freight; or (3) cost, insurance, and freight (c. i. f.). All offers made to the Director of Foreign Purchases will be recorded, and all purchases will be made from the recorded list.

Schedule of Commodities Offered for Sale

MONDAYS	WEDNESDAYS	FRIDAYS
Babassu kernels	Babassu kernels	Babassu kernels
Babassu oil	Babassu oil	Babassu oil
Castor beans	Castor beans	Castor beans
Castor oil	Castor oil	Castor oil
Palm nuts and kernels	Palm nuts and kernels	Palm nuts and kernels
Palm oil	Palm oil	Palm oil
Palm kernel oil	Palm kernel oil	Palm kernel oil
Rapeseed oil	Rapeseed oil	Rapeseed oil
Peanut oil	Peanut oil	Peanut oil
Linseed oil	Linseed oil	Linseed oil
Cottonseed oil	Cottonseed oil	Cottonseed oil
Sunflowerseed oil	Sunflowerseed oil	Sunflowerseed oil
Cashew nut shell oil	Cashew nut shell oil	
Coconut oil	Coconut oil	
Corn oil	Corn oil	
Tallow	Tallow	
Copra	Copra	
Glycerol	Glycerol	
Cohune nuts		Cohune nuts
Neat's-foot oil		Neat's-foot oil
	Sperm oil	Muru muru kernels
	Seal oil	Tucum nuts
		Curicury nuts

Aluminum Salt Supply Increases

ALUMINUM salts shipped in the United States in 1941 increased 22 per cent in quantity and 35 per cent in value over 1940, according to the U. S. Bureau of Mines. Producers reported the shipment of 626,384 short tons valued at $17,382,675, compared with 513,520 tons valued at $12,882,578 in 1940. Shipments of aluminum sulfate, principal product of the aluminum salts industry, gained 21 per cent in 1941 compared with 1940. Sales of aluminum chloride advanced 48 per cent. Shipments of alumina in 1941, excluding that used by the aluminum industry, increased 113 per cent in quantity and 108 per cent in value over 1940.

LEO T. CROWLEY, Alien Property Custodian, has announced the seizure by his office of the holdings of Leonardo Cerini, an Italian, in R. A. C. E., Inc., of Cleveland, Ohio, a company engaged in the design and manufacture of chemical equipment.

Specify EIMER AND AMEND TESTED PURITY REAGENTS



Electrometric Titrations Employed

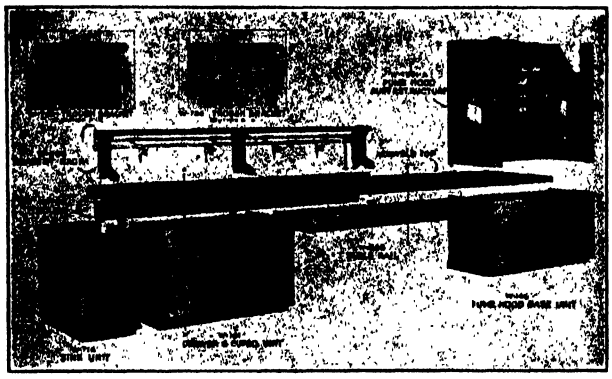
E & A Tested Purity Reagents are prepared and analyzed by the latest approved methods. They comply with the A. C. S. Specifications for purity, and the exact analysis of each lot is stated on the label.

The reliability provided by E & A Tested Purity Reagents has caused them to be adopted for analytical work in many leading laboratories.

EIMER AND AMEND

Manufacturing Chemists

635 Greenwich St., New York, N. Y., U.S.A.



Note how Kewaunee Standard Units are Assembled

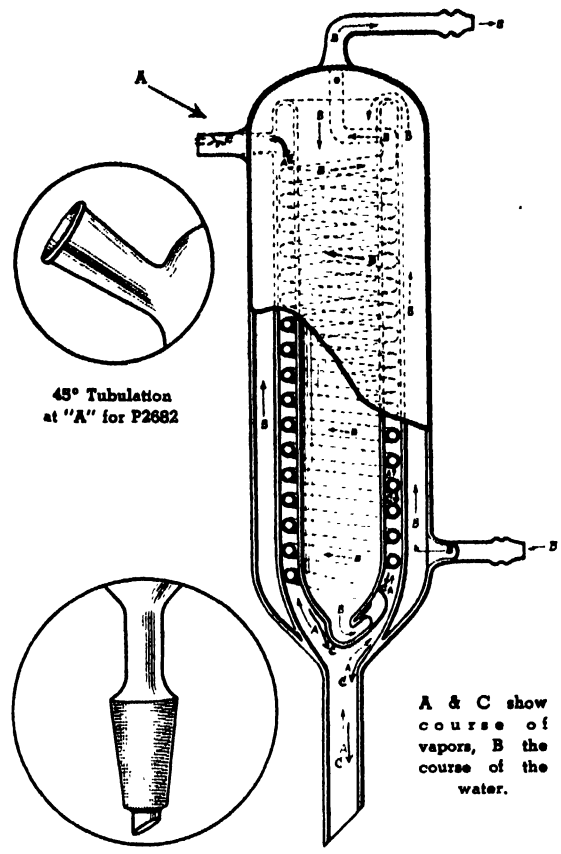
EQUIP YOUR LABORATORIES with KEWAUNEE MATCHED UNITS — and SAVE!

Investigate the Kewaunee Cut-Cost Method of producing fine quality Laboratory Furniture. See how Kewaunee smart designs, using a minimum of critical materials, meet every need and give greater working efficiency and more uniform appearance. Quick Service is possible, due to Kewaunee's Unit Construction Method. Wood now available — Steel restricted for the duration.

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P2681

THE EKERT CONDENSER

A new condenser, compact and extremely efficient which will out-perform any condenser four times its length in condensing power. Originally designed as a reflux condenser, it has also shown its adaptability as a superior vertical distillation condenser.

Especially recommended in the refluxing or distillation of volatile liquids to eliminate the use of extra long condenser of the usual type.

Experiments carried out with ether, alcohol and steam under intensified conditions not normally encountered, showed exceedingly fine results.

To test its performance as a distillation condenser, live steam was entered directly into the tubulation at the top of the 800 mm size, with the result that the condensate ran cold.

Both the reflux and distillation condenser are identically constructed, in the lengths listed below. Vapors to be condensed travel along a system of water cooled coils which are wound about a water cooled internal cylinder, all of which are finally encased in another large surfaced water cooled external cylindrical jacket. The construction permits cooling of the entire unit with one single continuous circuit of water.

Invented by Mr. W. Ekert of Fritzsche Bros., who has had long experience in reflux condensing, this condenser has already found immediate acceptance by chemists in the essential oil and soap laboratories, both for its compactness and its efficiency.

Obtainable in the following sizes:

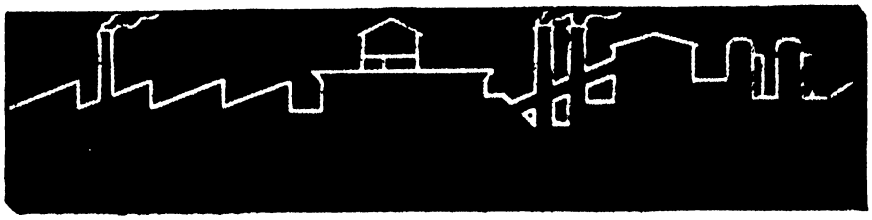
P2681	Condenser, Ekert Reflux, Made of Pyrex glass, Pat. Pending, 200 mm Jacket	$15.00
P2682	Condenser, Ekert Distillation, Pat. Pending, 400 mm Jacket	30.00

These condensers can be supplied in larger or intermediate sizes; also with standard taper or spherical connections as ordered at additional cost of the joints only.

THE EMIL GREINER COMPANY

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NEW YORK, N. Y.



Portable Water Purifier



A SELF-CONTAINED water purification unit that uses no chlorine or other chemicals has been designed by the Technicraft Engineering Co., 5610 South Soto St., Los Angeles. The unit, known as the Sterozone Model B, is light enough to be dropped by parachute in remote areas.

The unit sterilizes water, killing all bacteria, controls taste and odor, and reduces color. Advantages claimed by the manufacturer are complete water purification without use of chlorine or other chemicals now on the restricted list, automatic operation that does not require supervision by highly trained technicians, and extremely low-cost operation.

Cast Iron Grid Unit Heater

TO COOPERATE with the war effort in using substitute materials the Grid unit heater of the D. J. Murray Manufacturing Co., Wausau, Wis., is being made with cast iron instead of aluminum heating sections. Being constructed of cast iron, this new unit is also free from electrolysis that causes corrosion, leaks, and breakdowns, as only one type metal comes into contact with steam or hot water. For the present the unit will be made in eight sizes. Since it is of a special design, application for patent has been filed by the manufacturer.

Army-Navy Production Award to Bowser

THE joint Army-Navy E production award has been given to S. F. Bowser & Co., Inc., Fort Wayne, Ind., and its subsidiary, The Fostoria Screw Co., Fostoria, Ohio, for exceeding all production expectations in view of the facilities at their command.

J. F. PRITCHARD & Co. have moved their offices to 2200 Fidelity Bldg., Kansas City, Mo.

Chrome Leather Finger Cots

IN ANNOUNCING production of three chrome leather finger cots, American Optical Co., Southbridge, Mass., points out that sturdy finger protectors are more and more replacing the use of makeshift strips of gummed paper, bits of cloth, and adhesive tape.

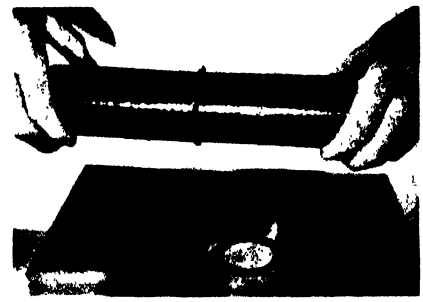
The No. 1000 chrome leather finger cot (short type) is recommended for operations in which only one or two fingers need to be protected or where there is only an intermittent finger hazard. The second type, the No. 1001 chrome leather finger cot (tie-on type), is unusually large, and can be used as a dependable protection for a finger or thumb that is bandaged. The tie-on feature makes it applicable to a wide number of uses. The No. 1688 chrome leather two finger and thumb protector is recommended for operations where several movements require finger protection while succeeding movements require the accuracy and sense of touch of a bare hand.

Army-Navy Award to Monsanto

THE Monsanto Chemical Co. has been given the highest industrial award within the granting of the Army and Navy for achievements in the production of essential war materials. Three military-naval ceremonies for the presentation of the award were held simultaneously on August 17 at the executive headquarters of the company in St. Louis and at its plants in Monsanto, Tenn., and Anniston, Ala. The company is the first in Missouri, Tennessee, and Alabama to receive the high honor. It also was the first in Missouri and Tennessee and the second in Alabama to receive the Navy E.

Saran Pipe

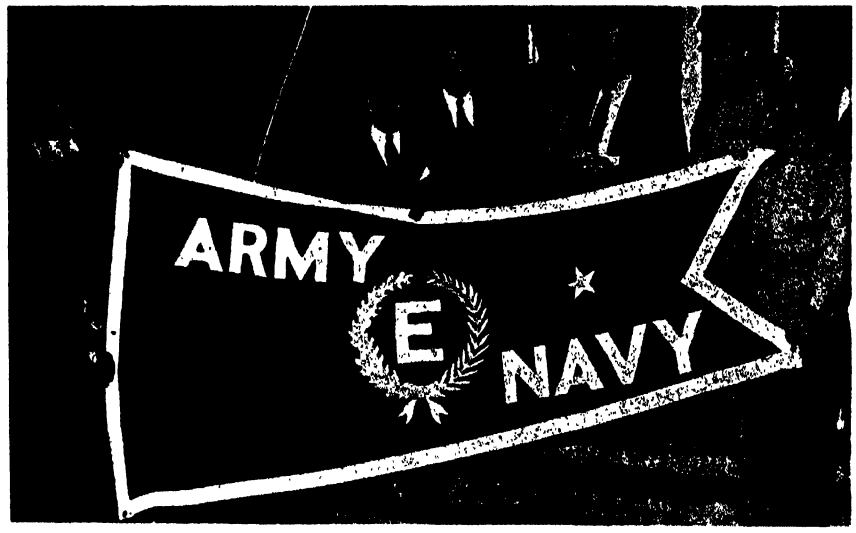
A NEW plastic pipe, manufactured in the same dimensions as extra strong steel pipe of 2-inches outside diameter or less, has been announced by the Dow Chemical Co., Midland, Mich. This pipe is entirely unaffected by water, and only a few solvents exhibit any adverse effects. It is made of the thermoplastic resin, Saran. The base resin is odorless, tasteless, and nontoxic. The plastic does not burn, and its toughness and abrasion resistance are of high order. The pipe is nonscaling and withstands freezing. Heat resistance is said to be excellent up to 175° F.



Saran pipe is produced in smooth, round, accurately sized lengths having dimensions identical with those of strong iron pipe. It can be readily welded, heated, and bent, cut with a wood or hack saw, and threaded with ordinary iron pipe dies. The weight is naturally much less than comparable sizes of iron pipe, an advantage in shipping, general handling, and suspension.

Fittings for Saran pipe, except standard flanges, are not available at present, although they are expected to follow shortly. Molds are being constructed to make additional flanges, with threaded ells, tees, and couplings to be available in the near future

CONTINUED ON PAGE 1147



Monsanto Receives Army-Navy "E"

Officials of the Monsanto Chemical Co., St. Louis, Mo., are shown here receiving the Army-Navy production award from military officers at a ceremony held at the executive offices of the company August 17. Shown left to right receiving the burgee are Edgar M. Queeny, president; Gaston DuBois, vice president, and R. R. Cole, vice president and general manager of the Phosphate Division of Monsanto. Officers are Lieutenant Commander F. E. Deam, Lieutenant Colonel E. H. Sager, and Colonel Merle H. Davis, who personally made the presentation to Mr. Queeny.



filter facts

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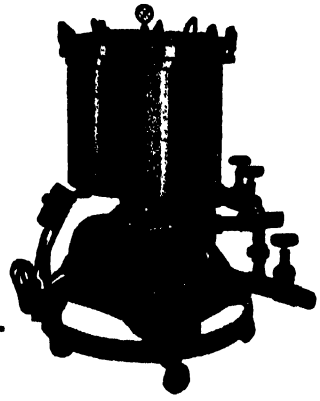
2nd — All Sparkler Filters use the exclusive horizontal plate method of filtration. The nests of Filter plates are interchangeable, taking a cake thick or thin as required, and using any of the various filter aids, diatomaceous earths, activated carbons, filter papers, wire cloths, asbestos, fuller's earths, bleaching or absorbent clays in proportions best suited for work to be done quickly and thoroughly.

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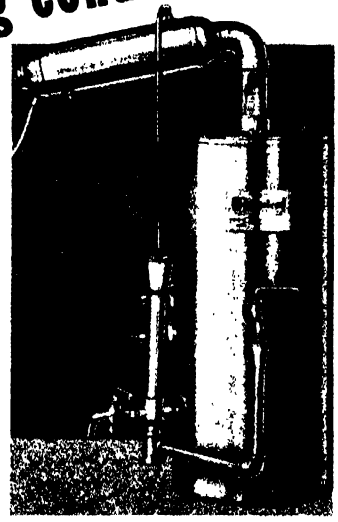
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IN the latest edition of this nationally famous textbook on industrial chemistry, the high standards set in the three previous editions have been consistently maintained. Aware of the war-imposed need for a volume which would include the latest developments in such strategically important fields as synthetic rubbers, synthetic fibers, explosives, chemical warfare and petroleum, to mention only a few, the author has been particularly painstaking in presenting these subjects completely, yet briefly, so that the reader may grasp the essential points with a minimum of effort. The greatest care has been exercised to include all material bearing on the part being played by industrial chemistry in winning the war; at the same time the thoroughness with which the fundamentals of standard practice were described in the earlier editions has not been diminished. The latest production figures are given in all the industries discussed, and the most recent developments are featured.

In line with present trends toward conservation of materials, the wordage on each page has been slightly increased, so that although the fourth edition contains the same number of pages as the third, there is actually the equivalent of 75 additional pages. In spite of this increase and of rising costs of manufacture, it has been found possible to offer this edition at a slight reduction in price. This fact is eloquent testimony to the success of its predecessors.

Besides its wide use as a text in hundreds of colleges and secondary schools throughout the Americas, this book is an indispensable requirement for reference in high schools, public libraries, and industrial laboratories. It is essential not only to the student entering upon the field of industrial chemistry, but to engineers, plant supervisors and business men who wish a quick access to the outstanding developments in fields other than their immediate interests.

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CHEMICAL MARKET PRICES

August 28, 1942

Compiled from weekly current price listings in the *Oil, Paint, and Drug Reporter*, with permission of the publisher under its copyright. These prices, unless otherwise specified, are those prevailing in the New York market for technical grades in usual large commercial quantities.

Acetaldehyde, drums, c/l., wks.	lb.	.11
Acetamide, tech., kegs, 500-lb. lots, works	lb.	.30
Acetanilide, tech., powd., bbls.	lb.	.27
Acetic anhydride, drums, c/l., frt. allowed	lb.	.11½
Acetone, C. P., drums, c/l., dlvd.	lb.	.08½
Acetophenetidin, bbls., 1000 lbs.	lb.	1.00
Acetophenone, drums, 100 lbs.	lb.	1.55
Acid, abietic, drums, c/l.	lb.	.08¾
Acetic, 28%, bbls., c/l.	100 lbs.	3.38
56%, bbls., c/l.	100 lbs.	5.58
Glacial, synth., drums, c/l.	100 lbs.	9.15
Glacial, U. S. P., drums, works	100 lbs.	10.95
Acetylsalicylic, U. S. P., bbls.	lb.	.40
Anthranilic, tech., bbls.	lb.	.95
Battery, cbys., c/l., E. wks.	100 lbs.	1.60
Benzoic, tech., bbls.	lb.	.43
Boric, tech., gran., bags	ton	99.00
Butyric (99%), drums, c/l., wks.	lb.	.22
Chloroacetic, mono-, tech., bbls. wks.	lb.	.17
Chlorosulfonic, drums, c/l., wks.	lb.	.03
Chromic, 99%, drums	lb.	.16¼
Cinnamic, bottles	lb.	3.50*
Citric, cryst., bbls., c/l.	lb.	.20
Cresylic, H. B., 210–215°, drums, c/l., wks., frt. equal	gal.	.81
Formic, 90%, cbys., f. o. b. works, c/l.	lb.	.10½
Gallic, tech., bbls.	lb.	1.10
Hydriodic, 57%, 5-lb. bot.	lb.	2.90
Hydrobromic, 34%, cbys.	lb.	.35
Hydrochloric, 20°, tank, wks.	100 lbs.	1.75
Hydrofluoric, 30%, bbls., wks.	lb.	.06
60%, lead cbys.	lb.	.14
Hydrofluosilicic, 30%, bbls., wks.	lb.	.09
Hypophosphorus, U. S. P., 30%, 5-gal. demis	lb	75
Lactic, dark, 22%, bbls.	100 lbs.	2.90
Light, 22%, bbls., wks.	100 lbs.	3.90
Maleic, powd., drums	lb.	.30
Mixed, tanks, wks.	N unit, lb.	.05
	S unit, lb.	.0085
Naphthenic, 220–230, drums	lb.	.13
Nitric, C. P., cbys.	lb.	13
36°, cbys., c/l., wks.	100 lbs.	5.00
Oxalic, bbls., wks.	lb.	.11¼
Phosphoric, U. S. P., 50%	lb.	.10½
Picramic, kegs	lb.	.65
Picric, bbls.	lb.	.35
Pyrogallic, tech., bbls.	lb.	1.45
Salicylic, tech., bbls.	lb.	33
Stearic, distilled, d. p., bags, dlvd.	lb.	.14
Sulfanilic, tech., 250-lb. bbls.	lb.	.17
Sulfuric, 66°, cbys., c/l., E. wks.	100 lbs.	1.50
66°, tanks, E. wks.	ton	16.50
60°, tanks, E. wks.	ton	13.00
Oleum, 20%, tanks, E. wks.	ton	19.50
Tannic, tech., bbls.	lb.	.71
Tartaric, U. S. P., cryst., bbls.	lb.	.70½
Tungstic, pure, 100-lb. pkg.	lb.	2.80
Alcohol, ethyl, 190 proof, from molasses, drums, c/l.	gal.	8.19
Amyl, from pentane, tanks	lb.	.131
Butyl, normal, tanks, frt. allowed	lb.	.12½
Cinnamic, bottles	lb.	3.00
Denatured, C. D. 14, drums, c/l., wks., E	gal.	.65
Diacetone, tech., drums, c/l.	lb.	.11
Furfuryl, tech., drums, c/l., wks.	lb.	.20
Isobutyl, ref., drums, works	lb.	.0860
Alcohol, isopropyl, ref., 91%, drums, c/l., f. o. b. dest.	gal.	.40½
Wood, *see* Methanol		
Aldol, 95%, drums, c/l., wks.	lb.	.12
Alpha-naphthol, bbls.	lb.	.52
Alpha-naphthylamine, bbls.	lb.	.32
Alum, ammonia, lump, bbls., wks.	100 lbs.	4.25
Chrome, bbls.	lb.	.12½
Potash, lump, bbls., wks.	100 lbs.	4.50
Soda, bbls., wks.	100 lbs.	3.25
Aluminum, metal, 98–99%, drums, c/l.	lb.	.15
Chloride, anhyd., commercial, drums extra, c/l., wks.	lb.	.08
Stearate, bbls., c/l.	lb.	.23
Sulfate, comm'l, bags, c/l., wks., frt. equal	100 lbs.	1.15
Iron-free, bags, wks.	100 lbs.	1.75
Ammonia, anhydrous, fertilizer, f. o. b. wks., frt. equalized	ton	90.00
Pure, cyls.	lb.	.16
Ammonia, aqua, 26°, tanks (on NH_3 content), f. o. b. wks.	lb.	.04
Ammonium bicarbonate, drums	lb.	.0564
Bifluoride, bbls.	lb.	.16
Bromide, bbls.	lb.	.31
Carbonate, tech., bbls.	lb.	.08¼
Chloride, gray, bbls.	100 lbs.	5.50
U. S. P., gran., bbls.	lb.	.10
Iodide, 25-lb. jars	lb.	3.65
Linoleate, 80%, anhyd., bbls.	lb.	.12
Nitrate, tech., bags, c/l., wks.	100 lbs.	4.35
Oleate, bbls.	lb.	.14
Oxalate, kegs	lb.	.23
Persulfate, cases	lb.	.25½
Phosphate, dibasic, tech., bbls.	lb.	.07¼
Sulfate, bulk, c/l., f. o. b. cars, ports contract	ton	29.20
Sulfide, liq. 40–45%, basis 100%, tanks, dlvd.	lb.	.07½
Amyl acetate, from pentane, tanks, frt. allowed	lb.	.14½
Chloride, mixed, tanks, wks.	lb.	.06
Mercaptan, drums, l. c. l., wks.	lb.	1.10
Oleate, drums, l. c. l., wks.	lb.	.31
Stearate, drums, l. c. l., wks.	lb.	.32½
Amylene, tanks, wks.	lb.	.09
Anilin oil, drums	lb.	.15
Anthraquinone, subl., bbls.	lb.	.70
Antimony, chloride, soln., cbys.	lb.	.17
Needle, Bolivian, 67%	lb.	.18½
Oxide, bags, c/l.	lb.	.15
Salts, 65%, bbls.	lb.	.40
Argols, test 75–80%, basis 100%, f. o. b. Spanish ports	100 kilos	105.00
Arsenic, metal, kegs	lb.	No prices
White, c/l., kegs	lb.	.04
Arsenous chloride, cans	lb.	4.85
Barium carbonate, natural, 99%— 200 mesh, bags, c/l., wks.	ton	43.00
Chloride, tech., cryst., bgs., c/l.	ton	77.00
Dioxide, drums, wks.	lb.	.10
Hydroxide, bbls., wks.	lb.	.06
Nitrate, casks	lb.	.11
Barytes, floated, 350-lb. bbls., wks.	ton	27.65
Benzaldehyde, tech., drums	lb.	.45
Benzidine base, bbls.	lb.	.70
Benzol, tanks, frt. allowed E. of Omaha	gal.	.15
Benzoyl chloride, carboys	lb.	.23
Benzyl acetate, F. F. C., drums	lb.	.59*
Beta-naphthol, tech., bbls.	lb.	.23
Beta-naphthylamine, tech., kegs	lb.	.51
Bismuth, metal, ton lots	lb.	1.25
Bismuth nitrate, cans	lb.	1.30
Oxychloride, kegs	lb.	3.10
Subnitrate, powd., barrels	lb.	1.20
Blanc fixe, dry, bags, c/l.	ton	60.00
Bleaching powder, drums, wks.	100 lbs.	2.25
Bone black, 4, bbls., c/l., frt. allowed E	lb.	.11
Borax, tech., gran., bulk, c/l., frt. allowed	ton	41.50
Bordeaux mixture, drums	lb.	.11
Bromine, cases	lb.	.25
Bromoform, cbys.	lb.	1.42
Butyl acetate, drums, c/l., frt. allowed	lb.	.14½
Aldehyde, drums, l. c. l.	lb.	.16½
Lactate, drums	lb.	.26½
Stearate, drums	lb.	.31
Cadmium, metal, ingots, cases	lb.	.90
Bromide, 25-lb. jars	lb.	1.65
Sulfide, boxes	lb.	1.10*
Caffeine, 100-lb. drums, 10,000 lbs. or more	lb.	2.60
Calcium acetate, bags	100 lbs.	3.00
Arsenate, bgs., c/l.	lb.	.07
Carbonate, precip., bags, 50 lbs., c/l., wks.	lb.	.02¾
Chloride, bags, flake, c/l., dlvd.	ton	18.50
Gluconate, U. S. P., bbls., 150 lbs.	lb.	.52
Phosphate, dibasic, 38–40% P_2O_5, bags, Atlan. pts.	unit-ton	No prices
Tribas, bbls.	lb.	.0635
Calomel, bbls., kegs, 50 lbs. or more	lb.	2.95
Camphor, synthetic, gran., powd., drums, ton lots	lb.	.42
Carbazole, 95%, drums, ton lots, wks.	lb.	.70
arbon bisulfide, drums, c/l.	lb.	.05
Black, reg., uncomp., bgs., c/l., works	lb.	.03625
Dioxide, liq., cyl.	lb.	.06
Tetrachloride, drums, c/l., frt. allowed	gal.	.73
Casein, dom., 20–30 mesh, bags, c/l.	lb.	.18½
Cerium oxalate, bbls., wks.	lb.	.35
Charcoal, willow, powd., bbls.	lb.	.06
China clay, bulk, c/l., wks.	ton	7.00
Chloral hydrate, drums	lb.	.90
Chlorine, liq., c/l., cyl., dlvd.	lb.	.05¼
Tanks, wks., frt. equal	100 lbs.	1.75
Chlorobenzene, mono-, drums	lb.	.07
Chloroform, tech., drums	lb.	.20
Chromium acetate, 24%, powd., bbls.	lb.	.22
Coal tar, crude, bbls., c/l., wks.	bbl.	8.25
Cobalt oxide, black, kegs	lb.	1.84
Copper carbonate, 52–54%, bbls.	lb.	.18
Chloride, bbls.	lb.	.23¼
Cyanide tech., bbls.	lb.	.34
Metal, elec.	lb.	.12
Oxide, black, bbls., tons, wks.	lb.	.19½
Sulfate, bbls., c/l., wks.	100 lbs.	5.15
Copperas, cryst., bulk, c/l., wks.	ton	14.00
Cream of tartar, bbls.	lb.	.57½
Cresol, U. S. P., drums, c/l., wks.	lb.	.10¾
Crotonaldehyde, 97%, c/l., wks.	lb.	.15
Cyanamide, 21% N, pulvd., works, contracts	unit-ton	1.52½*
Diamylamine, drums, c/l., wks.	lb.	.61
Diamylene, tanks, wks.	lb.	.09½
Diamyl phthalate, tanks	lb.	.21
Diatomaceous earth, dom., bags, c/l., Pacific Cst.	ton	22.00

Dibutylamine, drums, l. c. l., wks.	lb.	.64
Dibutylphthalate, drums, c/l., dlvd.	lb.	.21
Tartrate, drums	lb.	.92
Dichloroethyl ether, drums, c/l., wks.	lb.	.15
Diethanolamine, drums, c/l., wks.	lb.	.23½
Diethylaniline, drums	lb.	.40
Diethyleneglycol, drums, c/l., wks.	lb.	.14
Monobutyl ether, drums, wks.	lb.	.22½
Monoethyl ether, drums, c/l., wks.	lb.	.14½
Diethyl phthalate, drums, c/l.	lb.	.22
Sulfate, tech., drums, wks	lb.	.15
Diglycol oleate, light, bbls	lb.	.17
Dimethylaniline, drums	lb.	.23
Dimethyl phthalate, drums, c/l., dlvd	lb.	.20
Dinitrobenzene, tech., drums	lb.	.18
Dinitrochlorobenzene, bbls	lb.	.14
Dinitronaphthalene, bbls	lb.	.35
Dinitrophenol, bbls	lb.	.22
Diphenyl, bbls., c/l, wks	lb.	.15
Diphenylamine, bbls	lb.	.25
Diphenylguanidine, bbls	lb.	.35
Epsom salt, tech., bags	100 lbs.	1.80
Ether, concn., drums	lb.	.11
Nitrous, bots, 100 lbs	lb.	.93
Ethyl acetate, 85-90%, tanks, frt. allowed	lb.	.11
Acetoacetate, drums, c/l., wks.	lb.	.37½
Bromide, drums	lb.	.50
Chloride, drums	lb.	.18
Formate, drums	lb.	.27¾
Methyl ketone, drums	lb.	.09
Ethylene dichloride, drums, c/l., wks., frt. allowed	lb.	.0742
Glycol, drums, c/l.	lb.	.14½
Monobutyl ether, drums, wks.	lb.	.16½
Monoethyl ether, drums, wks.	lb.	.14½
Monoethyl ether acetate, drums, wks.	lb.	.11½
Monomethyl ether, drums, wks.	lb.	.15½
Feldspar, 20 mesh, bulk, wks	ton	9.75
Film scrap colors, dk., cs., 1000 lbs., E. wks.	lb.	.13½
Fluorspar, 95%, bags, f. o. b. mines	ton	34.00
Formaldehyde, bbls., c/l.	lb.	.05½
Fuller's earth, bags, c/l., mines	ton	8.50
Furfural, tech., drums, contract, works	lb.	.10
Glauber's salt, bbls., c/l.	100 lbs.	1.05
Glycol phthalate, drums	lb.	.38
Stearate, drums	lb.	.26
Hexamethylenetetramine tech., drums	lb.	.32
Hydrogen peroxide, 100 vol., cbys., c/l	lb.	.16
Hydroquinone, kegs	lb.	.90
Indigo, synth., liq., bbls	lb.	.16½
Iodine, resubl., jars	lb.	2.00
Iodoform, drums, 100 lbs	lb.	3.95
Iron acetate, N. F. IV, cbys	lb.	.15
Iron chloride, tech., cryst., bbls., wks., frt. allowed	lb.	.05
Isopropyl acetate, tanks, frt. allowed	lb.	.10
Lead acetate, white, broken	lb.	.12½
Arsenate, bbls	lb.	.11
Metal, N. Y	lb.	.0650
Oxide, litharge, bbls, 20-ton lots	lb.	.0790
Peroxide, powd., tech	lb.	.23
Red, bbls., 20-ton lots	lb.	.09
Sulfate, bbls	lb.	.0725
White, basic carb., bbls	lb.	.0825
Lecithin, edible, drums, c/l	lb.	.34
Tech., drms., c/l	lb.	.28
Lime, lime, chemical, bulk, wks.	ton	7.00
Lime-sulfur, dry, bags, c/l	lb.	No prices
Lithopone, ordinary, bbls	lb.	.04½
Magnesite, calcined, dom., bags	ton	84.00
Magnesium carbonate, tech., bags, c/l	lb.	.06¼
Chloride, drums	ton	32.00
Fluosilicate, cryst., bbls	lb.	.18
Oxide, light, bbls	lb.	.26
Manganese chloride, bbls	lb.	.14*
Dioxide, 85-90%, bbls., c/l., wks.	ton	74.00
Sulfate, anhyd., bbls., wks	lb.	.11¼
Mannitol, commercial, bbls., wks.	lb.	.35
Menthol, nat., cans	lb.	13.00
Mercury bichloride, cryst., drums, 50 lbs. or more	lb.	2.39
Mercury, flasks, 76 lbs., mines	flask	191.00
Meta-phenylenediamine, kegs	lb.	.65
Meta-toluylenediamine, kegs	lb.	.70
Methanol, synthetic, drums, frt. allowed, c/l	gal.	.34½
Tanks, frt. allowed	gal.	.28
Methyl acetate, 97-99%, tanks	gal.	.09½
Chloride, cylinders	lb.	.32
Formate, l. c. l., drums	lb.	.89
Hexylketone, drums, tech., wks.	lb.	.60
Salicylate, drums	lb.	.35
Monoamylamine, drums, c/l., wks.	lb.	.61
Monobutylamine, drums, l. c. l., wks.	lb.	.51
Monoethanolamine, drums, wks.	lb.	.24
Naphthalene, crude, dom., 74 deg., bags, c/l., wks.	100 lbs.	2.75
Nickel salt, single, bbls.	lb.	.13
Niter cake, bulk	ton	16.00
Nitrobenzene, drums	lb.	.08
Nitrocellulose, alcohol-sol., bbls., wks.	lb.	.28
Nitromethane, drums, l. c. l., wks.	lb.	.25
Octanol, normal, drums	lb.	.85
Oil, castor, No. 3, tanks	lb.	.12¾
China wood, dms.	lb.	.39
Coconut, crude, tanks	lb.	.0835
Cod, Newf., bbls.	gal.	.90
Corn, crude, tanks, mills	lb.	.12¾*
Cottonseed, cooking, bbls.	lb.	.16¾
Linseed, raw, tanks	lb.	.1240
Menhaden, crude, tanks, f. o. b. Baltimore	gal.	.0890
Neat's-foot, pure, bbls.	lb.	.19¼
Oiticica, bbls.	lb.	.25
Oleo, No. 1, bbls.	lb.	.13¼
Olive oil, denat., bbls.	gal.	3.75
Edible, Calif., drums	gal.	4.10
Palm, Niger, bbls.	lb.	.0825
Peanut, crude, tanks	lb.	.12⅞
Perilla, drums	lb.	.2450
Rapeseed, denatured, c. i. f.	gal.	.1150
Red, bbls.	lb.	.11¾
Soy bean, crude, tanks	lb.	.12*
Sperm, 38°, bbls.	lb.	.1301
Whale, bbls., natural, refined	lb.	.1070*
Ortho-dichlorobenzene, drums	lb.	.06
Ortho-nitrochlorobenzene, kegs	lb.	.15
Ortho-nitrotoluene, drums	lb.	.09
Ortho-toluidine, bbls.	lb.	.19
Para dichlorobenzene, drums, c/l.	lb.	.11
Para-formaldehyde, drums	lb.	.23
Paraldehyde, tech., drums	lb.	.12
Para-nitraniline, drums	lb.	.45
Para-nitrochlorobenzene, drums	lb.	.15
Para-nitrotoluene, bbls.	lb.	.30
Para-phenylenediamine, bbls.	lb.	1.25
Para-toluidine, bbls.	lb.	.48
Paris Green, 250-lb. kegs	lb.	.24
Perchlorethylene, drums, c/l., wks.	lb.	.09
Phenol, drums, c/l., wks.	lb.	.12½
Phenolphthalein, yellow, drums, ton lots	lb.	.80
Phenylethyl alcohol, bottles	lb.	2.10
Phloroglucinol, tech., tins, wks.	lb.	15.00
c. p., tins, wks.	lb.	20.00
Phosphorus, red, cases	lb.	.40
Oxychloride, 175-lb. cylinders	lb.	.15
Trichloride, cyl.	lb.	.15
Phthalic anhydride, bbls., c/l.	lb.	.14½
Platinum, metal, solid	os.	36.00
Potash, caustic, solid, drums	lb.	.06¼
Potassium acetate, tech., bbls.	lb.	.28
Bicarbonate, gran., bbls.	lb.	.19
Bichromate, casks, c/l., wks.	lb.	.09½
Bromide, U. S. P., gran., bbls.	lb.	.27
Carbonate, 80-85%, calc., casks.	lb.	.06½
Chlorate, cryst., kegs	lb.	.11*
Chloride, tech., cryst., bgs.	lb.	.08*
Cyanide, drums	lb.	.55
Meta-bisulfite, bbls.	lb.	.18
Muriate, fert., bulk	K2O unit	.53½
Permanganate, tech., drums	lb.	.19¾
Prussiate, red, bbls.	lb.	.70
Yellow, casks	lb.	.17
Pyridine, denat., drums	gal.	1.71
Pyrocatechin, c. p., drums	lb.	2.15
Quinine, 100-oz. cans	oz.	.97½
Resorcinol, tech., kegs	lb.	.68
Rochelle salt, powd., bbls.	lb.	.43½
Saccharin, drums	lb.	1.45
Salt cake, bulk, wks.	ton	15.00
Saltpeter, gran., bbls.	100 lbs.	8.20
Silica, amorph., 96%, 325 mesh, bags, c/l., wks.	ton	17.00
Silver nitrate, vials	os.	.26½
Soda, ash, 58%, light, paper bags, contract, wks.	100 lbs.	1.05
Caustic, 76%, solid, drums, contract, wks.	100 lbs.	2.30
Sodium acetate, flake, 60%, bbls.	lb.	.05
Alginate, drums	lb.	.79
Antimoniate, bbls.	lb.	.15
Benzoate, U. S. P., bbls.	lb.	.46
Bicarbonate, U. S. P., powd., bbls., c/l., wks.	100 lbs.	1.85
Bichromate, c/l., wks.	lb.	.07½
Bisulfite, bbls.	100 lbs.	3.00
Bromide, U. S. P., bbls.	lb.	.27
Chlorate, cryst., bags	lb.	.06¼
Chloride, bags	ton	15.70
Cyanide, 96-98%, dom., drums	lb.	.14
Fluoride, white, 90%, bbls., c/l., frt. alld.	lb.	.08
Metallic, untrimmed bricks, drums, f. o. b. Niagara Falls	lb.	.15½
Metasilicate, gran., bbls.	100 lbs.	2.50
Naphthionate, bbls.	lb.	.50
Nitrate, crude, bulk, works	ton	27.00
Nitrite, bbls.	lb.	.06¾
Perborate, bbls.	lb.	.14¾
Phosphate, disodium, cryst., bags, c/l., wks.	100 lbs.	2.55
Phosphate, trisodium, bags, c/l., wks.	100 lbs.	2.70
Picramate, kegs	lb.	.65
Prussiate, yellow, bbls.	lb.	.11
Silicate, drums, c/l., 40°	100 lbs.	.80
Silicofluoride, dom., bbls.	lb.	.09
Stannate, drums	lb.	.33½
Sulfate, anhyd., bags	100 lbs.	1.70
Sulfide, cryst., bbls.	100 lbs.	2.40
Solid, 60%	100 lbs.	3.15
Sulfocyanide, c. p., bbls.	lb.	.55
Thiosulfate, reg., cryst., bgs.	100 lbs.	2.25
Tungstate, tech., kegs	lb.	No prices
Strontium carbonate, tech., bbls.	lb.	.25*
Nitrate, bbls.	lb.	.07¾
Sulfur, bulk, mines	ton	16.00
Chloride, drums	lb.	.03
Dioxide, commercial, cyl., wks.	lb.	.07
Tetrachloroethane, 50-gal. drums	lb.	.08
Thiocarbanilid, bbls.	lb.	.24
Tin, Straits	lb.	.52
Crystals, bbls.	lb.	.39
Oxide, bbls.	lb.	.55
Tetrachloride, anhydrous, drums, bbls.	lb.	No price
Titanium dioxide, bags	lb.	.14¾
Toluene, tanks	gal.	.28
Triamylamine, drums, c/l., wks.	lb.	.98
Triamylborate, drums, l. c. l., wks.	lb.	.33
Tributylamine, drums, c/l., wks.	lb.	.78
Trichloroethylene, drums, wks, frt. allowed	lb.	.08
Tricresyl phosphate, tech., drums.	lb.	.25
Triethanolamine, drums, c/l., wks.	lb.	.19
Triphenyl phosphate, barrels	lb.	.31
Tungsten, tech., powder	lb.	2.60
Urea, dom., 46 + % N., bags, f. o. b. wks. or seaboard	ton	80.00
Vanillin, 25-lb. tins	lb.	2.35
Whiting, comm., dry-grd., bags, c/l., wks.	ton	18.00
Xylene, 10°, tanks	gal.	.30
Xylidine, drums	lb.	.35
Zinc ammonium chloride, bbls.	lb.	.0565
Chloride, tech., fused, drums	lb.	.05
Dust, bbls., c/l.	lb.	.1035
Metal slabs, at N. Y.	lb.	.0865
Oxide, Amer., bags	lb.	.0725
Stearate, tech., bbls.	lb.	.30
Sulfate, cryst., bgs., c/l., wks.	100 lbs.	3.60

* Nominal.

EMPLOYMENT INFORMATION

RATES to be paid in advance. Standard setting 5c a word, minimum charge $2.00 each; include 8 words for box address. Exceptions see ⟶ Display, $10.00 per column inch 2 inches maximum, larger units at regular display unit rates. No discounts or allowances.
SEND advertisements with remittance to INDUSTRIAL AND ENGINEERING CHEMISTRY, 332 West 42nd St., New York, N. Y., to reach there not later than 10:00 A.M. on the 10th and 25th, closing dates for editions of CHEMICAL and ENGINEERING NEWS of the 25th and 10th, respectively. Insertions made in order of receipt provided necessary remittances are complete.
EMPLOYERS are requested to mention in their announcements the section of the country in which the open position is located to ensure replies only from those who are geographically available.
In printing these advertisements the SOCIETY assumes no obligations as to qualifications of prospective employees or responsibility of employers.

UNEMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking employment for themselves are allowed in one calendar year 3 announcements free (one per issue) set in standard style and limited to 50 words each, including 8-word box address, and 3 additional standard announcements at 50% of regular rate. Further announcements and excess words at full rate.

EMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking new positions are permitted 3 standard announcements during the calendar year at 50% of the regular rate—include 8 words for box address.

EMPLOYERS seeking chemists and chemical engineers are permitted 3 standard announcements, not to exceed 50 words each including box address and not more than one per issue, during the calendar year without charge, provided they agree in writing to acknowledge all replies (excess words 5c each), otherwise full rate applies.

The AMERICAN CHEMICAL SOCIETY is vitally interested in the welfare of its members and in seeing that the chemical industry is manned with competent chemists and chemical engineers. These pages are part of our service in that connection. In addition most of the larger sections of the AMERICAN CHEMICAL SOCIETY and several of the smaller ones have active employment committees. Local section secretaries in your area will inform you as to any employment aids that may be available locally.

An Employment Clearinghouse is operated at each national meeting of the SOCIETY for the purpose of bringing together representatives of industry looking for chemists and members and student affiliates in attendance wishing to make such contacts. For further details, consult the preliminary and final programs as printed in the NEWS EDITION prior to each meeting.

In the New York area, special employment facilities are offered by the Employment Bureau of the Chemists' Club, 52 East 41st St., New York, N. Y. In the Chicago area, the Chicago Section maintains an employment service at 505 N. Michigan Avenue, Chicago, Ill.

Those replying to announcements should be careful to send copies and not original documents. Advertising circulars will not be forwarded and to that end all letters will be opened at the forwarding office.

SITUATIONS OPEN

Those announcements in which the letter "P" is part of the address key have paid in full and are not committed to acknowledge replies. The Society regards acknowledgment by employers of all applications as an act of common courtesy but can assume no responsibility for their failure to do so.

EXECUTIVES, CHEMICAL ENGINEERS AND CHEMISTS with exceptional backgrounds of experience should use our confidential and individual method of contacting responsible employers. No limit to territory. We negotiate all overtures. Established 1915. The National Business Bourse, 20 W. Jackson Blvd., Chicago, Ill.

CHEMICAL ENGINEER excellent opportunity for man of outstanding qualifications in research laboratories located in the East. Please submit college record, experience, accomplishments, and small photo.
Box 75–TP–7, Ind. & Eng. Chem., Easton, Pa.

CHEMIST with good basic training and initiative, for work in dye laboratory in conjunction with production dyeing of stock and piece goods. Experience as dyer desirable but not essential. Must have good "color eye" and knowledge of color matching. In reply give full particulars of training, experience, draft status and salary desired. Eastern location.
Box 12–N–8, Ind. & Eng. Chem., Easton, Pa.

FOOD TECHNOLOGIST. Applications will be welcomed from men with outstanding records to serve as junior chemists in eastern Research Laboratory. Prospects for advancement excellent for men of right qualifications. Please submit record of training and experience, personal history and recent small photo.
Box 76–TP–7, Ind. & Eng. Chem., Easton, Pa.

WANTED—GRADUATE Chemist with laboratory and plant experience in paper coating. Location Middle West.
Box 28–NP–8, Ind. & Eng. Chem., Easton, Pa.

EDITORIAL ASSISTANT on Chemical and Engineering News to do editing, some rewriting, caption writing, proofreading, production details, and general office work. Several years' college training in journalism and chemistry desired, as well as a knowledge of typewriting and preferably of stenography. State qualifications fully and submit photo. Apply to Industrial and Engineering Chemistry, P. O. Box B, Woods Hole, Mass.

WANTED GRADUATE Chemist with experience in water paste and powder paints.
Box 66–NP–8, Ind. & Eng. Chem., Easton, Pa.

A CHEMICAL SALES organization handling chemical specialties used by numerous defense industries has an opening in New England for a salesman with a degree in chemistry. Opportunity to acquire part interest in organization. Give draft status, availability, education and sales experience.
Box 14–T–8, Ind. & Eng. Chem., Easton, Pa.

WANTED: ORGANIC Chemist by College for women located in South. M.S required, Ph.D. preferred. Rank and salary dependent on qualifications. Woman desired but will consider man. State qualifications and salary expected.
Box 37–T–8, Ind. & Eng. Chem., Easton, Pa.

CHEMIST CAPABLE of undertaking basic research work on textile fibres. Also technically trained graduate interested in textile development work. Excellent opportunities with well known New England textile company. Salary commensurate with ability and experience. Give all pertinent information and enclose recent photograph.
Box 43–TP–8, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER wanted by Mid-West manufacturer of refinery and gasoline plant equipment. Prefer man with operating or design experience. Permanent position open in company handling only high priority business. Reply stating training, experience, salary and include recent photograph. All replies confidential.
Box 49–T–8, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST with Bachelor or Master degree, desired in research laboratory of food manufacturer located in the East. Opportunity for man with sound training and superior college record. Supply details concerning training, experience, personal history and small photo.
Box 51–TP–8, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER or chemist interested in control and development work leading to plant supervisory positions; large plant, Aggressive Company, producing roofing felt, granules, asphalt roofing and asphalt specialties. Give details of education and past experience. Personnel Director, The Flintkote Company, New Orleans, Louisiana.

GRADUATE ASSISTANTSHIP, half time, in General Chemistry; woman's college near New York City; prefer woman with master's degree planning graduate work in New York City colleges. Salary $800–1000. Give details of education and experience.
Box 74–T–8, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, B.S. in chemistry wanted for chemical laboratory in Niagara Falls, New York. Address: The Carborundum Company, Service Department, Niagara Falls, N. Y.

CHEMIST with some petroleum experience. Needed in Chicago area for development of petroleum products and rust preventives. State age, draft status, degree, and salary desired in opening letter.
Box 79–TP–8, Ind. & Eng. Chem., Easton, Pa.

CHEMIST to take charge of laboratory analyzing tool, stainless and special steels and alloys, part of time required for research work. In replying give full information concerning age, training, experience, family status, health, etc.
Box 10–NP–9, Ind. & Eng. Chem., Easton, Pa.

MIDWESTERN RESEARCH institution has opening for young woman, B.S., M.S., for bacteriological and analytical chemical work. Also open position for physical chemist, male, Ph.D. Give full details of training, experience, personal data, photograph and salary desired. Armour Research Foundation, 35 W. 33rd Street, Chicago.

CHEMISTRY TEACHER wanted. Must be able to teach elementary college physics courses. Position to be filled by September 20. Stockton Junior College, Stockton, California.

WANTED—EXPERIENCED chemical and metallurgical engineer capable of setting up new product research department for Western New York manufacturer. Excellent opportunity for right man. Write giving education, experience, references and salary requirements.
Box 15–NP–9, Ind. & Eng. Chem., Easton, Pa.

WANTED: CHEMICAL superintendent also a graduate chemist or engineer both with several years' recent experience in chemical operations, to work under manager in directing several inorganic heavy chemical operations all in same location. Experience with chemical equipment also in increasing production and efficiencies required. Residence at plant in South. Give full particulars as to education, experience and salary expected. Opportunity for good men.
Box 16–NP–9, Ind. & Eng. Chem., Easton, Pa.

WANTED—GRADUATE chemist, research experience with drying and semi-drying oils. Extensive knowledge of analytical oil determinations required.
Box 17–NP–9, Ind. & Eng. Chem., Easton, Pa.

CHEMIST WANTED: preferably in the field of metallic soaps, though a broad knowledge of organic may be substituted. Should be capable of research and development. Permanent position, aggressive concern, Ohio location. In reply state salary desired, draft status and education in detail.
Box 20–N–9, Ind. & Eng. Chem., Easton, Pa.

RUBBER CHEMIST, experienced in rubber laboratory. Should be recent graduate chemist or chemical engineer. Non-graduate with several years' experience will do if possesses initiative. State age, experience, draft status, salary desired, education, etc. Chicago section.
Box 22–N–9, Ind. & Eng. Chem., Easton, Pa.

WANTED—GRADUATE chemist for production and quality control. Successful American crude drug subsidiary in Buenos Aires. Selective Service deferment necessary. Give details of educational training, commercial experience, references and availability.
Box 23–NP–9, Ind. & Eng. Chem., Easton, Pa.

CHEMISTS, MALE or female for routine inspection and analysis on food products. Modern laboratories located in Mid-west.
Box 24–NP–9, Ind. & Eng. Chem., Easton, Pa.

CHEMIST or CHEMICAL Engineer wanted by laboratory supply house to travel Baltimore, Washington and Richmond territory. State education, experience and salary expected.
Box 47–NP–9, Ind. & Eng. Chem., Easton, Pa.

(See Box 50–NP–9 on p. 1148)

CHEMIST or CHEMICAL Engineer whose recent basic training in inorganic, organic and physical chemistry fits him for analytical and research work in problems dealing with the process industries. Prefer a recent graduate with B.S. or M.S. degree. Experience not essential. Include all personal reference data and recent photo in first letter. Woman would be considered.
Box 52–NP–9, Ind. & Eng. Chem., Easton, Pa.

GODCHAUX Sugars, Inc., New Orleans, La., desires chemist or chemical engineer for development work on by-products. Experience in plastics, fermentation, or lignin desirable. Position offers opportunity for man with initiative and practical ability. Give full information, references, photograph.
Box 53–NP–9, Ind. & Eng. Chem., Easton, Pa.

RESEARCH and DEVELOPMENT chemist experienced in paper and protective coatings, adhesives, and allied material. Excellent future. State complete qualifications, salary and when available. P. O. Box 23, Louisville, Kentucky.

(Continued on page 1146)

Address communications to the box number indicated and Mail to Easton, Penna.

The American Chemical Society has no information concerning the position advertised, or in regard to those seeking employment.

(Situations Open Continued)

EXCELLENT OPPORTUNITY in industry for a man with electro-chemical training, preferably Electro plating. Must have degree from recognised college or university. Married man with dependents preferred. All information will be held strictly confidential.
Box 58–N–9, Ind. & Eng. Chem., Easton, Pa.

PLASTICS-RESIN chemist needed for midwest manufacturer phenolic molding, plywood, adhesive resins. Thorough experience in formulation, production, and evaluation essential. Ability to demonstrate in customers' plants and knowledge of aminoplasts, polystyrene and other plastics also desirable. Send full particulars in first reply including details of academic training, industrial experience, salary expected, draft status and snapshot.
Box 60–N–9, Ind. & Eng. Chem., Easton, Pa.

PHARMACEUTICAL CHEMIST. Acquainted with analytical and control procedure for established pharmaceutical house in the New York area. State full details.
Box 62–NP–9, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, American born, wanted for literature work in a library connected with a petroleum research laboratory situated in the Chicago area. Applicant must be thoroughly grounded in organic and physical Chemistry; and she should be able to read German and to type.
Box 63–NP–9, Ind. & Eng. Chem., Easton, Pa.

WANTED: Chemist, deferred on account of age or dependents, with sufficient education and experience to hold position as Chief Chemist in cement plant in California. Must have analytical ability. Some knowledge of chemical engineering desirable. State age, draft status education, experience, salary expected.
Box 66–N–9, Ind. & Eng. Chem., Easton, Pa.

CHEMIST or CHEMICAL engineer. Chemistry major preferably minor in mathematics or physics. Work concerns water analysis, oil tests, corrosion, drilling mud, and other problems of petroleum production. Additional salary in accordance with experience. Location in well-equipped laboratory, Midwest city.
Box 67–N–9, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER for electrical insulation work. Should have experience in both organic and inorganic chemistry. Also, some knowledge of resins. 30–35 years old. Location, Pittsburgh.
Box 68–NP–9, Ind. & Eng. Chem., Easton, Pa.

LATIN AMERICAN Chemist or chemical engineer or man entirely familiar with Spanish and Latin American business. Position offers opportunity to direct production of chemical plant in Latin America. Applicants should submit educational history, experience, age, and a recent photograph.
Box 72–N–9, Ind. & Eng. Chem., Easton, Pa.

CHEMIST with experience in formulation of paints and surface coatings. Knowledge of synthetic resins and their application to the textile industry desirable. Position offers opportunity to direct research. Applicants should submit education, experience, age and recent photograph.
Box 73–NP–9, Ind. & Eng. Chem., Easton, Pa.

A MIDDLE Western industrial organization is seeking one or two men, preferably under 35, for adhesive research. Actual industrial experience in this field is desirable but not essential. Excellent opportunity for one familiar with adhesives, starch conversion and raw materials, such as starch, dextrins, glues, gums, resins, etc.
Box 74–NP–9, Ind. & Eng. Chem., Easton, Pa.

EXCELLENT OPPORTUNITY for creative chemist-salesman. Old established firm marketing operating supplies nationally direct to industry desires to emphasize expansion in textile processing oils. Interested in contacting mature and experienced "chemist-salesman" with ability to sell personally and to train sales force to sell textile oils. Please write giving details of qualifications.
Box 75–NP–9, Ind. & Eng. Chem., Easton, Pa.

ENGINEER—Philadelphia manufacturer of recording control instruments desires to employ several application engineers for the chemical industries. Applicants should be familiar with the practice and theory of industrial chemical processes and with the construction and use of available instruments and control devices. Must be capable of foreseeing practical needs for devices not yet available. A good education in physics or in chemical engineering considered essential. Applicants must be U. S. Citizens. Address replies to K-32, P. O. Box 3414, Phila., Pa.

SITUATIONS WANTED
(A.C.S. MEMBERS)

FOOD CHEMIST with over twenty years' wide experience in the Food Industry, in direction, research, process development, quality control, and factory problems. Desires a responsible position.
Box 69–N–8, Ind. & Eng. Chem., Easton, Pa.

TECHNICAL MARKET ANALYST Ph.D. 1940. Well rounded graduate training in physical, organic and inorganic chemistry. Limited training in metallurgy. Two years' industrial research experience. Desires position as market analyst for research or technical divisions of well established progressive company. Married, draft status 3-A, Phi Beta Kappa, Sigma Xi. Available on reasonable notice.
Box 37–N–8, Ind. & Eng. Chem., Easton, Pa.

RESEARCH DIRECTOR Ph.D., formerly assistant at Kaiser Wilhelm Institute of Chemistry and University of Paris. 15 years' research experience in organic chemistry, synthetic pharmaceuticals, hormones, alkaloids, microanalysis. Patents and publications. Now director of research industrial laboratory. Desires similar position in large industrial research laboratory or university. Austrian, have first citizenship papers. Married, age 38.
Box 39–N–8, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST, B.Sc., M.Sc., several years' industrial experience with oils, soaps, waxes, polishes. Desires industrial research or teaching position offering opportunity for research. Masters in physical chemistry. Trained in micro-techniques, physical methods and new analytical procedures. Married, age 27, prefer Northeastern area.
Box 25–T–8, Ind. & Eng. Chem., Easton, Pa.

VISITING PROFESSOR, available for the duration. Experienced teacher of organic, biochemistry, general chemistry. Author of texts and laboratory manuals in general chemistry, qualitative analysis, D.Sc. University of Geneva. See Who's Who. Geo. W. Muhleman, 1450 Englewood Ave., St. Paul, Minn.

ORGANIC CHEMIST, Ph.D. 1940 would like teaching or research position in organic or biochemistry. Experience in chemistry of microorganisms, carbohydrates, organic synthesis, azo dyes. Employed. 2 years industrial. Phi Beta Kappa, Sigma Xi. Publications. Prefer Western U. S. Married, 3-A, age 31.
Box 29–T–8, Ind. & Eng. Chem., Easton, Pa.

MEDICAL CHEMIST, PH.D., Broad experience in technical and scientific research on food products, biologicals and pharmaceuticals. Ten years with medical and hospital supply firm. Research, development and business knowledge. New York State or East preferred. References. Available Sept. 1. Class 3-A.
Box 40–T–8, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.Ch., and Biochemist, Ph.D., 1942 from large midwestern university. Desire academic or industrial position. Special training in Colloid chemistry. Experience with nitrocellulose and ensymes. Six publications. Age 25, Single. Available immediately.
Box 41–T–8, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.S., 28, married, one child, 3-A. Personable, responsible. Excellent organic training. 3 years' research and industrial experience. Desires organic research or development position in Chicago area. Now available.
Box 70–T–8, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER (Ch.E.), young man, three years' laboratory and plant experience, sixteen years' industrial sales. Loyal, enthusiastic, industrious. Can translate technical data understandingly to the layman. Effective speaker, writer, organizer. Authority chemical defense. Available immediately. Desires position to serve Nation more effectively.
Box 71–T–8, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., 1935, six years' hydrocarbon research and development: Gasoline finishing, blending. Product and process improvement. Semi-scale quality fractionation producing high octane blending agents. Group leader alkylation, isomerization. Directive ability. Married, age 35. Desires responsible position.
Box 77–T–8, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL and INDUSTRIAL microscopist, and metallographist. Would like to organise or supervise a microscopical laboratory for research, new products development and application, process and product improvement. Ph.D., major in physical chemistry, minor in microscopy, Cornell. Fourteen years in research laboratories of the largest companies in two industries, five as research chemist, nine as microscopist dealing with a great variety of problems and materials; shorter periods in two other industries; experience with metals includes thesis and recent work on magnesium alloys. Sigma Xi. Married, two children, 42. Employed.
Box 87–T–8, Ind. & Eng. Chem., Easton, Pa.

DIRECTOR, RESEARCH or laboratory. Executive ability to direct staff and to apply original work and processes, on products inorganic, organic, biological, etc., to ethical pharmaceuticals, Drugs and Allied Lines. Pharm.D. extensive training and long experience. Wishes director position or assistant to technical executive.
Box 102–T–8, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.S. 1941 Columbia. Organic Major. Analytical and synthetic laboratory experience. Age 23, single, Draft status 2-A. Wants position with industrial concern engaged in war work.
Box 12–N–9, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST—B.S. and graduate credits. Four years' industrial experience in standard analytical work and research. Desires position in essential industry. Available immediately. Class 2-A.
Box 14–N–9, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL POSITION, preferably with small eastern or southern firm, wanted by Ph.D., physical chemistry 1940, with two years' research experience. Married, twenty-eight years old, draft classification 2-B. Sigma Xi. Protestant American. Now employed, available one month's notice.
Box 18–N–9, Ind. & Eng. Chem., Easton, Pa.

INORGANIC CHEMIST, Ph.D. 1941. Four years' experience in applied analytical chemistry. Excellent background in organic and physical. Employed in nationally famous research institution. Desires location in western or central New York. Sigma Xi, Phi Lambda Upsilon. Age 27, married, Protestant. Draft 3-A.
Box 21–N–9, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, PHARMACEUTICAL, Phm.B. (Pharmacy); B.Sc. and M.Sc. (Chemistry); wishes to change to progressive firm offering responsible position requiring a knowledge of pharmacy, pharmaceutical chemistry, manufacturing procedures and control, as well as ability to do investigating work with new products and with formula changes in existing products; administrative ability; two years' experience as chief chemist of small pharmaceutical house. Age 31, 2-A deferment, Canadian, first papers for U. S. citizenship, excellent references.
Box 26–N–9, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. 14 years' experience various fields. Organic, pharmaceutical, cosmetic bio-chemistry. Analysis, Research, Development, Production control. Three languages. Imaginative, inventive, adaptable worker. Married with child. Age 39. Immediately available. Desires position. Location anywhere.
Box 29–N–9, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, B.S., M.S., nine years' experience in water treatment, steam boiler problems, also corrosion control, pipe lines, ordnance equipment, etc. Five years in insulation, heat transfer and acoustic control. Two years' foundry practice, malleable and gray iron, control of mixes for furnace and cupola melts. Experienced in research development, control, technical field service. Best of references. American, age 37, married, family, draft 3-A. Desire permanent position with good future. Available October 15. Location, Southern California preferred.
Box 31–N–9, Ind. & Eng. Chem., Easton, Pa.

DIRECTOR of RESEARCH, now employed, contemplates change due to undesirable location of present company. Thoroughly experienced in complete organization of research laboratories, equipment and hiring and handling of personnel. Ten years' experience in thermoplastic and thermosetting resins, molding, adhesives, cements, emulsions, rubber, proteins, cellulose derivatives. Designed molding and other plastic handling machinery. Experienced in plywoods and plywood molding and machine design. Sixteen patents. Christian. Age 35. Citizen. 3-A. Formal training at Eastern universities in mechanical engineering and physical and colloid chemistry.
Box 32–N–9, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER—20 years' varied experience in research, development, design, and plant operations in the fields of synthetic rubber, plastics, and other organic chemicals. Development work preferred in Eastern U. S.
Box 34–N–9, Ind. & Eng. Chem., Easton, Pa.

CHEMIST Ph.D. 30 years old, married, dependents, 3½ years' experience development work on adhesives and surface coatings.
Box 37–N–9, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, M.A. Columbia, 1941; physical and organic. Recently resigned from non-essential research position. Age 21. Excellent scholastic background and record. One year's experience. Alert, intelligent, practical, versatile. Highest references. Research preferred but will consider other. Available immediately anywhere in U. S.
Box 39–N–9, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST: B.S. in Chemistry 1939, experienced in literature searching, abstracting, indexing, library cataloging, typing, and office methods, with knowledge of scientific German, desires position as research librarian.
Box 41–N–9, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL RESEARCH wanted in a modern up-to-date laboratory by B.Ch. (Organic) with 5 years' catalytic cracking and recently organic polysulfide plastics researches. Patents. Knowledge of synthetic rubber. Supervisory experience. Age 32, married, draft 2-A.
Box 44–N–9, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 1147)

(Situations Wanted Continued)

ORGANIC-INORGANIC Chemist. M.A. leading Mid-Western University. Six years' industrial research experience including organic and inorganic polymers. Knowledge of properties, reactions and uses of compounds of 91 elements beside carbon. Patents. Articulate, adaptable, independent, willing worker with insatiable curiosity. Aged 29, married. Employed but seeking research position with greater responsibilities.
Box 45-N-9, Ind. & Eng. Chem., Easton, Pa.

PROJECT ENGINEER—Chemical engineer presently employed by large chemical company desires responsible position with a future. Experience covers equipment design and purchasing; plant layout and construction. Thoroughly familiar with chemical and mechanical aspects of process equipment and especially well trained in heat transfer problems. Experienced also in pilot plant design, operation, process evaluation, and as shift engineer. Citizen, age 30, married, 3-A Draft status, Protestant. Salary required $5400 per year. Eastern location preferred.
Box 46-N-9, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST. August Ph.D.; minors, Physical and Chemical Engineering. Excellent scholastic record, publications, experienced teaching and fulltime research in isolation, identification and synthesis of organic acids and nitrogen heterocycles. Age, 28; dependents. Now available for teaching or research preferably in Southwest.
Box 49-N-9, Ind. & Eng. Chem., Easton, Pa.

CHEMIST Ph.D. Excellent, varied industrial experience, research and others. Available on reasonable notice.
Box 51-N-9, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST. Graduate from European universities, age 30, married, 2 children, Draft Class 3, Protestant, 3 years in research laboratory for plastics, desires employment in research to use his wide range of chemical education. Preferably Organic Chemistry or Physiology. Languages French, German and Scandinavian. Available immediately.
Box 54-N-9; Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL CHEMIST, with business and executive experience. University graduate, twenty years' excellent record in research, development, sales and service with State, Federal institution and corporation. Publications, patents, sales literature. Desires active employment. References from all employers. Listed in American Men of Science. Draft 3-B.
Box 59-N-9, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL CHEMIST Ph.D. 25 years' experience synthetic organic chemistry, process development, plant management, research direction, plant design, experienced in synthetic chemicals, plastics, protective coatings. Capable of directing plant producing organic substances or taking charge of research program.
Box 65-N-9, Ind. & Eng. Chem., Easton, Pa.

CHIEF CHEMIST, Metallurgist & Ceramist, Plumbers' cast iron enamelware, 13 years. Shut down by WPB. Chief Chemist, enameled kitchenware and metallic coatings, 8 years. Research & development, heavy chemicals, 7 years. B.S. in Chemistry. Permanent position desired where supervisory experience in control and research work would be useful.
Box 71-N-9, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED (NONMEMBERS)

CHEMIST, MASTERS degree accredited Western college, now employed desires change. Three years' experience in raw materials and petroleum specialties. Age 27, single, white. Draft 4-F. Particularly interested in Northwest or Intermountain states.
Box 34-T-8, Ind. & Eng. Chem., Easton, Pa.

PATENT ATTORNEY Illinois bar; postgraduate degree, master patent law; working toward B.S. in Chemistry; recently admitted to practice before patent office; thirteen years' broad legal experience; intensive appellate experience; desires position with Chicago law firm or patent department specialising in chemical patents. Age 34. 3-A classification.
Box 25-N-9, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER—Design and cost estimating of process equipment experience. Experience in heavy chemicals plant layout, research and development. Will be available shortly.
Box 33-N-9, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, university degree, widely experienced analytical chemist. 14 years' industrial work, research, development operations. Many years gas & oil refining with all manifestations. Previous vegetable oils, fats. Recently accomplished process for Berylliumoxide. Age 44, single. Desires permanent connection anywhere.
Box 40-N-9, Ind. & Eng. Chem., Easton, Pa.

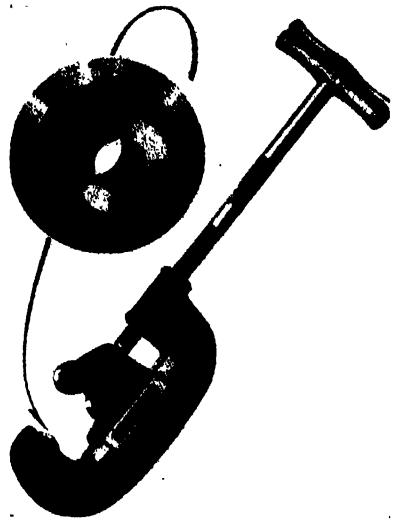
CHEMICAL ENGINEER, 12 years' experience organic chemical plant planning, layout, equipment design, piping, specifications, equipment selection, supervising plant operations, etc. Capable taking complete charge of products, or supervising production. Good practical knowledge of process operations. Desire permanent connection with responsibility. American, Protestant. Married. Age 37.
Box 43-N-9, Ind. & Eng. Chem., Easton, Pa.

FELLOWSHIP. Titanium chemistry research available September 15 to 30. Applicant with M.S. in chemical engineering, well trained in physical and organic chemistry. Submit complete data first letter including photograph, draft status, religious preference, experience, and certified transcript of record including grades to Arthur W. Hixson, Executive Officer, Department of Chemical Engineering, Columbia University, New York City. $2,000 per annum leading to doctorate.

Industrial News

CONTINUED FROM PAGE 1140

Water-Hardening Tool Steel



Heavy-duty pipe cutter shown with cutter wheel made of Jessop RT tool steel

FOR many applications where extreme toughness is required above other characteristics, the Jessop Steel Co., Washington, Penna., is now furnishing a water-hardening tool steel under the brand name of Jessop RT. RT has enough ductility, even with its unusual hardness and strength, that it will stretch more than 4 per cent before it will break. For example, a tensile test on properly treated RT will show breaking strength of 323,000 pounds per square inch and elongation in 2 inches of 4.5 per cent. Jessop RT acquires a hard case and tough core when large and medium sizes are hardened. A $1^1/_2$-inch piece will have a fine-grained case approximately $^3/_{16}$ inch to $^1/_4$ inch deep with hardness of about C-61/63 Rockwell. The smaller sizes, under $^3/_4$ inch will harden throughout.

THE executive sales office of the Columbia Chemical Division of the Pittsburgh Plate Glass Co. has been moved to Pittsburgh from New York. Also involved in the transfer are the chemical division's traffic and advertising departments.

Service Record of Standard Oil of Indiana

TYPICAL of the experienced labor of Standard Oil Co. of Indiana producing fuels and lubricants for the armed forces, war industries, and the farm front are 11,993 active employees with a total of 175,010 years of service who will have been awarded gold pins in recognition of 10 to 40 years of service each by December 31 this year.

Ninety-five employees will have been awarded pins for 40 years of service, 607 for 30 years, 4,009 for 20 years, and 7,282 for 10 years. Of these, seven employees will be awarded pins for 40 years, 66 for 30 years, 285 for 20 years, and 326 for 10 years during the last six months of 1942. The 30-year employees who will be honored include Harry F. Glair, general manager of manufacturing and a director, and William C. Ewald, an assistant secretary.

Extinguishing Magnesium Fires

A NEW product developed by the Research Laboratory of the Philip Carey Mfg. Co., Lockland, Cincinnati, Ohio, for reducing losses incident to magnesium fires is called Carey MX granules. Tests are said to show that, when spread over the fire, the granules soften and seal the burning magnesium with an airtight blanket. It is also possible to reclaim much of the magnesium when this method of extinguishing fires is used. The product has been tested by the Underwriters' Laboratories, Inc.

Army-Navy E Award to Porter

THE H. K. Porter Co., Pittsburgh, Penna., has been selected by the Army and Navy Departments to receive the joint Army-Navy E Award, in recognition of high achievement in production of war equipment. The company, which turns out locomotives, process equipment, and special ordnance material, is one of the first locomotive manufacturers to receive this award. In further expanding production, the company will soon open another plant in Pennsylvania.

Cochrane Appoints Flowmeter Representative in Philadelphia

COCHRANE CORP., Philadelphia, Penna., announces appointment of the Energy Control Co. as flowmeter representative for eastern Pennsylvania, southern New Jersey, Delaware, and Maryland. Energy Control Co. is located at 3107 North Broad St., Philadelphia, and will also handle Hays combustion control and instruments and the Heacon damper. Energy Control Co. also represents these lines in New York City and vicinity, including western Connecticut and northern New Jersey.

Help Put Empty Cylinders to Work

PRODUCTION requirements today are such that there is an increased demand for oxygen and acetylene. This demand can be met if empty cylinders are returned promptly and if cylinder stocks in the hands of users of oxy-acetylene welding and cutting are maintained at a minimum.

MISCELLANEOUS

BUSINESS OPPORTUNITIES • FOR SALE • WANTED • ETC.

Five cents a word, minimum charge $2.00; display available at $7.50 per inch; in advance. No discounts or allowances

MICRO-ELEMENTARY ANALYSES: C, H, N, S, P, Halogens, Methoxyl, Mol. wt., etc., U.S.P. and other official tests, Purity tests, Microinorganic assays, Spot tests, Micro-distillations, Toxicological investigations, and typical micro-chemical research work. Dr. Carl Tiedcke, 366 Fifth Avenue, New York, N. Y.

COLLOIDAL ASPIRIN
U. S. P. 2,293,359

The owner of this patent will entertain offers from firms having at least B-2 rating in Dunn and Bradstreet.

Box 89-T-8, Ind. & Eng. Chem., Easton, Pa.

COMPLETELY EQUIPPED analytical and research laboratory. Specializing on food, bacteriological work, brewing research and water analysis. Established clientel. Selling entire business including furniture, equipment, etc., account of illness.
Box 98-T-8, Ind. & Eng. Chem., Easton, Pa.

For Sale
CRESYLIC ACID
William D. Neuberg Company
420 Lexington Ave. New York, N. Y.
Telephone LE 2-3324

FOR SALE: From private library, chemical abstracts complete 1 to 34, including 1st and 2nd decennial indexes, bound in buckram, except 1st six volumes bound in half leather; J. A. C. S., 29 to 63 bound in buckram; Ind. and Eng. Chem. 16-33 unbound.
Box 19-N-9, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: showroom samples. Savings to 50%. Chemical centrifuge with perforated manganese bronze basket. Engler-Ubbelohde Viscosimeter. Silverman microscope illuminator. Motors: 1/3 HP, 110 V, AC; 1/8 HP, 110 V, DC. No priorities required. Schaar & Company, 754 West Lexington Street, Chicago, Ill.

FOR SALE: Annales Institute Pasteur Vol. 1—47, International Critical Tables, Bulletin Societe Chemique 1920—1933, 1935—1939, $135.00, Journal Institute of Petroleum Technologists 1924—1939, $100 00, Biochemisches Zeitschrift Band 1—77, 83—85, 92—100, 104—108, 115—120, 126—130, 176—190. Newly bound $625.00, Annales de Chemie et Physique.
Box 28-N-9, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Petrographic microscope. Unused Zeiss, model III-M. Asking price $650.00. Address Theodore Woodward, 43 Lowell Avenue, West Orange, N. J.

WE OFFER: Organic Alkyl Halides and Polyhalides, also Aliphatic Polyfluorides and Polychlorides of Propane—also Digitonin-Dulcitol-Sodium Cacodylate-Histamine and Histidine Compounds-Methionine-de-Ribose—also Cacodylic-Galacturonic-Levulinic-Mucic-Naphthalene Acetic Acids.
Box 35-N-9, Ind. & Eng. Chem., Easton, Pa

FOR SALE: Journal American Chemical Society Vol. 27-55 (1904-33) $200. Ind. & Eng. Chem. Vol. 1-33 (1909-41), with Analyt. Edition Vol. 1-13 (1929-41) $200. Unbound and excellent condition.
Box 42-N-9, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Chemisches Zentralblatt years 1868, 1869, 1897 to 1914. 1920 to 1932. Zeitschrift analytische Chemie vols. 34t o 54, Friedlaender, Fortschritte Teerfarbenfabrikation vols. 1 to 12. Wish to purchase: Chemical Abstracts cplt. set Intern. Critical Tables.
Box 48-N-9, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Amer. Chem. Soc. Journals Vol. 23-Vol. 54 incl. $200. First Decennial Index Chem. Abstracts 4 volumes $60. Jour. Soc. Chem. Ind. with Brit. Chem. abstracts yearly index. Vol. 22-48 incl. Any reasonable offer accepted. All unbound and in excellent condition. Location N. Y. C.
Box 69-N-9, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Chemical Abstracts, Volumes 1 to 27, Industrial & Engineering Chemistry, Volumes 1 to 23, Journal American Chemical Society, Volumes 27 to 55. Volumes are unbound but in excellent condition. Chemical Abstracts have annual indexes, but not decennial indexes. Location, Easton, Pa.
Box 70-N-9, Ind. & Eng. Chem., Easton, Pa.

FOR SALE—We are in the service to serve you with fully guaranteed laboratory equipment. We are serving government depts., war plants, institutions, industrial & research laboratories. We can serve you too. Check this list or send your lists and we will quote on your needs immediately if available. Gaertner Cathetometer, McMichaels Viscosimeter, Stormer Viscosimeter, Saybolt Viscosimeter, Cement Compression Tester, International Centrifuges, Schmidt & Haensch Precision Saccharimeters double wedge 200-400 mm, Zeiss Sugar Refractometers, Scott Testers, Suter single strand tester, Mullen Paper testers, Mullen Tensile tester, Stokes water stills, Bramhall & Deane size 2 autoclave, American horizontal autoclave 14 × 22, new Labtest Hydraulic presses 6 × 6, new drying ovens 12 × 12, New Incubators 10 × 10, B & L Dipping Refractometer, B & L Spencer Microscopes, B & L Chemical Microscope, Microscopic Accessories, Mechanical stages, Camera Lucida, Eyepieces, Micrometers, Dark Field Condensers, Weston Meters all ranges and types, Spencer Rotary Microtomes, Automatic Clinical Microtome, Pulp Balances (New) 150 gr capacity, 1 mg sensitivity $27.50 in Mahogany cases with drawer, colorimeters, Ross #66 Pulverizers 18" cages, Stokes Eureka single tablet press, Electric Hot Plates 3 heat two sizes 7" and 8" at $8.75 and $10.75 each, etc., all offerings are subject to prior sale and government regulations. Write or wire for immediate information and quotations, The Laboratory Exchange, 24 East 21st Street, New York City.

WANTED: 200 pounds Iron Cacodylate—also moderate amounts Asparagine, Alanine, Edestine, Phloridzin, Levulose, Orcinol, Tryptophane, Xylose; Aspartic Acid, Acrylic Acid, Rhenium Salts, Hafnium Salts. All rare earth salts including Dysprosium, Europium, Gadolinium, Scandium.
Box 36-N-9, Ind. & Eng. Chem., Easton, Pa.

WANTED: "Chemisches Zentralblatt": 1913, 1914, 1925-1927, 1933-1936, 1938-1941, paying per unbound year $18.00 or per bound year $22.00; "Zeitschrift fuer Elektrochemie": 1894-1926, or any year. Dr. G. H. Fransius, 201 East 82nd Street, New York, N. Y.

WANTED TO BUY. We urge you to sell us now those idle or surplus instruments which someone somewhere needs in a hurry on some vital production or research problem. Sell now and obtain the highest resale value ever possible. We are purchasing 99% of all equipment which has been offered us for the past 12 months. Offer us now by air-mail. Telegraph all equipment you can do without and obtain our immediate cash offer. We have definite orders on hand and are ready to purchase outright. Located anywhere in America. Such as Abbe Refractometers, microscopes, Polariscopes, Binocular microscopes, Metallurgical Microscopes, and testing instruments. Measuring microscopes, Balances, spectographic equipment, microscopic accessories, slide rules, Verniers, balance weights, Weston meters, shunts, instruments of every description, centrifuges, autoclaves, ovens, ball mills, Barnstead Stills, Cathetometers, and hundreds of other instruments too numerous to mention. Complete laboratories or plants containing laboratories write or wire description for immediate response. The Laboratory Exchange, 24 E. 21st St., New York City.

REFRACTOMETER, new or used, send full description, price, etc.
Box 61-NP-9, Ind. & Eng. Chem., Easton, Pa.

IMPORTANT!

Publication and closing dates of Chemical and Engineering News

Issue of the 10th closes—
25th of preceding month

Issue of the 25th closes—
10th of the month

UNUSUAL OPPORTUNITY OPEN FOR

CHEMICAL ENGINEER

with large and long established company having an extensive research and development program

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Position is available for development work in plastics with this company which is not now engaged in plastics manufacture. The man desired must have a broad knowledge of the field. This is an unusual opportunity for a Chemical Engineer with the right technical qualifications and organizing ability. Inquiries will be held in strict confidence.

Reply: Box 50-NP-9, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL AND ENGINEERING NEWS

HARRISON E. HOWE, Editor

PUBLISHED BY THE AMERICAN CHEMICAL SOCIETY

VOLUME 20 SEPTEMBER 25, 1942 NUMBER 18

The A. C. S. Meeting in Buffalo

Directors' Minutes

THE Board of Directors of the AMERICAN CHEMICAL SOCIETY met in Parlor C of the Hotel Statler, Buffalo, N. Y., at 8:30 P. M., September 6, 1942. Thomas Midgley, Jr., Chairman of the Board, presided, and the following Directors were present: L. H. Adams, Roger Adams, Robert T. Baldwin, E. K. Bolton, Willard H. Dow, Wm. Lloyd Evans, Per K. Frolich, A. J. Hill, H. N. Holmes, Charles L. Parsons, R. E. Swain, Charles A. Thomas, and R. E. Wilson. H. E. Howe was present by invitation. The minutes of the last meeting, which had been distributed to each Director, were approved without being read.

An ad interim report of the SOCIETY'S activities was presented by the Secretary and approved for presentation to the Council.

Lawrence W. Bass gave a verbal report on the progress of the Committee on Economic Status. It was moved, seconded, and carried that the Editor be and is hereby authorized to use the necessary pages to print the report in CHEMICAL AND ENGINEERING NEWS, publishing it as a series. When completed, reprints are to be struck off and made available to the membership at a price estimated to cover cost of printing and distribution.

It was moved, seconded, and carried that the report of the Finance Committee be accepted and placed on file.

The Directors discussed the situation confronting the SOCIETY with regard to the general session on Wednesday afternoon, as announced in CHEMICAL AND ENGINEERING NEWS, and its relation to the activities of the Baruch committee on the synthetic rubber program. It was moved, seconded, and carried that the following statement be presented to the general assembly after the awarding of the prizes on Wednesday afternoon, September 9, 1942:

This meeting was planned in detail before the appointment of the Baruch Committee. The speakers were picked with care in the hope that their pronouncements, under the auspices of the AMERICAN CHEMICAL SOCIETY, would carry conviction to the public that American chemists can bring the production of synthetic rubber to a successful conclusion. The addresses were prepared with care and were released by high authority for presentation and publication.

The appointment of the Baruch Committee introduced an unexpected situation. Its personnel commands the respect of every intelligent chemist. The committee has not reported, but its findings are certain to carry conviction to every unbiased American citizen.

Under these conditions, the Board of Directors of the AMERICAN CHEMICAL SOCIETY, at the suggestion of E. R. Weidlein, has withdrawn his paper on "Progress of Synthetic Rubber Production" from presentation at this time, and it will not be published before the report of the Baruch Committee has been formulated and made public.

Both courtesy and ethics demand such action. No suggestion for or against such procedure has been made by the Baruch Committee.

The paper announced as "The Outlook on the Rubber Situation" was to have been an extemporaneous discussion by a prominent but unnamed official. He, for similar reasons, feels he should not appear. The papers by A. L. Elder and Willard H. Dow will be presented.

The Directors are confident that the members of the SOCIETY will understand and approve their decision. As the official program had been printed and distributed to 35,000 subscribers to CHEMICAL AND ENGINEERING NEWS, there was no possible way of giving advance notice of this action to the membership.

* * * *

It was moved, seconded, and carried that an additional appropriation of $3,000 be added to the 1942 budget for the office of the Secretary and Business Manager.

It was moved, seconded, and carried that the sum of $2,000, or as much thereof as may be necessary, be appropriated for the purchase of a bookkeeping machine, and that the Treasurer be authorized to make the necessary expenditure from funds not otherwise appropriated.

It was moved, seconded, and carried that a sum not to exceed $500 be appropriated for the expenses of an exhibit at the National Chemical Exposition to be held in Chicago, Ill., November 24 to 29, 1942, and that the Treasurer be authorized to make the necessary expenditure from funds not otherwise appropriated.

A communication received from Auburn A. Ross, Secretary of the Group of Local Section Officers, at the Memphis meeting, just after the Directors' meeting had adjourned, was read and discussed. It covered certain recommendations regarding changes in the method of administering commissions on new memberships. It was moved, seconded, and carried that the Directors could not approve the recommended change. The report was ordered placed on file.

A report on the inventory of paper with the Mack Printing Co. was read and ordered placed on file.

The Secretary gave a verbal report on the SOCIETY'S relations with the Export Censor.

The President reported on the activities of his office during the year.

At 12:03 A. M., just prior to adjournment, it was moved, seconded, and carried that the motions recorded above be approved. There being no further business, the meeting adjourned.

CHARLES L. PARSONS, *Secretary*

Buffalo Meeting Abstracts

ABSTRACTS of Buffalo meeting papers sold out at Buffalo and are now being reprinted. Send your orders without delay to A. C. S. News Service, 1155 Sixteenth St., N. W., Washington, D. C.

Council Policy Committee Minutes

THE Council Policy Committee met in Room 1002, the Hotel Statler, at 3:00 P. M., September 6, 1942. Harry N. Holmes presided, and the following members of the committee were present: Robert T. Baldwin, E. M. Billings, E. J. Crane, G. J. Esselen, Wm. Lloyd Evans, Per K. Frolich, H. E. Howe, Arthur B. Lamb, Thomas Midgley, Jr., Charles L. Parsons, and Walter Schmidt.

After discussion, the committee appointed a committee of six, as required by the Constitution, to nominate two individuals for the office of Director-at-Large to succeed Thomas Midgley, Jr., who is ineligible for re-election.

A communication was received suggesting that a national employment bureau be conducted by the SOCIETY. After discussion, the Secretary was advised to write Mr. Fetzer that the committee considers the present procedures of the Employment Information pages in CHEMICAL AND ENGINEERING NEWS and the Employment Clearing House are much better methods of operation and that these facilities are functioning with real accomplishment.

The President of the SOCIETY was asked to select three men to consider what the SOCIETY might do, if anything, to improve the present employment procedure, and after due consideration, to report their findings to the Council Policy Committee.

Two communications were received requesting the SOCIETY to undertake to direct the utilization of chemists in civilian defense. After discussion, it was decided that the communications already sent by the Secretary requesting the Local Sections to cooperate actively with the Chemical Warfare Service and the Office of Civilian Defense were all that is necessary at present. Since this work is being officially directed by the Chemical Warfare Service and the Office of Civilian Defense, it is the opinion of the committee that it is unnecessary to set up a third procedure.

There was a general discussion of other SOCIETY problems. No other action was taken.

The meeting then adjourned.

CHARLES L. PARSONS, *Secretary*

Council Minutes

THE Council of the AMERICAN CHEMICAL SOCIETY met in the Ballroom of the Hotel Statler, Buffalo, N. Y., at 9:40 A. M., September 7, 1942, with President Harry N. Holmes presiding and the following Councilors and substitutes present:

Councilors and Substitutes

Ex Officio. L. H. Adams, Roger Adams, Robert T. Baldwin, Edward Bartow, L. W. Bass, Shailer L. Bass, Erle M. Billings, E. K. Bolton, F. E. Brown, E. J. Crane, Willard H. Dow, Wm. Lloyd Evans, Per K. Frolich, E. E. Harris, E. H. Harvey, Arthur J. Hill, H. E. Howe, Arthur B. Lamb, S. C. Lind, Thomas Midgley, Jr., Ben H. Nicolet, Charles L. Parsons, G. L. Royer, Walter A. Schmidt, H. B. Siems, Lee Irvin Smith, Robert E. Wilson.

Councilors-at-Large. Geo. D. Beal, Gustav Egloff, Henry Gilman, H. B. Hass, Edward Mack, Jr., Carl S. Marvel, C. E. K. Mees.

Local Sections. *Akron*, Wm. I. Burt. *Alabama*, S. S. Heide, J. T. Vann. *Ames*, Harvey C. Diehl (subs.), L. A. Underkofler. *Baton Rouge*, Robert S. Asbury (subs.), C. L. Brown. *Binghamton*, Abraham Bavley (subs.). *California*, T. W. Evans (subs.), F. M. McMillan (subs.), Carl R. Noller. *Central Pennsylvania*, R. A. Dutcher, C. C. Wright. *Chicago*, Howard Adler, M. S. Agruss (subs.), M. H. Arveson (subs.), H. C. Black (subs.), Herman S. Bloch (subs.), V. Conquest, E. D. Fuller (subs.), W. F. Henderson, H. R. Kraybill (subs.), L. E. May, H. S. Mitchell (subs.), J. Q. Peniston (subs.), Roy C. Newton, B. E. Schaar, H. Gladys Swope (subs.), Charles L. Thomas (subs.), E. H. Volwiler. *Cincinnati*, Robert F. Brown, Howard Ecker (subs.), C. C. Ruchhoft, R. C. Stillman (subs.). *Cleveland*, E. A. Arnold, H. S. Booth, L. E. Steiner, John C. Weaver. *Columbus*, Cecil E. Boord, W. A. Manuel, M. L. Wolfrom. *Connecticut Valley*, M. G. Burford (subs.), Richard D. Dunlop, Mary L. Sherrill. *Dallas–Fort Worth*, C. S. Kuhn, Jr. (subs.), Madison L. Marshall (subs.). *Dayton*, Austin M. Patterson, Charles A. Thomas (subs.). *Delaware*, H. R. Dittmar, F. W. Johnson (subs.), Emil Ott. *Detroit*, George Calingaert, Carl F. Graham (subs.), Joseph J. Jasper, Helen I. Miner, L. A. Sweet. *East Tennessee*, J. H. Wood. *Eastern New York*, Arthur Knudson, A. L. Marshall. *Erie*, Sister Doloretta Thorn. *Florida*, J. P. Bain, Fred H. Heath (subs.). *Georgia*, J. S. Guy, Osborn R. Quayle (subs.). *Indiana*, Kenneth W. Wantland (subs.). *Kanawha Valley*, R. G. Owen (subs.), Whitfield Price, George Vincent Scofield (subs.). *Kansas State College*, Alfred T. Perkins (subs.). *Lehigh Valley*, C. D. Pratt. *Louisiana*, A. W. Chapman (subs.), Harold A. Levey. *Maryland*, A. H. Corwin, H. C. Knight (subs.), P. K. Leatherman (subs.), F. Y. Wiselogle (subs.). *Memphis*, Robert F. Gould (subs.). *Michigan State College*, Ralph C. Huston (subs.). *Mid-Hudson*, Dorman McBurney. *Midland*, Edgar C. Britton, W. R. Veasey. *Milwaukee*, Stephen E. Freeman (subs.), C. O. Miller (subs.). *Minnesota*, Charles G. Ferrari, L. H. Reyerson (subs.), W. M. Sandstrom (subs.), R. C. Sherwood (subs.). *Nebraska*, E. Roger Washburn. *New York*, Ross A. Baker, C. R. Dawson, E. J. Durham, Charles N. Frey (subs.), S. F. Gaffin, Philip P. Gray, H. W. Hermance, Arthur W. Hixson (subs.), Wm. R. Johnston, D. H. Killeffer, R. E. Kirk (subs.), S. D. Kirkpatrick, H. G. Lindwall (subs.), Frank S. Low, H. Burton Lowe (subs.), W. F. O'Connor, Donald Price, W. M. Ralph, E. Whitman Rice, Cornelia T. Snell (subs.), Foster Dee Snell, Warren M. Sperry, A. H. Tenney, W. W. Winship (subs.), Lincoln T. Work (subs.). *North Carolina*, Paul M. Gross, Oscar K. Rice (subs.). *North Jersey*, E. R. Allen, Herbert L. Davis (subs.), Karl Folkers (subs.), Calvin S. Fuller (subs.), Rufus D. Reed, Wm. Rieman, III, H. F. Wakefield, Henry J. Wing (subs.). *Northeast Tennessee*, John R. Caldwell. *Northeast Wisconsin*, Harry F. Lewis. *Northeastern*, Chester M. Alter, Avery A. Ashdown (subs.), E. R. Atkinson (subs.), Thorne M. Carpenter (subs.), Robert D. Eddy, Gustavus J. Esselen, H. A. Iddles, Hermann C. Lythgoe (subs.), Arthur A. Vernon (subs.). *Northern West Virginia*, E. C. H. Davies (subs.). *Northwestern Utah*, Walter D. Bonner. *Oklahoma*, O. M. Smith (subs.). *Pennsylvania–New York Western Border*, Ralph W. Hufferd. *Peoria*, J. P. Kass (subs.), Ralph H. Manley (subs.). *Philadelphia*, Herbert K. Alber (subs.), Wm. T. Caldwell (subs.), Marshall D. Gates (subs.), D. F. Gould (subs.), J. Bennett Hill, L. F. McBurney (subs.), John M. McIlvain (subs.), Arthur Osol, Wm. Rogers, Jr. (subs.), Floyd T. Tyson. *Pittsburgh*, J. P. Fugassi (subs.), E. W. Gilliland (subs.), Herbert E. Longenecker (subs.), D. S. McKinney (subs.), R. G. Russell (subs.), E. K. Wallace, J. C. Warner (subs.). *Purdue*, F. D. Martin (subs.). *Rhode Island*, Laurence S. Foster (subs.). *Rochester*, F. R. Baxter, Charles R. Fordyce, R. W. Helmcamp, Donald K. Tressler. *St. Joseph Valley*, Columba Curran (subs.). *St. Louis*, Henry L. Dahm, Paul A. Krueger, F. D. Smith (subs.), L. A. Watt (subs.). *South Jersey*, Henry G. Berger, W. S. Calcott, Paul W. Carleton (subs.). *Southeastern Pennsylvania*, P. O. Powers (subs.). *Southeastern Texas*, P. L. Brandt (subs.), H. Gershinowitz (subs.), Harry B. Weiser (subs.). *Southern California*, W. A. Bush, T. A. Geissman (subs.), T. L. Jacobs (subs.), Wm. G. Young (subs.). *Syracuse*, A. L. Elder, Paul A. Keene. *Toledo*, Robert E. Dunham (subs.). *University of Illinois*, R. E. Greenfield, G. Frederick Smith. *University of Michigan*, H. H. Willard. *Virginia*, L. B. Arnold, Jr. (subs.), E. S. Harlow (subs.), Robert H. Kean (subs.). *Washington*, Norman Bekkedahl (subs.), W. D. Collins, Nathan L. Drake, Alden H. Emery (subs.), James H. Hibben, H. S. Isbell (subs.), F. O. Rice, Michael X. Sullivan, Charles E. White (subs.). *Western Connecticut*, Harry L. Fisher, Lois W. Woodford. *Western New York*, Warren K. Eglof, W. L. Hyden, H. O. Kauffmann (subs.), H. W. Post, Carl H. Rasch. *Wilson Dam*, G. L. Bridger (subs.). *Wisconsin*,

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Homer Adkins. *Wooster*, M. P. Puterbaugh (subs.).

It was moved, seconded, and carried that the minutes of the Memphis meeting be approved as printed.

The Secretary read the following list of members reported as deceased since the Council meeting at Memphis:

Deceased Members

Backus, Arthur A.
Bernhard, Adolph
Billheimer, Edward C.
Busch, Henry P.[1]
Carpenter, Harry A.
Caspari, Charles E.
Cone, Richard M.
Crawford, Ellis T., Jr.
Dearden, John R.
Fleming, Raphael Stuart
Glenn, Gustavus R., Jr.
Hall, Clarence A.
Hoover, Charles R.
Knight, Henry G.
Krister, William H.
Lee, Kenneth G.
Lewis, Herbert Samuel
McElroy, K. P.
Moyer, Laurence S.
Oltman, R. E.
Owens, Charles Robley
Pfanstiehl, Carl
Rogers, Burl G.
Rolfe, Geo. W.
Roy, Charles S.
Scherrer, John A.
Schlicting, Emil
Stanton, F. M.
Stewart, Andrew
Swisher, Donald P.
Taylor, Harold Leo
Thompson, Gustave W.
Wardell, Charles H., Jr.
Warmbrunn, David
Wikoff, Alan G.
Willstatter, Richard[2]

[1] Life member
[2] Honorary member

The Council stood a few moments in silent tribute to their memory.

By direction of the President, the Secretary read the following report on the condition of the Society, which statement had been read previously to the Board of Directors at its meeting on September 6:

Ad Interim Report on Condition of the American Chemical Society September 1942

The American Chemical Society still progresses, and in spite of the war and its many drawbacks will unquestionably more than balance its budget again in 1942. Naturally, the expenses have increased and are increasing, but the appreciation of the chemists and chemical engineers of America for the Society's work also means increased support. During 1942, up to September 1, 4,025 individuals have joined the Society. The total membership today is 31,423, against 28,551 on the same date last year; a net increase of 2,873 after deducting resignations, delinquencies, etc. Seven new student affiliate chapters have been added, but the number of student affiliates has decreased from 1,819 to 1,765. This is due to the decreasing number of students who have been allowed to remain in college as candidates for scientific and technical degrees.

There has been a very severe but expected drop in foreign subscriptions, especially of nonmembers. There has naturally been an increase in membership subscriptions, but these would have been considerably greater except for the war. The total subscriptions to the *Journal of the American Chemical Society* have decreased 126; *Chemical Abstracts* shows a decrease of 680; but *Industrial and Engineering Chemistry* has increased by 413 and Chemical and Engineering News has increased by 1,667 subscriptions.

The Secretary's office has been literally swamped with problems of real import. His time has been given not only to matters of normal Society policy and business, but especially to strenuous attempts to see that chemists are placed or retained where they can be most useful in the war effort. He has received full cooperation from Selective Service Headquarters but not always from the Local Boards. Still, a fair record has been made, and it is believed that at least nine out of ten, when information has been obtained and furnished to headquarters, have been deferred and retained in the Production Army where they properly belong.

The Secretary's time has also been taken up, as might be expected, with questions of censorship, especially as to the exportation of our journals to foreign countries. While certain issues have had to be held, as announced in the June 25 issue of Chemical and Engineering News, on the whole the Society has no complaints regarding the treatment it has received. The censor has a duty to perform, and is making every effort to carry it out without undue hardship on the part of the American Chemical Society.

The Employment Clearing House is functioning successfully again at this meeting. The operations at the Memphis meeting were described on page 659 of the May 25 issue of Chemical and Engineering News. This has become one of the most valuable and helpful facilities of the American Chemical Society, not only to employees but also to employers.

Many of the Local Sections, to whom suggestions were sent from the Secretary's office regarding cooperation with the Office of Civilian Defense, have responded and are functioning vigorously and intelligently.

The other functions of the Society are proceeding in an extremely satisfactory manner and need no special comment. The members are all familiar with the continuously improving quantity and quality of the published material they are receiving.

Charles L. Parsons, *Secretary*

A petition for the formation of a Local Section with headquarters at Kalamazoo, Mich., signed by 38 members of the Society, with territory comprising the counties of Allegan, Kalamazoo, Kent, Ottawa, and Van Buren in the State of Michigan, to be known as the Kalamazoo Section, was approved unanimously by the Council.

Arthur B. Lamb was re-elected Editor of the *Journal of the American Chemical Society;* E. J. Crane was re-elected Editor of *Chemical Abstracts;* Harrison E. Howe was re-elected Editor of *Industrial and Engineering Chemistry* and Editor of Chemical and Engineering News—all for a term of three years, beginning January 1, 1943.

C. S. Marvel and George Scatchard were elected Associate Editors of the *Journal of the American Chemical Society* for a term of five years beginning January 1943, succeeding R. C. Fuson and Farrington Daniels, each ineligible for re-election.

W. A. Noyes, Jr., and George O. Burr were elected Associate Editors of the *Journal of Physical Chemistry* for a term of two years beginning January 1, 1943, and succeed W. H. Rhodebush and I. M. Kolthoff.

R. L. Shriner and T. B. Drew were elected to the Editorial Board of *Chemical Reviews* for a term of three years, beginning January 1, 1943. They succeed R. C. Elderfield and E. R. Gilliland.

Bruce K. Brown, W. T. Read, and Charles A. Thomas were re-elected associate editors of Technologic Monographs for a term of three years, beginning January 1, 1943.

M. G. Mellon and R. H. Müller were elected members of the Advisory Board of the Analytical Edition of *Industrial and Engineering Chemistry* for a term of three years, beginning January 1, 1943.

Erle M. Billings was re-elected a member of the Council Policy Committee for a term of three years, beginning January 1, 1943.

J. Sam Guy presented the following report of the Committee to Encourage and Foster Research in American Colleges through the use of advisors:

Report of Committee to Encourage and Foster Research in American Colleges through Use of Advisors

This committee has as its objective an effort to mesh any unused talent of the members of the Society, especially retired directors of research, with the departments of chemistry among the smaller colleges and universities where the staff is not sufficiently large or well equipped to carry on such work alone.

The committee believes that there are many unsolved chemical problems which could be "farmed out" under the direction of visiting professors who have had wide experience in directing research. Such problems could be placed in the hands of the better college students where they would serve both as an inspiration to the student and a definite service to the subject. There are many retired or

emeritus teachers who would be vitally interested in doing a great service to education.

The committee, consisting of Messrs. Evans, Willard, Reid, Lind, Hopkins, Brinkley, and Guy, Chairman, would be glad to contact both college and university departments who may be interested in such a program. This may be done through contacting the chairman.

J. SAMUEL GUY, *Chairman*

DEPARTMENT OF CHEMISTRY
EMORY UNIVERSITY, GA.

The Secretary was instructed to send the unanimous thanks of the Council to the Local Section officers, committees, and individuals who, under very great difficulties, have contributed to the splendid success of the Buffalo meeting.

The selective service situation with reference to chemists and chemical engineers was discussed.

There being no further business, the Council adjourned.

CHARLES L. PARSONS, *Secretary*

Awards in Chemistry

NOMINATIONS for awards administered by the AMERICAN CHEMICAL SOCIETY must be made under the conditions of the awards and must be in the hands of the Secretary of the SOCIETY, 1155 Sixteenth St., N. W., Washington, D. C., on or before January 1 of the year of the award. These awards include the AMERICAN CHEMICAL SOCIETY Award in Pure Chemistry, the Eli Lilly and Company Award in Biological Chemistry, the Borden Award in the Chemistry of Milk, and the Women's Award in Chemistry.

Full details were printed in the September 10, 1941, NEWS EDITION, page 969.



Nelson Allen, Local Committee Chairman

A. C. S. Meeting Registrations

YEAR	PLACE AND DATE	REGISTRATION
1935	New York, N. Y., April	5105
1935	San Francisco, Calif., August	1111
1936	Kansas City, Mo., April	1491
1936	Pittsburgh, Penna., September	2904
1937	Chapel Hill, N. C., April	2155
1937	Rochester, N. Y., September	3483
1938	Dallas, Tex., April	1093
1938	Milwaukee, Wis., September	2871
1939	Baltimore, Md., April	4024
1939	Boston, Mass., September	3924
1940	Cincinnati, Ohio, April	3514
1940	Detroit, Mich., September	4206
1941	St. Louis, Mo., April	3960
1941	Atlantic City, N. J., September	5021
1942	Memphis, Tenn., April	2324
1942	Buffalo, N. Y., September	4288

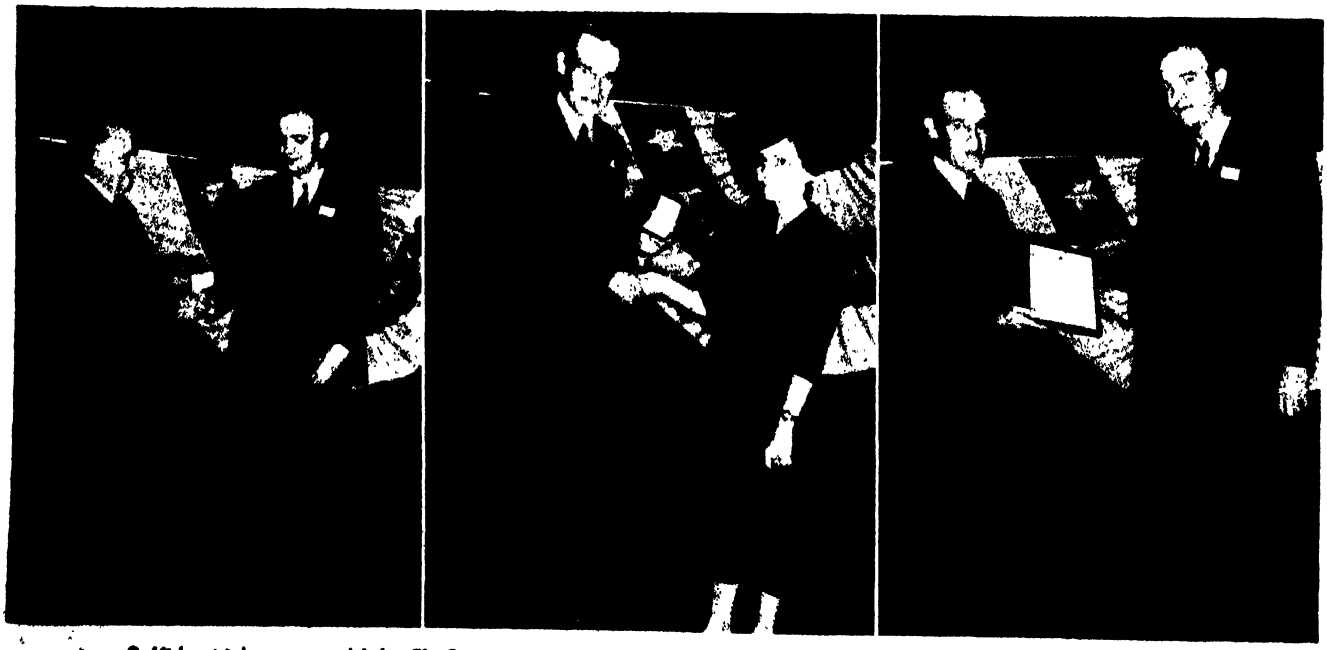
Chemical Abstracts Luncheon

IN ENDEAVORING to live up to its slogan "Key to the World's Chemical Literature" during these war-disturbed days, *Chemical Abstracts* is having enough difficulties to qualify as model for a radio serial. Nevertheless, this journal is managing with considerable success to maintain its world-wide scope. The means which have been found to do this provided the keynote of the discussion at the abstractors' luncheon in Buffalo. Editor E. J. Crane announced that *Chemical Abstracts* has dropped only 22 per cent in size to September 1, 1942, from the corresponding size before war broke out in Europe in 1939 and only 10.5 per cent from the size at the corresponding date last year. Most of the reduction is attributable to the wartime decrease in chemical publication.

Former Editor Austin M. Patterson and President-Elect Per K. Frolich, once an abstractor, were the luncheon speakers.



Gustav Egloff of Universal Oil Products Co. in a characteristic pose



S. Kirkpatrick presents Alpha Chi Sigma's check to J. L. Oncley. *Center.* President Holmes presents the Garvan Medal to Florence B. Seibert. *Right.* Presentation of A. C. S. Award in Pure Chemistry to J. L. Oncley



Left. Mrs. H. O. Kauffmann, wife of member of local executive committee, poses with Lieutenant General Knudsen

Center. Dr. and Mrs. P. K. Frolich

Bottom. Mrs. Allen and E. Falcao, official Brazilian representative



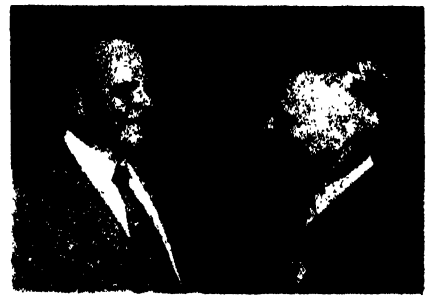
Dr. and Mrs. J. L. Oncley



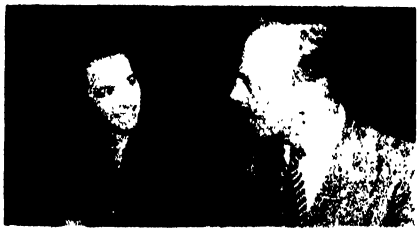


In earnest debate: O. R. Sweeney, Iowa State, and T. A. Boyd, General Motors





H. H. Willard, University of Michigan, and Ed. F. Degering, Purdue University



Mr. and Mrs. W. W. Duecker, Texas Gulf Sulphur Co.



Messrs. Kulka and Ashford, students, McGill University



President Harry N. Holmes, Willard Dow, Dow Chemical Co., and A. L. Elder, WPB



From top to bottom. W. K. Eglof, E. F. Wesp, and J. H. Crowdle. B. Morey, G. E. Symons, and R. L. Murray. W. M. Buehl, Walter Klabunde, R. B. Elliott. Max E. Bretschger, J. F. Walker, H. O. Kauffmann, and L. F. Hoyt

At Buffalo under Priorities

VITALITY and determination of chemists to get together were demonstrated again at Buffalo where priorities on transportation and limits to housing capacity were the immovable bodies met by the irresistible force of near-record attendance of chemists.

* * *

GREGARIOUSNESS with serious purpose and active interest in the rubber program pushed registration at the 104th meeting of the A. C. S. into third place on the list of records. Only New York and Atlantic City hold their places and Detroit and Baltimore drop back one place each to let Buffalo into third place.

* * *

TRANSPORTATION difficulties in getting to the meeting were forgotten in the pride of arrival, but from then on the impression gained rapidly as the week progressed that Buffalo and the Western New York Section were in league with the transportation companies to make the temporary increase in the frontier's chemical census permanent. Mass exodus over crowded rail lines presented new challenges to chemical ingenuity, and new tests of the patience of transportation company employees.

* * *

HOUSING became stringent when all available rooms in the selected hotels were reserved two months before the meeting. Some relief was afforded by commandeering private homes and Canada helped by allowing some chemists to use hotels across the border.

* * *

BUS and taxi transportation in connection with the meeting, especially for sightseeing to Niagara Falls, added to the troubles of the local committee when freezing orders canceled advance arrangements. Again Canada proved a good neighbor by providing busses on regularly scheduled runs to take sightseers to the Falls.

* * *

THE Division of Paint, Varnish, and Plastics Chemistry solved its transportation problem during a rainy part of the meeting by utilizing the "Black Maria" of the Buffalo Police Department (the police had supplied the division's meeting place) to

shuttle members to and from the Statler. Whether this extraordinary service by the police indicates excessive rectitude on the part of the division's members or the contrary had not been decided at the close of the meeting.

* * *

MEETING rooms overflowed often. The court stenographer to record two of the papers before the Symposium on Research Management could not get into the room to do his job on account of the crowd. Food, too, interested an unexpected number and overcrowded the Symposium on methods for the Preservation of Foodstuffs and Their Application in the War Effort with double the capacity of the room. Agriculture and Food had to move to larger quarters on another floor, and thanks to the smooth arrangements of the local committee, the move was made (complete with audience) in 15 minutes between papers.

* * *

EXCHANGING rooms between divisions was almost the order of the day to meet the needs of unexpectedly large attendances.

* * *

CENSORSHIP required the deletion of several papers from the program at various points and may become an even more important factor in arranging future programs.

* * *

MEDALS to the local committee members and divisional officers who conducted an outstanding meeting under the most trying and changeable conditions.

* * *

MEDAL, also, to Florence B. Seibert—Women's Award in Chemistry (Garvan Medal); and AMERICAN CHEMICAL SOCIETY Award in Pure Chemistry (sponsored by Alpha Chi Sigma) to John Lawrence Oncley, who is a member of the fraternity.

* * *

REGISTRATION got off to a good start on Sunday to the apparent surprise of many who seem to forget that high registration on Sunday has become the rule.

* * *

FOR the record: divisions meeting, 17; papers, 425; authors, 693; symposia, 14.

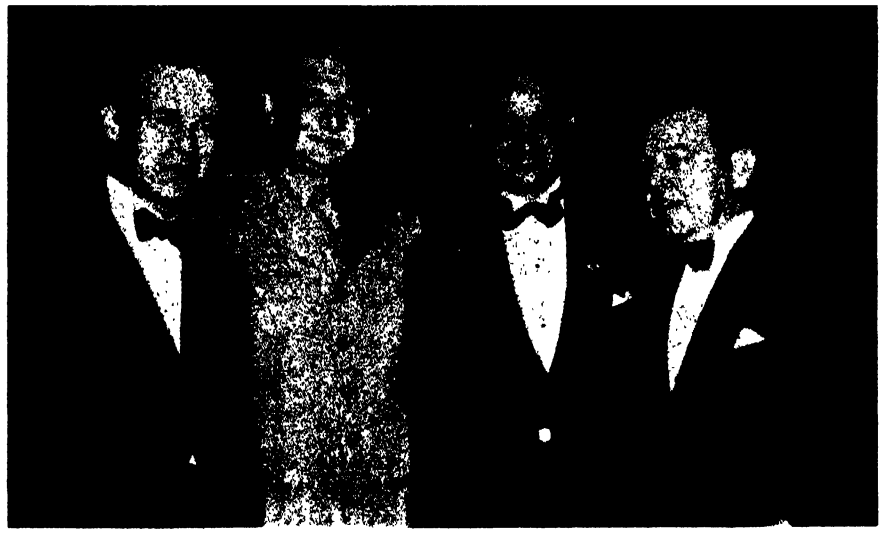
* * *

MONDAY'S Council meeting approached another record of peace and expedition in handling its business without serious argument on any points.

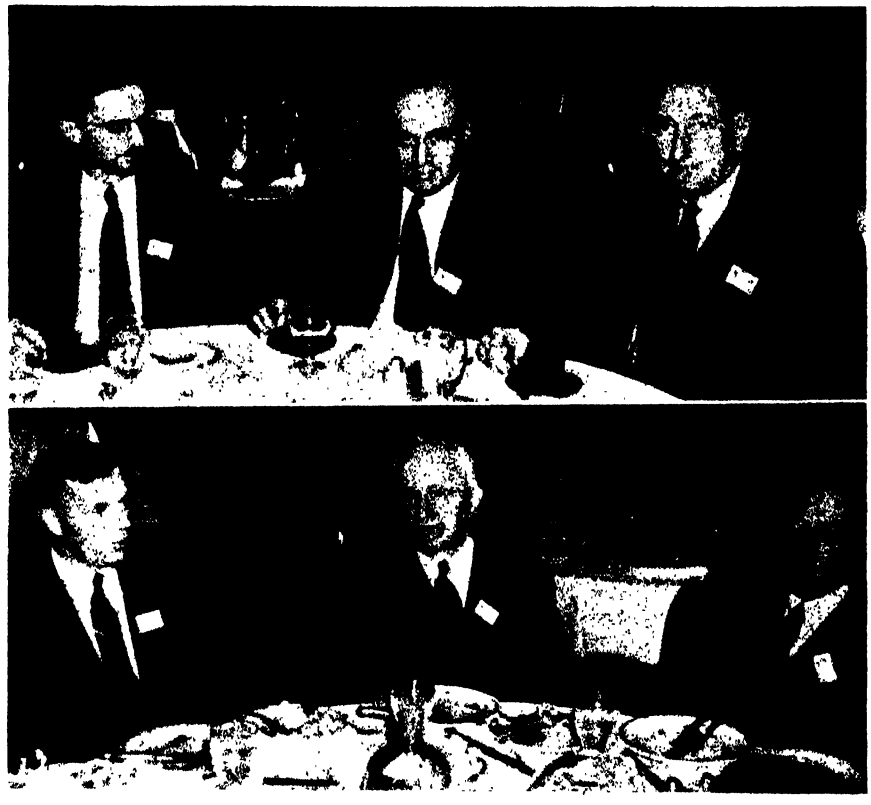
* * *

DIVISIONAL meetings got off to a flying start on Monday afternoon and continued through the week with the Division of Rubber Chemistry winding up the program with two sessions on Friday.

* * *



At the subscription dinner Wednesday night ***Left to right:*** **President Harry N. Holmes, Lieutenant General W. S. Knudsen, Local Committeeman R. L. Murray and E. R. Weidlein**



Top. **E. J. Ritchie, Eagle Pitcher Lead Co., J. H. Calbeck, consultant, and A. F. Brown, Imperial Paper and Color Co.** ***Bottom.*** **Harry Outcault, St. Joseph's Lead Co., W. L. Evans, Ohio State University, and W. A. Bush, California Flaxseed Products**



Left to right: **N. D. Scott, F. S. Pratt, P. J. Carlisle, L. M. White, du Pont Electrochemicals Division**

THE strange sound evident in the Statler on Wednesday afternoon at 8:14:30 P. M. was the sigh of sincere relief by the local committee when registration passed the 4,000 mark. The sigh was based on changes of plan and uncertainty of most things connected with the meeting before and after Pearl Harbor. First estimates of attendance hovered around 5,000. Later these were revised several times to fit circumstances, even the possibility of no meeting at all, and final commitments and arrangements were made with some trepidation on the basis of 4,000.

* * *

GROUP meetings and meals continue an important part of the functioning of national meetings. Seventy-five such events were scheduled on the Buffalo program, each well attended, in addition to numerous less formal affairs in all parts of the frontier territory.

* * *



Top. Dr. and Mrs. G. Symons. *Center.* E. Bartow, Iowa State, and W. J. Karslake, National Aniline & Chemical Co. *Bottom.* L. C. Rubin and H. O. Forrest, The M. W. Kellogg Co., and M. De Simo, Great Lakes Carbon



C. M. A. Stine delving into the future at Monday night's general meeting



Left. E. Williams, director of research at General Aniline & Film Corp. *Below.* J. V. N. Dorr, Dorr Co., H. E. Howe, and C. M. A. Stine, du Pont. *Right.* Frank Whitmore, Pennsylvania State College, speaker, students' breakfast. N. Rakestraw, Editor, *Journal of Chemical Education* at speaker's right







From left to right. D. Othmer, Brooklyn Polytechnic Institute; W. Weinrich, Gulf Research & Development Co., and Secretary, Division of Industrial and Engineering Chemistry; J. Krueger, Edwal Laboratories; and L. H. Reyerson, University of Minnesota



From left to right: G. Esselen, consultant; W. H. Brockett, WPB; H. B. Lowe, Reinhold Publishing Corp.; J. Bennet Hill, Sun Oil Co.; and R. S. Casey, Schaeffer Pen Co.



Top left. Burrows Morey, original general chairman of Buffalo meeting, and A. H. White, University of Michigan



Center left. Gladys Swope, Waukegan, Ill., and W. F. Henderson, Visking Corp.



Bottom left. Guy Harcourt, vice president, Buffalo Foundry & Machine Corp., and Miss Harcourt



Below. Mr. and Mrs. W. Oldham



Bottom. R. H. Barth, H. Burrel, P. H. Hammond, Heyden Chemical Corp.



Buffalo Historical Museum facing Delaware Park Lake

PUBLIC address systems in the Statler being interconnected through a central switchboard provided relief for heavy listening to papers. One of Monday's sessions included a swing band interlude of the current "I've got spurs...", and the speaker at one luncheon was similarly interrupted with unexpected music. The hilarity accompanying each outbreak was too great, and the embarrassment too evident, to permit names to be given here.

* * *

MONDAY evening's entertainment took place in the gigantic, carefully calculated megaphone comprising the principal auditorium of Buffalo's magnificent Kleinhans Music Hall. Opening the program were three familiar compositions rendered with finished artistry by the Buffalo Philharmonic Orchestra under the baton of Franco Autori. Honorable Alan D. Drake, substituting for Buffalo's Mayor Kelly, welcomed chemists. President Harry N. Holmes and C. M. A. Stine dipped into the present and the future to show the vital effect of chemistry and of science in national survival in the present world turmoil and in molding a better future. Nonchemical Buffalonians as well as chemists were stimulated and inspired by the two significant addresses.

* * *

A NURSERY, fully equipped with toys dear to the very youthful and in charge of a trained kindergartner, was at the disposal of chemists at the Statler. No children showed up to utilize it and one chemist hearing of that attempted to crash the nursery gate but refused to stay when he found that the toy selection was not complete enough to include an electric train. Obviously a thwarted attempt to circumvent the transportation shortage.

* * *

TUESDAY evening again demonstrated the avidity of chemists for gambling on the long chances when the County Fair at Buffalo's huge Memorial Auditorium provided plenty of stage money and attractions where it could be gambled away. Circus attractions on a stage in the center of the arena drew attention and interest for most of the evening and winners at the gambling were hard to find afterward. Prizes were War Bonds and proceeds from various concessions went to the U. S. O.

* * *

DANCING vied with circus stunts and gambling as the high point of Tuesday evening's fun.

* * *

WEDNESDAY afternoon's general meeting high spotted the interest of the week with the synthetic rubber program as the subject. The arena of the Memorial Auditorium (total capacity, 18,000) comfortably held a crowd estimated at around three thousand gathered to learn what could be known of this vital production problem. Albert L. Elder, of the War Production Board, described "Progress of Butadiene Production" and outlined the present status of this phase of the synthetic rubber program in some detail. "Progress of Styrene Production" was described by Willard H. Dow, president of the Dow Chemical Co.

* * *

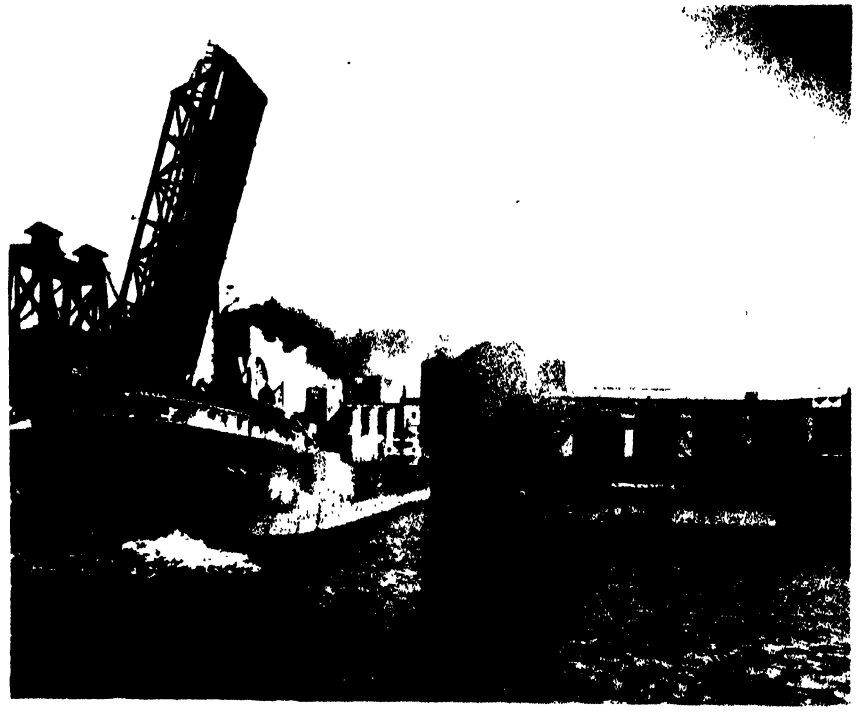
COMPLETING the synthetic rubber picture from a chemical point of view were papers occupying three sessions of the Division of Rubber Chemistry.

* * *

LIEUTENANT-GENERAL WILLIAM S. KNUDSEN told Wednesday evening's subscription dinner of the progress made in the production of planes, tanks, arms, and ships to equip our fighting forces to win over our enemies.

* * *

UNITED Nations Dinner" was the name given the subscription dinner



On the Buffalo waterfront

by the local committee, an idea borne out by decorations consisting of the flags of all our allies and a menu printed in the various languages represented by them.

* * *

FELICITATIONS from Brazilian chemists at the United Nations Dinner were presented personally by E. R. Falcao of Rio de Janeiro. Russian chemists sent their greetings by cablegram. Both were heartily received by the assembly.

* * *

LIMITATIONS on attendance at the United Nations Dinner placed by the available space in the Statler Ballroom left many attending the meeting without places. No vacancies were discoverable in the Ballroom where everyone possible was accommodated. The original number of tickets (800) was increased by an added hundred without satisfying demand. At the last minute, a veritable "black market" in tickets thrived briefly to help those whose plans were changed to let them dine elsewhere.



Edmund Hayes Hall on the University of Buffalo campus







At the Wednesday evening banquet: E. Falcao, W. L. Evans, Mrs. Oncley, and E. Bartow. Mrs. B. Morey, N. Allen, F. Seibert (medal winner), and P. K. Frolich. Mrs. Harry N. Holmes, Lieutenant General Knudsen, and Harry N. Holmes

EATING at Buffalo was seldom simple, but never did it reach real difficulty. That was described for the Division of Agricultural and Food Chemistry by Professor Laird, recently returned from captivity in Hong Kong.

* * *

EVERY kind of thing, including shirts, badges, opportunities, wallets, and even sense of humor and patience, was reported lost or found or both during the meeting. The only known exception was pants and they were lost by one of the performers at Tuesday's County Fair!

* * *

OBVIOUSLY Holmes and Stine did not enter into collusion or conspiracy on their two papers in advance of Monday evening's Public Meeting, since both discussed many of the same important factors in our present problems and future destiny. Fortunately, even though both are Johns Hopkins alumni, their treatments were quite different and both were heard with rapt interest.

* * *

THE Employment Clearing House encountered and solved new problems at Buffalo. Originally designed to assist unemployed chemically trained persons, this growingly useful feature of national meetings currently handled efficiently the avid demand of employers for help. Applicants, of whom very few indeed were even temporarily unemployed, were outnumbered in the ratio of 4 to 3 by employers seeking workers. The average was somewhat more than five interviews per applicant. Unique among the applicants was a husband-and-wife team, both well trained chemists.

* * *

ONE light spot in the synthetic rubber picture was the verse read by President Holmes at the United Nations Dinner. The history of the verse is not completely known, nor has it been possible to discover the author's name. Presumably it should be accompanied by an apology to Joyce Kilmer. Here it is:

I THINK that I shall never see
A tire unsired by a tree
A tube without a patch or hole
Whose ancestry is THIOKOL,
Or heels to ease pedestrian stress
Well wrought from good old Buna-S.
Our streets with grass soon will be green,
While Congress argues butadiene.
To dream of tires made from Butyl,
Is pleasant, but it's also futile.
Let's rubber seize from Japanese,
Not vainly wait for RFCs.



County Fair Scenes. *Top right.* **The County Fair Tuesday night was replete with "guess your weight" artists and penny games.** *Below.* **Specializing in glamour and music, circus scenes, and general dancing**

AT THE Public Meeting Monday evening, the chairman pointed out that the stage decorations were rubber trees—synthetic.

* * *

MEMBERSHIP in the A. C. S. was reported at the Council Meeting to have reached 31,423. That is a lot of chemists.

* * *

THE Captain E. J. Crane among the first U. S. Marines to land on the Solomon Islands was not his namesake, the honorable Editor of Chemical Abstracts, nor even a member of his family.

* * *

TOLD at the meeting: James B. Conant approached a guarded door in Washington and was told by the watchman to "Keep out". Thereupon, the doctor intent upon getting to an important meeting, explained that he was president of Harvard. The watchman said, "Excuse me. You are not permitted to enter here."

* * *

THE SOCIETY now boasts 99 local sections and with the coming of universal gas rationing many of them are likely to adopt the custom, already adopted by a few, of becoming peripatetic and meeting where even a few members can be gathered together.

* * *

RESTRICTIONS on transportation may have the effect of encouraging meetings of divisions individually in the future, at least for the duration.

* * *

A LARGE group of chemists from the Buffalo meeting took Tuesday afternoon off to help the Hooker Electrochemical Co. and its more than a thousand employees celebrate the award of the Army and Navy "E" for excellence in production. The pride of both the employees and the officers of the company in this recognition of their accomplishment and effort was evident in spurring all to break their own records, for work was resumed even before visitors were all gone.

* * *

THEN there is the story of the lady at the Hooker celebration who asked a plant guard to direct her to the "Powder Room". The guard was nonplussed because, he said, "Hooker don't make powder".

* * *

SWING was provided for official dancing by Jack Valentine and by Dick Kuhn, but no census of purveyors of music in the modern manner at unscheduled dance spots could be made.

* * *

IN VIEW of everything, particularly restricted transportation, the standard farewell at Buffalo was: "See you at Indianapolis, if. . . ."

Divisional Officers Breakfast

HOWARD I. CRAMER was elected chairman of this group to succeed C. R. Hoover, and Arthur C. Cope was elected secretary.

Dr. Parsons discussed the difficulties involved in having the Indianapolis meeting and suggested the possibility of combined divisional meetings. This is to be decided by the Directors and will be announced by January 1, 1943.

A motion was passed to the effect that in the author index of the meeting program the current connection be given and not the institution at which the work was done.

It was also suggested that the divisional secretaries send three copies of their program to the secretary's office in the future and also use greater care in following directions sent them in the preparation of the program.

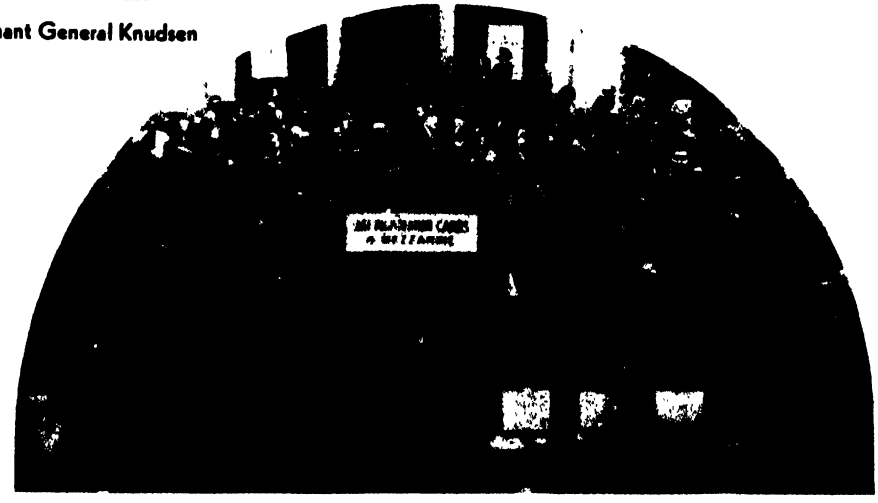
A symposium is being considered by the Division of Water, Sewage and Sanitation Chemistry in cooperation with the Division of Industrial and Engineering Chemistry. The Division of Biological Chemistry is planning a symposium with the Division of Agricultural and Food Chemistry on Biological and Chemical Methods of Assay.

G. L. ROYER, *Acting Secretary*



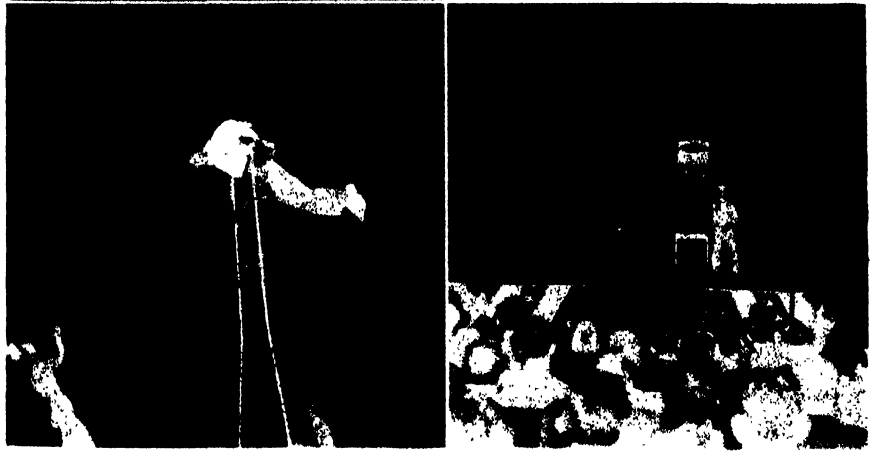
R. L. Murray, Mrs. Harry N. Holmes, and Lieutenant General Knudsen





Part of the registration crowd, foyer of Hotel Statler





Entertainers at the County Fair



President Harry N. Holmes discussing survival through science at the general meeting Monday night, Kleinhans Music Hall

Registration at Buffalo, N. Y.

State	Members		Visitors		Nonmembers	
	Men	Women	Men	Women	Men	Women
Alabama	13	0	1	3	0	0
Arizona	0	0	0	0	0	0
Arkansas	3	0	0	0	0	0
California	40	0	9	3	2	0
Colorado	6	1	0	0	0	0
Connecticut	71	3	1	3	3	0
Delaware	89	1	3	3	7	2
District of Columbia	57	3	8	12	0	0
Florida	4	2	0	0	0	0
Georgia	8	0	2	1	1	0
Idaho	2	0	0	0	3	0
Illinois	218	4	19	13	7	0
Indiana	86	0	2	5	2	0
Iowa	18	0	0	0	0	0
Kansas	9	0	1	1	0	0
Kentucky	13	1	1	2	0	0
Louisiana	11	0	0	0	2	0
Maine	6	0	0	0	0	0
Maryland	50	6	4	7	3	0
Massachusetts	118	11	16	9	4	0
Michigan	169	10	9	35	5	0
Minnesota	34	0	1	4	0	0
Mississippi	1	0	0	1	0	0
Missouri	27	0	2	1	0	0
Montana	1	0	0	0	0	0
Nebraska	4	1	1	0	0	0
Nevada	0	0	0	0	0	0
New Hampshire	5	0	0	0	0	0
New Jersey	239	7	13	9	17	0
New York	1073	51	158	138	89	7
New Mexico	0	0	0	0	0	0
North Carolina	9	4	1	0	0	0
North Dakota	2	0	0	0	0	0
Oklahoma	10	0	0	0	0	0
Ohio	282	8	45	29	16	0
Oregon	1	0	0	0	0	0
Pennsylvania	354	10	25	53	11	0
Rhode Island	20	0	1	3	1	0
South Carolina	1	0	0	0	0	0
South Dakota	0	0	0	0	0	0
Tennessee	16	1	1	1	0	0
Texas	25	0	2	1	2	0
Utah	1	0	0	1	0	0
Vermont	6	0	0	2	0	0
Virginia	33	2	0	6	2	0
Washington	4	0	0	1	1	0
West Virginia	27	0	0	5	1	0
Wisconsin	31	2	1	3	0	0
Wyoming	0	0	0	0	0	0
Philippines	0	1	0	0	0	0
Brasil	0	0	1	0	0	0
Canada	40	1	46	1	2	0
India	0	0	1	0	0	0
Total	3237	130	375	356	181	9
Grand Total	4288					

Data Published on Selective Service

Because of the wide interest in this subject and the need for obtaining trained men for our Production Army, we give below references to information we have published on occupational deferments, including those of men in training, and the need for technically trained persons. Future developments will be brought to the attention of our readers.

Chemical and Engineering News

(News Edition previous to 1942)

Vol. 18 (1940), pages 890, 1127

Vol. 19 (1941), pages 129, 311, 457, 459, 489, 520, 587, 681, 797, 1164, 1412, 1464

Vol. 20 (1942), pages 110, 157, 472, 579–80, 788, 812, 837–39, 985, 1099 and 1100

Industrial and Engineering Chemistry

Vol. 33 (1941), pages 1, 135, 283, 561

Vol. 34 (1942), pages 2, 131, 259, 648

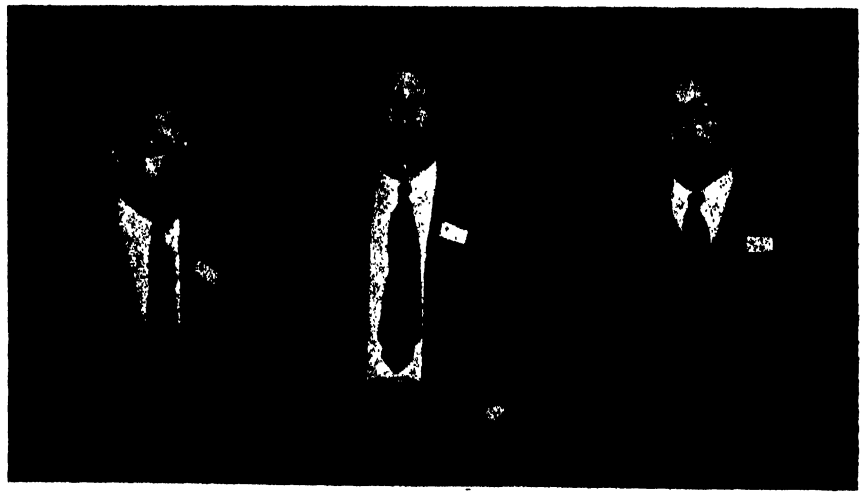
140th Anniversary of Du Pont Co.

Commemorating the 140th anniversary of the founding of E. I. du Pont de Nemours & Co., Inc., a special issue of *The Du Pont Magazine* has been brought out. Walter S. Carpenter, Jr., president, referred to the war work entrusted to the company, but pointed out that of the 140 years of its history less than fifteen had been devoted to wartime production.

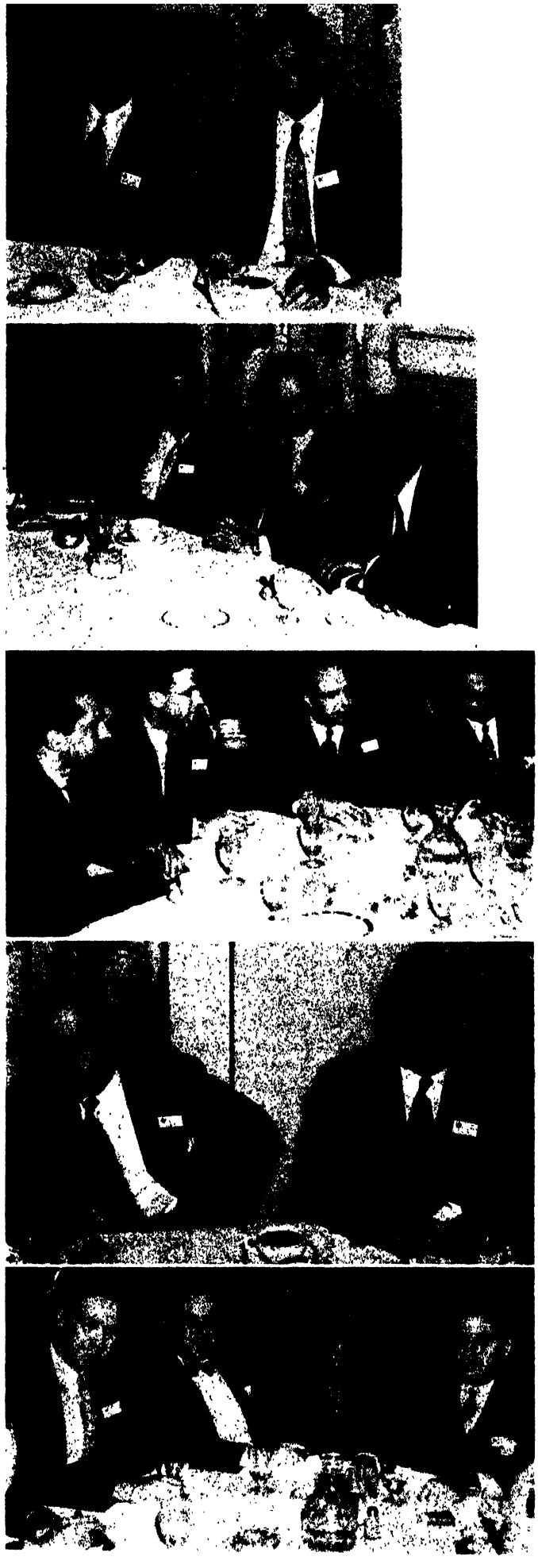
Raymond J. Carey, technical salesman of the General Dyestuff Corp., has been granted a leave of absence to accept a commission as first lieutenant in the U. S. Army. He has been assigned to the Chemical Warfare Service.

Scientific Advisory Committee of Minnesota War Industries

Governor Harold Stassen recently appointed a Scientific Advisory Committee for Minnesota War Industries. The following individuals were named members of the committee: I. M. Kolthoff, chemistry; L. F. Miller, physics; F. B. Rowley, engineering; T. L. Joseph, metallurgy; R. E. Montonna, chemical engineering; M. B. Visscher, physiology; and L. H. Reyerson, chemistry and committee chairman. It will be the duty of the committee to give scientific and technical advice to the war industries of the State. Already members have been of real assistance in problems connected with production for war.



From left to right. H. I. Cramer, Sharples Solvents Corp.; J. N. Street, Firestone Tire and Rubber Co.; and A. L. Elder, WPB



Divisional Reports

Agricultural and Food Chemistry

At Buffalo the Division of Agricultural and Food Chemistry enjoyed one of the most successful meetings in its history. All the sessions attracted unusual interest, the attendance far surpassing all expectations and in several cases exceeding the capacity of the meeting rooms. At the Monday session the number in attendance represented almost 20 per cent of the total registration on that day.

All sessions, except three, were devoted to a Symposium on Methods for the Preservation of Foodstuffs and Their Application in the War Effort. The timeliness of the subjects and the character of the papers presented proved attractive to the representatives of many groups interested in food processing, food machinery, and the manufacturers of packaging materials as well as those whose primary interest falls in the fundamental chemistry underlying nutrition and food processing. Of especial interest were the papers presented by officers of the Quartermaster Corps, the Sanitary Corps, and the Chemical Warfare Service. Timely were the several papers on dehydration, preservation by freezing, and the effect of wartime conservation on food packages. Also outstanding were papers on the stabilization of fats, preservation of fruits and vegetable juices, the aldose-protein condensation partially responsible for the browning of evaporated milk, and one on a method for preventing the degradation of chlorophyll in canned vegetables. Z. I. Kertesz presented the report of the Committee on Pectin Nomenclature. In all, 44 papers were presented, including one on vitamins on which the division collaborated with the Division of Biological Chemistry.

The large attendance at the divisional luncheon honoring Lucius M. Tolman, who served as chairman of the division more than 25 years ago, was particularly gratifying. Mr. Tolman was presented with an engraved certificate commemorating the occasion. Mary E. Pennington and H. R. Kraybill were called upon to recall some of the highlights of Mr. Tolman's history in the chemical field.

The membership of the division numbers 283. Approximately 100 were in attendance at Buffalo.

Plans for the Indianapolis meeting are yet incomplete but probably will include further consideration of food dehydration and a program of papers dealing with a comparison of biological, microbiological, and chemical methods for vitamin assay. Roger H. Lueck, *Secretary*

Analytical and Micro Chemistry

Two sessions were held. Eight papers were classified as "micro" and nine as "analytical". At the Micro Chemistry Session, C. J. Rodden, National Bureau of Standards, presented a report of the Divisional Committee on Microbalances, in which he announced the results of a cooperative test of the reproducibility of weighings, conducted by members of the division. It is planned to publish these results later. He also announced that his committee was studying a set of specifications for design, materials, and construction which should prove of interest to American manufacturers of microbalances.

Division of Industrial and Engineering Chemistry luncheon, Tuesday noon. *Reading from top to bottom.* Lawrence Bass, New England Industrial Research Foundation, Inc., and T. Chilton, du Pont Co. W. Weinrich, Gulf Research and Development Co.; H. E. Howe; R. Norris Shreve, Purdue University; M. L. Crossley, Calco Chemical Co. C. Steffens, General Printing Ink; R. M. Lawrence, Atlas Powder Co.; W. H. Bowman, Westvaco Chlorine; and A. G. Richards, Dewey & Almy Chemical Co. C. Thomas, Monsanto Chemical Co., and O. A. Hougen, University of Wisconsin. H. S. Gardner, University of Rochester; F. J. Curtis and D. M. Sheean, Monsanto Chemical Co.

Other papers that seemed of more than usual interest were those of Wernimont on the Karl Fischer method for moisture, using a dead-stop end point determined by a simple electrical hook-up, and the papers of Rieman on calcium determination. The attendance varied from about 50 to 100.

A joint Symposium on the Teaching and Practice of Analytical Chemistry with the Division of Chemical Education attracted an audience of about 150 who were well repaid by the uniform excellence and interest of the three papers. It was unfortunate that time did not permit discussion from the floor.

The business meeting was conducted at the divisional luncheon at which 85 members and guests were present. The outgoing chairman announced that the divisional Committee on Microchemical Apparatus had completed a set of drawings and specifications of the apparatus recommended for the determination of sulfur and halogen. Since the specifications had been agreed on by the committee and by representatives of the manufacturers the division approved them for early publication in the Analytical Edition.

The roster of the division contains approximately 190 names.

FRANCIS W. POWER, S.J., *Secretary*

Cellulose Chemistry

THE Division of Cellulose Chemistry held its sessions on Thursday, during which 10 papers were presented. About one hundred people—the average attendance—were comfortably accommodated. Active discussion followed most of the papers and added materially to the value of the meeting.

An annual report of the Committee on Standards and Methods of Testing, under the chairmanship of Fred Olsen, indicated that considerable progress has been made by this committee toward development of standard methods for many tests of importance in the commercial use of cellulose.

The division has 226 members.

The annual business meeting was held during the afternoon session.

The division plans to hold sessions for presentation of general papers at the spring meeting in Indianapolis.

CHARLES R. FORDYCE, *Secretary*

Chemical Education

OF A total membership of 136, a goodly number attended the three sessions, comprising 15 papers, held by the division and the joint symposium with the Analytical and Micro Chemistry Division on Teaching and Practice of Analytical Chemistry.

Of the three separate sessions, the program planned for students proved so attractive that many past the student age attended and felt well repaid because all the papers were excellent and helpful.

Over 100 were present at the student breakfast, presided over by N. W. Rakestraw, who was also the speaker at the divisional luncheon the preceding day.

PAUL H. FALL, *Secretary*

Colloid Chemistry

THE present membership of the division is 130 and of this number 65 attended the Buffalo meeting. Many from other divisions also were present, especially for the Thursday afternoon symposium.

Thirteen technical papers, mostly of a physical chemical nature were presented in addition to the symposium of four papers. The outstanding feature was the symposium which reviewed fields of application of colloid science in nontechnical language. The crowded audience overflowed into the adjoining room and corridor.

No meeting will be held at Indianapolis if the Colloid Symposium is to meet as planned in June 1943.

J. W. MCBAIN, *Secretary*

Fertilizer Chemistry

THE divisional meetings were exceptionally well attended. Approximately 200 were present and 27 papers were presented. The papers covered new developments in manufacturing processes, utilization of waste products, effect of fertilizer on soil salt concentration, boron in agriculture, and new horizons in nitrogen. Of particular interest was a paper on the present status of plant hormones.

A potash symposium consisting of 15 papers was of exceptional interest. Among other things it was shown that the present known potash reserves of the United States are adequate to supply the needs of this Nation for at least another 200 years. The role of potash in agriculture was discussed in a series of 12 papers. About 200 members attended the sessions.

CHARLES A. BULL, *Secretary*



Paint, Varnish, and Plastics Division is taken home by Buffalo Police Department in paddy wagon. The crime wasn't serious though. The division found itself stranded at the Police Academy by a sudden rainfall and a drought of cabs, so the police substituted Black Maria for the yellow peril.

Gas and Fuel Chemistry

THE total membership of the Division of Gas and Fuel Chemistry is 115 and of this number it is estimated that 50 were in attendance at Buffalo. Seventeen papers were presented.

The program included a half-day general session and a Symposium on Uses of Coal by Various Industries. The seven papers presented at the general meeting dealt with producer gas formation, burner flames, corrosion of metals by flue gases, and various phases of coal oxidation.

H. J. Rose, of Mellon Institute, presided at the symposium at which nine papers were presented. Of greatest interest were the papers dealing with the utilization of coal and coal products in the plastics and synthetic rubber industries, and the prospective new uses of coal in the production of new chemicals.

Attendance averaged 50 and reached a maximum of 125. No special plans have been made for the Indianapolis meeting.

G. R. YOHE, *Secretary-Treasurer*

Medicinal Chemistry

APPROXIMATELY 200 persons attended the session of the division, though the total membership of the division is only 150. The average attendance was about 75 and 14 papers were presented.

The papers covered a wide range of interests, including a most interesting discussion of a new theory to account for the activity of sulfanilamide-type drugs, and designed to permit prediction of activity of new compounds from certain simple measurements of physical properties. This theory was presented from two different points of view by two completely independent speakers whose work was quite unknown to each other (papers 11 and 14). The Divisional Luncheon was featured by the presentation of the movie, "Malaria", loaned by the Shell Oil Co.

Plans for Indianapolis include the usual session for general papers, and a symposium on a topic of live current interest if the appropriate speakers are in a position to speak publicly at that time.

JOHN H. SPEER, *Secretary*

Organic Chemistry

A TOTAL of 50 papers was presented before the Division of Organic Chemistry at the Buffalo meeting. Divisional Chairman Lee I. Smith presided at each of

the four half-day sessions. His record of introducing each speaker and listening to every paper can never be surpassed. Both audience and speakers enjoyed the acoustics, visibility, and comfort provided by the Statler Terrace Room.

At the meeting of the Executive Committee plans were made to hold the Tenth National Organic Chemistry Symposium on December 28, 29, and 30, 1943, at Boston, Mass., unless war conditions make it impossible or inadvisable to hold a symposium at that time.

ARTHUR C. COPE, *Secretary*

Paint, Varnish, and Plastics Chemistry

OWING to the preoccupation of most of our members with the war effort, only 10 papers were submitted at the Buffalo meeting. As usual the plastics papers attracted particular attention. Among the papers of the Protective Coatings Group, that by Dr. Freeman, of the Pittsburgh Plate Glass Co., dealing with solvent fractionation of oils was received with considerable interest and gave rise to numerous questions.

At the business meeting it was decided, after considerable discussion, to reduce the number of meetings to one a year for the duration of the war. The next meeting, therefore, is to be held in the fall of 1943 in conjunction with the meeting of the national SOCIETY. Members of the division who wish to present papers at that meeting are urged to submit them as early as possible, and preferably not later than the middle of June 1943.

The attendance at the Buffalo meeting was surprisingly good and amounted to about 300 during the presentation of some of the papers. The division now has 479 members.

At the close of the Tuesday afternoon session the members of the Division of Paint, Varnish, and Plastics Chemistry were marooned in the Police Academy because of a very heavy shower until the "Black Maria" of the Buffalo Police Department was pressed into service. The next day one of the Buffalo papers published a photograph showing one of our members running from the police wagon to the entrance of his hotel. His friends are still wondering what explanation he will offer.

A. C. ELM, *Secretary*



Attending the dinner of the Division of Paint, Varnish, and Plastics Chemistry Tuesday night. 1. J. Broker, Krebs Pigment, and G. W. Ashman, New Jersey Zinc Co. 2. A. Schuster, Durez Plastics, A. E. Hay, Pratt and Lambert, speaker, and S. L. Bass, Dow Chemical Co., and chairman of the group. 3. J. De Bell, De Bell Bros., and J. A. Kenney, Barrett Co. 4. Speakers' table: W. H. Lutz, Pratt and Lambert, W. W. Bauer, Pittsburgh Plate Glass Co., and M. Catena, McDougal Bros. 5. Also at speakers' table: A. C. Elm, New Jersey Zinc Co., Robert J. Moore, Bakelite Corp., Gustav Egloff, Universal Oil Products Co., G. G. Sward, National Paint and Varnish Association

Petroleum Chemistry

APPROXIMATELY 150 to 200 out of a total membership of 700 attended the session at which 14 papers were presented. A highlight of the Division of Petroleum Chemistry dinner was a talk by Peter Honig, formerly director of the Sugar Experimental Station of Java and director of the Rubber Institute of Java. He talked on "My Impressions of Java".

L. W. HENDERSON, *Secretary*

Physical and Inorganic Chemistry

THE Division of Physical and Inorganic Chemistry met for 10 half-day sessions, at which 58 papers, 18 invited and 40 contributed, were presented. There were three symposia, one on Kinetics Using Tracer Isotopes, organized by W. F. Libby, of the University of California, a second on Flow under Abnormal Conditions, organized by H. Mark, of the Polytechnic Institute of Brooklyn and the Society of Rheology, and, finally, one on Low-Temperature Phenomena, organized by D. H. Andrews, Johns Hopkins University. The Low-Temperature Group met for a special luncheon on Thursday.

A highlight of the division's sessions was the presentation of the address of the recipient of the A. C. S. Award in Pure Chemistry, J. L. Oncley. He gave a stimulating paper on "Physical Chemical Properties of Crystalline Serum Albumins from Human and Bovine Plasmas".

The usual dinner was held on Monday evening. The speaker was H. J. Barrett, of the Electrochemical Division of the du Pont company. He gave an interesting talk on "Unique Chemicals Derived from Salt". Dr. Oncley was also a guest of honor. The Secretary reported that the membership of the division was 506.

The Annual Symposium, which would normally be held in December, 1942, has been canceled. Plans for the Annual Symposium for 1943 are being held in

abeyance. It may be postponed until the summer of 1944, or may be canceled altogether, depending upon circumstances. Plans for the spring meeting at Indianapolis are, however, going forward, and arrangements for two symposia are being made but are not quite completed.

O. K. RICE, *Secretary*

Rubber Chemistry

THE Division of Rubber Chemistry enjoyed one of the most successful meetings in its history. This fact assumes added significance when it is recalled that the formation of this division was authorized by the Council of the AMERICAN CHEMICAL SOCIETY during the convention held in Buffalo in April 1919.

The total current membership of the division is approximately 975. Of this number, 500 to 600 were at the Buffalo meeting. The attendance at the technical sessions, including members of other divisions, varied between 600 and 750. Approximately 625 attended the divisional banquet held at the Hotel Statler on Thursday evening.

Twenty-nine papers were presented during the technical sessions. Of this number nine were of a general nature and 20 were devoted to theoretical and applied phases of the synthetic rubber development. Particularly interesting at the general session were those papers dealing with the potentialities of growing rubber in the United States, improved methods for the production of a new type of crude rubber possessing unusually uniform properties, and a new technique for the photographing of colloidal systems using the ultraviolet microscope. The Friday session was devoted to a symposium on the Compounding and Properties of Synthetic Rubbers now being developed in this country. It is planned to publish the papers in this group, along with those given before the general meeting dealing with butadiene and styrene, in the November issue of *Industrial and Engineering Chemistry*.

The division is planning to meet with the SOCIETY at Indianapolis next April. Although plans for this meeting are at present tentative, it is probable that the keynote of that meeting will again be synthetic rubber.

H. I. CRAMER, *Secretary*

Sugar Chemistry and Technology

THE papers presented in this division were not perhaps such as to bring newspaper notoriety but they did largely contain practical implications and indicate that a fundamental concept of the starch molecule and of the products of its breakdown have been pretty generally expanded and that all sugars and the starch derivatives are about to become of more economic value as bases for organic synthesis and the production of commercially important products.

The total membership of the division is now 194 and of this number approximately 45 were present. Nonmembers swelled the average attendance to approximately 80.

The executive committee has given much thought to the apparent difficulties in listening to all the presentations on the carbohydrates at our general meetings because of the wide distribution of such papers throughout the divisions and the hitherto unavoidable conflicts in the times of their presentation. It was proposed at the business meeting of this division that an agreement be entered into with the Division of Cellulose Chemistry that our meetings should hereafter follow each other, the order being reversed on successive meetings, and be held in the same room so that no conflict can possibly occur between these divisions. If this works out satisfactorily there will be a carbohydrate series of papers which will be arranged by the two divisions separately but which will nevertheless blend into a continuous program. It is hoped that this idea can be expanded in the future in some way until most conflicts have been eliminated.

E. WHITMAN RICE, *Secretary*

Water, Sewage, and Sanitation Chemistry

THE division held two sessions on Tuesday, September 8, at which time 15 papers were presented, one being in the form of a round-table discussion in which four men discussed different phases of the problem. The highlight of the meeting was this round-table discussion, entitled "The Detection of Poisons and Chemical Warfare Agents in Water Supplies".

The papers that aroused the most discussion were those dealing with the superchlorination of water for bottling carbonated beverages; demineralizing solutions by a two-step ion exchange process; the relationship between the fusain contents and the exchange capacities of sulfonated coal fines; prevention of microbiological slimes with phenol derivatives; and acid waste treatment. The latter paper dealt with the treatment of acid trade wastes from five different types of industries.

A business session was held Tuesday afternoon.

The Divisional dinner was held Tuesday evening at the Hotel Touraine and was attended by 33 members.

The Buffalo sewage works was visited Wednesday morning. This is a new and unique plant, in that its chief function is to disinfect the sewage, clarification being of secondary importance.

A joint symposium on industrial water uses is planned with the Division of Industrial Chemistry for the Indianapolis meeting in the spring. There will also be a general meeting of the Division at that time.

H. GLADYS SWOPE, *Secretary*

Local Section Officers Breakfast

THE breakfast meeting of the Local Section Officers Group was held at Hotel Touraine on Tuesday morning, September 9, with 37 present. Chairman F. O. Rice presided.

W. P. Yant, Mine Safety Appliances Co., Pittsburgh, was introduced as chairman for next year. Harry L. Fisher, U. S. Industrial Chemicals, was selected as Chairman-Elect and L. A. Underkofler, Iowa State College, was made Secretary.

Alden H. Emery reported on the speaker touring service, stating that less difficulty than had been anticipated was being experienced in arranging tours for the coming season. A considerable number of tours have already been arranged and others are almost completed. There remains, of course, the probability that conditions may arise making it necessary to cancel certain tours.

It was voted to continue the L. S. O. G. Exchange column in CHEMICAL AND ENGINEERING NEWS with Ed. F. Degering retained as Editor. Considerable discussion ensued as to suitable contents for contributions to the column. Special activities of the Local Sections and their defense activities were considered especially appropriate for inclusion.

The remainder of the meeting was devoted to discussion of section problems. A paramount problem is that of transportation for members to meetings of the Local Sections.

L. A. UNDERKOFLER, *Secretary*

Hooker Awarded Army-Navy "E"

NO SHORTAGE of will and determination hampers America's use of her most potent secret weapon: free men working in a free country", said Ralph Binkley, chairman of the Hooker Employees' Representation Association, speaking at the ceremonies of presentation of the United States Army-Navy Production Award to the Hooker Electrochemical Co. and its 1,019 employees at the company's Niagara Falls plant on September 8, 1942.

Presentation of the Army-Navy Production Award "E" Flag was made by Major General William N. Porter, chief, Chemical Warfare Service, and accepted for the company by its president, Harry M. Hooker.

Commander R. S. Smith, Jr., U. S. Navy, presented "E" pins to Hooker employees which were accepted by Mr. Binkley and four other employees of more than 30 years' service: George W. Stone (38 years), Joseph J. Bellegia (36 years), William Hayes (35 years), and Julius Bellegia (30 years).

Also participating in the ceremonies were: Alan Valentine, president of the University of Rochester, who presided; Chaplain J. W. Hrdlicka, of Fort Niagara; Eugene Butler, Mayor of Niagara Falls; Edwin R. Bartlett, executive vice-president of Hooker; John Sturgess, vocalist; and the Niagara Falls Concert Band, Edward D'Anna, leader.

In addition to Hooker employees and their families, representatives of the Army and Navy, and citizens of the Niagara Falls frontier, a large delegation of prominent chemists from the 104th meeting of the AMERICAN CHEMICAL SOCIETY were present at the ceremonies as guests of the company. Following the formalities at the plant, guests were given a buffet supper by the Hooker company at Hotel Niagara.

Federal Trade Stipulation on Termite Repellent

THE Reilly Tar & Chemical Corp., Indianapolis, Ind., engaged in the manufacture and sale of various coal-tar products, including one designated as "Reilly Transote", has stipulated with the Federal Trade Commission that in advertising its product it will discontinue any representation conveying the belief to purchasers that the repellent effectiveness of its product is of such permanence as to assure against all future termite infestations and decay, or to afford permanent or complete protection against termites and decay, irrespective of the lapse of time. "Reilly Transote", formerly known as "Reilly Transparent Penetrating Creosote", is recommended as a treatment for wood building construction and for the soil on which a termite-infested building stands.

The corporation also agrees to cease any representation implying that tests of the product have been made by the Termite Investigations Committee of California which were of such scope or time coverage as to warrant the inference that the effective value of the product would remain unimpaired or endure as complete protection against termites, irrespective of the lapse of time.

The corporation further agrees to discontinue the use of the word "creosote" either alone or in connection with the words "coal-tar product" as descriptive of the product, and the use of the word "creosote" in any way so as to imply that the product is creosote, as that term is understood in the wood-preserving trade.

Robert L. Warfel has been named a research engineer on the staff of Battelle Memorial Institute, Columbus, Ohio, and has been assigned to the Division of Analytical Chemistry. Mr. Warfel formerly was associated with the Carnegie-Illinois Steel Corp., Gary, Ind.

Buffalo Makes the Tools for the Chemist

EMIL RAYMOND RIEGEL, University of Buffalo, Buffalo, N. Y.

THE name of the Buffalo Dental Manufacturing Co. hardly suggests the high position it has always occupied among manufacturers of "tools for the chemist"; yet the industrial section of its wholesale department is concerned largely with items destined for the chemical industries.

The company was founded in 1867 and from the beginning imported various types of Fletcher's gas burning appliances from Worthington, England. After a few years the company manufactured these articles in this country, having acquired the American patents of Fletcher. The name of the firm came about in this way: Their biggest business was the manufacture of vulcanizers used by dentists for vulcanizing the rubber plates which, in the early days, embedded the artificial teeth. A large amount of business, however, was with laboratories and supply houses which bought their furnaces, gas burners, foot blowers for blowpipe work, rotary blowers, tweezers, and alcohol lamps. Their foot blowers were found in every laboratory. Many chemists still prefer them to air from the compressor because of the ease with which the pressure can be varied without calling for the use of the hands. It is believed that the firm was the first to introduce domestic gas stoves to the citizens of Buffalo.

Times have changed and some items manufactured at the beginning have become obsolete. But to this day the Buffalo Dental Manufacturing Co.'s blowpipes and furnaces are standard equipment in laboratories all over the United States. Gas-brazing blowpipes of various sizes, autoclaves for high and low pressure, boiling burners, and water heaters are among the items which still furnish an excellent business. L. E. Menge is president.

To the works chemists who were active 30 years ago, the Taber pump was a synonym for a sliding vane pump with everlasting life. When the vanes wore, they were replaced by new ones, and the reassembled pump continued its function. If the rotor became worn, it was replaced, and the pump continued to work; even the casing might be exchanged for a new one and made to function with used rotor and vanes. The Taber sliding vane pump was and is able to handle suspensions, slurries, and dissolved melts containing lumps of coal, or other solids.

The Taber Pump Co. is one of the oldest manufacturers of specialized pumps. It is probably the oldest concern to have manufactured the vane or blade type of rotary pumps. The company was founded by B. F. Taber, a tanner, in about 1859. Mr. Taber needed a pump which would not become clogged with pieces of bark and hide when transferring the tan liquors in the yard from one place to another. He set about to build a rotary pump which would not clog, and succeeded in doing so with the help of a mechanic. This was the foundation on which the Taber company was built, and even today this type of pump is in general use throughout the tanning industry.

From this modest beginning the company has developed a wide variety of centrifugal and rotary pumps for processing industries, foodstuffs, paints and varnishes, breweries, and heavy chemicals. At this time specialized pumps for the explosive and chemical warfare plants keep the shops working overtime. The Taber pumps include leakproof pumps, vacuum pumps of an improved type, and vertical centrifugals.

The president of the company, William F. Traudt, has been active for many years in dispelling the notion held by some people that a pump is "just a pump". There is a science of pumping, and different designs, different types, different clearances furnish special services with high efficiency; the pump must be suited to the requirements.

The firm of Pierce and Stevens, Inc., is primarily engaged in manufacturing lacquers and special solvents of all kinds, but it markets also special devices such as a scale which automatically shuts off the liquid being weighed when the container is filled. Many of these devices are patented.

The Buffalo Scale Co. holds an important place in its line; it was founded by one of Buffalo's well-known families.

The Consolidated Packaging Machinery Corp. manufactures automatic scales and packaging machinery which are distributed nationally and internationally. Packages may be automatically sealed or sewed, besides being filled and weighed. A six-scale automatic unit packages solid materials at the rate of 40, 60, or 100 per minute. A number of the products of the plant are the well-known Hoepner automatic machines, mainly scales. Among other activities, the company designs, manufactures, and installs scales and scale controls with panel board for the automatic mixing and delivery of six (or more) different materials in different amounts destined to form a batch for feeding a furnace or storage silo.

A final bit of history: The first Pyrex thermometers were made at the Corning Glass Works in 1919 by F. Kraissl, and they had been ordered by Mr. Hough, to be used in "dynamite pots" which the Buffalo Foundry and Machine Co. was manufacturing at that time.

[1] Supplement to the article appearing in the July 10 issue, pages 841–3.

Creation of Research Organization Presents Problem

To assume the responsibility for the operation of a complex and going chemical industry without an organization for basic fundamental and applied research imposes, according to R. E. McConnell, president of the General Aniline & Film Corp. of New York, unique and pressing problems of management.

Mr. McConnell pointed out that the creation of such a research organization necessarily involved seeking the services of some men already employed in essential war industries. He was sure that, because of the wide appreciation of the problems to be solved and of the importance of their solution in the national interest, this could be achieved with the entire good will and cooperation of these industries with whom the corporation might indeed come in competition.

General Aniline & Film is now wholly American owned and managed by a board of directors appointed by the Alien Property Custodian. Provisions will be made, according to Mr. McConnell, to prevent its reversion to alien ownership at any future time. Presently the corporation is engaged in production essential to the war effort through its three manufacturing divisions, Agfa Ansco Division (photographic materials and apparatus), General Aniline Works Division (dyestuffs, intermediates, and chemical products), and Ozalid Division (reproduction processes).

While no final plans have been announced for the disposition of the ownership now held by the Alien Property Custodian, Mr. McConnell pointed out that the interlocking nature of the operations suggested the wisdom of maintaining the unity and integrity of the property as a whole. Present operations are now so integrated as to make the company a self-sustaining unit of sufficient size and resources as to be logically and profitably operated independently. Clearly the anti-trust laws would prevent the passing of many of its operations under the control of its principal competitors.

In addition to its three major divisions, General Aniline & Film Corp., with Sterling Products, Inc., owns Winthrop Chemical Co., Sterling performing the functions of management.

Lectures on Modern Chemical Theories

The Department of Chemistry of the Polytechnic Institute of Brooklyn announces that Henry Eyring, of Princeton University, will join its staff during the coming academic year as visiting professor of physical chemistry. Professor Eyring will lecture in the Graduate School on "Modern Chemical Theories", on alternate Fridays, beginning October 2, 1942.

Bauxite Deposits in the United States

Carrying forward the war program of the Department of the Interior, engineers and geologists of the Bureau of Mines and the Geological Survey have blocked out more than 500,000 tons of valuable bauxite in two Georgia counties. Some of the bauxite may be used immediately. The deposits are located in the Andersonville district of Sumter and Macon Counties, in west central Georgia. As soon as the exploratory work is completed, all essential information will be turned over to the owners of property on which drilling was done. It is anticipated that the bauxite will be mined promptly.

Extensive investigations indicate that, out of 500,000 tons of bauxite deposits in the area, over 200,000 tons contain better than 50 per cent alumina and rate as a Grade B ore, which is next to the best quality ore for yielding metallic aluminum. Existing industrial processing plants can handle this grade of ore immediately after it is removed from the ground, and it is probable that the remaining 300,000 tons of Grade C Georgia bauxite may be utilized through methods now being studied or developed both by the Bureau of Mines and private industry.

Sponge Iron Pilot Plant

The commercial-size pilot plant for the production of sponge iron, to be built by the Bureau of Mines under a recent authorization by Congress, will be located at Laramie, Wyo., on a site made available to the Government. This location was chosen mainly because of its nearness to available sources of iron ore, natural gas, and coal. On the basis of its studies to date, the Bureau of Mines has concluded that sponge iron can be utilized as a suitable substitute for scrap iron to mix with ordinary pig iron in manufacturing steel.

While the construction of the pilot plant is progressing, the Bureau of Mines will make a thorough investigation of various processes for producing sponge iron in small-scale pilot plants which are owned by private companies. Three of the processes to be investigated are reported to have produced sponge iron successfully on a pilot-plant scale.

Chemical Production in Sweden

Efforts of Sweden's chemical industries to fill the gap caused by stoppage by war of former sources of supply are reported from abroad.

Increased production has made advances in this direction, it is stated, production of sodium sulfate, nitric acid, and hydrochloric acid being reported. Output of sulfuric acid is now meeting domestic demand, while chlorine, organic chlorine derivatives, and various electrochemical products are becoming available in larger quantities. Zinc salts, chromic acid, chromium compounds, certain phosphates, and potassium permanganate are replacing former imports of the same type.

WPB Changes in Personnel

E. W. Reid, chief of the Chemicals Branch of the War Production Board, has announced the appointment of Lawrence Brown as assistant branch chief in charge of Staff Sections. He will coordinate the functions of the five Staff Sections of the branch.

New chief of the Aromatics and Intermediates Section is Hugh D. Hughes, formerly with Carbide and Carbon Chemicals Corp., New York, N. Y. He succeeds James Raynolds, who becomes assistant chief of the Chemicals Branch. This section takes over the Plasticizers and Glycols Unit, which was formerly in the Plastics and Resins Section.

A new Transportation and Packaging Section has been established within the Chemicals Branch, with Donald C. Knapp as chief. A new Plastics and Synthetic Rubber Section has also been set up, replacing the two sections heretofore operating separately in these fields. Frank Carman, former chief of the Synthetic Rubber Section, is in charge of the new section. The former chief of the Plastics and Resins Section, Arthur Petersen, heads the Products Advisory Section of the branch, while James Lawson, formerly with WPB's Special Industrial Machinery Branch before its abolition, is new chief of the Projects, Machinery, and Facilities Section of the Chemicals Branch.

Training for Prospectors

As part of its program of encouragement to prospectors for chromium, manganese, and other metals, the Canadian authorities are conducting special courses for prospectors, while geological parties sent out by the government will assist prospectors, who also receive tax concessions.

Canadian Control of Lead

Canada now exercises close control over buying and selling of all lead and lead-base alloys, it is reported by the Department of Commerce. Such control is said to have been necessitated by increased demand for lead as a substitute for more critical materials.

William M. Jeffers, president of the Union Pacific Railroad, has been appointed rubber administrator by the War Production Board and wil have full control over all phases of the rubber program.

John H. Nair has resigned from the Borden Co. after 23 years and has become associated with Continental Foods, Inc., Hoboken, N. J., where he is doing research work on dehydrated foods.



KIRKPATRICK

An H. D. duster model No. 1 in operation at Shirley Plantation, Tallulah, La.

Insecticides for Control of Cotton Insects

R. C. ROARK

Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, Washington, D. C.

In 1940 (*15*) there were in cultivation in the United States 24,871,000 acres of cotton, of which 23,861,000 acres were harvested, producing 12,566,000 bales of 500 pounds gross weight each. The greatest acreage, 44,608,000, was harvested in 1926, but the highest production, 18,946,000 bales, was obtained from 33,623,000 acres in 1937 when the yield was 270 pounds per acre.

This enormous production would not be possible without the use of large quantities of many insecticides and fungicides designed to combat specific insect and fungus pests. The cotton plant is unusually attractive to insects, among which are some of the most destructive pests of agriculture. The principal insects attacking the cotton plant in the United States, arranged approximately in the order of decreasing importance, are the following:

COLEOPTERA
- Boll weevil
- Cowpea curculio
- May beetles
- Thurberia weevil
- Wireworms

LEPIDOPTERA
- Bollworm
- Cotton leaf perforator
- Cotton leaf worm
- Cotton square borer
- Cutworms
- Fall armyworm
- Garden webworm
- Pink bollworm
- Salt-marsh caterpillar
- Yellow-striped armyworm

HEMIPTERA
- Cotton dauber
- Cotton flea hopper
- Cotton stainer
- Rapid plant bug
- Stinkbugs
- Tarnished plant bug

HOMOPTERA
- Cotton aphid
- Root aphids
- Sharpshooters

ACARINA
- Common red spider

ORTHOPTERA
- Crickets
- Grasshoppers

In addition, cotton may be attacked by leaf-cutting ants (Hymenoptera), and thrips (Thysanoptera), as well as many additional species of the orders mentioned. Of all these insect pests the boll weevil is the most destructive. It is conservatively estimated that on an average one tenth of the cotton crop is destroyed by it. A heavy toll is also exacted by many other pests.

The principal insecticides and fungicides used to combat pests attacking cotton and the estimated annual consumption of each are:

	Pounds
ARSENICALS	
Calcium arsenate (includes some London purple, which is calcium arsenate plus calcium arsonite)	40,000,000
Lead arsenate	1,400,000
Paris green	500,000
White arsenic	100,000
FLUORINE COMPOUNDS	
Cryolite	400,000
CONTACT POISONS	
Nicotine sulfate solution (40 per cent nicotine)	32,000
Rotenone dusts (1 per cent rotenone)	250,000
Sulfur	20,000,000
FUNGICIDE	
Organic-mercury seed disinfectants	600,000

Calcium Arsenate

The consumption of calcium arsenate, which is used chiefly against the boll weevil, fluctuates widely from year to year because of the fluctuations in the abundance of this insect. In 1941 when damage by boll weevils was unusually severe, most of the 70,000,000 pounds of calcium arsenate sold that year was used on cotton. Commercial calcium arsenate is a variable mixture of several arsenates of calcium and calcium hydroxide. Smith and Murray (*13*) in 1931 reported analyses of 16 commercial calcium arsenates as follows:

Molecular quotient or molar ratio CaO/As_2O_5	3.0 to 4.1
$Ca(OH)_2$	1.52 to 12.66
CaO as arsenate	31.49 to 40.59
Total As_2O_5	40.32 to 44.39
Water-soluble As_2O_5 (A. O. A. C. method)	0.06 to 2.37

They concluded that these samples consist of mixtures of $3CaO.As_2O_5$ and $4CaO.As_2O_5$. The common assumption that the arsenic in commercial calcium arsenate is all present as tricalcium arsenate [$Ca_3(AsO_4)_2$] is erroneous.

In 1937 Nelson and Cassil (*7*) examined 22 brands of commercial calcium arsenate and found, on comparing their analyses with previous ones, that there is considerable variation in the chemical composition and in the molar ratio CaO/As_2O_5 in the same brands from year to year as well as among the various brands.

Calcium arsenates with five definite CaO/As_2O_5 ratios are known, forming a series from the soluble, acidic monocalcium salt, $CaH_4(AsO_4)_2$, to the insoluble, basic tetracalcium salt, $Ca.CaOH.AsO_4$. In addition there is evidence for the existence of solid solutions in the region between tricalcium and tetracalcium arsenate, wherein the tricalcium salt is capable of dissolving large quantities of tetracalcium arsenate. In the manufacture of commercial calcium arsenate the formation of the acidic monocalcium salt is impossible because of its high solubility, and the presence of the basic tetracalcium salt in the final product is unlikely because, although readily formed at 20° to

25° C., this salt appears to be unstable at temperatures of 62° C. and above, such as are used in practice. This leaves the calcium arsenates varying in acidity from the dicalcium salt to the solid solution of tri and tetra salts as the only ones likely to be found in commercial preparations.

Phase-rule studies by Nelson and Haring (*8*) in 1937 failed to verify the existence of the compound $10CaO.3As_2O_5.xH_2O$, which was reported by Tartar *et al.* (*14*) and also by Pearce and associates (*9*, *10*).

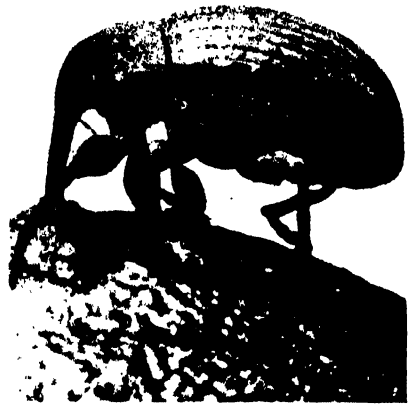
Nelson (*6*) in 1939 reported that calcium arsenates of low solubility can be prepared by atomizing a dilute solution of arsenic acid into a suspension of hydrated lime according to the process of Henninger (*5*). By proper control of conditions, calcium arsenates can be prepared that are uniform in composition, basicity, and soluble arsenic (As_2O_5). The mechanism of the reaction in a process such as this, wherein a dilute solution of acid reacts with a saturated solution of calcium hydroxide, appears to be the formation of the most basic salt first, which upon further addition of acid goes over into the less basic solid solution.

Goodhue (*3*) in 1936 determined the particle-size distribution, the loose bulking value, the true density, and the angle of slope for 22 samples of commercial calcium arsenate. The particle-size distribution and loose bulking value varied greatly, but the density and the angle of slope showed less variation. Special grades produced by some of the companies were, in every case, finer than their standard grades. A comparison of the loose bulking values and the particle size by sedimentation showed less correlation. The bulking value, so often used as an indication of fineness, is unreliable and often entirely misleading. A correlation between density and particle size exists, the finest samples having the highest densities.

The complexity of commercial calcium arsenates was further shown by Goodhue and Cassil (*4*). They separated a commercial sample into several fractions by an air classifier. Since analyses of these fractions showed a great variation in chemical composition, a chemical as well as a mechanical separation was accomplished. The water-soluble arsenic (As_2O_5), when determined by the method of Pearce *et al.* (*11*), ranged from 3.0 per cent in the fine particles to 18.8 per cent in the coarse.

The principal use of calcium arsenate is to combat the boll weevil, but it is also recommended against the cotton leaf worm and the bollworm. The rates of application are against the boll weevil, 4 to 6 pounds per acre applied three or more times; against the bollworm, 8 to 10 pounds per acre applied three or more times; and against the cotton leaf worm, one application of 5 pounds per acre.

The calcium arsenate is applied to the plants as a dry dust from ground machines or airplanes. For combating the boll weevil a mixture of 1 pound of calcium arsenate, 1 gallon of water, and 1 gallon of molasses may be daubed on the plants with a homemade rag mop when the cotton begins to square. This procedure is employed mostly in North and South Carolina and is not so effective as dusting.



Enlargement of boll weevil on cotton boll

It is obvious that the total quantity of calcium arsenate manufactured yearly (58,000,000 pounds is the maximum) would be insufficient to control those insects if the entire cotton-growing acreage were infested and were treated according to recommendations. Fortunately the abundance of insects varies markedly from year to year, depending on floods, drought, abnormally high or low temperatures, etc., and not all the acreage need be treated in one season.

Substitutes for Calcium Arsenate

Fluorine Compounds. Of the raw materials used to make calcium arsenate, lime derived from limestone is abundant, but arsenic is in increasing demand for the manufacture of lead arsenate, Paris green, sodium arsenite, and glass, for the hardening of lead, and for other purposes. Of the possible substitutes for arsenic for use in poisoning insects, fluorine seems to be the most promising. Fluorine is present in phosphate rock to the extent of about 3.7 per cent. Only a part of this can be profitably recovered in the process of making superphosphate. In 1940, 2,564,844 long tons of phosphate rock were mined in the United States, sufficient to yield about 21,000 tons of economically recoverable fluorine. There is potentially available, therefore, an amount of fluorine compounds sufficient to replace most of the arsenical insecticides, assuming their use at the same rates of application.

Tests made by the Chemical Warfare Service in 1924–26 with the fluosilicates of sodium, barium, and calcium were reported by Walker (*16*). A special light sodium fluosilicate containing 80 per cent of Na_2SiF_6 and 20 per cent of colloidal silica was as toxic as calcium arsenate to the boll weevil and caused no damage to the cotton plant, but because it is easily washed off by rain it was less effective than calcium arsenate in the field. Walker surmised that the addition of an adhesive would overcome this deficiency, but no tests of stickers were made. Tests of cryolite, Na_3AlF_6, against the boll weevil by the U. S. Bureau of Entomology and Plant Quarantine have indicated that it is only about half as effective as calcium arsenate. Cryolite is effective against the bollworm. Many of the commercial fluorine insecticides are too coarse for good distribution by the machines used for applying calcium arsenate. Finer powders would doubtless dust better and also adhere more tenaciously to vegetation.

Special Calcium Arsenate. A special calcium arsenate containing only 20 per cent of arsenic (calculated as As_2O_5) was reported by Walker (*17*) about 15 years ago to be about as effective as commercial calcium arsenate containing twice this quantity of arsenic when tested in cages and in the field upon boll weevils. This material was prepared by heating white arsenic and precipitated chalk at 650° C. from one quarter hour to one hour in a forge furnace using an oxidizing flame from a gas burner. Almost complete conversion of the arsenic to the pentavalent state was obtained, but the loss of arsenic by volatilization was about 20 per cent. This process of making calcium arsenate has never been adopted by insecticide manufacturers, and no further tests with such a product are recorded. Ordinary calcium arsenate diluted with an equal weight of hydrated lime to an arsenic pentoxide content of 20 per cent has proved somewhat inferior to the 40 per cent product, but it is sufficiently toxic to control a moderate infestation of boll weevils and is recommended for use on light, sandy soils where it is necessary to add as little arsenic as possible.

London Purple

To enhance the killing value of commercial calcium arsenate, white arsenic may be added to the reaction tank during the process of manufacture. The finished product, containing 4.6 to 5.8 per cent of As_2O_3 present as calcium arsenite, is now marketed under the name "London purple" (*12*). White arsenic is sometimes mixed mechanically with dry calcium arsenate or hydrated lime, and such mixtures are sold under proprietary names for quick control of the cotton leaf worm.

Lead Arsenate

Lead arsenate ($PbHAsO_4$) is but little used for control of the boll weevil because it usually costs about twice as much as calcium arsenate and contains one fourth less arsenic, but it is applied as a spray against the cotton leaf worm.

Paris Green

Paris green [$Cu(CH_3COO)_2.3Cu(AsO_2)_2$], although higher priced than lead arsenate, has the advantage of containing nearly twice as much arsenic. Moreover, this arsenic is present in the trivalent state, and trivalent arsenic is considered more toxic than pentavalent arsenic. Paris green is sometimes added to calcium arsenate to step up its toxicity, especially when quick control is needed against large larvae of the cotton leaf worm. Usually 10 or 15 pounds of Paris green is mixed with 90 or 85 pounds of calcium arsenate. Paris green may be used also in a mixture of 1 part of Paris green, 1 part of flour as a sticker, and about 5 parts of lime to prevent burning. From 12 to 14 pounds of this mixture should be applied per acre.

The principal use of Paris green, however, is in admixture with dusting sulfur for the control of the cotton flea hopper and other hemipterous insects. T. P. Cassidy and H. G. Johnston recently reported (unpublished) that in Arizona during 1941, 72,688 acre-applications of such a mixture containing 7.5 per cent of Paris green were made on 29,924 acres of cotton, at the rate of 15 pounds per acre-application. Before Cassidy and associates showed that dusting with insecticides may be profitable in Arizona, practically no cotton in that State was dusted. In 1941, 16.6 per cent of the cotton acreage in Arizona was dusted.

Sulfur

Sulfur alone, applied at the rate of 12 to 15 pounds per acre, is effective against the cotton flea hopper. Two or three applications four or five days apart are usually sufficient. Where boll weevils as well as flea hoppers are prevalent, a combined application of 8 pounds of sulfur and 4 pounds of calcium arsenate per acre should be used. The mixture of sulfur and calcium arsenate is more effective against the adult flea hopper than sulfur alone, and large quantities are used in Texas.

Sulfur is also effective against the common red spider, which sporadically is a destructive cotton pest in the Southeast. Sulfur and mixtures of sulfur and arsenicals are also relied upon to control all the Hemiptera that attack cotton. It is estimated that 20,000,000 pounds of sulfur are used annually as dusts upon cotton, mostly in Texas. For use as an insecticidal dust the sulfur must be finely ground and mixed with 1 or 2 per cent of a conditioner, such as magnesium carbonate or tricalcium phosphate. The function of the conditioner is to prevent the sulfur from lumping and to make it free-flowing when fed from the dusting machine.

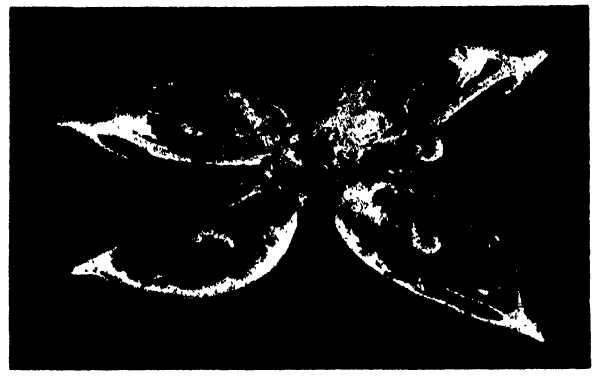
Gooden (*1*) recently determined the average particle diameters of 54 samples of commercial insecticidal powdered sulfurs by means of the self-calculating air-permeation apparatus of Gooden and Smith (*2*). The surface mean diameters of the particles in 14 samples of ground conditioned sulfurs—the kind used for dusting cotton—ranged from 8 to 14 microns. All were much smaller than the openings in a standard 325-mesh screen (45 microns).

Rotenone

Dusts made by mixing 20 pounds of powdered derris or cube root (5 per cent of rotenone) with 80 pounds of calcium arsenate have been used to prevent the increase of aphids on cotton plants that often follows dusting with calcium arsenate. Since commercial calcium arsenate may contain up to 10 per cent of free hydrated lime and the insecticidal value of derris and cube is destroyed in an alkaline environment, such mixtures should not be used after they have stood for several months. It is estimated that 50,000 pounds of derris and cube powders were used in dusting cotton in 1941. Rotenone can also be used to control aphid infestations not caused by the application of calcium arsenate.

Nicotine

Nicotine sulfate solution (40 per cent nicotine) is also used to combat aphids on cotton. For this purpose it is mixed with calcium arsenate or hydrated lime in the proportion of 6.25 pounds to 93.75 pounds. The lime reacts with the nicotine sulfate, forming free nicotine, which is volatile. For this reason these dusts should be applied soon after mixing or else be preserved in tight metal cans. About 32,000 pounds of nicotine sulfate solution (equivalent to 427,000 pounds of tobacco of 3 per cent nicotine content) are used annually on cotton. This is sufficient to make 512,000 pounds of nicotine dust.



KIRKPATRICK

Boll weevil pupa and larvae in a cotton boll

Fungicides

No fungicide is applied to growing cotton, but in many places the seed is treated to prevent seedling diseases and stimulate growth of the small plants. It is estimated that there are used annually for this purpose 600,000 pounds of organic-mercury seed disinfectants, the metallic mercury content of which ranges from 1.5 to 4 per cent.

Supply of Cotton Insecticides during the War

Sulfur appears to be the only material of which an abundant supply is likely to continue to be available. Supplies of copper (an ingredient of Paris green), lead (a constituent of lead arsenate), and mercury (used to make seed disinfectants) are already short. It may become necessary to ration arsenic, which is going in increasing quantity into the manufacture of glass now needed in greater amount to replace tin for containers. All rotenone is imported, and the 1943 supply promises to be one half of normal. More nicotine can be had only by using leaf tobacco, a procedure which is likely to boost the price beyond the reach of most farmers. It is imperative that insecticides be applied to cotton as effectively as possible to conserve the supply.



BILLETT

A close-up of three green cotton bolls. The center boll shows the pink bollworm crawling out of the hull. The boll to the right has the hull cut but webbed over just prior to the exit of the larva.

Future Research on Cotton Insecticides

The Boll Weevil Conference for the Southeastern States, at its meeting in Atlanta, Ga., January 8 and 9, 1942, adopted recommendations of its Committee on Research Needs that investigations be made "of dusting machinery to increase efficacy and permit of uniform low dosages so as to conserve supplies of insecticides, reduce the cost, and lessen danger of soil injury, to adapt orchard and other available dusters to use on cotton"; and "of insecticidal dust and dust mixtures with reference to the relations between their efficacy and physical and chemical properties". These recommendations appear to the writer to be eminently practical. There seems little likelihood of finding a new insecticide as efficient and as cheap as calcium arsenate. Certain synthetics may replace rotenone and nicotine in part, but their use against cotton insects is not very extensive. On the other hand, proper timing and the more effective application of known insecticides will permit adequate insect control with decreased dosage, thus effecting a saving of materials vital to war needs.

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Robert S. Aries has been appointed research Engineer of the Connecticut Hard Rubber Co., New Haven, Conn., where he is engaged in the development of synthetic resins. Mr. Aries was formerly doing research and development on a project of the Northwood Chemical Co. of Phelps, Wis., at the Polytechnic Institute of Brooklyn.

A. C. S. Student Membership Awards for 1942

Donor	Recipient
Alpha Chi Sigma Fraternity	
Alpha Chi Chapter. This award is presented to the highest ranking male senior student in chemical technology or chemical engineering at Iowa State College.	**Donald Alonzo Robinson**
Alpha Kappa Chapter. This award consists of membership and a subscription to one journal to the senior in chemistry or chemical engineering having the highest scholastic average at the University of Virginia.	**Robert W. Alfriend**
Rho Chapter. This annual award consists of membership and a subscription to one journal to the outstanding senior receiving a B.S. degree in chemistry at the University of North Carolina.	**John Mitchell Sorrow, Jr.**
Gamma Sigma Epsilon Chemical Fraternity. These memberships are awarded annually by the fraternity to the most outstanding student in each chapter.	
Beta Beta Chapter, John B. Stetson University.	**Wilbur Irving Kaye**
Kappa Alpha Chapter, St. Lawrence University.	**Robert C. Kunz (for 1941)**
	Sylvia Gunderson
Lind, Samuel Colville. This award consists of a membership in the American Chemical Society to that candidate for the B.S. degree in chemistry having the best standing in chemistry at the end of the first semester of his third or fourth year in chemistry at Washington and Lee University.	**Robert S. Rosenfeld**
Syracuse Section, American Chemical Society. This award is presented annually to a high ranking senior in chemistry or chemical engineering in one of the colleges in the territory of the Syracuse Section.	**William H. McPherson, Jr.,** Syracuse University
Lehigh Valley Section, American Chemical Society. The chemical faculties of the colleges within the Lehigh Valley Section select as winners of these awards the outstanding students in chemistry or chemical engineering, based on their three and one-half years of college work.	
Albright College	**Leon R. Steckley**
Cedar Crest College	**Marion S. Reichard**
Lafayette College	**Norman A. Exley**
Lehigh University	**Richard M. Luckring**
Muhlenberg College	**Milton N. Donin**

A Preface for Scientists

ORLANDO ALOYSIUS BATTISTA

American Viscose Corp., Marcus Hook, Penna.

Scientists should be the most conservative people on earth. They should be the last people to be too sure of themselves. They never should assume an authoritative mannerism or develop overconfidence because of the superficial prestige of degrees.

They should be very careful never to underestimate the inventive mind of youth. The age of an exponent never should be permitted to prejudice the evaluation of experimental facts, and the whiteness or length of a beard never must be misconstrued as a basis for scientific integrity.

Scientists who forget how little they know, relatively, about their own field and speak dogmatically, with a tone of infallible finality, expose themselves to invincible elements.

True scientists concern themselves only with the discovery and establishment of facts, reserving speculation as a source of amusement and relaxation. Their preface to every dissertation, every thesis or lecture, might read: "We do not present these data as the inviolable truth, but only wish to state that the details recorded represent the observations we know we made and think we saw".

Course Offered in Reading Chemical Russian

The Polytechnic Institute of Brooklyn will offer a course in the reading of chemical Russian in the fall of 1942–43. This will be given on Tuesday evenings throughout the year. It is designed to give a mastery of the grammatical principles and the vocabulary necessary for the translation of technical articles from Russian reference books and periodicals. Registrants need not have had previous experience with Russian but must have studied some other modern foreign language.

The work will involve supervised study and translation from chemical journals. It will be taught by Karl Steik, a well-known consulting chemist and an accomplished linguist.

Details may be had by writing Raymond E. Kirk, Department of Chemistry, 99 Livingston St., Brooklyn, N. Y.



Development, Manufacture, and Utilization of Peanut Flour[1]

DONALD S. PAYNE

Agricultural Marketing Administration, United States Department of Agriculture, Washington, D. C.

PEANUTS have been grown in the United States since colonial times, but they did not become of commercial importance until about 60 years ago. In the succeeding 40 years production increased to about 1,000,000 acres, and in the past 20 years it further increased to about 2,000,000 acres which produced annually around 600,000 tons.

For 1942 production goals are about 5,000,000 acres with indicated production of around 1,800,000 tons of peanuts. Approximately 600,000 tons may be shelled for customary use in confections, peanut butter, and out-of-hand eating. After deducting the quantity which probably will remain on the farm for feed and seed, this may leave available for crushing into oil and the by-product press cake, approximately 1,000,000 tons of peanuts.

Since the beginning of the peanut crushing industry, the press cake has been accepted as an excellent protein supplement in the feeding of farm animals. In late years scientists have established the excellence of peanut protein as a human food. Reduction of the peanut into oil and cake can be accomplished by hydraulic or expeller press or by solvent extraction methods. By certain modifications of any of these processes a sizable portion of the cake can be made suitable for human food. Peanut flour is a high quality, easily digestible, protein concentrate and is comparatively low in cost.

Early Efforts

There was a great deal of interest in peanut flour during the first World War. An honest effort was made to prepare an acceptable product, but because of the lack of proper processing equipment and food plant engineering technique, those peanut flours were not satisfactory.

Early in 1937 the Surplus Marketing Administration, now a part of the Agricultural Marketing Administration, in connection with its peanut marketing programs was requested to purchase peanut flour and donate it for relief purposes. This request was favorably received, and various agencies were asked to submit samples for testing so that specifications could be drawn and a program inaugurated. The samples examined by the laboratories of the Bureau of Home Economics and the Bureau of Agricultural Chemistry and Engineering indicated that these flours really were no more than slightly refined peanut meals containing approximately the same quantities of grit, hair, hulls, and other foreign material usually present in such products. The flavor and color were not acceptable. As a result a program to encourage the distribution of these peanut flours was not undertaken, but work was begun with cooperating agencies to develop a desirable product (*1*).

In 1938 a company attempted to develop an edible peanut flour. It started with 1 ton of farmers' stock peanuts which were shelled at a local shelling plant. The shelled peanuts were hand picked by farm labor and blanched by a local candy company. The blanched nuts were crushed at a distant oil mill and the cake processed into flour in a local mill by rolling and bolting. From this 1 ton of farmers' stock peanuts a yield of 40 pounds of a 90-mesh flour and 200 pounds of a 40-mesh material was obtained. Extreme difficulty was experienced in bolting the flour due to blanking of the bolting cloth. It was the consensus of those interested in this development that the cost of producing an edible peanut flour by this method would be prohibitive. Because of the difficulty in processing and the extremely low flour yields, this project was abandoned (*1*).

In 1939 state experiment stations cooperating with the Surplus Marketing Administration produced small quantities of peanut flour of rather nice flavor and of good color. The processing methods used in the manufacture of this flour were again prohibitive in cost (*1*). Later in 1939 a cotton oil mill company, which had successfully overcome similar difficulties in the manufacture of cottonseed flour, was requested to undertake the development of processes necessary to manufacture a peanut flour that would meet the requirements of flavor, color, freedom from foreign materials, nutritional characteristics, and processing costs (*1*).

The Process

In earlier attempts to manufacture peanut flour apparently three factors prohibited success—insufficient cleaning of the raw material, lack of proper cooking technique, and uneconomical methods of preparing flour from the press cake.

Experience to date indicates that peanut flour can be produced by the expeller or hydraulic press or by solvent extraction methods. Such methods have been used in the past in the processing of peanuts for the production of oil and the by-product press cake or flakes. But such processes do not require the exclusion from the press cake of sticks, stems, hulls, insect remains, decomposed kernels, and various other foreign materials commonly present in farmers' stock peanuts. Such materials do not normally adversely affect either the quality of the peanut oil, as it is amenable to highly efficient methods of refining, or the use of the press cake in animal feeding. These foreign materials, however, make the press cake or flakes wholly unfit for use as human food.

The manufacture of such press cake or flakes as a food product, therefore, necessitates a major departure from usual oil mill practice, in that the raw material must be of the best quality and thoroughly cleaned before crushing. In the processing of flour from peanuts the oil no longer can be considered the primary product and the press cake the by-product. Rather the press cake must assume the position of the product controlling the operation of the various processes.

In two of the usual methods of crushing peanuts, the hydraulic and expeller press, a more or less severe heat treatment is given the decorticated nuts in order to facilitate the pressing of the oil. This heat treatment induces many changes in the non-oleaginous portion of the peanut. In terms of peanut flour production, certain of these changes are desirable and others highly undesirable. A certain amount of cooking is necessary to facilitate the reduction of the oil content, to improve the flavor, and to reduce the moisture content. A very minimum of cooking is desirable in that even slight cooking adversely affects color, induces changes in the proteins, and causes destruction of significant quantities of thiamin. It has been possible to reach a compromise between overcooking which causes a loss in nutritional value, and undercooking which limits the removal of the oil and makes more difficult the further processing of the cake into flour.

One of the factors limiting the early production of peanut flour was the difficulty in sizing the ground cake. The only method described was that of bolting, the

[1] Presented at the Symposium on Utilization of Agricultural Products of the South during the 103rd Meeting of the AMERICAN CHEMICAL SOCIETY, Memphis, Tenn., April 20 to 23, 1942.

same method by which wheat flour is produced. This proved highly unsuccessful since the peanut flour blinded the bolting cloth, necessitating frequent cleaning and excessive cloth area. The sizing operation has been successfully and economically accomplished with mechanical air separators which float the flour fraction from the coarser ground portion by means of an air stream.

Many problems not mentioned in the literature were encountered and had to be solved before the production of peanut flour could be called a success. All such problems have been successfully worked out, and production of an excellent grade of peanut flour is now past the laboratory and pilot-plant stage.

Properties

Tentative specifications of the peanut flour available from the process now in use are as follows:

LOW FAT PEANUT FOOD FLOUR. Hulls and skins removed; free from particles of hair, insect fragments, or other foreign material; light in color; bland and free from any bitter or raw taste; less than 3 per cent fiber; not less than 5 per cent or more than 9 per cent fat; not less than 55 per cent protein with protein content specified; not more than 10 per cent moisture; and not less than 95 per cent through 120-mesh U. S. standard screen.

The proximate composition of such peanut flour made from white Spanish-type peanuts is as follows:

		RANGE
Protein	60.0%	55-62%
Fat	7.0%	5- 9%
Fiber	2.5%	2- 3%
Water	6.0%	2-10%
Thiamin	4.0 I. U./g.	
Riboflavin	5.0 γ/g.	
Niacin	350.0 γ/g.	

Utilization

For a long time peanuts and peanut food products have been recognized as having a very high nutritive value. Most of us are so familiar with them as food that we no doubt forget what an inexpensive and valuable contribution they can make toward good nutrition in our everyday diets. Peanuts are especially rich in highly digestible and desirable proteins and are excellent sources of vitamins and minerals.

As early as 1920, the Bureau of Agricultural Chemistry and Engineering secured a patent on a bread made from 68 per cent of white wheat flour and 23 per cent of peanut flour and butter, salt mixture, and yeast. Rats, when fed this bread, showed a normal growth as compared with a very poor growth obtained from bread made from white flour in a similar manner. Similar soybean and white flour bread was fed as a check. The rats made about the same growth on the soybean bread as on the peanut bread (*3*).

Information recently obtained about the German army ration indicates that it contains a large proportion of soybean flour used in different recipes. The soybean flour is added to soups, breads, pastries, macaroni, and is used as a substitute for meat products. The soldier thus is supposed to obtain his balanced needs of protein, fats, mineral salts, and vitamins without the use of meat, eggs, or other ordinarily used protein concentrate foods (*2*).

The excellent keeping qualities of the soybean flour and its concentrated form greatly simplify the problems of packing and transporting. Such products are supplemented with dried or frozen fruits and vegetables, such as apple sauce, tomatoes, and peas. In campaign the soldiers also carry highly concentrated foods containing these products. These diets perhaps would not be considered particularly palatable according to American standards, but they apparently are nutritionally adequate (*2*).

The peanut flour and grits made from the oil-press cake now being manufactured, as well as soy flour, can be utilized to improve the protein level of the food supply.

The proteins of soybeans and peanuts also present some striking contrast to those of other legumes. Chemical analysis and scientific tests show that soybeans and soybean products contain a goodly proportion of proteins, but they are efficient only after they have been heated, while raw peanuts contain proteins of high nutritive value nearly equal to those of milk, meat, and eggs, which are not only highly digestible but rank among the highest in quality (*4*).

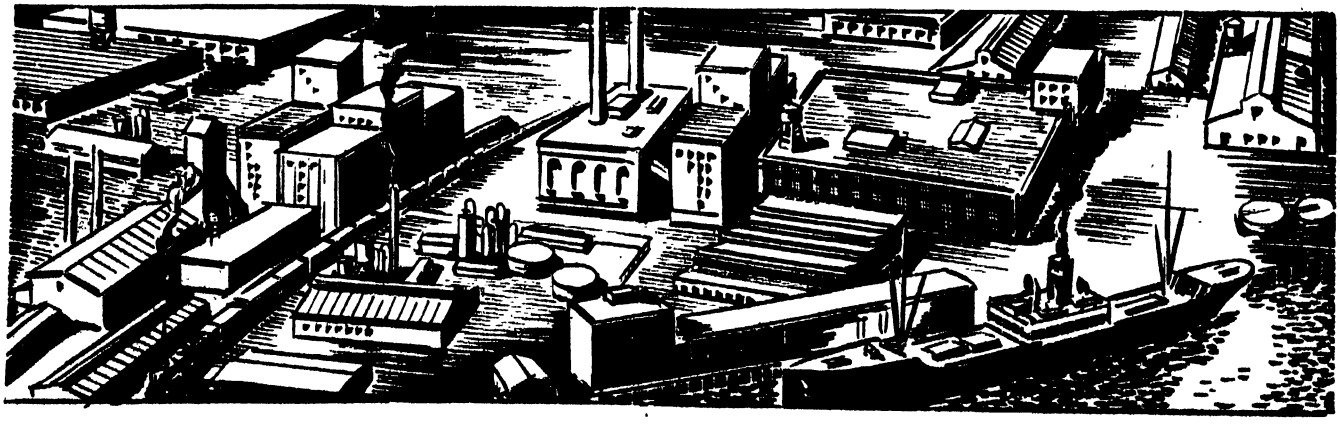
Peanut flour may be used for blending with cereal flour in baking to increase the protein content; as an extender and binder in meat loaves, sausage, and other meat products to maintain or increase the protein content; as a base material in dry soup concentrate; and for blending with cereals such as wheat, corn meal, hominy grits, rolled oats, farina, and various prepared dry cereals. Recently dry soup concentrates containing peanut flour have been receiving wide recognition, and consideration is being given to the use of peanut products in cereals for undernourished groups.

Outlook

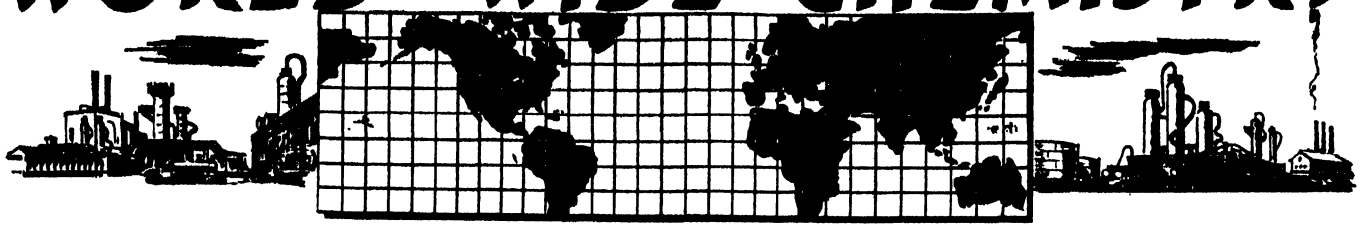
There is much scientific information to indicate the high nutritive value of peanut flour. This, together with its excellent keeping qualities and highly concentrated form, makes its use for defense purposes and for undernourished peoples particularly advantageous. The present interest in fortified foods and plans to improve the health of the Nation are focusing attention on protein concentrates made from peanuts, soybeans, and cottonseed. Not only is it important to have available at this time ample and low-cost sources of protein, but it may be of even greater importance after the war when world markets are reopened. There will probably be an extreme need for protein foods on the part of nations and people with little purchasing power. As the potential supply of peanut flour is almost unlimited and as the product is ideally suited in color, flavor, and nutritional characteristics, it is a most logical food to fill this need.

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WORLD-WIDE CHEMISTRY



Continental Europe

Germany

German pharmaceutical manufacturers have stressed the difficulties created by the shortage of imported drugs and the need to change over to alternative raw materials for the production of medicinal products. Recent reports say that important adjustments have become necessary, and only by an increase of sales to other countries of Continental Europe was the turnover maintained. In German pharmaceutical markets an increasing scarcity of essential drugs has been noticed. As from July 1 ration cards for insulin have been issued to diabetics, not because the drug is in short supply, it is stated, but to prevent hoarding. Pharmacists must apply to the authorities for allocations of other drugs in short supply. The change in diet is reported to have increased the demand for vitamin products and other tonic foods, which are sold only on a doctor's prescription. Demand for certain narcotics also has greatly increased. In particular, barbituric acid and its homologs are said to be used in "uncontrolled quantities bordering on mania". Similarly, demand for quinine preparations has risen. Numerous restrictions have been placed on the distribution and sale of pharmaceutical products, reportedly not so much because of an immediate shortage but rather as a precautionary policy and also in the belief that drug consumption before the war had already reached proportions which were not in the best interest of the patients. A large consumer of pharmaceutical products is the army. Lately the authorities have also reduced the production of medicinal products with a view to saving manpower for more urgent war work.

Rayon Industry Adjusts to Wartime Production Needs

With the government-supported expansion of cell-wool production the importance of rayon for the textile industry has relatively declined, even though the quantities made available for technical purposes may have increased. German rayon factories have had to make important adjustments to meet wartime requirements, according to a statement by Vereinigte Glanzstoff-Fabriken, the leading producing company. New types involving much work and great financial sacrifices, have been developed, and further adjustments will be needed. New investments, on the other hand, have been comparatively small because existing plants were used to produce the fibers needed for technical and industrial purposes. This, however, was accomplished only at the cost of quantity and quality of civilian supplies. The changes have reduced the profitability of operations.

War Damage and Decreased Imports Hurt Guano Works

Guano-Werke A.-G., Hamburg, the German guano manufacturer who used to rely mostly on raw material from South America, reports for 1941 that the plant was operated on a limited scale only. The chief income item consists of interest on funds which were not employed in the company's normal business, while the amount set aside for depreciation had to be increased one half because of damage resulting from partial closing of the factory. While plant and equipment are valued at 1,400,000 marks, a reconstruction reserve is shown in the balance sheet for the first time at 1,470,000 marks. The company's works are situated in an industrial part of Hamburg which has been the target of many air raids.

Cellulose Manufacturers Study Waste Sulfite Liquor Utilization

Vereinigung Sulfitablauge G. m. b. H. has been founded as a joint enterprise of all German cellulose producers using the sulfite process for the development of new methods to utilize the waste sulfite liquor. About nine tenths of the total German cellulose production is obtained by the sulfite process, and utilization of the waste liquor is a problem of considerable economic importance. Heretofore some alcohol has been produced from the waste liquor, and it is hoped that in the future a variety of different products, including cleansing agents, tanning materials, adhesives, and fillers, will be obtained. It is intended that each factory shall concentrate on one or a few of these products so as to keep costs as low as possible.

A new process for recovery of valuable products from the waste liquor, which is claimed to be promising, starts with the drying of the liquor at temperatures of 1,000 to 1,200° C. by fumes. The resulting powder is then treated according to the special requirements of the subsequent utilization. The tanning materials prepared from sulfite liquor are said to be equivalent to quebracho extract and economically preferable because tanning takes a shorter time, the color of the leather is lighter, and the labor cost is smaller. Products recovered from the waste liquor can be added to washing agents and are said to result in a saving in fat content by 50 per cent without reduction of the cleaning power.

Copper Smelter Slag Utilized as Fertilizer

Copper slag from Norddeutsche Affinerie, Hamburg, formerly regarded as a waste product and disposed of in the form of paving stones, has been tried out as a fertilizer. The material consists largely of silica and iron and contains 0.413 per cent of copper as well as traces of manganese, molybdenum, arsenic, and lead. When the slag was applied to ordinary crops, no adverse effects were observed. It is claimed that the material may be used with advantage on soils deficient in copper, although its effect is not equal to that of copper sulfate. About 18 cwt. of copper slag are recommended instead of 1 cwt. of $CuSO_4.H_2O$.

Pyrite Recovered at Coal-Dressing Plants

Experience gained in World War I in the recovery of pyrite from coal-dressing plants is being used again in this war. Before the war one plant of this type was already in operation, and more installations have been made since. New machinery, including a new hydraulically operated jig washer, has been introduced, but the high consumption of fresh water placed a limit on use of these machines. They are now used only for concentration, and experiments have been carried out jointly by

the Association for Mining Interests and I. G. Farbenindustrie for improved methods of pyrite recovery. It is claimed that a practical process has been developed and, to give a stimulus for its more extensive application, the price paid for pyrite has recently been raised. Production of sulfur material from this side is expected to increase further.

High-Grade Motor Spirit Can Be Produced from Peat

Investigations at the Institute for Chemical Technology, Munich, have shown that it is possible to obtain a high-grade motor spirit from peat by the combination of low-temperature carbonization and high-pressure hydrogenation. Low-temperature carbonization yielded a highly reactive peat tar which changed color and consistency soon after distillation. Hydrogenation of the peat tar under pressure in the presence of molybdenum oxide catalysts produced a high-grade motor spirit. Hydrogenation was carried out at 465° and 485° C. At the lower temperature approximately 50 per cent of motor spirit of 0.738 specific gravity and an octane number of 63 was obtained; this required further refining. At the higher temperature 95 per cent of the tar was recovered as a fuel of 0.8 specific gravity and octane number 97. The remaining 5 per cent is described as gas oil.

No information is available about the economic side of the process. The principal difficulty in the chemical treatment of peat, which has been attempted in various experimental stations in Germany, arises from its physical condition and the need to dry it beforehand and use comparatively large vessels of corrosion-resistant metal.

Machinery Developed for Processing Igelit Resin

Synthetic resins of the polyvinyl chloride type, known in Germany under the trade name "Igelit", present some special problems in processing because they cannot be hardened or vulcanized like other rubberlike materials and have no sharply defined smelting point, so that they cannot be cast in the ordinary way. A new machine which is now used extensively for the manufacture of simple forms, like heels for shoes and handles for bicycles, consists of two parts. The Igelit powder is fed into a screw which is heated to 160° C. When the powder has been plasticized at this temperature, it is pressed into forms cooled by water and remains in these for one half to one minute until the temperature has been reduced to 60° to 70° C. The machine is capable of an output of 30 to 125 kg. per hour, and no plasticizer is required. For more complicated parts the powder is fed into a tube which is 4 feet long and heated by oil to 180° C. From this it is transferred in a viscous state to the forms, where it remains under pressure until the press cylinder is withdrawn. This method is also said to result in a substantial saving of time.

Waste Pickling Water Used in Paint Manufacture

Increased attention is being paid to the ferrous chloride liquors obtained in galvanizing shops and other works of the iron and steel industry, and several new outlets have been developed. Most important at present is their use in the paint trade. About 6,000 tons of the waste pickling liquor are said to be sent to paint factories every year. Iron sulfate salts obtained from it are used against charlock in agriculture, as catalysts in the production of motor spirit, and for the desulfurization of gases. In the future the total output of iron sulfate from this source is to be worked up into sulfuric acid and iron suitable for the furnace. Ferrous chloride liquors and iron sulfate salts are recommended also for the chemical precipitation of town and industrial sewage.

Substitutes for Coal-Tar Pitch Used in Briquetting

The shortage of coal-tar pitch has caused German coal firms to look for alternative materials for coal briquetting. Synthetic resins, hydrogenation residues, sulfite liquor, and cellulose pitch are mentioned among materials which may be used for briquetting coal, and a new process has been developed for making coal briquets without binder. None of the material mentioned, however, is available in adequate quantities, so a combination of the various substitutes seems to be more promising. At present hopes are based mainly on a combination of coal-tar pitch and sulfite liquor of which there is a growing output in cellulose plants.

Prussian State Enterprise Leases Alsatian Potash Mines

Preussische Bergwerks- und Hütten-A.-G., a company owned by the Prussian Federal State, has now obtained the lease of the entire Alsatian potash industry. It previously had the trust management of the mines. The Alsatian potash industry will be operated by Elsässische Kaliwerke G. m. b. H., a company formed for this purpose with a nominal capital of 50,000 marks. The new company has full control not only of the former German mines which were in the hands of Mines Domaniales de Potasse d'Alsace, the French official enterprise, but also of Mines de Kali Ste. Thérèse, the private potash company. The Alsatian potash salts are distinguished by a comparatively high average potash content (23 per cent) and absence of magnesium chloride which facilitates processing. While the Preussag subsidiary will be responsible for production, the marketing side will be under the control of the German Potash Syndicate. Owing to the transportation shortage, greater use is being made of Alsatian potash in France, the Low Countries, and western Germany, whereas potash from the mines in central Germany is used to a larger extent in eastern consuming areas.

I. G. Farbenindustrie in the "Protectorate"

Chemische Werke Aussig-Falkenau G. m. b. H., a company which has taken over the plants of the Aussiger Verein, the large Czecho-Slovakian chemical producer, at Aussig and Falkenau, has raised its capital from 4,000,000 to 14,000,000 marks. I. G. Farbenindustrie and another German chemical company, Chemische Fabriken von Heyden A.-G., are interested in the enterprise which by the capital increase becomes one of the largest chemical firms in central Europe.

Dynamit Nobel Doubles Turnover

The expansion of industrial activity in the eastern territories is reflected by the annual report of Dynamit Nobel, the leading chemical producer in Slovakia, which is also under the control of I. G. Farbenindustrie. Extension of the plant was continued according to plans, it is stated in the report for 1941. At the end of the year 1,000 employees were serving the company. The value of sales was doubled in 1941.

Sweden

The Physicochemical Institute at Upsala, which is directed by the Nobel prize winner, The Svedberg, has concentrated on the synthetic production of rubber, resin, and similar materials since the war cut off its usual overseas supplies. Last November Professor Svedberg was asked by the State Industrial Commission to work out as soon as possible a process for artificial rubber production. After a few weeks a first test consignment of a substance resembling the American artificial rubber neoprene was sent to the commission, and experiments have gone on since in cooperation with the Swedish rubber works which will later take up the manufacture on a large scale.

Indigenous Motor Fuels Are Developed in Sweden

To overcome the shortage of imported mineral oils, the Swedish Government has paid particular attention to development of producer gas plants for use in road vehicles and coastal vessels which can be operated on charcoal or wood, fuel materials which are available in almost unlimited quantities. Lately the tendency has been in favor of producer gas plants using wood rather than charcoal because the latter material is required in large quantities for iron smelting. Agricultural tractors are also converted to use of producer gas, and the government assists by development of a standard model and interest-free loans for farmers who wish to convert.

As far as smaller tractors are concerned, use of a liquid fuel prepared mainly from indigenous materials has been found more attractive. This is marketed under the name Xotyl and consists of 85 per cent of sulfite alcohol and 15 per cent of ordinary gasoline. Liquid fuels obtained from oil shale are reserved mainly for the needs of the navy and mercantile marine. The total number of motor cars in Sweden has declined from 248,854 before the war to 74,131 last April.

Distribution of Chemical Fertilizers Meets Difficulties

According to the program of the Swedish Food Commission, announced last November, farmers were to have been provided in 1941-42 with 80 per cent of their normal supplies of phosphatic fertilizers and 85 per cent of their requirements of nitrate of lime, while no restrictions were envisaged for cyanamide and ammonium sulfate. Considerable difficulties in the distribution of chemical fertilizers have been experienced in recent months, however, and energetic and speedy measures for an improvement of the fertilizer position are demanded by agricultural interests. It seems likely that more drastic restrictions will have to be imposed on the use of fertilizers generally. Bones which were used to a large extent for agricultural purposes as well as for the manufacture of glue are now used mainly for other purposes, so that, according to a report by Stockholms Bemmjölsfabrik A.B., the bone glue factories in Sweden will have to reduce employment substantially

Finland

Production of alcohol from residues of the cellulose industry has made considerable progress in Finland since the beginning of the war. All sulfite cellulose plants are now equipped with alcohol recovery apparatus, since the Alcohol Monopoly has undertaken to buy the entire output for at least five years. Were production of sulfite cellulose equal to prewar figures, alcohol output would be sufficient to cover about 40 per cent of the total Finnish motor fuel requirements. Cellulose production, however, has declined substantially because of the curtailment of the export business and, since the supply of sulfite alcohol has naturally been affected by this decline, it is now proposed to erect a plant for the saccharification of wood by a process which has been developed by the Finnish chemist, Dr. Ant-Wuorinen. This would, it is reported, result in very large supplies of alcohol irrespective of the market conditions for other forestry products.

The Netherlands

A considerable part of the business of the Dutch pharmaceutical industry before the war was based on the treatment of imported raw materials and drugs from the Dutch colonies in the West and East Indies. Since Holland has been cut off from these sources of supply, Dutch pharmaceutical manufacturers have endeavored to make up for the loss by use of raw materials obtained from other European countries. The results have not been satisfactory in general. N. V. Koninklijke Pharmaceutische Fabrieken v. h. Brocades-Stheeman & Pharmacia reports that its plant at Meppel operates almost normally most of the time, but the factory at Nimwegen suffers from reduced raw material supplies and difficulties encountered in the use of substitutes. The turnover during the first half of 1942 was unsatisfactory. Wages and taxes have substantially increased.

Belgium

A scheme for the distribution of chemical fertilizers to the whole country under uniform regulations in 1942-43 has been prepared. Supplies of nitrogen are to be retained at the figure of 60,000 tons recorded for 1938-39. Most of this quantity will be obtained in the form of ammonium sulfate from local factories. Consumption of phosphatic fertilizers is to be reduced from 68,000 to 30,000 tons (of phosphoric acid), and most of the supply will be obtained in the form of basic slag from local iron works. Use of potash salts is to be greatly increased, especially for the cultivation of wheat and potatoes, and is expected to reach 105,000 tons of K_2O (against 55,000 tons in 1938-39). The supply will come from the Alsatian mines.

France

Schneider-Creusot, the French armament combine, which like other French companies with extensive foreign interests sold to German firms finds itself in possession of large liquid funds, has acquired a controlling interest in Etablissements Barbet, a company with a capital of 10,000,000 francs which specializes in the construction of chemical apparatus and operates several distillation plants.

Colorado Beetle Campaign to Be Extended to Whole Country

The campaign against the Colorado beetle will be extended to the whole of France during the current year. In 1941, 3,500 tons of arsenical lime were used in 38 départements over an area of 300,000 hectares. Most of the material was obtained from Germany, and small quantities of arsenical lime will still be supplied by German factories this year. The bulk of the 20,000 tons which are to be used in the 1942 campaign, however, will be produced in France. The campaign is likely to be held up by the shortage of spraying instruments.

Distributing Office for North African Phosphates to Be Formed

Distribution of chemical fertilizers to French farmers has met with considerable delay owing to difficulties in production and transportation. Distributing centers in the départements have been instructed to inform the fertilizer factories about the requirements to be met, and growers of some crops, such as sugar beets, which are required in large quantities have been assured that they will receive larger allocations of mineral fertilizers.

For the supply of phosphates France depends mainly on rock phosphates from North Africa, and a new office is to be established for distribution of this fertilizer because available supplies are substantially below demands.

Decline of Chemical Output Stimulates North African Industries

The difficulty of obtaining chemical products from French factories has stimulated new industries in North Africa. A company which was formed recently intends to produce copper sulfate from cuprous pyrites found in French Morocco. Increased interest is also shown for certain salt deposits in Algeria, and a project is on foot for the establishment of a caustic soda factory to use this raw material. The manufacture of soaps from vegetable oils, of which there is now a surplus production because of export and shipping difficulties, has also been studied. Groundnut oil has been used experimentally as a locomotive fuel in three trains operating on the first portion of the Transsahara railway which was opened to traffic a short while ago.

Portugal

Companhia Uniaon Fabril and Sociedade Anoniao Portugues have been authorized by the government to import duty-free plant and equipment for the manufacture of ammonium sulfate on condition that such a plant cannot be supplied by local manufacturers within a certain period. The supply of chemical fertilizers to Portuguese farmers has met with considerable difficulties recently and, while it is still hoped to obtain larger supplies from abroad, increased efforts are to be made for the manufacture of fertilizers in the country.

Spain

Several schemes for the production of nitrogenous fertilizers have been announced in Spain during the past 12 months, mostly in conjunction with plans for the extension and modernization of existing iron and steel plants. It is now possible to give a survey of the actual developments.

Sociedad Espanola de Fabricaciones Nitrogenadas (Sefanito) was formed by Altos Hornos de Viscaya at Bilbao. Its plant is scheduled to produce 125,000 tons of ammonium sulfate, the raw material being the furnace gases of the iron plant at that town. Sefanito has a capital of 150,000,000 pesetas and also intends to build a plant for 60,000 tons yearly of ammonium sulfate at Sagunt. Nitrato de Castilla (Nicas) is a subsidiary of Saltos de Duero, the electrochemical combine, and intends to build a plant for 60,000 tons of nitrogenous fertilizers to be produced by electrolysis at Valladolid. Hidroelectrica Espanola is another company which is to use the electrochemical process for the production of 40,000 tons of nitrogenous fertilizers. Finally Sociedad Iberica del Nitrogeno has recently raised its capital in order to extend its plant at La Felguera where furnace gases of the iron works are used.

This and other projects are to yield another 600,000 tons of nitrogenous fertilizers, so that Spain will have an additional supply of about 175,000 tons of nitrogen when all the current schemes have been carried out. This quantity would be sufficient to replace the bulk of the fertilizer imports before the civil war, but at that time Spain was still one of the most backward countries of Europe in the matter of chemical fertilizers, although she had a local potash industry at her disposal and could obtain phosphates from North Africa.

Cellulose Sources Used in Synthetic Fiber Industry

Lack of the normal sources of cellulose for use in synthetic fiber plants has encouraged research in other cellulose materials in Spain. Fabricacion Espanola de Fibras Artificiales S. A. (Fefasa) has recently commenced production in a 10,000-ton plant at Miranda del Ebro where straw is used as a raw material. This plant is to be expanded so that it will later be capable of an annual output of 27,000 tons. Sociedad Nacional Industrias Aplicaciones Celulosa Espanola (Snisace) is interested in a process for the use of eucalyptus wood, of which there are large supplies in the Provinces of Santander, Asturia, and Huelva. S. A. Lana Linera Espanola is engaged on the construction of two plants at Aranda de Duero and Miranda del Ebro where cellulose is to be obtained from potato tops. S. A. de Industrias de la Paja del Aroz (Saipa) is to build a plant for the production of cellulose from rice straw at Sueta. A number of other projects are under consideration.

Italy

Ente Zolfi Italiana, the Italian central organization for the sulfur industry, reports for 1941 that the total production was 7 per cent below the preceding year's figure. Substantial sales have been reported for carbon sulfide, but exports of sulfur declined as a result of the war and smaller quantities of rock sulfur were sent to the refineries.

The financial position of the Italian sulfur industry seems to have improved, for the Italian Government did not pay any subsidies. Ente Zolfi Italiana has made further efforts for modernization of the sulfur mines and improved organization of marketing. Great difficulties, however, resulted from the lack of transportation and labor, obstacles which are known to have grown more serious lately. No improvement in the export position can be expected for the current year, since Germany, the principal foreign customer in recent years, has taken further steps for an increase in the production of sulfuric acid from local raw materials.

Bemberg Company Draws on Stocks to Meet Demand

S. A. Bemberg, Milan, the Italian company which uses the Bemberg process for the production of artificial silk, reports that the production of rayon and cellwool was maintained at 1940 levels during the past year. Further satisfactory development is expected despite continuing raw material difficulties. The demand for the company's products increased in 1941 and was met only by withdrawals from stocks, while the export business had to be neglected.



New Methane Gas Producing Company Formed In Southern Italy

Societa Anonima Meridionale Metano (Samet) has been formed with a capital of 900,000 lire at Naples for the development of methane gas deposits in southern Italy.

Southeastern Europe

The shortage of mineral oils and other liquid fuels in Continental Europe has encouraged the search for natural gas. It is reported that at present 40 deposits of natural gas in various parts of southeastern Europe are being exploited. About 1,500 gas wells are in production and yield an annual output of approximately 2,000,000,000 cubic meters of natural gas.

In Rumania the semiofficial Sonametan company is leading. The company has made arrangements for the supply of natural gas to various industrial plants using gas either as fuel or as raw material. In Hungary a company has been formed for the production of electric power on the basis of natural gas. The government has taken up 10,000,000 pengö of the shares, and the municipal council of Budapest has also taken a financial interest in the enterprise, which is to supply local industries with power and fuel. Natural gas deposits are also to be developed in Croatia. Even in Switzerland a concession for natural gas has been granted for a deposit supposed to exist in the canton of Schwyz.

Hungarian Nitrogen Plant to Be Expanded

The Nitrogen Works at Pet are to be extended at a cost of 6,000,000 pengö. A new artificial fertilizer plant is to be built by the company in the northern part of Transylvania where natural gas is to be used as a fuel.

Montecatini Acquires Interest in Bulgarian Chemical Industry

Montecatini, the Italian chemical combine, has acquired a financial interest in the chemical factory Amonal in Bulgaria. Amonal changed its name to Montecatini-Amonal and raised its capital to 3,000,000 lewa. It will act mainly as a marketing organization for Montecatini products in Bulgaria, but it is not impossible that the company will engage in manufacturing activities.

Germany Interested In Metal Mining Industry of Yugoslavia

Yugoslavia is by far the most important of all the German-occupied countries from the point of view of nonferrous metal

supplies. The mines of Bor are the largest copper producers in Europe, and the lead-zinc mines of Trepca and other deposits are of considerable interest. Nevertheless German official and semiofficial sources have been reticent about the progress made in developing these mines, and now it is stated that a systematic investigation of the mineral resources of Yugoslavia has still to be made. The work seems to have been held up by the administrative changes, establishment of a Croatian state, and transfer of important districts to Italy, Hungary, and Bulgaria. In Serbia, the remaining part of the Yugoslavian kingdom, a commissioner-general has been appointed for all sections of industry, and systematic exploration work is to be carried out under his control in conjunction with Balkan Metall A. G., a semiofficial company formed for this purpose. Adjustment of diverging interests to the changed conditions is said to be one of the more urgent tasks still awaiting the attention of the commissioner-general.

Petroleum Legislation in Rumania Changed to Push Local Production

A new petroleum bill has been passed by the Council of Ministers in Rumania. Its main provision is the redivision of perimeters handed over for exploration and exploitation to private firms. These are to include larger areas than was formerly the case so that connected geological structures can be worked under comprehensive plans. Where the perimeters are too large for smaller firms, several companies may cooperate in the development work.

Another important change in Rumanian petroleum legislation is a reduction in the amount of royalties to be paid to the government. These will vary between 2 and 14 per cent of the production, so that it will be possible to reopen closed wells.

The bill provides further that the entire crude oil production must be refined in Rumanian plants. Exports even of semi-finished products will be prohibited in the future. The petroleum companies are to join forces with existing technical institutes in a new National Petroleum Institute for the promotion of petroleum engineering. The government will supervise work in the oil refineries in order to ensure full use of modern processes. The refineries may be ordered to amalgamate to permit more economical operations. All oil pipes serving the export trade will be taken over by the government, but pipe lines connecting oil fields with refineries will be returned to private ownership. To increase Rumanian interest in the petroleum industry, it has been decided to grant substantial privileges to firms which are more than 75 per cent owned and managed by Rumanian nationals.

Growth of Medicinal Plants in New Zealand Is Encouraged

EXPERIMENTAL cultivation of such medicinal plants as foxglove or digitalis, thornapple, henbane, and others, is being undertaken in New Zealand through encouragement of the British Government, in order to replenish decreasing stocks of various important drugs, according to a consular report from New Zealand.

The dried leaves of foxglove, thornapple, henbane, and roots of nightshade are frequently sent to England for extraction of essential drugs, it is stated. Other plants which may be grown in New Zealand for extraction of medicines and flavorings include poppy, peppermint, caraway, coriander, fennel, and licorice.

Italian Production of Chemicals Hampered by Shortage of Electricity

ITALIAN chemical production is hampered by shortages of electric current and coal, official reports from that country indicate.

Although nitrate-producing capacity, for instance, is stated to be ample for both military and agricultural needs, actual production is lowered by the shortages mentioned, coupled with transportation problems and scarcity of raw materials. The result has been an enforced reduction in fertilizer use, in turn an important factor in holding back Italy's attempts to expand agricultural production.

Shortage of copper is said to be one cause for heavy cutailment of copper spray manufactures, some plants being idle for lack of this metallic ingredient. New sprays requiring a minimum of copper are being tested.

Shifting of important chemical works to locations said to offer more favorable basic raw materials is under consideration.

Switzerland Rations Copper in Spraying Solutions

SWITZERLAND has inaugurated scrap copper collections on account of dwindling imports and copper supplies becoming exhausted.

Rationing of copper to 690 tons for use in spraying liquids, compared with normal consumption of 1,550 tons, has been ordered for this year, according to food value of crops. Some 180 tons of copper were used in the last prewar year to combat fruit tree pests, compared with 50 tons allowed this year.

A NEW machine, said by British paint-spray equipment makers to require only 10 days to build, is reported from England to be capable of painting 5,000 shells in 8 hours and to do the work of 120 people by the use of only three workers. Two watchers and a loader are the only labor required, it is stated.

Canada Produces First Pure Magnesia

PRODUCTION of pure magnesia for the first time in Canada, is reported by the Aluminum Co. of Canada, Ltd., from its new plant in Quebec. The raw material used is brucitic limestone from the Gatineau Valley. The first 50 tons of hydrated lime produced at the plant were presented to the Dominion's experimental farm.

Venezuela Plans to Produce Quicksilver

PLANS for development of quicksilver production in Venezuela, to a monthly output of about 200 tons of 8 per cent ore, equivalent to about 100 flasks, are reported by U. S. Bureau of Mines. An order has been placed in the United States for empty flasks, indicating that treatment at the mine may begin during the current year.

Canada Is Important Producer of Mercury

CANADA has become an important producer of mercury since discovery in 1937 of mercury deposits in northern British Columbia. Canada now supplies the United Kingdom with a large part of its requirements in addition to meeting domestic needs. Production started in 1940, with further geological work the following year. Prior thereto little mercury was produced in Canada.

A CHANGE of name from the former S. A. pour Industrie Chimique to Chemische Werke Dornach G. m. b. H., is reported for this Alsatian firm formerly connected with the Kuhlman group and now under German control, making dyestuffs, pharmaceuticals, and other chemical products.

ITALY is reported to be expanding its aluminum output to an extent that is meeting national needs and allowing a surplus for export. The country is said to have an abundance of laucite, yielding potassium salts as a by-product and furnishing raw material for the metal output

GERMAN experiments with the use of sulfite lye as a binder in production of fuel briquets are reported from British sources to be still in progress, and are said to promise good results. Experiments are in the hands of the Zellstoffabrik Waldohof, of Mannheim.

EXPANSION from 30,000 to 40,000 tons capacity is reported for a Swedish factory producing calcium nitrate. The increased production was necessitated by present conditions but still does not meet demand, despite increased output at an old factory as well.

Survey of Postwar Prospects

More than eight thousand manufacturers are cooperating in a survey now under way to determine postwar employment and reconversion prospects. Wholesale and retail trades also are being queried as to their after-the-war outlook, as will other segments of industry within the next few weeks.

This survey is a part of the research project which the Chamber of Commerce of the United States has undertaken to develop facts as to consumer demands, and the means of industry to fill them when full peace-time production is resumed. The project is designed to assist management, labor, agriculture, and the government in planning for quick reconversion and quick employment after the war.

The broad national canvass of the postwar consumer market was initiated by the Chamber several weeks ago. The consumer analysis was undertaken on a comprehensive national scale when a preliminary pilot survey indicated that war's end will bring a tremendous demand for the products of American industry.

The specific industry research, participated in by manufacturers and other segments of industry, is to analyze plant capacity needed for a continuation of "defense" needs after the war; plant capacity available for production of civilian goods; machine tools needed for reconversion; labor needed for reconversion and for production after the war; and time required for reconversion.

War Risk Insurance Rates

The War Shipping Administration has announced that following advices received from the OPA, the War Shipping Administration has withdrawn nominal war risk insurance rates covering the importation of certain commodities, including industrial chemicals. Effective September 1, these shipments take the rates which prevailed under insurances granted by the War Shipping Administration in the month of July.

Characteristics of Gas Flames

Pointing the way to development of more efficient gas and oil burners for home and industrial use, technicians of the Bureau of Mines and the Carnegie Institute of Technology, Pittsburgh, Penna., have evolved a method which should permit increased accuracy in determining the characteristics of gas flames under various controlled conditions. The experiments indicate that simple, inexpensive tests can be developed for determining the proper mixture for gas burners and the method by which it is fed, so that the burners will operate at maximum efficiency.

The research is one phase of a study intended to eliminate guesswork in the design and operation of burners and to produce flames of definite physical dimensions with a minimum waste of fuel.

New Biochemistry Journal

Archives of Biochemistry, new journal in biochemistry, is announced by the publishers, The Academic Press Inc., 125 East 23rd St., New York, N. Y. The first issue will appear about the middle of October.

The purpose of the new journal is to provide a medium of publication for scientific papers in the widening scope of biochemistry. The fields to be represented are: proteins, hormones, vitamins, viruses, enzymology, biochemical and biophysical research in chromosomes, metabolism, nutrition, photosynthesis, plant chemistry, organic chemistry as far as related to living organisms, colloid science in its biological application, and chemotherapy.

The editorial board is composed of: M. L. Crossley, American Cyanamid Company; R. A. Gortner, University of Minnesota; F. C. Koch, Armour and Co.; C. M. McCay, Cornell University; F. F. Nord, Fordham University; F. W. Went, California Institute of Technology; and C. H. Werkman, Iowa State College.

Two volumes per year are planned, each volume at $5.50.

Union Catalogs

A plan of the Social Science Research Council and the Joint Committee on Materials for Research of the American Council of Learned Societies, through the aid of the Carnegie Corp., has borne fruit in the form of a 409-page volume, Union Catalogs in the United States, published by the American Library Association, 520 North Michigan Ave., Chicago. The volume gives a complete picture of the status, planning, cost, administration, use, limitations, and possibilities of an instrument to which research workers are turning in increasing numbers for the location of the literatures of their respective subjects. Its price is $5.00.

University Microfilms

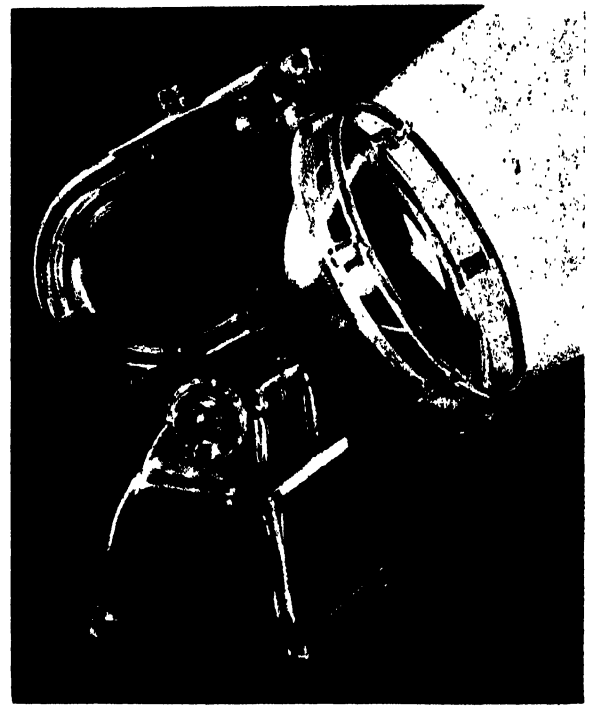
Among the abstracts of doctoral dissertations recently made available by University Microfilms, 313 North First St., Ann Arbor, Mich., are the following: "The Heat Capacity of Nickel Nitrate Hexammoniate from 54° K. to 300° K., the Transition at 243° K., and the Anomalous Energy Absorption below 85° K." by F. C. Toettcher, University of Missouri, 213 pages, price $2.66.

"Liquid-Vapor Equilibrium in Hydrocarbon-Water Systems", by R. E. Chaddock, University of Michigan, 120 pages, price $1.50. Paper enlargements, 6 × 8 inches, are available at 10 cents per page.

Alcohol for War Use Only

All 128 distilleries in the United States are to be converted to the production of war alcohol by November 1, when manufacture of whisky, gin, and other beverage spirits will cease. It is predicted that 476,000,000 gallons of alcohol will be needed for war purposes in 1943, more than half of it in the manufacture of butadiene.

R. J. Laidlaw has been appointed manager of the Cleveland district office of the Worthington Pump and Machinery Corp., succeeding A. J. Klug.



Utility Lantern

A new type of general utility lantern with an all-Tenite housing has recently been developed. This FocOlite lantern features an adjustable focal length and a small light bulb on an extension cord that may be used to illuminate objects not made visible by the larger beam. The product is manufactured by the Focal Co., Downey, Calif., and the housing is molded of Tennessee Eastman Tenite by the Modern Plastics Co., Los Angeles, Calif.

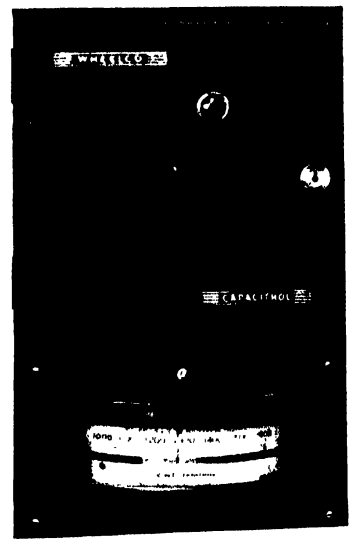
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"Electronic Principle" Temperature Control *(D2).

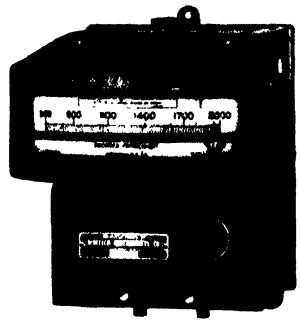
Limitrols *(D202).

Indicating Pyrometers *(D302).

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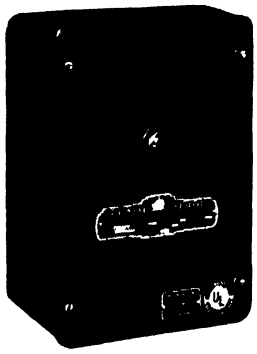


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Potentio-trol

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Flame-otrol

1936

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Proportioning Control *(D2).

Portable Potentiometers *(A502).

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PROPORTIONING CONTROL for continuously varying fuel input to maintain constant temperature — applied to "Electronic Principle" Controllers.

★

1938

Potentio-trols *(A2).
Program Control *(D2).
Rheotrols *(J302).
Flame-eyes *(L302).
Automatic Ignition Flame-otrols *(L2).

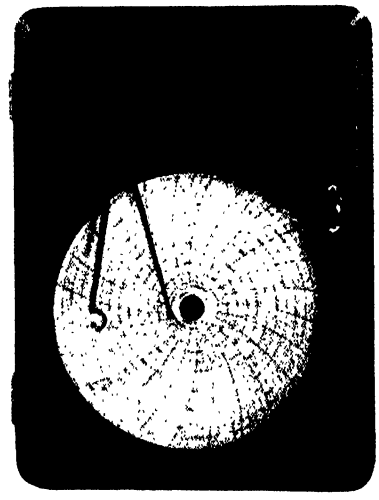
POTENTIO-TROLS potentiometric method of temperature measurement combined with "Electronic Principle" Control.

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Indicating Therm-otrol *(G502).
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Recording Thermometers *(G403).

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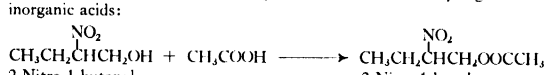
these reactions will suggest many others:

Aminohydroxy Compounds are made by reducing the corresponding nitrohydroxy derivatives:



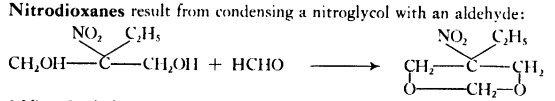
2-Nitro-2-methyl-1-propanol → 2-Amino-2-methyl-1-propanol

Nitro Esters are made by reacting nitro alcohols with many organic and inorganic acids:



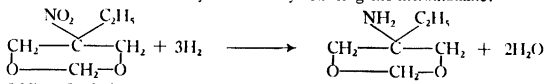
2-Nitro-1-butanol → 2-Nitro-1-butyl acetate

Nitrodioxanes result from condensing a nitroglycol with an aldehyde:



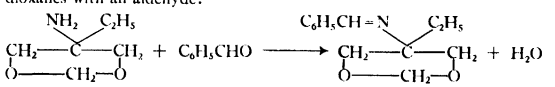
2-Nitro-2-ethyl-1, 3-propanediol → 5-Nitro-5-ethyl-1, 3-dioxane

Aminodioxanes are easily obtained by reducing the nitrodioxane:



5-Nitro-5-ethyl-1, 3-dioxane → 5-Amino-5-ethyl-1, 3-dioxane

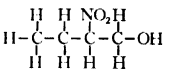
N-substituted Iminodioxanes may be made by condensing aminodioxanes with an aldehyde:



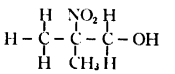
5-Amino-5-ethyl-1, 3-dioxane → 5-Benzylidenimino-5-ethyl-1, 3-dioxane

The Nitrohydroxy Compounds

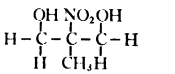
produced by condensation of the Nitroparaffins with aldehydes



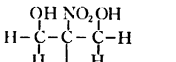
2-Nitro-1-butanol



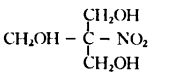
2-Nitro-2-methyl-1-propanol



2-Nitro-2-methyl-1, 3-propanediol



2-Nitro-2-ethyl-1, 3-propanediol



Tris (hydroxymethyl)-nitromethane

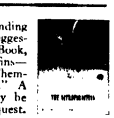
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The Nitroparaffins at Work will be featured in our exhibit at the National Chemical Exposition in Chicago, November 24th to 29th. You are cordially invited to visit our Booth.

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Chemists are finding many helpful suggestions in the Data Book, "The Nitroparaffins—New Worlds for Chemical Exploration." A copy will gladly be mailed you on request.







American Chemical Society[1]

105TH MEETING. Indianapolis, Ind., April 12 to 16, 1943.

106TH MEETING. Minneapolis, Minn., fall of 1943.

NATIONAL CHEMICAL EXPOSITION and NATIONAL INDUSTRIAL CHEMICAL CONFERENCE. Sherman Hotel, Chicago, Ill., November 24 to 29, 1942.

Other Scientific Societies

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Netherland Plaza Hotel, Cincinnati, Ohio, November 16 to 18.

AMERICAN OIL CHEMISTS' SOCIETY. Drake Hotel, Chicago, Ill., October 7 to 9.

AMERICAN PETROLEUM INSTITUTE. Palmer House, Chicago, Ill., November 9 to 13. Annual meeting.

AMERICAN WELDING SOCIETY. Hotel Cleveland, Cleveland, Ohio, October 12. Annual meeting.

DETROIT RUBBER AND PLASTICS GROUP. Hotel Detroit Leland, Detroit, Mich., October 2.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA. William Penn Hotel, Pittsburgh, Penna., November 9 and 10. Third annual water conference.

INDUSTRIAL HYGIENE FOUNDATION. Mellon Institute, Pittsburgh, Penna., November 10 and 11. Annual meeting.

NATIONAL LUBRICATING GREASE INSTITUTE. New Orleans, La., October 26 to 28.

SOCIETY OF CHEMICAL INDUSTRY, Montreal Section, Rubber and Plastics Division. McGill Faculty Club, Montreal, Que., October 9.

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY. Hotel Statler, Boston, Mass., September 29 to October 1.

[1] The list of the SOCIETY'S National Officers and Directors, Editors, members of Council, Divisional and Local Section Officers, Committees, and Chapters of Student Affiliates appears in CHEMICAL AND ENGINEERING NEWS three times a year usually February 10, May 10, and October 10. The latest list is printed on page 601 of the May 10 issue.



Local Sections

SECTION AND PLACE	OCT.	SPEAKER	SUBJECT
Baton Rouge, La.	15	**H. E. Longenecker**	
Central Texas, Austin	12	**H. E. Longenecker**	
Dallas–Fort Worth, North Texas Agricultural College, Arlington	10	**H. E. Longenecker**	
Detroit, Mich.	13	**Frederick Seitz**	Semi-Conductors
Kansas City, Mo.	7	**H. E. Longenecker**	
Kansas State College, Manhattan	8	**H. E. Longenecker**	
Maine, Chemistry Laboratory, Bowdoin College, Brunswick	3	**Harry N. Holmes**	Strategic Raw Materials and the National Defense
Michigan State College, East Lansing	15	**Frederick Seitz**	Semi-Conductors
Midland, Mich.	14	**Frederick Seitz**	Semi-Conductors
New York, Hotel Pennsylvania	9	**C. G. King** **Vincent du Vigneaud**	Nutrition Foundation Structure of Biotin
North Jersey	12	**Hugh S. Taylor**	Catalytic Chemistry in World War II
Northeastern, Huntington Hall, M. I. T., Cambridge, Mass.	1	**Harry N. Holmes**	Strategic Raw Materials and the National Defense
Pittsburgh, Penna.	15	**J. H. Mathews**	Crime Detection (Student Night)
Rhode Island, Metcalf Auditorium, Brown University, Providence	2	**Harry N. Holmes**	Strategic Raw Materials and the National Defense
Rochester, Cutler Union, Prince Street Campus, University of Rochester	5	**C. D. Lowry, Jr.**	New Chemistry of Olefins Derived from Petroleum
St. Louis, Mo.	5	**H. E. Longenecker**	
Southeastern Texas, Houston	14	**H. E. Longenecker**	
Texas A. & M., College Station	13	**H. E. Longenecker**	
Toledo, Ohio	12	**Frederick Seitz**	Semi-Conductors
University of Missouri, Columbia	6	**H. E. Longenecker**	

New Course in Plastics

THE Polytechnic Institute of Brooklyn is offering a new graduate course in the technology of resins and plastics. Prominent specialists in each of the important resins and plastics in current use will give the lectures, following the plan so successfully used in such courses as organic synthesis and petroleum refining.

The program includes phenolic, urea, acrylic, vinyl, and styrene resins, as well as cellulose esters and ethers, regenerated cellulose, casein and shellac plastics. Sources of raw materials, use of fillers, plasticizers, dyes, lubricants, and accelerators will be discussed, and the techniques of manufacture of the resins, compounding, molding, impregnating, laminating, and coating. Production of synthetic fibers and elastomers is included, also an introduction to the design of products fabricated from plastics.

The course consists of 28 lectures, on Thursday nights at 8:00 P. M., beginning October 1.

Seminar on Mechanism of High Polymeric Reactions

THE Department of Chemistry of the Polytechnic Institute of Brooklyn, Brooklyn, N. Y., has arranged a series of seminars on "The Mechanism of High Polymeric Reactions", to be held alternate Saturdays from 11:00 A. M to 1:00 P. M. beginning October 3. The seminars will be under the direction of H. Mark and C. E. Waring.

Officers of Junior Chemical Engineers of New York

NEWLY elected officers of the Junior Chemical Engineers of New York are: president, John R. Callaham, *Chemical and Metallurgical Engineering;* vice president, Howard Ten Broeck, Socony-Vacuum Oil Co.; secretary-treasurer, Alvin S. Weiss, Schenley Distillers Corp.; assistant secretary-treasurer, Edward T. Maples, M. W. Kellogg Co.; chairman of publicity committee, George M. Hain; chairman of program committee, Raymond P. Devoluy; chairman of membership committee, Frank Melaccio; intersociety activities, Frank B. White.

War Training Courses in Radio and Chemistry

WESTERN Reserve University, Cleveland, Ohio, in cooperation with the U. S. Government is offering war training courses in "Chemistry in the Service of War", "Industrial Chemical Analysis", "Fundamentals of Radio", "Industrial Electrochemistry", and "Synthesis and Use of Strategic Organic Chemicals".

Mellon Institute Technochemical Lectures

A SERIES of lectures on recent advances and current trends in the American chemical industry will be presented by technologic specialists of the Mellon Institute, Pittsburgh, Penna., during 1942–43 on alternate Wednesdays.

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POTOMAC POSTSCRIPTS

Price Regulations

All distributors selling chemicals or drugs covered by specific price regulations were licensed August 11 by the Office of Price Administration through Supplementary Order 11. The order, which also makes the holding of a license a required condition for selling, contains the usual provision on suspension of licenses. Retailers are excluded from the licensing order, since they are already licensed under the General Maximum Price Regulation. Manufacturers, except those who redistribute or operate at the distribution level through subsidiaries, affiliates, or branches, are also excluded, as are laboratories operated by nonprofit educational institutions.

In his statement of considerations accompanying the order Price Administrator Leon Henderson explained he had "deemed it necessary to extend licensing to the chemical and drug industry . . . because of the vital role which chemicals and drugs play in our national life. Chemicals are essential to the war effort. Drugs are vital to public health. It is important to the Nation that prices of these commodities remain stable, and that there be no evasion of existing and forthcoming price regulations dealing with these commodities."

The order lists the price regulations, issued for the chemical and drug industry, which cover the products whose distributors are now licensed. The order provides also that licenses shall be required of distributors selling chemicals or drugs which may be covered through regulations issued in the future, which make applicable by reference the provisions of the order.

Supplementary Order No. 11 supersedes the licensing provisions of the General Maximum Price Regulation, insofar as they apply to distributors of chemicals or drugs licensed by the supplementary order.

Butyl Alcohol and Acetone. The effective date of Maximum Price Regulations Nos. 36 and 37, substantially reducing the maximum prices for normal butyl alcohol and acetone produced by both fermentation and synthesis, has been postponed from September 3 to October 3, the Office of Price Administration has announced.

This delay is necessary due to a change in market conditions for fermentation acetone and fermentation butyl alcohol. Fermentation acetone is a by-product from the manufacture of fermentation butyl alcohol. Due to the joint-product nature of fermentation acetone and fermentation butyl alcohol—fermentation acetone represents about 20 per cent of total acetone production, the remaining 80 per cent being produced synthetically—the prices of the two products are closely related.

Maximum Price Regulation 37 sets a maximum price of 12½ cents per pound for the butyl alcohol produced by fermentation, while Maximum Price Regulation 36 establishes a price of 8½ cents a pound for fermentation acetone. Under Revised Price Schedules 36 and 37, which have governed these products up to the present, the maximum price for both fermentation butyl alcohol and acetone is 15.8 cents a pound.

Cotton Linters and Hull Fibers. Sales of cotton linters and hull fibers by the United States or any of its agencies are not subject to the pricing provisions of Maximum Price Regulation 191 according to Amendment 1, effective September 10.

This exemption was made, the Office of Price Administration explained, in order to facilitate the carrying out of plans made by the War Production Board and the Commodity Credit Corporation for the orderly marketing and conversion into chemical cotton pulp of cotton linters. In order to prevent any interference with the continuous supply of cotton linters necessary to maintain maximum production of chemical cotton pulp, the War Production Board has authorised the Commodity Credit Corporation, and the Commodity Credit Corporation has undertaken, to purchase all cotton linters for resale to the producers of chemical cotton pulp. To assure the greatest possible speed in the execution of these plans, OPA has exempted sales of cotton linters and hull fibers by the United States or any of its agencies from the price regulation governing cotton linters and hull fibers.

Sulfate of ammonia—one of the most important agricultural fertilizers—is brought under a specific dollars and cents price ceiling on all sales by producers, importers, and primary jobbers.

Maximum Price Regulation 205. Maximum prices that may be charged are a base price of $28.20 per ton at inland oven plus the transportation charges to buyer's destination from the inland oven nearest the buyer's destination, or a base price of $29.20 per ton at port, plus the transportation charges to buyer's destination from the port nearest to the buyer's destination.

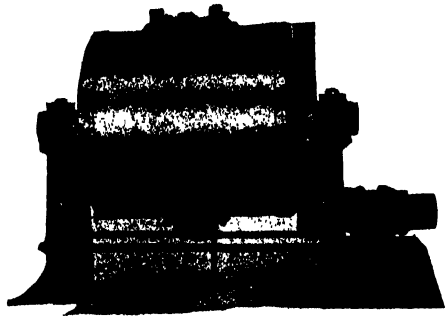
With the exception that no separate differential is granted in the regulation for "spot sales", these prices are at approximately the same level requested in May 1941 and again last February of the producers by the Price Administrator.

CONTINUED ON PAGE 1188

WHAT MUST YOU GRIND OR MIX IN WAR PRODUCTION WORK?

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MILLS AND MIXERS

are being used in every field of industry where low labor, efficiency requirements, and immunity from breakdowns are important.

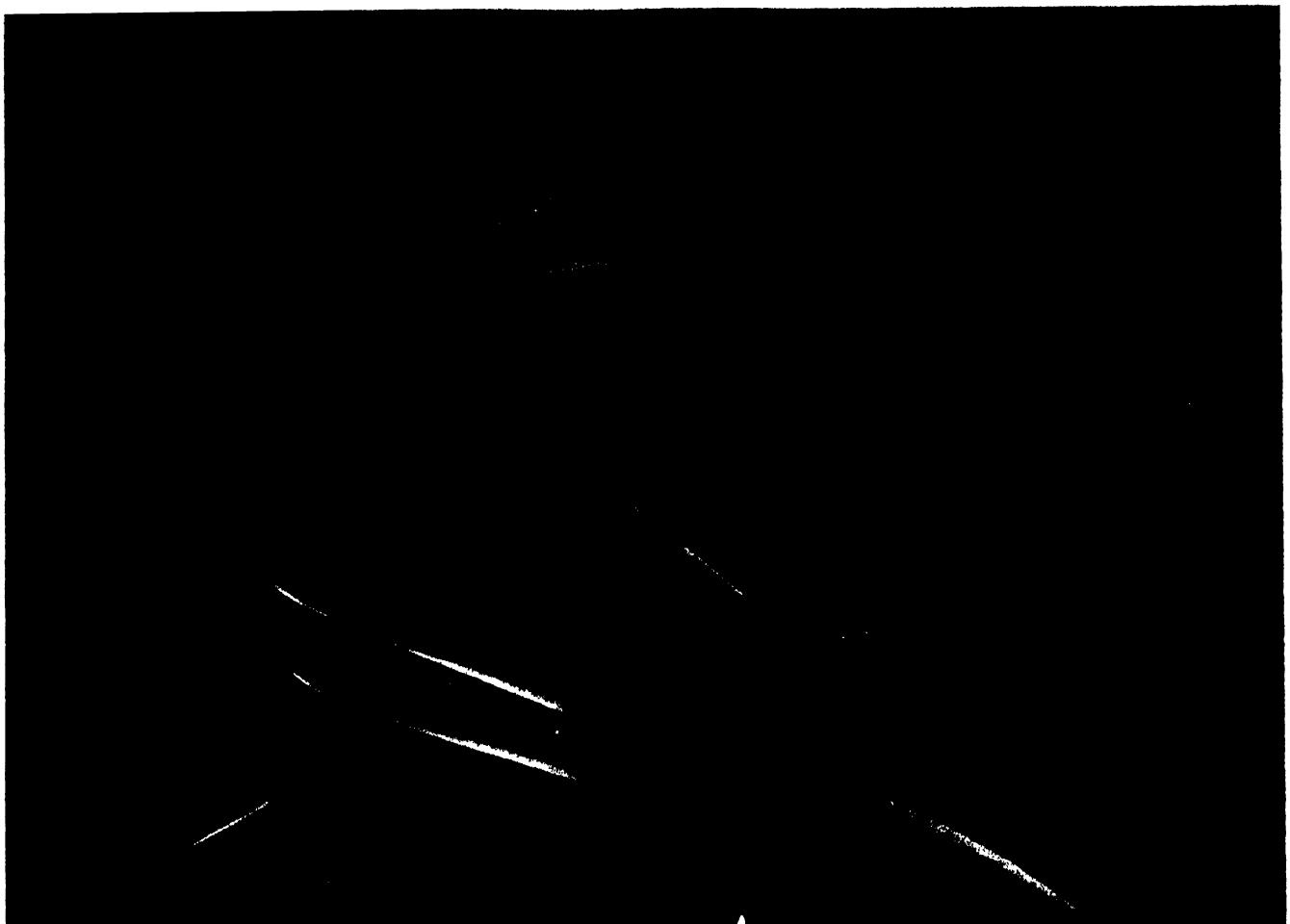


IN WAR PRODUCTION WORK

PAUL O. ABBÉ MILLS AND MIXERS are now processing materials for smokeless powder, tracer powder, black-out and camouflage paints, abrasives, welding wire coverings, porcelains, drugs, chemicals, nitro-cellulose, and many other products and substances.

PAUL O. ABBÉ offers the experience of 65 years familiarity with milling and mixing problems.

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. . . and insured against it. Engine failure is not included in the kind of trouble for which this marauder was built. Her deadly striking power must not be impaired — or the lives of her crew endangered by a breakdown of any kind. This is why American submarines of the latest types are equipped with both Sharples Diesel Lubricating and Fuel Oil Purifiers. Abrasives, water and sludge in lubricating oil are primary causes of engine trouble on seagoing craft and the Sharples application of centrifugal force is the proven way to continuously provide clean lubricating and fuel oil to Diesel engines.

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Potomac Postscripts

CONTINUED FROM PAGE 1186

Only that sulfate of ammonia which contains 20.5 per cent or more of nitrogen and which is directly applied to the soil as a fertilizer or used in mixed fertilizers is affected by the regulation.

Vitamin A Oils and Concentrates. Prices of the natural oils and concentrates from which vitamin A is obtained have been stabilized at levels substantially lower than those prevailing during the speculative flurry of late 1941. Maximum Price Regulation 203 applies to all persons who sell the oils or concentrates, and removes these products from the provisions of Revised Price Schedule 53 (Fats and Oils).

The specific dollars-and-cents maximum prices contained in the regulation for vitamin A oils and concentrates are slightly higher than the average prices of 1941, although they are lower than the prices charged during the fall and winter of last year when prices increased sharply. In general, the maximum prices are high enough to permit producers, and concentrators of the oils to operate at their average 1941 margins and to purchase fish livers at the average prices paid during last year.

Volatile Oils. Sales and deliveries of volatile oils—the most important of which are peppermint and spearmint—by the growers of the plants from which these oils were distilled are exempted from the provisions of the General Maximum Price Regulation.

As most growers did not make sales during March 1942, the base pricing period of the general regulation, it has been deemed advisable to exempt their sales of these oils from the provisions of the regulation.

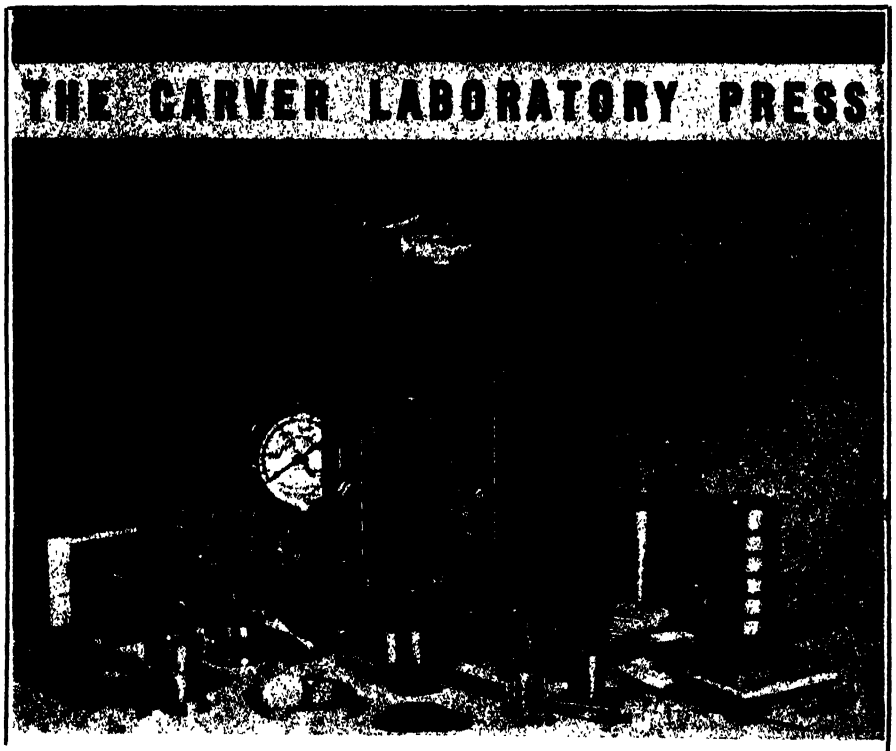
Two midwestern dealers in peppermint and spearmint oils have been authorized by OPA to adjust their maximum prices under the General Maximum Price Regulation in line with those of their competitors to enable them to carry out their contracts with the farmers.

The OPA also announced that the prices of peppermint and spearmint are being closely scrutinized and, if desirable, a separate maximum price regulation covering them may be issued in the next few months. Sales of these oils, other than sales by growers of the plants from which the oils were distilled, are covered by the General Maximum Price Regulation.

Wood Waste. The maximum price for veneer mill wood waste when sold to the Ford Motor Co. for use as a raw material at its Iron Mountain, Mich., wood distillation plant has been adjusted.

This adjustment, which exempts veneer mill wood wastes used for this purpose from provisions of the General Maximum Price Regulation until November 1, 1942, was contained in Amendment 22 to Supplementary Regulation 1 and became effective August 14. Up to the present this particular plant, which produces important war chemicals such as wood alcohol, methyl acetone, and acetic acid, has used wood waste, along with chemical logs and bolts—small logs from 3 to 18 feet long and 3 inches and up in diameter—as raw materials. The logs are exempted from the General Regulation and, as a result, the company has been able to pay a high enough price to obtain enough logs to operate at full capacity.

Currently the plant is dependent upon the wood waste as its main raw material as floods in the area have reduced the supply of logs. Present prices established for the wood waste under the General Regulation are not sufficiently high to assure an adequate supply. Any increases in price for the wood waste which may result from the exemption will not be reflected in the price of the chemicals produced at the plant.



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Complaint Filed against Molybdenum Producers

THE Department of Justice has announced the filing of a complaint and the entry of a consent decree in the U. S. District Court for the Southern District of New York against the five principal American producers and distributors of molybdenum, charging violation of the Sherman Antitrust Act.

Named as defendants were the Climax Molybdenum Co., Greene Cananea Copper Co., Anaconda Sales Co., Molybdenum Corp. of America, and Kennecott Sales Corp., all of New York, N. Y.

The consent decree would enjoin the defendants from dividing up world markets and fixing resale prices, thus effectively breaking up an international molybdenum cartel which was in operation from 1929 to the outbreak of the war in Europe in 1939.

Chemical Manufacturers Indexes

THE June index of the value of chemical manufacturers' shipments, according to the monthly industry survey of the Department of Commerce, was 170 compared with the same figure for May and 164 in June of last year taking the average month of 1939 at 100.

The department's figures show also that the May 1942 index of the value of chemical manufacturers inventories was 162.4 compared with 159.9 in May 1941 and 119.5 in June 1941 again taking the average month of 1939 at 100.

Natural Rosins profitably replaced by



New, high-melting, Pale Resin!

Poly-Pale* Resin (from WG to X on the rosin scale) is more widely and more completely soluble than natural rosins. It has a higher melting-point, lower acid number, higher viscosity, and is substantially free of metals.

Moreover, applications for this new resin extend beyond replacements for rosins. It avoids rosin's well-known tendency to crystallize in certain processes.

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Adhesives · Core Oils
Metallic Resinates and Dryers

Descriptions of the physical and chemical characteristics of Poly-Pale, and extensive information of value in formulating, are contained in the revised 2nd edition of the booklet "Poly-Pale Resin." Mail the coupon for your copy.

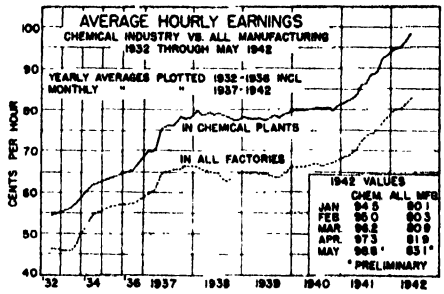
*Reg. U. S. Pat. Off. by Hercules Powder Company

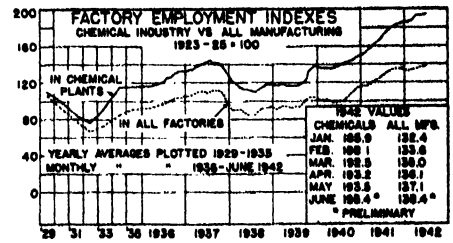
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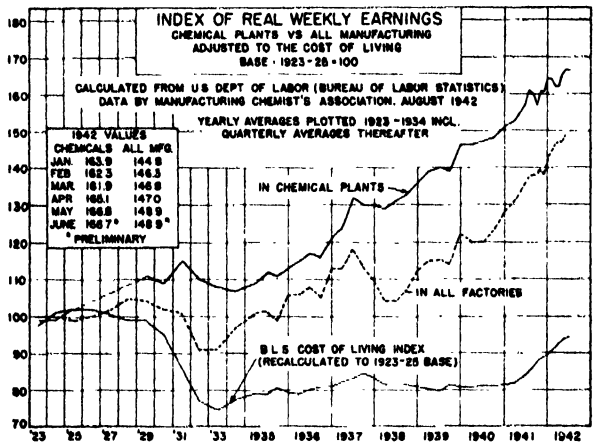
Wage, Hour, Employment, and Price Trends

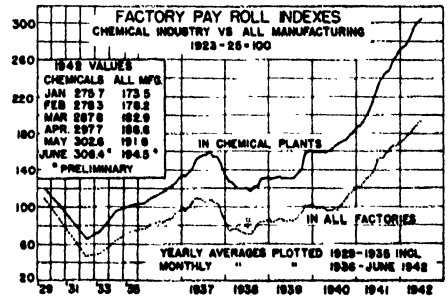
The Chemical Industry Compared with All Industry

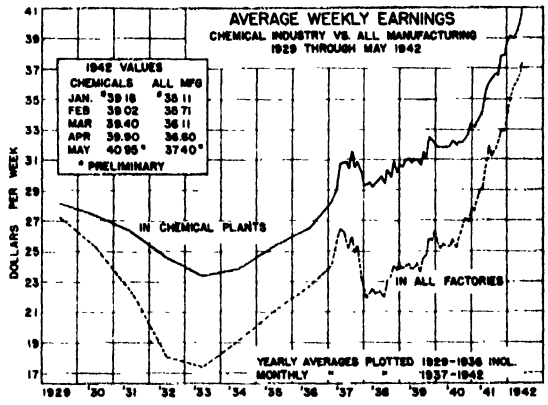
STATISTICS in these graphs were compiled from official sources by the Manufacturing Chemists' Association, 608 Woodward Bldg., Washington, D. C. Chemical graphs in this M. C. A. Statistical Report No. 21 show only the data listed by the U. S. Department of Labor under "chemicals" and do not include soap, explosives, petroleum refining, rayon, drugs, fertilizers, cottonseed oil, cake or meal, and paints and varnishes.

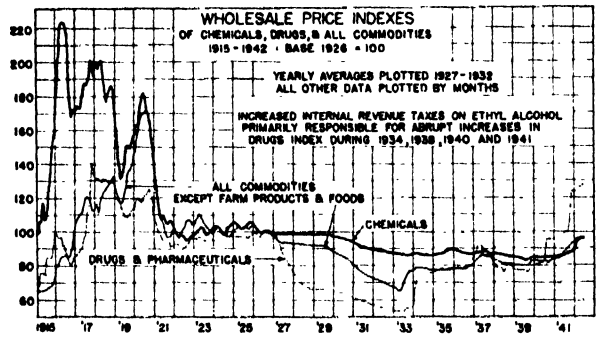


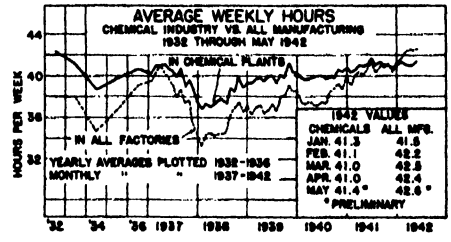












Engineering Data on Plywood

OF INTEREST to users, manufacturers, and specifiers of plywood is a series of tables on "Strength and Deflection of Douglas Fir Plywood Under Loads Applied at Right Angles to Face", by Charles B. Norris, Forest Products Laboratory, published by I. F. Laucks, Inc., Seattle, Wash. The tables are the results of a cooperative project between I. F. Laucks, Inc., and Forest Products Laboratory. The charts are devoted to Douglas fir plywood, but the method for adaptation to other woods is provided.

This information is reprinted as a 16-page booklet from Mr. Norris' "Technique of Plywood", a handbook of 250 pages just issued by I. F. Laucks, Inc. ($2.50 postpaid). Copies of the booklet are available from I. F. Laucks, Inc., at 10 cents each.

Frank L. Campbell, has taken leave of absence from the Ohio State University to perform advisory service on insecticides in the Chemicals Division, Office for Agricultural War Relations, U. S. Department of Agriculture, Washington, D. C.

By-Product and Beehive Coke

THE Bureau of Mines, U. S. Department of the Interior, has prepared report MMS 1015 on the distribution of by-product and beehive coke in 1941, showing the greatest output of coke in the history of the country, thanks to unprecedented activity in the iron and steel industry during the year. The report gives statistical data, including consumption by states, comparative consumption, source of coke consumed, destination of coke produced in each state, breeze and screenings, and exports.


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Solvay Soda Ash has its place in the Victory Program as an important basic material required in the manufacture of equipment and other products for our armed forces. Listed below are a few of the many essential war materials produced with the help of Solvay Soda Ash.
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LEATHER
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PAPER
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Alkalies and Chemical Products Manufactured by The Solvay Process Company

NEWS-MAKERS

F. T. **Carson** of the National Bureau of Standards Paper Section received the degree of doctor of science at his alma mater, Hardin-Simmons University, in June in recognition of his achievements in research on physical properties of paper.

James R. Connell has been appointed vice president in charge of sales of the Fibre Conduit Co., Orangeburg, N. Y.

M. H. Corbin has been appointed manager of industrial sales and director of research for Standard Varnish Works, Chicago, Ill., in the eastern territory. Mr. Corbin succeeds the late **Paul Sommer**. Mr. Corbin was formerly in charge of the lacquer and research departments of Ault and Wiborg and The Arco Co. He has been with Standard since 1937, specializing on sales and technical service in the lacquer field.

Captain James B. Cordiner, Jr., is now attending the Ninth General Staff Course of the Command and General Staff School at Fort Leavenworth, Kans. After completion of the course, he is to assume the duties of assistant supply officer at the Anti-Aircraft Training Center at Camp Stewart, Ga.

Lowell V. Coulter has received appointment as instructor in the Department of Chemistry, Boston University. Since receiving his Ph.D. degree from the University of California, he has been teaching at the University of Idaho.

Graduates of the Incarnate Word College, San Antonio, Texas, who have recently taken technical positions, include the following: **Jean Craig**, technician in Army Hospital, Fort Sam Houston; **Mildred Schlosser**, laboratory technician in Nix Hospital, San Antonio; **Linette Goldman**, technician, Santa Rosa Hospital; **Mary Libert**, assistant chemist, Kincaid Steel Co.; **Ann Dalmas**, laboratory assistant in private laboratory; **June Pike**, junior chemist, Biochemistry Laboratory, Randolph Field, San Antonio; **Dorothyhe Freman**, assistant chemist, Longhorn Cement Co.

Ralph E. Davis, Jr., has joined the Sales Department of the Hooker Electrochemical Co., Niagara Falls, N. Y. For the past six years he had been superintendent of the tannery of Maylender Bros., Johnstown, N. Y.

Robert A. Diehm, since 1929 doing research and technical sales work with Röhm & Haas, has been appointed technical director of the Container Corp.

R. Edson Emery, president of Jessop Steel Co., Washington, Penna., is celebrating his 42nd anniversary of service in the steel industry. Mr. Emery started in 1900 with the Crucible Steel Co. and has served as president of Superior Steel Co. and as vice president of the Colonial Steel Co.

Clifford S. Garner, assistant professor of chemistry at the University of Texas, is on leave of absence doing research at the University of California in Berkeley on a project under the National Defense Research Committee.

George Gibson has been appointed assistant professor of chemistry at the Illinois Institute of Technology, Chicago, Ill. He received his Ph.D. degree from the institute in 1942.

Neil E. Gordon has resigned as chairman of the Chemistry Department of Central College, Fayette, Mo., to accept the position as chairman of the Chemistry Department at Wayne University, Detroit, Mich.

Richard H. Grimm has been appointed chief of the Industrial Alcohols Unit of WPB's Chemicals Branch. Mr. Grimm, formerly president of the American Commercial Alcohol Corp., had been in retirement since 1933 except for a term as president of the Industrial Alcohol Institute in 1935.

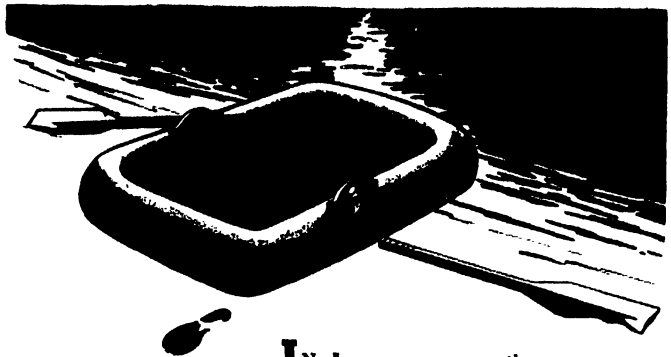
Major Albert N. Holcombe is on military leave from the Shell Chemical Co., Shell Point, Calif. He has been transferred from the Weldon Spring Ordnance Works to the Kentucky Ordnance Works as commanding officer.

M. R. Hoppe, vice president and technical director of the Parr Instrument Co., Moline, Ill., with which he has been associated for the past six years, has been commissioned a Captain in the Army Specialist Corps and assigned to Edgewood Arsenal for duty with the Chemical Warfare Service.

Captain Clarence W. Huffman has been placed in command of the Chemical

CONTINUED ON PAGE 1194

waste is a *Saboteur*

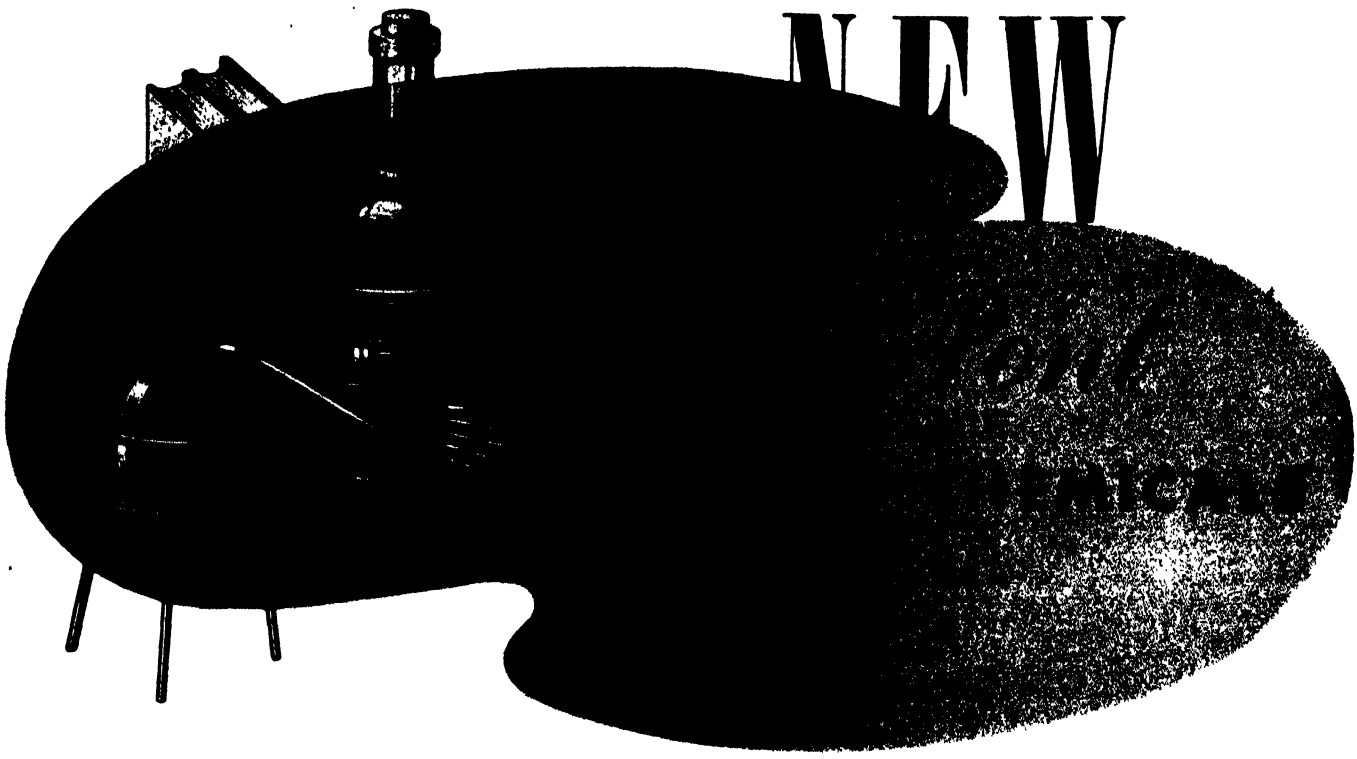


IN A war economy, the recovery and reclamation of by-products is not only a profitable operation, but, because of shortages caused by war production is often a patriotic duty. Many chemical manufacturers, who in normal times allowed valuable chemicals to flow to the sewer because the cost of reclaiming them was too high to be considered, are now finding it practical and economical to reclaim acid, alkali, dye and other liquors by treatment with NUCHAR Active Carbon.

Here are some of the chemical products being either recovered or reclaimed by simple, low-cost treatment with NUCHAR Active Carbon: Acetic Acid, Formic Acid, Muriatic Acid, Sulphuric Acid, Phenol, Glycerin, and Sodium Glutamate.

Write to our nearest office for further information on the reclamation or recovery of your process liquors.

NUCHAR INDUSTRIAL CHEMICAL SALES



These new chemicals have been produced by du Pont research laboratories. The properties of these products may suggest interesting possibilities for the manufacture of new essential materials.

SODIUM METHYL SULFATE ($NaCH_3SO_4$)

is a methylating agent. It should be of particular interest in methylating operations where convenient physical form, high solubility and lack of volatility are desirable. This product is available in sample quantities as a 50% aqueous solution.

SODIUM CHLOROSULFONATE ($NaClSO_3$)

is a finely divided crystalline powder which hydrolyzes rapidly to liberate hydrochloric acid. With the application of heat, the dry salt decomposes to yield chlorine and sulfur dioxide. It has possible use in the manufacture of materials in which sulfonation and chlorination reactions would be involved. The chlorosulfonates of calcium, magnesium, aluminum, iron, copper and lead can also be made available in sample quantities in case of special interest

GLYOXAL SULFATE ($SO_4CH-CHSO_4$)

is a white crystalline powder soluble in the lower alcohols and ketones. It is also markedly soluble in water at somewhat elevated temperatures (about 50°C) although slow decomposition takes place under these conditions. This material is of interest as a possible source of glyoxal, the simplest dialdehyde, which may be useful in reactions involving insolubilization and cross-linking.

SULFUR PENTOXYDICHLORIDE ($Cl-SO_2-O-SO_2-Cl$)

is a straw-colored liquid boiling at 150°C. It is only slowly soluble in cold water but reacts violently with water on warming. It is miscible with a variety of organic liquids and readily reacts with the ethylene linkages, hydroxyl groups and amine groups. Of interest is its possible use in the solubilization of petroleum, vegetable and fish oils.

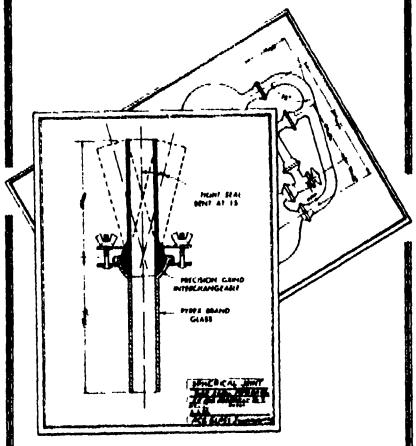
Although only limited quantities of these new chemicals are available at this time, special consideration will be given to the commercial production of any of these products which may have immediate use in war production.

For samples and available technical information pertinent to your interest, write:
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Newsmakers

CONTINUED FROM PAGE 1192

Warfare Service Company which operates a testing ground for chemical agents. He was formerly with the Research and Development Division, Edgewood Arsenal, Md.

Glen William Kilmer, B.S., M.S., Pennsylvania State College, and Ph.D. Harvard, and then post-doctorate fellow in biochemistry in Cornell University Medical School, has been appointed Instructor in Organic Chemistry in the University of Pittsburgh.

Robert C. Kuder, who obtained the Ph.D. degree at Northwestern University in June, is employed as an organic chemist on the research staff of the Whiting refinery of the Standard Oil Co. (Ind.).



Milton Kutz

Milton Kutz, who started work as an office boy 45 years ago and is now assistant to the general manager of the Electrochemicals Department, E. I. du Pont de Nemours & Co., Inc., was given a testimonial dinner by his associates on August 3, at the Hotel du Pont, Wilmington, Del.

Donald MacGillavry, Jr., University of Amsterdam, Holland, and Columbia University, who has also been Research Fellow at the University of Cambridge, England, has been appointed instructor in organic and analytical chemistry in the University of Pittsburgh.

John D. McCluer has left his position as research chemist with the Vanadium Corp. of America, Bridgeville, Penna., and has been associated for the past year with the Southern Asbestos Co., Charlotte, N. C., as research engineer.

J. P. Margeson, Jr., has been appointed vice president in charge of the Potash Division of the International Minerals & Chemical Corp., Chicago, Ill., and will continue in charge of the Magnesium Division. **John T. Burrows** has resigned as vice president of the company and will devote full time to the executive direction of the Phosphate Recovery Corp. **A. Norman Into** has been made sales manager of the Potash Division.

J. K. Missimer, formerly with the Standard Paper Manufacturing Co., Richmond, Va., has joined the staff of the Paper Section, National Bureau of Standards, as papermaker. With **M. J. O'Leary** who has served for a number of years as papermaker, he will operate the semicommercial papermaking equipment of the bureau.

S. A. Montgomery has been appointed manager of the Whiting, Ind., refinery of the Standard Oil Co. of Indiana, succeeding **E. J. Shaeffer** who has retired because of ill health. **W. J. McGill,** general superintendent of the Wood River refinery, will succeed Mr. Montgomery as manager, and will be succeeded by **T. C. Stockdale.**

Joseph E. Moody has been appointed manager of industrial relations for the York Ice Machinery Corp., York, Penna.

Irving E. Muskat resigned from the Pittsburgh Plate Glass Co. on May 15, and has accepted a position for half time as director of research with the Vulcan Detinning Co., Sewaren, N. J., where a new laboratory is under construction. Dr. Muskat is also working on the establishment of an independent company for research and development in synthetic resins.

Lieutenant Leroy C. Nelson has been called to active duty with the Engineer Corps and can be reached at A. P. O. No. 948, % Postmaster, Seattle, Wash. He was formerly employed as a technical service engineer with the Columbia Chemical Division of Pittsburgh Plate Glass Co., Barberton, Ohio.

Jack M. Noy has left the Foote Mineral Co., Philadelphia, to accept a position as chemical engineer in the Production Department of Climax Molybdenum Co., Langeloth, Penna.

Stiles M. Roberts has joined the staff of General Aniline and Film Corp., Process Development Department, New York, N. Y. He was formerly research chemist for the Texas Co., Beacon, N. Y.

Ernest Scheller has been appointed assistant to the president and general

manager of the Foil Division of Reynolds Metal Co., Louisville, Ky. Mr. Scheller, associated with the company since 1925, was formerly research director.

Chester W. Smith has joined the staff of the Detroit Rex Products Co., 13,005 Hillview Ave., Detroit, Mich., as research chemist in the Alkali Division. He was formerly affiliated with the J. C. Miller Co. as chief chemist.

Grant W. Smith has resigned his position as assistant professor of chemistry at the University of Kansas City, where he taught for the past seven years, and has joined the research staff of the B. F. Goodrich Co., Akron, Ohio. He is a research chemist in the Koroseal Division, working in polymerization research.

C. M. Suter has been made professor of chemistry at Northwestern University and has been appointed chairman of the department, succeeding **Murray A. Hines**, who becomes professor emeritus.



F. C. Todd

F. C. Todd, formerly a member of the faculty of the Pennsylvania State College, has joined the technical staff of the Battelle Memorial Institute, Columbus, Ohio, and has been assigned to research in industrial physics.

Richard K. Toner has joined the faculty of Princeton University as assistant professor of chemical engineering.

Edward F. Wagner, formerly associated with the Standard Oil Co. of Ohio, has joined the staff of the Illinois Institute of Technology, Chicago, Ill.

Victor E. Williams, assistant general manager of sales of the Organic Chemicals Division of the Monsanto Chemical Co., has been promoted to the position of director of sales of the division. **Frederick C. Renner**, assistant general manager of sales, has been made general manager of sales of the Organic Chemicals Division, with offices in St. Louis, Mo.

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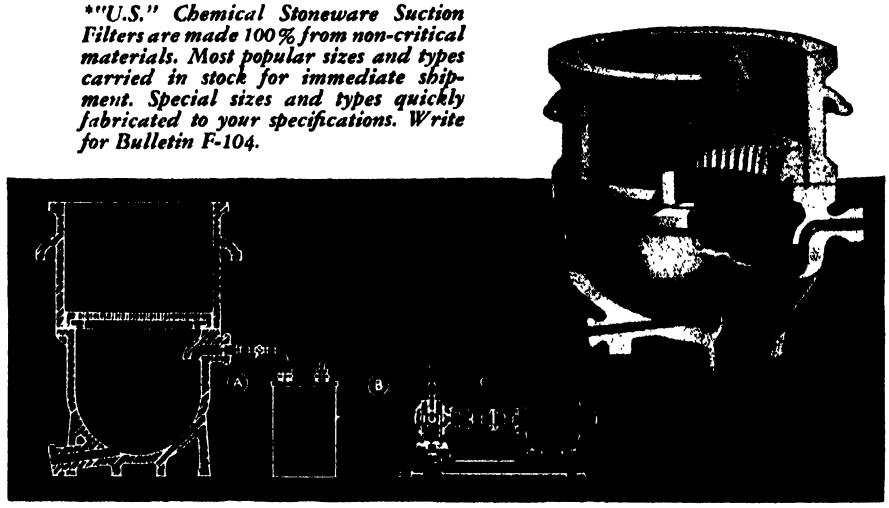
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NECROLOGY

Francis J. Arend

FRANCIS J. AREND, founder and president of the De Laval Steam Turbine Co., Trenton, N. J., died August 24. He was also president of the De Laval Separator Co.

Stuart L. Crawford

STUART L. CRAWFORD, consulting chemist and president of the National Testing Laboratories, died in Rochester, N. Y., on September 2, at the age of 60.

Mr. Crawford founded the National Testing Laboratories 20 years ago, after being associated as industrial and consulting chemist with various industries. He was president of the New York State Vinegar Association, and since 1909 had been a member of the AMERICAN CHEMICAL SOCIETY.

James M. Doran

JAMES M. DORAN, former prohibition commissioner, died September 8 in Washington, D. C.

Mr. Doran was born in Grand Forks, N. D., August 17, 1885, and received the B.S. degree from the University of Minnesota in 1907. He was a graduate student at George Washington University in 1912–13. In 1907 he became chemist with the Internal Revenue Bureau, United States Treasury, was made head of the chemical and technical division in 1920, and from 1927 to 1930 was commissioner of prohibition. He became commissioner of industrial alcohol in 1930, and later took up the duties of secretary of the Distilled Spirits Institute.

He had been a member of the AMERICAN CHEMICAL SOCIETY since 1906.

Martin L. Griffin

MARTIN L. GRIFFIN, retired consulting chemist and pioneer in paper chemistry, died August 28 in his 84th year.

Mr. Griffin was graduated from Amherst College in 1883 with the B.A. degree and received the M.A. three years later. He then opened a laboratory in Holyoke, Mass., for the paper industry, being one of the first chemists employed by the industry. Later he entered more closely into the employ of the larger manufacturers, including the West Virginia Pulp and Paper Co., Oxford Paper Co., and Champion Fibre Co. In 1919 he went to the Mt. Hope Finishing Co., North Dighton, as chief chemist and remained there until he retired from active work in 1928.

He had been a member of many technical societies, including the AMERICAN CHEMICAL SOCIETY, Society of Chemical Industry, Technical Association of the Pulp and Paper Industry, American Society of Textile Chemists and Colorists, and the American Institute of Mining and Metallurgical Engineers. He was a frequent contributor of scientific papers to the technical literature.

Robert E. Oltman

ROBERT E. OLTMAN, chief chemist of the Minnesota Valley Canning Co., died suddenly on July 24, 1942, at the age of 33 years. His passing removed from the canning industry one of its most brilliant young scientists. Dr. Oltman's researches in the fields of plant physiology and chemistry as pertaining to the canning industry have yielded noteworthy results.

Dr. Oltman was born in Cleveland, Ohio, December 5, 1908, and was educated in the public schools of Cleveland. In 1927 he entered the service of the U. S. Department of Agriculture in its campaign for the eradication of the corn borer, and during the next four summers became successively inspector, field scout foreman, assistant field supervisor, and field supervisor, with large crews of men under his supervision.

After a year at Western Reserve University, he entered Oberlin College from which he was graduated in 1932. There he showed an unusual capacity for research and invention. After graduation he entered the University of Minnesota as a graduate student and assistant (later instructor) in plant physiology, receiving his Ph.D. degree in 1936.

He then joined the Research Department of the Minnesota Canning Co. for a year, after which he was for two years director of research for Fine Foods of Canada, Ltd, Toronto. Returning to the Minnesota Canning Co. he was made chief chemist, although the research which he carried on and directed ranged widely over the methods of growing, harvesting, processing, packing, and shipping of the company's products.

Dr. Oltman had been a member of the AMERICAN CHEMICAL SOCIETY, of the American Association for the Advancement of Science, and a fellow of the Canadian Institute of Chemistry.

Jacob F. Schoellkopf

JACOB F. SCHOELLKOPF, SR., pioneer in the aniline color industry in the United States, died September 9 at the age of 84.

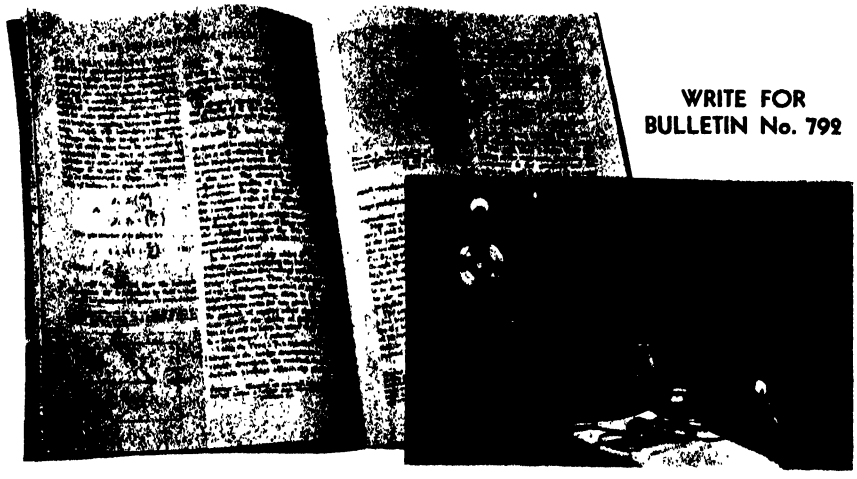
Mr. Schoellkopf was born in Buffalo, February 27, 1858, and studied chemistry in Stuttgart and Munich. In 1880 he

"IMPEDANCE BRIDGES ASSEMBLED FROM LABORATORY PARTS"

In certain branches of chemical research — studying the process of ionization in electrolytes, for example — a-c impedance measurements are very useful. Bridges for this type of measurement can easily be assembled from standard laboratory parts — resistors, inductors, capacitors.

How to set up and use impedance bridges was discussed in a series of articles entitled "Impedance Bridges Assembled from Laboratory Parts," which appeared in the General Radio *Experimenter*. These articles have been reprinted in the 24-page booklet illustrated below. Much information not usually found in text books is included, as, for instance, how to choose the best bridge circuit for a particular type of measurement, and how to determine the magnitude of residual impedance errors.

A copy is yours for the asking. This book will also be found helpful in familiarizing chemistry students with the construction and use of impedance bridges. Copies for classroom instruction and use are available in reasonable quantities.



WRITE FOR BULLETIN No. 792

Series-resistance capacitance bridge assembled on a laboratory bench.

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entered the aniline business in Buffalo, pioneering in making dyes in this country. He became president of the firm when it was incorporated in 1900 as the Schoellkopf Aniline and Chemical Works. At the time of the first World War the company was expanded and merged with other companies to form the National Aniline and Chemical Co., Inc., and Mr. Schoellkopf served as president until 1918.

In 1931 he founded the Jacob F. Schoellkopf Gold Medal, presented annually by the Western New York Section of the AMERICAN CHEMICAL SOCIETY to honor major advances in chemistry.

John Arthur Wilson

JOHN ARTHUR WILSON, consulting chemist and authority on leather chemistry died September 10 in New York after an illness of six months. He was 52 years old.

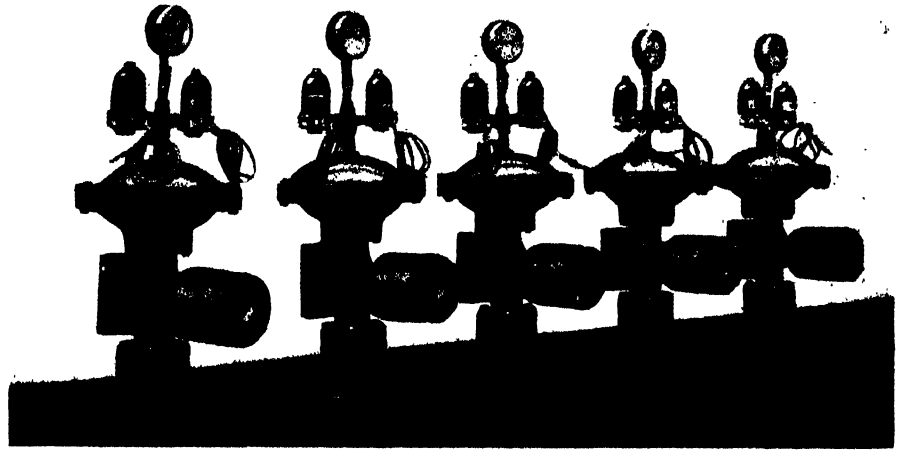
Dr. Wilson was born in Chicago, and studied at New York University and the University of Leeds, England. He received the honorary degree of doctor of science from Lehigh University in 1929. He began his scientific career as chemist in the Edison Chemical Works, Silver Lake, N. J., and was chief chemist of the A. F. Gallun & Sons Corp., Milwaukee, Wis., from 1912 to 1929. In 1915 and 1916 he served as honorary research assistant at the Procter International Research Laboratory in Leeds, England. He was president of the Security Management Co., Milwaukee, from 1926 to 1929, the International Security Management Co., Chicago, in 1929 and 1930, and the Wisconsin Investment Co. from 1930 to 1938. After serving as technical director of Bona Allen, Inc., Buford, Ga., from 1938 to 1940, he opened offices as a consulting chemist in New York.

In 1931 Dr. Wilson was the winner of the William H. Nichols Medal of the New York Section of the AMERICAN CHEMICAL SOCIETY for "outstanding achievement in colloid chemistry, applied particularly to leather and sanitation". He had been a member of the AMERICAN CHEMICAL SOCIETY since 1918 and had served as Divisional Chairman, Local Section Chairman, and Local Section Councilor of the SOCIETY. He was also a member of a considerable number of other scientific societies.

Dr. Wilson was the author of numerous scientific publications, including an AMERICAN CHEMICAL SOCIETY monograph on the chemistry of leather. With Procter in 1916 he developed a quantitative theory of molecular mechanism of protein-swelling in electrolytes, followed by similar theories on absorption, electrically charged surfaces, and interfaces. He had done much work on sanitation and water treatment.

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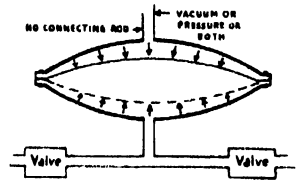


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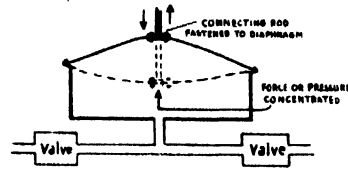
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2810

Melamine Resins

Two new applications of melamine resins for widely different purposes, announced by the American Cyanamid Co., New York, N. Y., are breaking production bottlenecks. Buttons molded of melamine resin plastic have withstood the gruelling tests prescribed by the Quartermaster Corps for use on cotton garments, heretofore met only by buttons machined from pearl and from imported vegetable ivory. The second new application of melamine resins opens the way to greater production of paper having high strength when wet and at the same time substantially increased resistance to folding.

Melamine resin plastic is the only synthetic material unaffected by the stringent tests of laundering, ironing, fading, decontamination, and impregnation imposed by the Army on buttons for cotton underwear and similar items of issued apparel subjected to the most severe conditions in service. Because buttons can be molded of synthetic resins without machining, their cost is materially reduced.

Melamine resin is the basis of a new treatment for paper pulp that imparts extraordinary wet strength to the sheet made from it and at the same time increases resistance to folding. Previous methods of raising the wet strength of paper have required special equipment to treat the sheet after it is formed and the treated sheet has been characterized by lowered resistance to folding. The new treatment is applied to the paper pulp before the sheet is formed, requiring no additional special equipment beyond that usual in every paper mill. The fold resistance of the sheet made of pulp treated by the new method is approximately doubled and no diminution in wet strength or fold resistance occurs on prolonged storage even under unfavorable conditions.

Tinless Cans

Tinless tin cans, grown on the farm and cattle range, have been announced by Raymond S. Macmillan, president of the Macmillan Petroleum Corporation, Los Angeles, Calif., as he made public the development through chemical research of the first all-fiber plastic-lined container which is impervious to oil. The tinless container is produced by direct processing of such surplus crops as corn, other grains, flaxseed, tallow, animal tissues, bone and clay; and the basic fiber is made from straw and waste paper.

The all-fiber containers represent a 10 per cent reduction in weight over cans previously used, thus permitting more oil to be shipped per freight carload. They also eliminate the need for tank cars and for the return shipment of empty drums in the distribution of lubricating oil.

Sales of Industrial Chemicals

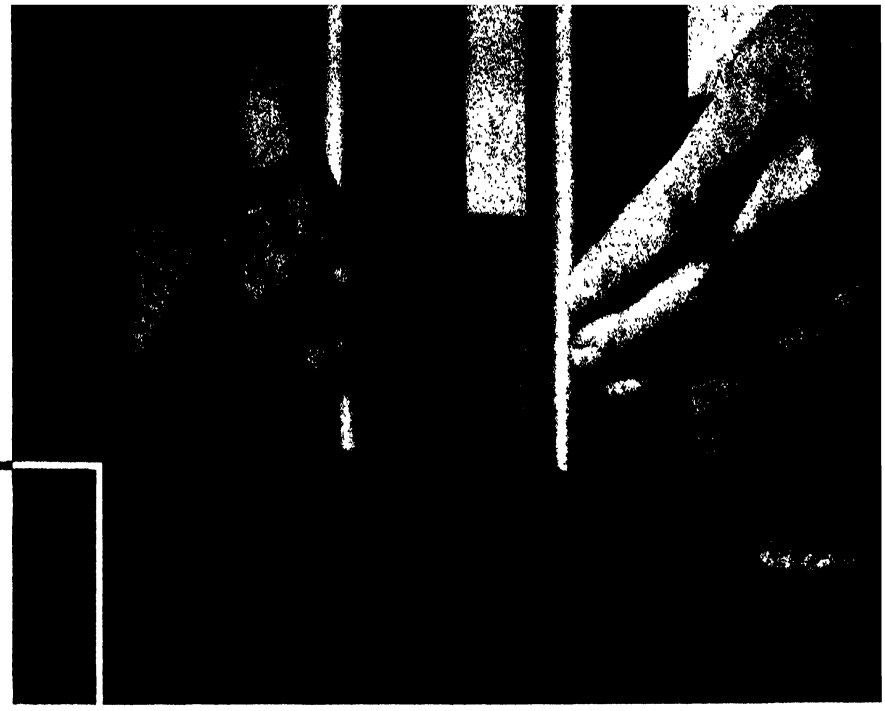
Sales of industrial chemicals as reported by 19 manufacturers to the Bureau of Census for the month of July amounted to $997,000, which is about 1 per cent less than sales made in June, and approximately the same volume as sales made in July a year earlier. Total sales for the first seven months of this year amounted to $13,633,000, a 20 per cent increase over sales for a comparable period in 1941.

Collection percentages, obtained by dividing the collections by accounts receivable, are reported by 19 establishments as 83 per cent in July, compared with 77 per cent for June, and 76 per cent for July 1941.

A report by the Department of Commerce on sales of wholesalers in 35 trades show a 9 per cent advance in July 1942 over the same month a year ago. The gain reported in June of this year as compared with June 1941 was 11 per cent. An increase of 5 per cent occurred between June and July 1942, as against the increase of 7 per cent recorded between these months in 1941. Sales for the first seven months of 1942 were 21 per cent above the corresponding period of 1941.

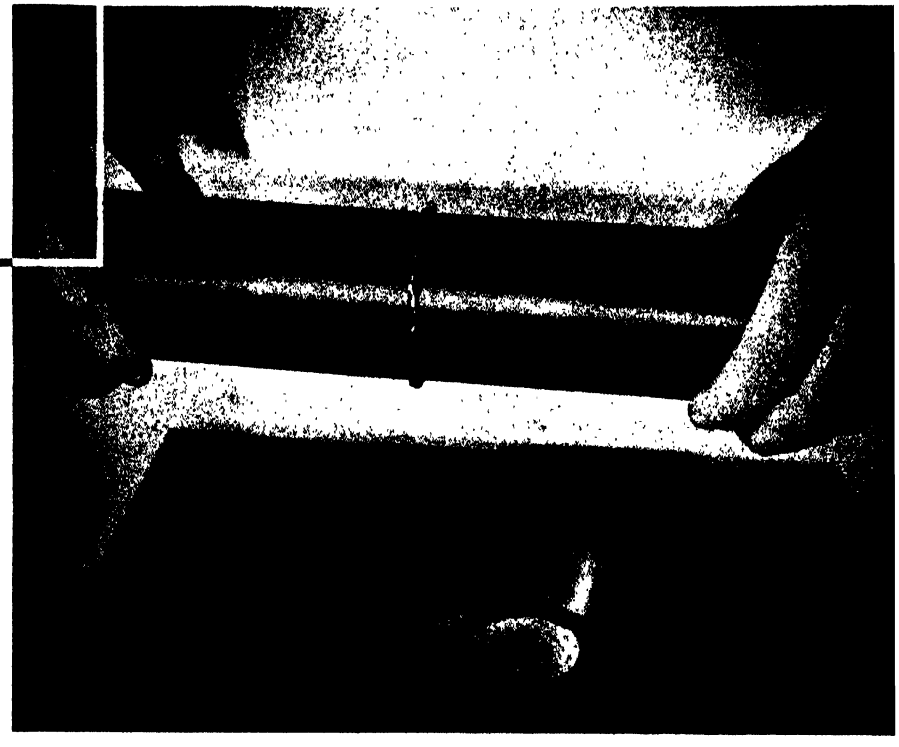


Staff of the Central Technical Laboratory, Armstrong Cork Co., Lancaster, Penna.



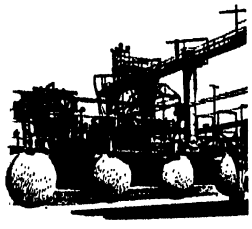
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Industrial Furnaces. Volume II. *W. Trinks.* 2nd ed. xiii + 351 pages. John Wiley and Sons, Inc., 440 Fourth Ave., New York, N. Y.; Chapman and Hall, Ltd., London, 1942. Price, $5.00.

PROFESSOR TRINKS is an outstanding authority on the design and operation of furnaces, especially the many different types used in the metallurgical industry. His years of experience and broad knowledge of American and European practice were reflected in the first edition, published in 1925 and subsequently translated into French, German, and Russian. Although Volume II is a continuation of Volume I (now in its third edition), it is complete in itself. As stated in the preface of the first edition, Volume I contains a great deal of theory and appeals mainly to the designer of furnaces, whereas Volume II is devoted primarily to practice and should appeal to coördinators of existing designs. In that class are men who must decide on the type of fuel or heat energy to be used in a specific case, those who select furnace equipment, sales engineers of furnace equipment, men who install furnaces, and furnace operators. The designer of furnaces also will find much that is helpful in the present volume.

In general, the plan and scope of the second edition are the same as in the first edition. However, large sections of the book have been rewritten to include new types of furnaces and new fuels, and to modernize furnace practice. Approximately half of the illustrations are new.

A great deal of equipment is described, but no manufacturers' names are mentioned, and fundamental types are selected for description as far as possible. The subject matter is treated in six chapters: Fuels and Sources of Heat Energy, Combustion Devices and Heating Elements, Control of Furnace Temperature, Control of Furnace Atmosphere, Labor Saving Appliances, and Critical Comparison of Fuels and Furnace Types.

Probably no other book contains so much practical information essential to a comprehensive review of the different types of furnaces, burners, and heat-control equipment available for industrial heating with solid, liquid, or gaseous fuels, or by electricity. The wealth of descriptive matter is presented clearly and is illustrated with numerous simple diagrams. Critical comments are made throughout the book on the suitability, advantages, and disadvantages for the purpose in hand of the fuels or types of equipment under discussion. Although much of the subject matter relates to metallurgical furnaces, especially those used in the steel, metal fabrication, and ceramic industries, this volume will be very useful to any technologist confronted with the problem of selecting or designing a furnace for any special purpose

The brief chapter on fuels and sources of energy should have been revised more extensively to bring it up to date Table I, on properties of fuels, gives analyses of different types of fuel which in some cases are not the most typical of American practice. No mention is made of the Standard Specifications for the Classification of North American Coals, adopted in 1937 by the American Standards Association and the American Society for Testing Materials. On page 27 the author states that "In general, the high-volatile coking and gas coals are caking coals, while the low-volatile or semi-bituminous coals are noncaking". The first part of this statement is correct, but the latter part is wrong; low-volatile coals, such as the Pocahontas and New River coals of West Virginia, are strongly swelling and caking.

The book is well printed in easily read type and the illustrations are clear cut.

A. C. FIELDNER

Industrial Camouflage Manual. *Konrad F. Wittmann.* 128 pages. Reinhold Publishing Corp., 330 West 42nd St., New York, N. Y., 1942. Price, $4.00.

THIS manual describes an industrial art which had its inception in the previous world conflict, and which has developed into a major technical problem due to the increased importance of aerial warfare. We whose activities center on the earth's surface are incapable of visualizing our familiar cities and industrial districts as does the bombardier whose eyes see chimneys, fuel tanks, and plants as masses or distinct shapes emphasized by the shadows they cast on the earth below him. Wittmann, in collaboration with the faculty of Pratt Institute, has done an excellent piece of work in a field new to most of us and yet essential to the war effort and to future industrial planning.

This book should be of major interest to managers of industrial plants, to city planners, and to architects. As befits a new industrial art, it treats the subject of camouflage from a viewpoint sufficiently elementary to interest even the average layman. We are given the perspective of the bombardier seeking his natural tar-

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gets—plants, transportation lines, military objectives—all the complex make-up of our industrial civilization. The fallacies of the former World War conception of camouflage, described as "dazzle painting", are brought out; this method served its purpose when most military activity took place on land and sea surfaces. However, with modern aerial warfare, the necessity of achieving the effect of three dimensions and a complete change of contour for the protection of vital objectives is stressed.

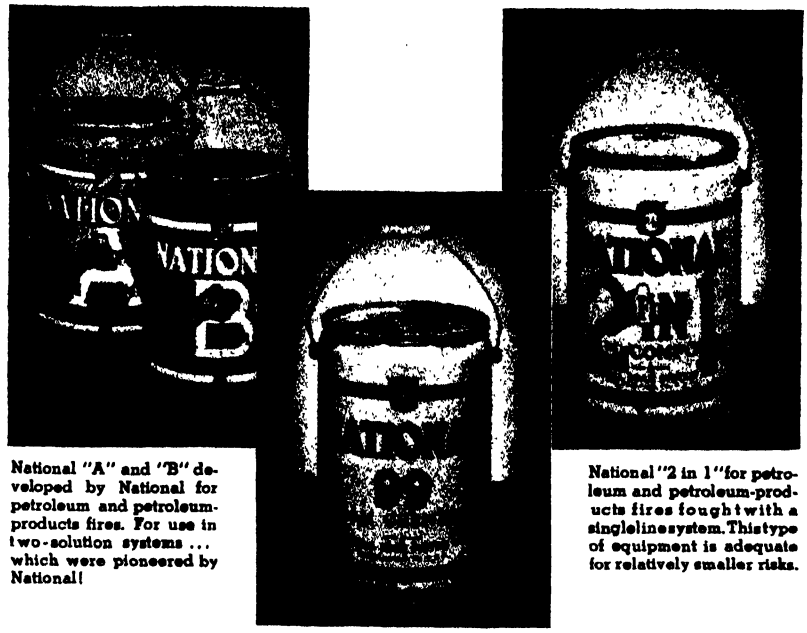
The different problems involved are well illustrated by aerial photographs and sketches; the methods of accomplishing the necessary deception are carefully described and depicted in camouflaged models. In addition to practical instructions for the successful diversion of air attack from existing plants, the basis for a new conception of industrial planning is developed. In future construction, we may have to discard our laboriously evolved ideas of efficiency—many departments centered under one roof. Such a complete change in planning would see the development of the art of industrial camouflage which entails the breaking down of our large industrial units into small ones, the decentralization of cities with their accompanying dislocations in transportation, housing, and retail business. Notwithstanding the fact that such a theory involves major changes, the whole subject is logically presented; the adjustments suggested for the present emergency are sound, and cost figures of materials, labor, and overhead are given. The diagrams are simple, and the ingenuity employed in the use of low-cost materials commendable. Although Europe has already accomplished a great deal in this field as illustrated by several photographs of Hamburg, we are certain to improve upon their record.

The manual is attractively put together in a loose-leaf binding on heavy paper, and the print is satisfactory. A major asset of the book lies in its form—a series of photographs or sketches explained in a direct manner with a minimum of words, each page covering one division of the subject. In addition to the industrialists involved in the problem, any person interested in the new questions raised by the war will read this publication with profit.

J. J. Healy, Jr.

Molecular Films, the Cyclotron, and the New Biology. *Hugh Stott Taylor, Ernest O. Lawrence,* and *Irving Langmuir.* 111 pages. Rutgers University Press, New Brunswick, N. J., 1942. Price, $1.25.

This is No. 4 of a series of books containing addresses delivered at the 175th anniversary of the founding of Rutgers University. It contains the following:



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Fundamental Science from Phlogiston to the Cyclotron. H. S. Taylor.
Molecular Films in Chemistry and Biology. Irving Langmuir.
Nuclear Physics and Biology. E. O. Lawrence.

In the short space of 23 pages Taylor gives a bird's-eye view of science over a couple of centuries, the study centering "largely around advances in chemistry, physics and physiology". The names quoted may well serve as the basis of a scientific *Information Please:* Newton, Black, Scheele, Cavendish, Priestly, Lavoisier, etc., down through Svedberg, Tselius, Stanley, Schroedinger, Heisenberg, Dirac, de Broglie, etc., in this polyglot, polyscientific, international survey which begins and ends with a truly sociologic and philosophic point of view.

Langmuir's paper epitomizes some of his valuable work on surface films, including the behavior of proteins and enzymes when expanded in films. A peculiar "edge effect" observed with supposedly very pure trypsin, is attributed to an impurity: In spreading a protein you change the shape of the molecule from that of the globular protein, which is approximately 25 or 30 Å. in diameter, to something which is perhaps a quarter of that or less, 8 or 10 Å. in thickness, which means that the original shape has been broken down. . . .The cause of spreading must be the presence of hydrophobic groups. The proteins themselves, like insulin and egg albumin, are highly soluble in water. The films are completely insoluble in water. You cannot get them back into solution by compressing them or, in fact as far as I know, in any way unless you degrade them still further. That difference is best accounted for by saying that in the proteins themselves the hydrophobic groups which are present in the side chains are buried in the interior of the molecule, and that in the spreading process those are brought to the surface, and it is the presence of those hydrophobic groups that cause the spreading phenomena. I think, in general, the best picture of this structure is Dr. Wrinch's theory of the cyclol structure. (Linus Pauling, among others, does not accept Dr. Wrinch's theory.)

Lawrence discusses work emerging from the discovery of the cyclotron, followed by commentaries by Leslie A. Chambers and J. R. Dunning, and by 16 pages of illustrations showing the cyclotron and what is being done with it. The giant instrument, now under construction at Berkeley, includes 3,700 tons of steel and 300 tons of copper. It will throw a neutron beam of 100 million electron volts about 140 feet, whereas the 225-ton medical cyclotron at the Crocker Radiation Laboratory throws a 16 million volt beam 4.5 feet.

Taylor says: "Of necessity, in the ideal human society to which we must look forward, the scientific aspects of life must be assigned their due proportions—they must not be 'cribbed, cabined, and confined', but neither must they be permitted to crowd out from our lives the humanistic, the social, and the spiritual values that are equally necessary and indispensable".

In the presence of this book the *Advocatus diaboli* is stricken dumb. In a perfunctory way he observes that there is a slight typographical error (carcinogenec) and also that the ultraviolet microscope is meant instead of the ultramicroscope, for this latter increases visibility rather than resolution.

The book should be read by all chemists, physicists, biologists, and physicians.

JEROME ALEXANDER



Occupation of the Industrial Chemist

A LEAFLET prepared by Occupational Index, Inc., New York University, Washington Square East, New York, N. Y., discusses the occupation of the industrial chemist, what is done in this occupation, women in the field, abilities essential to success, preparation necessary, entrance and advancement, earnings, number and distribution of workers, advantages and disadvantages, and future trend of employment, with recommended readings. Single copies may be obtained at 25 cents each.

Common Hazardous Chemicals

AN UP-TO-THE-MINUTE table of Common Hazardous Chemicals, sixth edition, has been released by the N. F. P. A. Committee on Hazardous Chemicals and Explosives in cooperation with the AMERICAN CHEMICAL SOCIETY.

The column on fire fighting phases gives the best extinguishing methods for fire in the chemicals listed. The latest information on shipping containers and storage safeguards, fire and life hazards is given for individual flammable chemicals.

This latest edition includes all the amendments adopted since 1931; also additional chemicals and information on fire fighting phases and a new paragraph on oxygen breathing equipment or helmets. Other paragraphs cover flammable limits and explosive range, ignition temperature, propagation of flame, and flash point. Price is 20 cents, post paid by National Fire Protection Association, International, 60 Batterymarch St., Boston, Mass.

National Emergency Steels

NATIONAL Emergency Steels, promulgated by the War Production Board in order to use American alloying metals to best advantage, and to conserve the scarcer imported metals, are described in a 36-page pamphlet prepared by the American Society for Metals, 7301 Euclid Ave., Cleveland, Ohio, and available for 25 cents per copy. Much of the material has already been published in *Metal Progress*.

These NE8000 steels are already in production. The pamphlet presents descriptions, tables of data, and photomicrographs to enable users of alloy steel to apply them.

Public Water Supplies in Georgia

GEOLOGICAL Water-Supply Paper 912, "Industrial Quality of Public Water Supplies in Georgia, 1940", has just been made available by the Geological Survey, U. S. Department of the Interior, in cooperation with the Division of Mines, Mining, and Geology of the Georgia Department of Natural Resources. It is an 83-page publication, available from the Superintendent of Documents, Washington, D. C., for 15 cents per copy.

The paper contains 157 analyses of the mineral content of the waters of 66 public water supplies which serve places with a total population of 1,098,819 or 35.2 per cent of the population of the state. For places where the water received chemical treatment, other than chlorination, analyses are given for both the raw and finished water. The systems are described in detail as to sources, treatment, rated capacity of treatment plants, and storage.

Depreciation of Group Property

IN THE light of new income tax legislation and the necessity for cooperation between business and government, American industry in the future must concern itself more and more with knowing its production costs, particularly depreciation, according to Robley Winfrey, valuation engineer of the Iowa Engineering Experiment Station. Mr. Winfrey has completed an intensive study of methods of depreciation of group properties, published in Bulletin 155, "Depreciation of Group Properties".

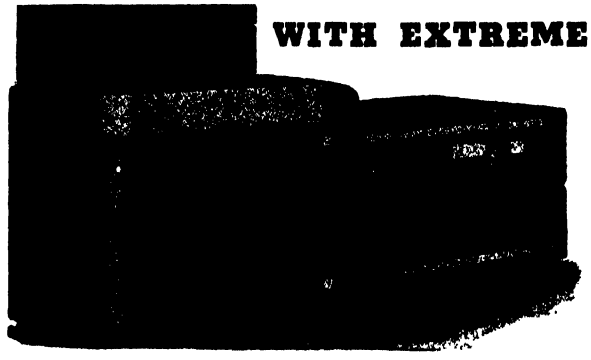
Copies of Bulletin 155 may be obtained without charge from the Iowa Engineering Experiment Station, Ames, Iowa. Bulletin 156, which contains depreciation tables for 18 types of life curves and at 0, 2, 4, 6, and 8 per cent interest, is available at $3.00.

Proceedings of Second Annual Water Conference

THE papers presented before the Second Annual Water Conference of the Engineers' Society of Western Pennsylvania have been printed under one cover, and are available at $2.15 per copy from the society, William Penn Hotel, Pittsburgh, Penna.

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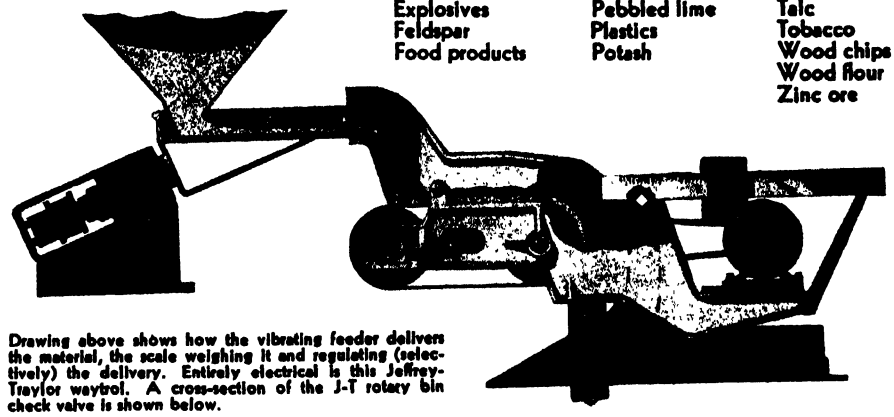


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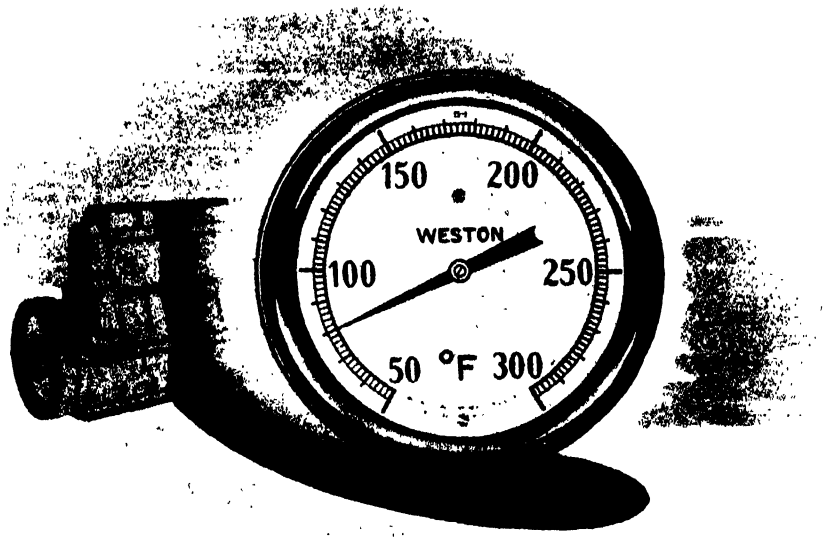
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CONTINUED ON PAGE 1206

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ELECTROPHORESIS OF PROTEINS
and the Chemistry of Cell Surfaces

by

Harold A. Abramson
Assistant Professor of Physiology, College of Physicians and Surgeons, Columbia University; Associate in Medicine, The Mount Sinai Hospital, New York City

Lawrence S. Moyer
Assistant Professor of Botany, University of Minnesota

and

Manuel H. Gorin
Chemical Research Supervisor, Field Research Department, Magnolia Petroleum Company

The surface chemistry of living cells — in particular the investigation of proteins by electrophoresis — has made such rapid advances in recent years that it has attracted the attention of workers in nearly all fields of biological science. This volume presents all phases of the subject in substantially complete form; both theoretical and practical aspects are fully discussed. This concise and readable description of the behavior of proteins in solution, adsorbed at surfaces, and oriented at the limits of crystal lattices will result in a clearer understanding of how proteins act in living cells.

The principles described apply to many diverse fields: to the treatment of allergies, which is the particular interest of the authors; to the study of blood and skin chemistry, which is of concern to dermatologists, physicians and cosmeticians; as well as to such industrially practical substances as wool, rubber latex, and other complex molecules in which proteins are involved. A glance at the table of contents will show the variety of subjects touched upon in this able study of protein behavior.

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Silver for Lining Containers

THE American Silver Producers' Research Project for investigating and developing industrial uses of silver, under the direction of Handy & Harman, New York, N. Y., has investigated the use of silver linings for containers of chemicals. Silver-lined containers are being seriously considered for foodstuffs, high-grade beverages, beer, cola sirup concentrates, condensed milk, evaporated milk, salves and other antiseptic materials, ether, aluminum chloride, and other chemicals. Silver is resistant to many products that attack tin, and has already found wide use in chemical manufacturing plants.

The work of the project has indicated that pore-free deposits of silver 0.001 inch on deep drawing steel are readily obtainable; on suitable base metal, such as electroplated copper, pore-free silver deposits as thin as 0.0001 inch can be produced; deep drawing steel electroplated with ductile deposits of copper, nickel, or silver, or any combination of these metals, can be subjected to severe plastic deformation, cold rolling, press-forming, and heating operations, without perforating initially pore-free deposits that have a total thickness of at least 0.002 inch. Silver-plated steel and objects fabricated from it may be joined or assembled by the use of low-temperature silver brazing allows and induction heating, without recourse to a protective atmosphere. It is practicable to manufacture relatively low-cost silver-lined containers, such as barrels, drums, and cans.

Work on silver-lined containers is now ready to be carried forward by industry in the plant, on pilot and full-scale commercial operation.

Copper Recovery

A NEW method for recovering copper by deplating it from iron and steel scrap has been announced by the Electroplating Division of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. Virtually 100 per cent of the copper is recovered in a form satisfactory for direct use in electroplating important metal parts for military equipment, and large quantities of strip steel and iron may be made available for reuse.

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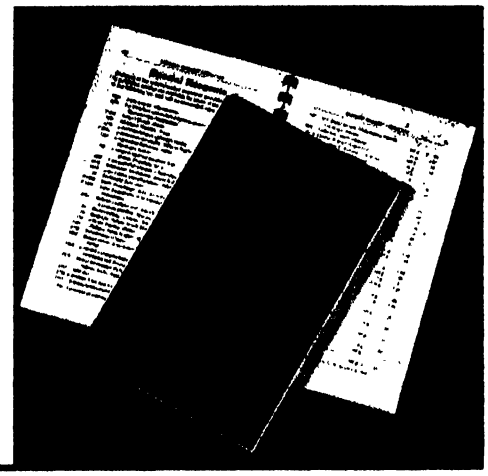
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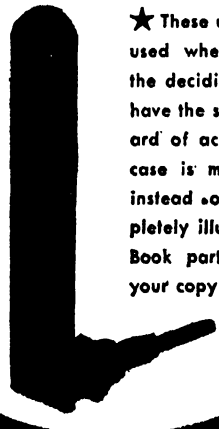
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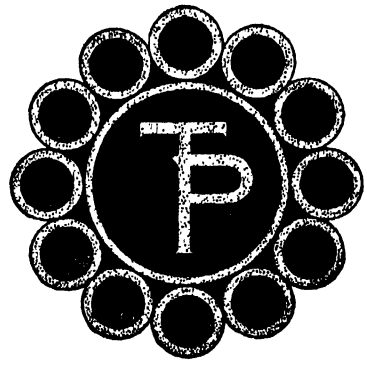
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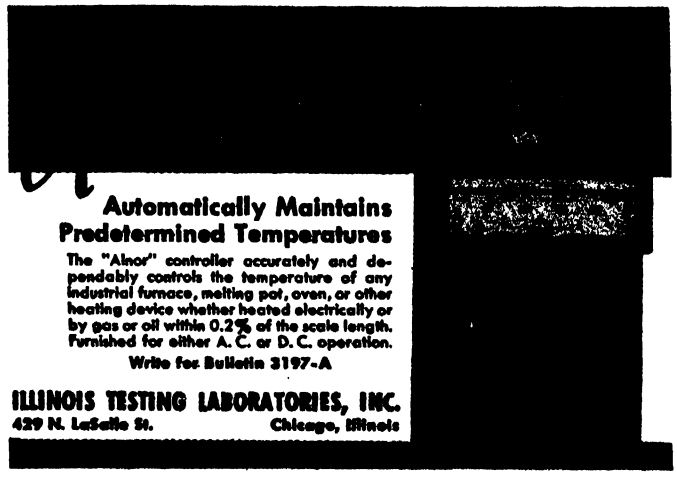


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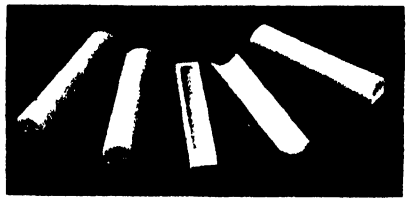
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Motion Pictures on Aluminum

THREE new films for training aluminum workers have been prepared by the Aluminum Co. of America, 801 Gulf Bldg., Pittsburgh, Penna., and are available in black and white, sound, in 16 mm. and 35 mm. These are how-to-do-it motion pictures, each requiring approximately a half hour to run. Prints are loaned free, or may be purchased at cost. "How to Weld Aluminum" describes and demonstrates the essentials of torch and arc welding, brazing, and resistance welding. "How to Rivet Aluminum" portrays the making and testing of rivets, preparation of the work, actual rivet-driving techniques, and inspection. "How to Machine Aluminum" discusses alloys usually used, the kind and shapes of tools, cutting compounds, speeds, and feeds.

Clearinghouse for Consultants

A CLEARINGHOUSE for consultants has been established by the Association of Consulting Chemists and Chemical Engineers, Inc., 50 East 41st St., New York, N. Y., as a free service to industry. Within the past year the association has received about three hundred requests covering many different fields, and has been successful in referring inquirers to specialists.



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Boats retain their original shape and will not fuse to tubes. Thick base prevents penetration of fused sample. Large inside area permits free flow of sample to form uniform thin layer. Boats are die formed and so have perfectly smooth surfaces, straight sides and excellent dimensional uniformity.

Boats with cover fit ¾" combustion tube. Large flat ends stabilize boat, so facilitating insertion or removal. Outside length, 77 mm; outside width, 12.5 mm; outside height, 9 mm; inside length, 72 mm; inside width, 8mm; inside depth, 5 mm.

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Business Statistics

WE ARE indebted to the Manufacturing Chemists' Association, 608 Woodward Bldg., Washington, D. C., for the following figures showing business conditions.

Monthly Statistical Report on Business Conditions

	Seasonally Adjusted			Without Adjustment		
	July 1942	June 1942	July 1941	July 1942	June 1942	July 1941
(Base 1935-39 = 100)						
Industrial production[a]	180[b]	176	160	181[b]	177	159
Chemical production	170[b]	171	146	164[b]	165	139
Steel production	221	215	196	221	215	196
Freight car loadings	142	141	138	142	139	138
(Base 1923-25 = 100)						
Construction contracts, residential	77[b]	76	115	77[b]	83	116
All other	315[b]	288	158	363[b]	346	182
Department store sales, value	117[b]	104	115	81[b]	100	79

	July 1942	June 1942	July 1941
Index of factory employment[c]:			
All manufacturing	141.6[b]	139.1	130.6
Chemicals	193.8[b]	195.8	175.9
Drugs	161.7[b]	158.2	129.5
Fertilizers	94.1[b]	102.0	90.5
Compressed gases	164 6[b]	161 6	141.3
Index of factory pay rolls[c]:			
All manufacturing	202.4[b]	197 7	152.7
Chemicals	311.9[b]	307.7	239.7
Drugs	211.0[b]	203.0	162.6
Fertilizers	119.1[b]	121.8	89.6
Compressed gases	234 4[b]	236 6	177 2
(Base 1926 = 100)			
Wholesale price indexes:			
All products (except farm products and foods)	95.7[b]	95.6[b]	89.7
Chemicals	96.5	96.5	87.3
Drugs and pharmaceuticals	129.1	129.1	100.0
Fertilizer materials	78 5	78 4	74.0
Purchasing power of the dollar:			
All products (except farm products and foods)	$1.046	$1.047	$1.115
Chemicals	1.036	1.036	1.145
Drugs and pharmaceuticals	0 775	0 775	1.000
Fertilizer materials	1 273	1 276	1 351

[a] Source of statistics in first six items: Federal Reserve Board.
[b] Preliminary figures.
[c] U. S. Department of Labor.

Sulfamate Weed Killer

ON PAGE 792 of INDUSTRIAL AND ENGINEERING CHEMISTRY (Vol. 34, 1942) appears an article by Cupery and Gordon, E. I. du Pont de Nemours & Co., Inc., regarding ammonium sulfamate as a weed killer. Search of the literature shows that this compound is rarely mentioned as such.

Lange's "Handbook of Chemistry", 1939 edition, describes sulfamic acid as "amino sulfite (acid)". Partington's "Inorganic Chemistry" describes it as "Hydroxylaminemonosulfonic acid". Hofmann's "Lehrbuch der anorganischen Chemie" describes it as "Amidosulfonsäure".

Henry P. Treffers has resigned as instructor in biochemistry at the College of Physicians and Surgeons, Columbia University, to accept an appointment as assistant professor of comparative pathology and biochemistry at the Harvard Schools of Medicine and Public Health.

Nutrition Values of Canned Foods

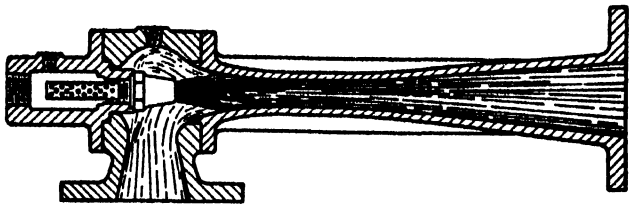
A RESEARCH program for the study o nutrition values of canned foods, developed by a committee representing the National Canners Association, Washington, D. C., has been inaugurated with the placement of financial grants with the Universities of Arizona and Wisconsin. Other grants will be made later. The program will be financed jointly by the National Canners Association and the Can Manufacturers Institute.

Who Makes It?

SOURCES for the following chemicals are wanted by The National Registry of Rare Chemicals, Armour Research Foundation, 35 West 33rd St., Chicago, Ill.

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Edited by A. A. Ashdown, Ed. F. Degering, J. E. Hawkins, and S. L. Redman

Send items to Ed. F. Degering, Department of Chemistry, Purdue University, Lafayette, Ind.

THE Western Connecticut Section of our SOCIETY was organized in the spring of 1936 and has been extremely successful since its beginning. With headquarters at Stamford, which is less than an hour by rail from the heart of New York, it includes in its roster not only many commuters who are among the most prominent members of our profession, but also many chemists whose business and social activities are carried on almost entirely in Fairfield County. The section, therefore, serves as a nucleus for the scientific and social contacts of chemists with fellow chemists and their families. From the beginning social values have been emphasized, and as a result the dinners preceding the meetings have become very popular with the wives of our various members, with a gain for all concerned in true friendliness and neighborliness.

We have found that, to keep the activities of the section on the highest possible plane, a division of responsibility among three active committees has produced most gratifying results. Since the prime object of the section is to promote active interest in the progress of chemical science, an able Program Committee has always been deemed of paramount importance by the elected officers of the section. In order, however, that the section's work shall continue to go forward under the most favorable circumstances we believe it to be absolutely essential to have active, vigorous Entertainment and Membership Committees as well. It has been found an excellent policy to have our Program Committee headed by an older member who has wide acquaintance among scientists, with younger men as assistants, who are being trained to handle the programs while they attend to such details as meeting the speaker and making him comfortable on his arrival in Stamford, and checking routine arrangements for the meeting.

The Entertainment Committee is under the direction of a member who likes good cheer and who is thoroughly familiar with the seating capacity, ventilation, and culinary standards of the various places in our locality where meetings may be held. The best results have been obtained from our Membership Committee when one member of that committee is appointed from each of the larger establishments in our section's territory, with a few "members-at-large".

The geographic location of the Western Connecticut Section and its own membership list have combined to make it relatively easy to secure excellent, well-known speakers for all of our meetings. We have always had the policy of assessing local dues against our members, and this has given us a reserve fund which has not only enabled us to pay traveling and hotel expenses for speakers invited from a distance but also to procure for the section's use a projector and screen.

Finally, the Board of Directors of this section has consistently adopted the policy of appointing younger members to committees. Their interest in the section's affairs is thus developed and encouraged so that they will be able to carry on in the future the work so auspiciously begun in 1936.—WILLIAM CABLER MOORE, *Western Connecticut Section.*

J. Mitchell Fain has been granted leave of absence for the duration from his duties as chemical engineer at Foster D. Snell, Inc., Brooklyn, N. Y., and has been called to active duty in the Chemical Warfare Service.

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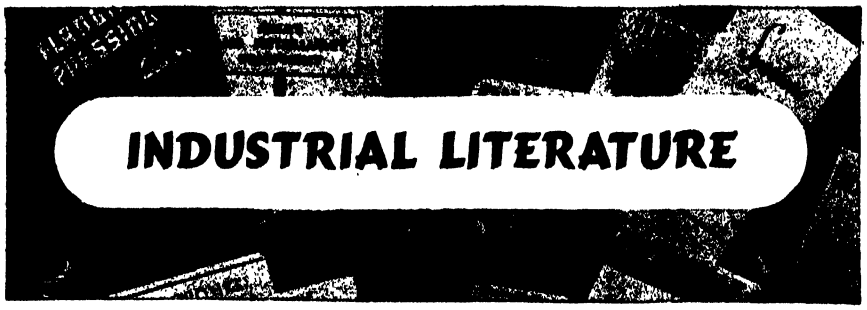
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INDUSTRIAL LITERATURE

Listed publications should be requested directly from the company concerned. Use business stationery, mention bulletin numbers, and refer to this journal. Publications will be sent free unless otherwise noted.

Butterfly Valves. A 4-page bulletin featuring heavy-duty butterfly valves which have sufficient face-to-face dimensions to permit the mounting of ball bearings for high-pressure service. These valves come in sizes for 150, 300, and 600 pounds pressure. The chief advantages, applications, and general operating characteristics are discussed. Complete dimension tables are included. *Bulletin 15-B CEN.* R-S Products Corp., Wayne Junction, Philadelphia, Penna.

Compressors. A new booklet on maintenance of two-cycle, gas-engine-driven compressors includes information on when such maintenance should be done, troubles operators sometimes encounter, and the method of solving these problems. A Do and Don't Section helps reduce maintenance and repair costs. *Booklet CEN.* Clark Bros. Co., Inc., Olean, N. Y.

Crane Operation. A safety manual on the safe operation of overhead cranes contains rules for the guidance of crane operators and hookers-on and for men working in the crane-operating area. Available are posters on safety, giving standard signals, and standard practice for operating cranes. *Manual CEN.* The Whiting Corp., 157th St. and Lathrop Ave., Harvey, Ill.

Direct-Fired Heaters. This bulletin carries tabulations showing comparative savings in metals, weight, etc., of this type of heater, as well as the smaller amount of floor space necessary, based on the same required B. t. u. output per hour. Oil-, gas-, and coal-fired models are compared with units of conventional design. Principles of combustion chamber, heat transfer, and fuel economies are fully explained. *Bulletin 506 CEN.* Dravo Corp., 300 Penn Ave., Pittsburgh, Penna.

Filter Papers. This bulletin gives complete information on a new line of laboratory filter papers claimed to be better than any from the European market. Applications of each grade, sizes, and specifications are included, both for qualitative and quantitative work. *Bulletin 65 CEN.* Carl Schleicher and Schuell Co., 116 West 14th St., New York, N. Y.

Floor Scales. A 4-page leaflet, profusely illustrated, shows typical floor-scale installations and sketches of structural features. *Form CEN 2410.* Toledo Scale Co., Toledo, Ohio.

Glues. "Laucks Glues for War" is the title of a 4-page broadside that describes how wood and glue are alternating for steel in the production of war materials. *Broadside CEN.* I. F. Laucks, Inc., Maritime Bldg., Seattle, Wash.

Heat Exchanger. A 12-page bulletin outlines the distinctive features and advantages of the G-R Tubeflo section; and includes a concise tabular comparison between its design characteristics and those of shell-and-tube exchangers. *Bulletin CEN 1621.* The Griscom-Russell Co., 285 Madison Ave., New York, N. Y.

Horizontal Single Piston Pumps. This specification bulletin packs a wealth of information into its 4 pages. A line drawing showing internal design, a capacity table, and detailed specifications, plus a dimension table give the complete story on this type of pump. *Bulletin W-111-B 51 CEN.* Worthington Pump & Machinery Corp., Harrison, N. J.

Industrial Dust Recovery. This new book is a compendium of facts and data on dust control. It uncovers the major problems of modern dust recovery and gives practical methods for their solution. Excellent illustrations show the inner workings of these collectors which have a special "double eddy current" feature, including graphs and charts and typical installations in the process industries. Arrangements of more than 100 different sizes are given, especially for flue dusts, with a partial list of applications, from abrasives to sugars. *Book CEN.* Buell Engineering Co., Inc., 70 Pine St., New York, N. Y.

Inspection Laboratory. A new booklet on the establishment of inspection laboratories in production plants, both large and small. The selection of essential material for such a laboratory, the use of gage blocks, comparators, projectors, and other equipment are discussed. *Booklet CEN.* George Scherr Co., 128 Lafayette St., New York, N. Y.

Magnetic Separators. This new bulletin takes up magnetic separators and separation, concentration, reclamation, and purification of materials. Types of separator are described with the advantages of each and their most profitable and efficient use. It is written for engineers and factory officials and includes material not usually found. *Bulletin 800 CEN.* Stearns Magnetic Mfg. Co., Milwaukee, Wis.

Maximum Load Finder. This is a patented calculator for finding maximum loads, at various distances in front of bumper for single, double, and triple reeving of cranes. Avoids twisted boomheads and wasted hours from overloading. A separate calculator is available for each of three crane models, covering 3-, 5-, and 7, ton capacities. Distinctive colors identify the load finder for each crane. The calculator is durable and made to fit the pocket. *Bulletin CEN.* Mercer Engineering Works, Inc., 30 Church St., New York. N. Y.

Mounted Wheels. A new booklet describes time-saving accessories for use with portable equipment, including steel cutters, drills, small wire brushes, and polishing wheels. A selection guide on the use of mounted wheels is included. *Booklet CEN.* Chicago Wheel and Mfg. Co., 1101 West Monroe St., Chicago, Ill.

New Employees' Manual. The employment of thousands of new workers is the reason for this manual, written in the language of the worker and containing interesting cartoonlike illustrations. Sections covered are health and safety, employment, general, and so on. *Booklet CEN.* Manning, Maxwell, Moore, Inc., Bridgeport, Conn.

pH Equipment. This new booklet tells what is new in modern pH control equipment. It lists and describes more than sixty different electrodes and electrode assemblies for chemical, biological, research, and industrial process control. *Beckman Bulletin 86 CEN.* National Technical Laboratories, South Pasadena, Calif.

Straight and Angle Swivels. This bulletin introduces a new line of straight and 90° angle swivels for making oil, grease, air, and other connections between stationary and revolving, oscillating, or other moving surfaces. These swivels are available in two constructions, ball bearing and light duty. Dimensions and other details are included. *Engineering Bulletin 424 CEN.* Trabon Engineering Corp., Cleveland, Ohio.

Terpene Solvents. A 21-page booklet, discussing properties and applications of a series of terpene solvents, includes technical graphs, structural formulas, and tables of typical analyses. *Booklet CEN.* Hercules Powder Co., Inc., Wilmington, Del.

Utility Conveyor. An offset data sheet illustrates and describes a new model of utility conveyor offered to those who can supply suitable priority ratings. The model supersedes the one offered last year and is said to incorporate many improvements and advantages not possible with the earlier design. *Data Sheet 501163 CEN.* Lamson Corp., Syracuse, N. Y.

Vinylite Resins. A new 20-page booklet describes the forms, properties, and uses of these resins. It takes up the four major types of vinyl resins and the plastic materials produced from them including rigid sheets, flexible sheeting and film, molding and extrusion compounds, adhesives, and resins for surface coating. Tables of properties and charts showing principal applications are added. *Booklet CEN.* Plastic Division, Carbide and Carbon Chemicals Corp., Unit of Union Carbide and Carbon Corp., 30 East 42nd Street, New York, N. Y.

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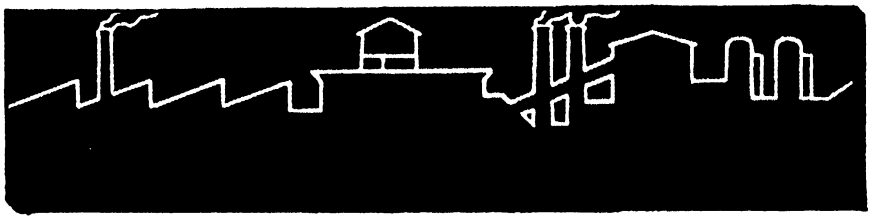
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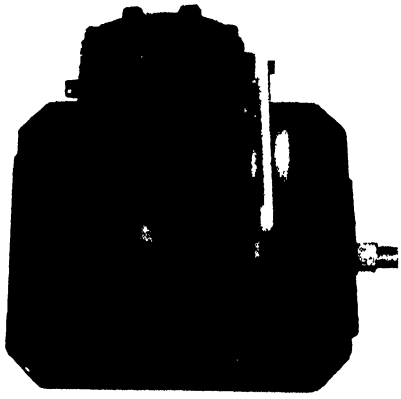
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Aneroid Manometer for Flow or Liquid Level

ABSENCE of mercury or other liquid from the flow and liquid level manometer of the Taylor Instrument Co., Rochester, N. Y., removes the possibility of product contamination and the hazard of mercury being blown. Sealing liquids are rarely required and mercury is released for the war effort. Replacing the stuffing box is a new torque tube assembly which gives a completely closed system, is designed to eliminate friction and lubrication, and does away with the lost time involved in maintenance. Friction, lost motion, and wear are reduced by the absence of internal pivots and springs.



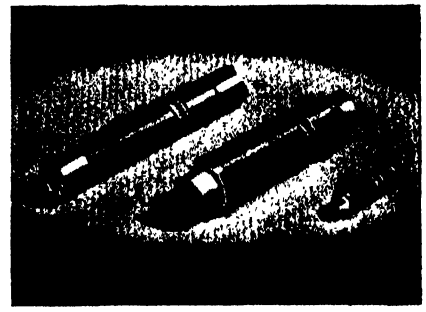
Quick Drying Paints

RESEARCH chemists in the paint field are easing a serious brake on war production by drastically reducing paint drying time. A du Pont development has been the short-bake synthetic finishes of the urea-formaldehyde resin variety. The same laboratories that produced the quick-drying Duco nitrocellulose lacquer which made possible the mass production of automobiles and put the Dulux synthetic resin enamel on 9,000,000 refrigerator cabinets have perfected a type of the latter as a camouflage airplane finish. First adopted by the British Government, the synthetic product, which does not rely on imported resins and gums, is now used largely by the U. S. Army and Navy Air Corps.

In addition to the fast-drying quality typical of synthetic finishes, the Dulux type camouflage paint for planes is highly resistant to the destructive action of deicing fluids.

Ferrule Resistors

THE Ohmite ferrule resistor has been designed for easy interchangeability without the use of tools by the Ohmite Manufacturing Co., 4835 Flournoy St., Department



9B, Chicago, Ill. An even winding of resistance wire on a ceramic core is protected by an Ohmite vitreous enamel coating. The wire is terminated on metal bands or ferrules which permit mounting in fuse clips. Ferrules are cup, sleeve, or cartridge type. Special ceramic cores are available which, with special coating, will withstand the temperature shock test of repeated im-

CONTINUED ON PAGE 1215

UNUSUAL OPPORTUNITY OPEN FOR

CHEMICAL ENGINEER

with large and long established company having an extensive research and development program

. . . . . .

Position is available for development work in plastics with this company which is not now engaged in plastics manufacture. The man desired must have a broad knowledge of the field. This is an unusual opportunity for a Chemical Engineer with the right technical qualifications and organizing ability. Inquiries will be held in strict confidence.

Reply: Box 80-NP-9, Ind. & Eng. Chem., Easton, Pa.

IMPORTANT!

Advertising Copy *must* make a trip to the U. S. Censors Office

SO

Closing dates advanced

Publication and closing dates of Chemical and Engineering News

Issue of the 10th closes—20th of preceding month; **mails 7th of month.**

Issue of the 25th closes—5th of the month; **mails 22nd of month.**

We urgently ask that advertisers make it a point of having complete copy in our hands *before* the closing dates shown to enable prompt publication and mailing.

EMPLOYMENT INFORMATION

RATES to be paid in advance. Standard setting 5c a word, minimum charge $2.00 each; include 8 words for box address. Exceptions see ⟶ Display, $10.00 per column inch. 2 inches maximum, larger units at regular display unit rates. No discounts or allowances.
SEND advertisements with remittance to INDUSTRIAL AND ENGINEERING CHEMISTRY, 332 West 42nd St., New York, N. Y., to reach there not later than 10:00 A.M. on the 5th and 20th, closing dates for editions of CHEMICAL and ENGINEERING NEWS of the 25th and 10th, respectively. Insertions made in order of receipt provided necessary remittances are complete.
EMPLOYERS are requested to mention in their announcements the section of the country in which the open position is located to ensure replies only from those who are geographically available.
In printing these advertisements the SOCIETY assumes no obligations as to qualifications of prospective employees or responsibility of employers.

UNEMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking employment for themselves are allowed in one calendar year 3 announcements free (one per issue) set in standard style and limited to 50 words each, including 8-word box address, and 3 additional standard announcements at 50% of regular rate. Further announcements and excess words at full rate.

EMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking new positions are permitted 3 standard announcements during the calendar year at 50% of the regular rate—include 8 words for box address.

EMPLOYERS seeking chemists and chemical engineers are permitted 3 standard announcements, not to exceed 50 words each including box address and not more than one per issue, during the calendar year without charge, provided they agree in writing to acknowledge all replies (excess words 5c each), otherwise full rate applies.

The AMERICAN CHEMICAL SOCIETY is vitally interested in the welfare of its members and in seeing that the chemical industry is manned with competent chemists and chemical engineers. These pages are part of our service in that connection. In addition most of the larger sections of the AMERICAN CHEMICAL SOCIETY and several of the smaller ones have active employment committees. Local section secretaries in your area will inform you as to any employment aids that may be available locally.

An Employment Clearinghouse is operated at each national meeting of the SOCIETY for the purpose of bringing together representatives of industry looking for chemists and members and student affiliates in attendance wishing to make such contacts. For further details, consult the preliminary and final programs as printed in the NEWS EDITION prior to each meeting.

In the New York area, special employment facilities are offered by the Employment Bureau of the Chemists' Club, 52 East 41st St., New York, N. Y. In the Chicago area, the Chicago Section maintains an employment service at 505 N. Michigan Avenue, Chicago, Ill.

Those replying to announcements should be careful to send copies and not original documents. Advertising circulars will not be forwarded and to that end all letters will be opened at the forwarding office.

SITUATIONS OPEN

Those announcements in which the letter "P" is part of the address key have paid in full and are not committed to acknowledge replies. The Society regards acknowledgment by employers of all applications as an act of common courtesy but can assume no responsibility for their failure to do so.

CHEMICAL ENGINEER excellent opportunity for man of outstanding qualifications in research laboratories located in the East. Please submit college record, experience, accomplishments, and small photo.
Box 75–TP–7, Ind. & Eng. Chem., Easton, Pa.

FOOD TECHNOLOGIST. Applications will be welcomed from men with outstanding records to serve as junior chemists in eastern Research Laboratory. Prospects for advancement excellent for men of right qualifications. Please submit record of training and experience, personal history and recent small photo.
Box 76–TP–7, Ind. & Eng. Chem., Easton, Pa.

A CHEMICAL SALES organisation handling chemical specialties used by numerous defense industries has an opening in New England for a salesman with a degree in chemistry. Opportunity to acquire part interest in organisation. Give draft status, availability, education and sales experience.
Box 14–T–8, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER or chemist interested in control and development work leading to plant supervisory positions; large plant, Aggressive Company, producing roofing felt, granules, asphalt roofing and asphalt specialties. Give details of education and past experience. Personnel Director, The Flintkote Company, New Orleans, Louisiana.

ANALYTICAL CHEMIST with Bachelor or Master degree, desired in research laboratory of food manufacturer located in the East. Opportunity for man with sound training and superior college record. Supply details concerning training, experience, personal history and small photo.
Box 51–TP–8, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, B.S. in chemistry wanted for chemical laboratory in Niagara Falls, New York. Address: The Carborundum Company, Service Department, Niagara Falls, N. Y.

CHEMIST with some petroleum experience. Needed in Chicago area for development of petroleum products and rust preventives. State age, draft status, degree, and salary desired in opening letter.
Box 79–TP–8, Ind. & Eng. Chem., Easton, Pa.

CHEMIST to take charge of laboratory analysing tool, stainless and special steels and alloys, part of time required for research work. In replying give full information concerning age, training, experience, family status, health, etc.
Box 10–NP–9, Ind. & Eng. Chem., Easton, Pa.

WANTED—GRADUATE chemist, research experience with drying and semi-drying oils. Extensive knowledge of analytical oil determinations required.
Box 17–NP–9, Ind. & Eng. Chem., Easton, Pa.

CHEMIST WANTED: preferably in the field of metallic soaps, though a broad knowledge of organic may be substituted. Should be capable of research and development. Permanent position, aggressive concern, Ohio location. In reply state salary desired, draft status and education in detail.
Box 20–N–9, Ind. & Eng. Chem., Easton, Pa.

CHEMISTS, MALE or female for routine inspection and analysis on food products. Modern laboratories located in Mid-west.
Box 24–NP–9, Ind. & Eng. Chem., Easton, Pa.

CHEMIST or CHEMICAL Engineer wanted by laboratory supply house to travel Baltimore, Washington and Richmond territory. State education, experience and salary expected.
Box 47–NP–9, Ind. & Eng. Chem., Easton, Pa.

(See Box 50–NP–9 on p. 1212)

CHEMISTS and CHEMICAL Engineers wanted for Pilot Plant Development and Research work in the Synthetic Organic field. Location metropolitan area. Please give complete details of training and experience.
Box 17–TP–9, Ind. & Eng. Chem., Easton, Pa.

GRADUATE FELLOWSHIP, The University of Texas, established by major oil company. Research on drilling muds leading to industrial position. Applicant must have engineering degree, knowledge of colloidal chemistry. Half-time allowed toward M.S. degree in petroleum engineering. Stipend, scholastic year 1942–43, $600.00.
Box 18–T–9, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST or Physicist for research study and measurement of pasting characteristics of starch. This research sponsored by Corn Industries Research Foundation. Submit full particulars of training, experience, draft status and small recent photograph to Research Department, Penick & Ford Ltd., Inc., Cedar Rapids, Iowa.

CHEMIST with good basic training for work on adhesives. Adhesive or rubber experience essential. Give full particulars of training, experience, draft status, and salary desired.
Box 23–T–9, Ind. & Eng. Chem., Easton, Pa.

SALES ENGINEERING executive. Location Northeast-Central. Man capable of supervising the sales, engineering and servicing of corrosion-resisting equipment. Must have a thorough knowledge of chemical plant processes and the application of equipment for handling corrosive liquids. A knowledge of the various corrosion-resisting alloys and their application is also necessary. Please give complete information regarding self and previous experience.
Box 26–TP–9, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST with general training in chemistry preferably in organic and analytical chemistry, for laboratory doing research work in interesting biochemical-organic field. Location Eastern Pennsylvania. Give details, including salary expected and recent photograph.
Box 28–TP–9, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST: Analytical and Research. Excellent opportunity, residential community, Connecticut shore one hour from New ... ord, include small photo and salary required.
Box 30–TP–9, Ind. & Eng. Chem., Easton, Pa.

SOAP LABORATORY in Middle West requires services of a graduate chemist, man with deferred draft status, or woman. Control and investigational work. Include all pertinent data regarding experience and personal history in reply. State salary required and submit small, recent photo.
Box 39–T–9, Ind. & Eng. Chem., Easton, Pa.

MIDWESTERN CHEMICAL company has excellent opportunity for woman chemist to serve as technical secretary and librarian. Give full information and salary expected in first letter.
Box 40–TP–9, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST for research in well equipped laboratory of Agricultural Experiment Station. Work on fats and oils, proteins, carbohydrates. Emphasis on natural products. Some organic synthesis. Young chemist with Ph.D. or equivalent desired. Salary about $2600. Excellent opportunity for publications. Location, northwestern.
Box 43–T–9, Ind. & Eng. Chem., Easton, Pa.

CHEMIST WANTED for work in chemical laboratory of large Oklahoma refinery. Give complete details, including education, citizenship, experience, salary desired. Send photograph.
Box 45–T–9, Ind. & Eng. Chem., Easton, Pa.

FELLOWSHIP-TITANIUM chemistry research available September 15 to October 5. Applicant with M.S. or equivalent in Chemical Engineering well trained in physics and physical chemistry. Submit complete data first letter including photograph, draft status, experience, and certified transcript of record including grades and references to Arthur W. Hixson, Executive Officer, Department of Chemical Engineering, Columbia University, New York City. $2000.00 per annum leading to doctorate.
Box 48–TP–9, Ind. & Eng. Chem., Easton, Pa.

COLLEGE TEACHER wanted to handle General and Organic Chemistry for the Duration. Experience necessary. Ph.D. desirable. State minimum acceptable salary and air mail full details to Phil Fehlandt, Chemistry Department, College of Pugetsound, Tacoma, Washington.
Box 51–T–9, Ind. & Eng. Chem., Easton, Pa.

PHARMACEUTICAL CHEMIST in established, well equipped midwest laboratory. Must be able to direct development of profitable ethical medicinals to point of commercial manufacture. Would help if he has contacts in institutions to ease clinical trials. An excellent permanent place for man who fits. Write completely of technical education, field of experience and draft status.
Box 55–TP–9, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMISTS. Graduates or commercial analysts for work in plant materials and control laboratories of Electrical Manufacturer. Familiarity with analysis and testing of rubber, metals, varnishes, asphalts, papers and textiles desirable but not essential. Male or female. Give full particulars including draft status. Locations: East, Mid-west, Pacific Coast.
Box 56–TP–9, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 1214)

Address communications to the box number indicated and Mail to Easton, Penna.

The American Chemical Society has no information concerning the position advertised, or in regard to those seeking employment.

(Situations Open Continued)

DEVELOPMENT of MATERIAL specifications and methods. Graduate chemist or chemical engineer who has had experience in writing material specifications and developing methods of test desired by Electrical Manufacturer. Location: East in vicinity of New York City. Give full particulars including draft status.
Box 57-TP-9, Ind. & Eng. Chem., Easton, Pa.

METALLURGIST—experienced in research and development of magnesium alloys, capable of conducting independent research and having some experience in production methods of light alloys. Give details of education, experience, publications, references. State age, salary desired. Send small photograph (not returnable).
Box 64-TP-9, Ind. & Eng. Chem., Easton, Pa.

POSITION AVAILABLE with established company in South for graduate chemist preferably with some experience in petroleum products. Applicant must be capable, for position will lead to research. Salary will advance as value to company increases.
Box 65-TP-9, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER with experience in chemical plant design, mechanical engineering, product design, and with a thorough knowledge of rubber and plastic technology, to work for plant in Middle West. Must be draft exempt and not employed at your highest skill in any other war plant.
Box 81-TP-9, Ind. & Eng. Chem., Easton, Pa.

CHEMIST to take charge of Analytical laboratory in Pennsylvania. Plant engaged in essential war work preferably a Ph.D. with industrial organic analytical experience. Give full details including photo and salary desired.
Box 82-TP-9, Ind. & Eng. Chem., Easton, Pa.

CHIEF CHEMIST

Position as chief chemist open to man with mature experience in the formulation and manufacture of phenolic laminating, impregnating and molding resins. Plant location in large industrial area in Middle West where opportunities in this field are unlimited. Quick availability important because of volume of War work. Only a qualified man with highest reference will be considered. State full details in reply addressed to

Box 83-TP-9, Ind. & Eng. Chem., Easton, Pa.

INSTRUCTOR WANTED immediately for inorganic, organic, analytical first courses at Erie Junior College, University of Pittsburgh $150 to $200 per month. Submit official transcript of college record and have department head send letter of recommendation direct to Department of Chemistry, University of Pittsburgh, Pittsburgh, Pa. M.S. degree required.
Box 84-T-9, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(A.C.S. MEMBERS)

SPECIAL LIBRARIES ASSOCIATION will recommend trained chemical and technical men and women librarians at no cost to employer or member. Competent persons are now available. Write to the Executive Office, 31 East Tenth Street, New York, New York, for additional information.

FOOD CHEMIST with over twenty years' wide experience in the Food Industry, in direction, research, process development, quality control, and factory problems. Desires a responsible position.
Box 69-N-8, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST, B.Sc., M.Sc., several years' industrial experience with oils, soaps, waxes, polishes. Desires industrial research or teaching position offering opportunity for research. Masters in physical chemistry. Trained in micro-techniques, physical methods and new analytical procedures. Married, age 27, prefer Northeastern area.
Box 25-T-8, Ind. & Eng. Chem., Easton, Pa.

MEDICAL CHEMIST, PH.D., Broad experience in technical and scientific research on food products, biologicals and pharmaceuticals. Ten years with medical and hospital supply firm. Research, development and business knowledge. New York State or East preferred. References. Available Sept. 1. Class 3-A.
Box 40-T-8, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.Ch., and Biochemist, Ph.D., 1942 from large midwestern university. Desire academic or industrial position. Special training in Colloid chemistry. Experience with nitrocellulose and enzymes. Six publications. Age 25, Single. Available immediately.
Box 41-T-8, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER (Ch.E.), young man, three years' laboratory and plant experience, sixteen years' industrial sales. Loyal, enthusiastic, industrious. Can translate technical data understandingly to the layman. Effective speaker, writer, organizer. Authority chemical defense. Available immediately. Desires position to serve Nation more effectively.
Box 71-T-8, Ind. & Eng. Chem., Easton, Pa.

DIRECTOR, RESEARCH or laboratory. Executive ability to direct staff and to apply original work and processes, on products inorganic, organic, biological, etc., to ethical pharmaceuticals, Drugs and Allied Lines. Pharm.D. extensive training and long experience. Wishes director position or assistant to technical executive.
Box 102-T-8, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. 12 years' academic and industrial experience in synthesis, hydrocarbons (Diolefins and derivatives) polymers and resins, publications, patents, languages. Employed, draft status 3-B. Desires responsible research position.
Box 23-T-8, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL POSITION, preferably with small eastern or southern firm, wanted by Ph.D., physical chemistry 1940, with two years' research experience. Married, twenty-eight years old, draft classification 2-B. Sigma Xi. Protestant American. Now employed, available one month's notice.
Box 18-N-9, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. 14 years' experience various fields. Organic, pharmaceutical, cosmetic bio-chemistry. Analysis, Research, Development, Production control. Three languages. Imaginative, inventive, adaptable worker. Married with child. Age 39. Immediately available. Desires position. Location anywhere.
Box 29-N-9, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, M.A. Columbia, 1941; physical and organic. Recently resigned from non-essential research position. Age 21. Excellent scholastic background and record. One year's experience. Alert, intelligent, practical, versatile. Highest references. Research preferred but will consider other. Available immediately anywhere in U. S.
Box 39-N-9, Ind. & Eng. Chem., Easton, Pa.

ORGANIC-INORGANIC Chemist. M.A. leading Mid-Western University. Six years' industrial research experience including organic and inorganic polymers. Knowledge of properties, reactions and uses of compounds of 91 elements beside carbon. Patents. Articulate, adaptable, independent, willing worker with insatiable curiosity. Aged 29, married. Employed but seeking research position with greater responsibilities.
Box 45-N-9, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST. August Ph.D.; minors, Physical and Chemical Engineering. Excellent scholastic record, publications, experienced teaching and fulltime research in isolation, identification and synthesis of organic acids and nitrogen heterocycles. Age, 28; dependents. Now available for teaching or research preferably in Southwest.
Box 49-N-9, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL CHEMIST, with business and executive experience. University graduate, twenty years' excellent record in research, development, sales and service with State, Federal institution and corporation. Publications, patents, sales literature. Desires active employment. References from all employers. Listed in American Men of Science. Draft 3-B.
Box 59-N-9, Ind. & Eng. Chem., Easton, Pa.

COLLEGE TEACHING, PH.D. 1937. Analytical or inorganic preferred. Experience also in physical, electrochemistry, and photochemistry. Desire teaching and research position. Publication. honorary societies. Ten years' teaching experience. Employed. Age 37, family.
Box 12-T-9, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, M.S. 1940, with work in organic synthesis. Industrial experience in analytical development, supervision and training of analysts. Employed at present, desires position with executive future, preferably in South or Southwest.
Box 13-T-9, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, B.S. and grad. credits, four years' experience in organic compounds, synthetic rubber, resins and plastics, thoroughly familiar with pilot plant operation. Seeks position in development or production. Available short notice, anywhere.
Box 15-T-9, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, B.S., white, single, Gentile. Eighteen years' analytical, research, supervisory experience; fuels, air pollution, yeast technology; bibliographic and editorial studies. References. Employed. Prefers bibliographic or supervisory work. $2400.
Box 20-T-9, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST—M.A., Phi Beta Kappa, age 25 years, single. Five years' supervisory experience and development and production of organic chemicals and pharmaceuticals. Patents pending. Adaptable; can handle men. Seek research, pilot plant or production position in war industry. Excellent references. Available on reasonable notice.
Box 21-T-9, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL CHEMIST in responsible position with specialties manufacturer wants job with direct bearing on war effort and post-war prospects. American, 37, married, two children. Sixteen years' achievement in production control, analysis, development, package improvement, plant operation, chiefly in utilization of materials including plastics, glass, metals, rubber. Like trouble-shooting, development, technical service work. East Coast location.
Box 25-T-9, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST—Experienced in plant biochemistry and pharmaceutical chemistry. Six years' research isolation, identification, analysis plant compounds. Experience in microanalysis, and organic synthesis. Ph.D. 1935. Major organic; minors, physical chemistry, bacteriology. Fifteen publications. Employed. Desires permanent position with chance for advancement. Age 33, married, two children, 3-A, Protestant.
Box 29-T-9, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, Ph.D., industrial organic chemist, 25 years' industrial and research experience, process developments, production problems, among others rayon, cellulose and derivatives. Patents, publications, new projects, languages, business knowledge. Married, one child. Available on short notice.
Box 31-T-9, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL CHEMIST seeks position of responsibility in chemical production directly concerned with war effort. Location immaterial. Now employed in East. Five years' industrial experience in plant control and operation chiefly in field of distillation. Experienced in handling labor. B.S. degree in organic chemistry from large middle western university. 3-A draft classification. Protestant.
Box 35-T-9, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST: B.S. 1935. 4 years' public service, 2 years' industrial experience in foods and allied products, supervision of analytical control laboratory. Desire investigational work on development and revision of methods. Age 29, married. Western or Northern states preferred, but will consider other locations. References. Now employed, but available on short notice.
Box 36-T-9, Ind. & Eng. Chem., Easton, Pa.

ARE YOU looking for a chief chemist? Have had twenty-five years' experience in analysis and research work on metals, ores, coal, oils and waters. Last fifteen years in full charge of commercial analytical laboratory. Would consider desirable opening as chief chemist or research on analytical methods.
Box 42-T-9, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, Ph.D., age 45, married, expert in synthetic resins with 20 years' experience in research, development and production. Excellent chemical background. Desires responsible position in research or development work in progressive company.
Box 44-T-9, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL CHEMIST, Ph.D., 14 years' varied experience in research and plant. Inorganic, medicinals, pigments, metal salts, metallurgical. Patents in welding and soldering. Age 39, family, draft classification 3-A. Experience as market analyst and translator. Four languages. Metropolitan New York and New Jersey.
Box 46-T-9, Ind. & Eng. Chem., Easton, Pa.

TEACHER, PH.D. Well qualified in Organic and General Chemistry. Twenty-five years' experience in University of recognised standing. Employed at present. Desire to make change.
Box 49-T-9, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 1215)

(Situations Wanted Continued)

ORGANIC CHEMIST, 23. Three years' industrial development experience with resins, adhesives, and gasket materials. Capable, efficient, publications, patent applications. Desire research or development position with opportunity. Prefer West or Southwest, consider others. Presently employed. New England area. Married, 2-B draft.
Box 50–T–9, Ind. & Eng. Chem., Easton, Pa.

SPECIAL PRODUCTS research and development chemist. Twelve years' experience in development and production of automotive, aeronautical, and household special products, including lubricating oils and petroleum specialties. Capable of directing development and production of products in these and allied fields. Now employed but would like to relocate, preferably in Dallas area. Age 39.
Box 52–T–9, Ind. & Eng. Chem., Easton, Pa.

PACIFIC COAST position desired by chemical engineer, 11 years' experience engineering and process work in organic chemicals, petroleum refining and equipment application design. Draft exempt, 33 years old, 3 dependents.
Box 58–T–9, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Ph.D., with excellent record of original accomplishment in research requiring application of physical-chemistry to enzymes, other systems of biological interest. Over twenty publications. Experience includes seven years of teaching, fellowships abroad, work in physico-chemical, biochemical, and biological laboratories. Prefer university position, or one requiring assumption of responsibility, exercise of initiative. Available at short notice. Family.
Box 59–T–9, Ind. & Eng. Chem., Easton, Pa.

MANUFACTURING & PRODUCTION chemist executive, formulator, analytical, engineering & medical training, 15 years' experience, organic, pharmaceutical, oils, etc. Has own established business but must change to defense

CHEMIST: 6 years' experience in analysis, production and development of essential oils and flavors. Six months' experience in iron analysis. Employed at present but desire change. Draft deferred.
Box 61–T–9, Ind. & Eng. Chem., Easton, Pa.

SYNTHETIC ORGANIC chemist, Ph.D. August 1942, Columbia. Thesis on the synthesis of substituted acetylenes, olephins, and veratroles. Experienced in biochemical and micro analysis, natural products isolation, synthetic preparations. Phi Lambda Upsilon, Sigma Xi. Available immediately, location immaterial, defense work preferred.
Box 63–T–9, Ind. & Eng. Chem., Easton, Pa.

UNIVERSITY or COLLEGE teaching. Ph.D. 1940. Organic major; mathematics minor. Two years' college teaching experience. Fellowships, assistantships, publications, honors. Present teaching position temporary. Desire post with opportunity for research. Woman.
Box 68–T–9, Ind. & Eng. Chem., Easton, Pa.

ESSENTIAL INDUSTRY employment desired by a physical chemistry major with minors in organic and chemical and metallurgical engineering. Ph.D. course work and research completed but lack languages and preliminary examinations. Single, 30, 2-A. Prefer processing or metallurgy. Employed.
Box 71–T–9, Ind. & Eng. Chem., Easton, Pa.

SYNTHETIC RESIN chemist. Five years' experience in technical research on synthetic coatings and adhesives. Also experienced in photochemistry and textiles. Has shown originality and has obtained practical results. Married, 2 dependents. Age 29. Harvard training. Now employed.
Box 72–T–9, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST—Spectroscopist, M.S. Experienced in inorganic chemical analysis; also in the development of spectrochemical methods. Familiar with physical methods of analysis. Experience in supervising. Training in physical, organic and inorganic chemistry. No routine. Employed, Gentile, married, draft status 3-A.
Box 78–T–9, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.S. 1941. Year's synthetic organic research experience. Thorough chemical training at accredited university including year of organic research and micro-analysis. Desires position as research assistant with view toward future business administration. Age 24. Draft status, 4-F. Available shortly.
Box 80–T–9, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(NONMEMBERS)

CHEMICAL ENGINEER—Design and cost estimating of process equipment experience. Experience in heavy chemicals plant layout, research and development. Will be available shortly.
Box 33–N–9, Ind. & Eng. Chem., Easton, Pa.

BACTERIOLOGIST-CHEMIST, B.S. (1932), age 36, married, 3-A, 10 years' industrial experience as bacteriologist and chemist in foods, beverages, wetting agents, detergents, colloids, lithographic preparations, formulation of industrial products; consultant in above fields; author of scientific articles; supervisor of laboratory, can handle men, write reports, etc. Available on short notice. Min. salary $3,000.00.
Box 10–T–9, Ind. & Eng. Chem., Easton, Pa.

PETROLEUM CHEMIST, B.S. in Ch.E. 9 years' research and development experience on lube oils and petroleum specialties. Age 32. Married. Draft 3-A. Presently employed, but available on reasonable notice.
Box 33–T–9, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, 22, B.S. (1941) in chemistry. Minors in mathematics and physics. One year's analytical experience in large industrial laboratory. New York City or vicinity desired. References. Available immediately.
Box 53–T–9, Ind. & Eng. Chem., Easton, Pa.

PHARMACEUTICAL CHEMIST—Columbia graduate, B.S. 1936, age 27; draft-deferred, total of five years' experience in pharmaceutical and cosmetic fields—four in analytical work and one in research and development.
Box 54–T–9, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, B.A. 1942, honors in chemistry, desires position organic field. Location immaterial, prefer vicinity university. Knowledge French, German, shorthand, typing, single, Protestant, age 19. Employed but available short notice.
Box 70–T–9, Ind. & Eng. Chem., Easton, Pa.

METALLURGIST, CHEMICAL engineer, age 33. Experience: Inorganic chemical development and production. Mineral dressing research and operation. Location immaterial.
Box 76–T–9, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, first class experience design, installation, development, and operation organic chemical plants. Capable taking complete charge of project from laboratory stage to operating plant. Desire permanent connection with responsibility. Married. One child.
Box 79–T–9, Ind. & Eng. Chem., Easton, Pa.

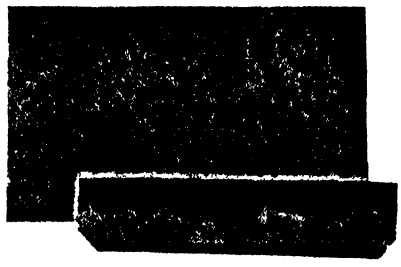
Industrial Literature

CONTINUED FROM PAGE 1212

mersions alternately from ice cold to hot water. Protective coatings which pass salt water immersion tests are also available.

Nonslippery Flooring

TO PRODUCE nonskid floors, either wet or dry, the Walter Maguire Co., Inc., New York, N. Y., offers Cortland emery aggregate, a mixture of scientifically graded large and small, sharp, hard particles of mineral emery, rating next to diamond in hardness.



For application, the aggregate is mixed with portland cement and water for the floor topping. This surface improves with wear, the floors actually becoming safer with use, because, as the rough emery particles are exposed by wearing away of the cement, their gripping action improves.

Insulating Varnish



Flame-resistant insulating varnishing protects windings of large electrical units

THE Sterling Varnish Co., 140 Ohio River Blvd., Haysville, Penna., has recently developed a new flame-resistant insulating varnish, designated as R-878, which is recommended for class B high-temperature insulation.

This new varnish is mechanically strong and dries all the way through when applied to electrical apparatus. After drying, it will not support combustion, when the flame is removed, neither will it melt nor resoften under operating temperatures.

Safety Cloth

A SAFETY cloth has been developed by the Colloid Equipment Co., Inc., 50 Church St., New York, N. Y., to provide a flexible window for buildings without the use of priority materials, and to be used as protection upon the inside of glass windows to reduce the danger to persons or property. Ceco safety cloth is a 10-mesh cotton with a tough, transparent plastic film.

New Drop-Forging Plant

AN associate company, the Kropp Forge Aviation Co., has been formed by the Kropp Forge Co. of Chicago.

A new plant in the course of construction involves a modern high-speed drop-forging manufacturing plant almost equal in size to the present plant.

The production tonnage of the new plant will be approximately four times the company's existing drop-forging production, but through the broad use of labor-serving equipment the manpower requirements of the new addition will be only two and one-half times that of existing operations.

All heating and heat-treating operations will be under complete laboratory control. A modern laboratory for making complete chemical and metallurgical de-

MISCELLANEOUS

BUSINESS OPPORTUNITIES • FOR SALE • WANTED • ETC.

Five cents a word, minimum charge $2.00; display available at $7.50 per inch; in advance. No discounts or allowances

MICRO-ELEMENTARY ANALYSES: C, H, N, S, P, Halogens, Methoxyl, Mol. wt., etc., U.S.P. and other official tests, Purity tests, Microinorganic assays, Spot tests, Micro-distillations, Toxicological investigations, and typical micro-chemical research work. Dr. Carl Tiedcke, 366 Fifth Avenue, New York, N. Y.

WANTED: Refractometer, new or used, send full description, price, etc.
Box 61-NP-9, Ind. & Eng. Chem., Easton, Pa.

WILL PURCHASE for cash or on royalty basis formulas for useful commercial compositions for use in paper, rubber coatings, adhesives, metal treatments, textiles, ceramics, tobacco, foods, fireproofing, waterproofing, insecticides, plastics, detergents, polishes, leather, soap, grease, inks, materials of construction, resins, emulsions plating, warfare, and other miscellaneous uses. It is not necessary that product have a very large market or be patented. Your reply will be held in strict confidence and we reserve the right to return any offering without obligation.
Box 32-T-9, Ind. & Eng. Chem., Easton, Pa.

WANTED JOURNAL of the American Chemical Society 1900 to 1940; Industrial & Engineering Chemistry volumes 1 to 32; Analytical Edition volumes 1 to 12; Chemical Abstracts first and Third Decennial Indexes; London Chemical Society Journal 1900 to 1941. State condition of journal and lowest price for immediate disposal.
N. Klein, 113 Fourth Ave., N. Y.

WANTED 2 Kilos Caesium Carbonate, 50 Kilos Boron Trichloride, 5 Kilos Uranium Metal, 10 pounds Boron Amorphous, 5 Kilos Histidine Hydrochloride, 500 grams Histamine, 100 grams Naphthoresorcinol, one Kilo Rhamnose, 20 lbs l. Asparagine, 25 pounds Xylose.
Box 66-T-9, Ind. & Eng. Chem., Easton, Pa.

WANTED—WANTED—WANTED—Your idle or surplus Laboratory equipment. More and more inquiries are coming in from direct war plants. Government departments. Research laboratories for practically all types of laboratory apparatus. All are trying to save time which new equipment requires. Sell us now while liberal government price regulations are in effect. Write or wire us your offerings for immediate purchase. We are in urgent need of microscopes, refractometers, polarimeters, microscopic cameras, metallurgical testing equipment, precision meters, Weston, Leeds & Northrup, Centrifuges, Hydraulic Presses, Ovens, Agate Mortars, Spectrographic Equipment, Wide Field Microscopes, Measuring Microscopes, Vacuum Ovens, Scott Testing Machines, Suter and others for all fabrics, rubber, paper, etc. Analytical balances, Torsion scales, chainomatics and hundreds of other items too numerous to mention. Contents of entire laboratories or plants will receive our immediate attention. Air-mail for immediate results. The Laboratory Exchange, 24 East 21st St., New York City.

FOR SALE: Cacodylic Acid and Sodium Cacodylate. These chemicals are of excellent quality and can be supplied in steady amounts.
Box 11-T-9, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Journal Chemical Society-London complete from 1874-1942, with Collective Indexes 1841-1922, containing Transactions, Abstracts & British Chemical Abstracts. Fine set, new condition uniformly labeled throughout, bound black buckram mostly new bindings, $525.00. Annual Reports Progr. of Chemistry Vol. 1—Date (1904-1941) cl. $40.00. Journal Soc. Chemical Industry—Vol. 1-59 (1882-1940) bound uniform condition with Collective Indexes $240.00.
Box 19-T-9, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: International Critical Tables. Complete with index. In excellent condition. Price $50.00 plus transportation cost. Oscar T. Quimby, 3129 Penrose Place, Cincinnati, Ohio.

FOR SALE: Ullman Encyclopedie der Technischen Chemie. First Edition Friedlander Fortschritte der Teerfarbrikationen 1—10 Ostwald Laherbuch der Chemie Moissan Traite de Chemie Minerale. Will sell at a reasonable cash offer.
Box 34-T-9, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Journal American Chemical Society, ten year set 1931-40; also Industrial Engineering Chemistry, ten year set 1931-40 with analytical edition. Price $27.50 each set, complete, unbound, some covers soiled. Cash with order. Willis A. Boughton, 12 Oxford Street, Cambridge, Mass.

FOR SALE: Comprehensive chemical dictionary manuscript, longhand, on 5 × 3 index cards; about 120 thousand terms. Steel cases. Correspondence invited from bona fide possible purchasers.
Box 38 T-9, Ind. & Eng. Chem., Easton, Pa.

AMERICAN CHEMICAL Society Publications. Complete set of all Journals since 1917. Mostly unbound and in perfect condition. Will sell as lot or complete file of any one Journal. Also ASTM Proceedings.
Box 41-T-9, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Biochemical Journal vols. 23 to 27. 31 to 34. Berichte der Deutschen Chemischen Gesellschaft years 1888 to 1920, 1935 1937. 1938. Bound. Industrial & Engineering Chemistry complete set up to 1939. Journal American Chemical Society years 1914 to 1941 bound. Pharmaceutish Weekblad, Amsterdam, 1903 to 1912 bound Transactions American Institute Chemical Engineers volumes 3 to 1940. Zeitschrift analytische Chemie vols. 16 to 54. 1877-1915 with General Registers.
Box 62-T-9, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: 5 Kilos Sparteine Sulphate, 100 pounds Sodium and Iron Cacodylate, Cacodylic Acid, 5 pounds each Barium and Strontium Metals, 200 pounds Orpiment, 100 pounds Greenland Cryolite, 100 pounds Chalcopyrite.
Box 69-T-9, Ind. & Eng. Chem., Easton, Pa.

FOR SALE—We are serving American chemistry as we have for the past ten years with fine, used, fully guaranteed laboratory equipment. Send us your lists for immediate quotations. We are constantly receiving new shipments and purchases. We may also locate or furnish those hard to get instruments or equipment which is holding you up. We are at your service at all times though we are very busy. Write or wire us your needs, no matter what they are. The Laboratory Exchange, 24 East 21st Street, New York City.

FOR SALE: Check this list of laboratory apparatus which we have available for immediate delivery. Leits New Inclined Binocular Model Microscope, B & L and Spencer Microscopes of all types are available. Spencer Model 810 Rotary Microtomes. B & L and Leits sliding microtomes. Scott 0-25 and 0-50 motor driven Tensile Tester with Recorder. Suter 0-12 lbs and 0-32 oz Table Model Tensile Tester, Mullen 0-600 lbs Hydraulic Hand Model Tester (3) Mullen Paper Testers, hand model 4 jar Porcelain Pebble Mill Motor driven. Bramhall & Deane #2 Autoclave. American Double Wall Autoclave 14 × 24. McMichael Viscosimeter. Stormer Viscosimeter. Hanovia Ultra Violet Quarts Lamp. International Clinical and type C Centrifuge Schmidt & Haensch Double Wedge Saccharimeters for tubes to 400 mm Zeiss Sugar Refractometer. B & L Dipping Refractometer Mechanical Stages. Dark field and Abbe Condensers. Other Microscopic accessories. Unused Pulp balances. 150 gr capacity 1 mg sensitivity in fine Mahogany Glass Case with Drawer. Laboratory Hydraulic Presses 6 × 6 self contained Hydraulic Pump. Gauge to 10 ton capacity. Electric Platten and Moulds for rubber, powder metallurgy and plastics are available. Agate Mortar Grinder E & A. Gaertner Spectrometer, small Drying Ovens and Incubators, etc. Write us your needs for immediate quotations. The Laboratory Exchange, 24 East 21st Street, New York City.

BERYLLIUM COPPER alloy for sale. 1773 pounds in form of ingots and miscellaneous scrap. 1.8 to 5.6 per cent beryllium; 0.08 to 0.7 per cent iron. General Preference Order M-160 applies.
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terminations and photomicrograph studies of test bars is nearing the point of completion.

The latest types of inspection equipment will be employed for making surface determinations, including a new luminous Magnaflux department.

Synthetic Wax

IN REPLACING rubber as a cloth backing in the manufacture of raincoats, life belts, etc., polyvinyl butyral has been used with considerable success. However, its surface tack has to be eliminated without adversely affecting the other properties. It is reported that Acrawax C, a synthetic wax manufactured by the Glyco Products Co., Inc., 230 King St., Brooklyn, N. Y., when added to the polyvinyl butyral in amounts as low as 1 per cent effectively eliminates this surface tack.

THE Sykes Advertising Agency has moved to larger quarters at 505 Empire Bldg., Liberty Avenue and Stanwix Street, Pittsburgh, Penna., as Army having asked for its previous office space.

Bethlehem Foundry & Machine Co. Earns Additional Honors

THE Bethlehem Foundry & Machine Co., Bethlehem, Penna., has been honored with the new Army-Navy production award recently announced. The new award is for "especially meritorious production of war materials" for both Army and Navy and is the highest honor to be presented. It is symbolized by a swallow-tailed flag with a large letter "E" in the center surrounded by a yellow wreath of oak and laurel leaves, mounted on a blue and red vertically divided background. The word "Army" appears on the red and the word "Navy" on the blue background. The flag has a white border. In February the company was awarded the Navy "E." This was later superseded by the All-Navy "E" burgee.

Brass Shine

WITH the unprecedented boom in brass buttons, brass fabricators have discovered a new and easier way to produce the shine for which these articles are noted.

Ferric sulfate has been found to do an exceptionally good job of removing ugly black smut and red cuprous oxide scale from the surface of the brass, according to Monsanto Chemical Co., Everett, Mass., which developed the process for commercial production of this chemical.

Ferric sulfate is used for the same purpose in the manufacture of brass cartridge cases. Since the making of a cartridge case consists of a series of drawing and annealing operations, it is essential that all scale and stain be removed before each draw or there is likelihood of fouling or breakage of the drawing dies.

Magnetic Separators

SEVERAL new designs in magnetic separators have been designed by the Stearns Magnetic Mfg. Co., Milwaukee, Wis.

One of these new laboratory units is the Stearns Style D size 0 separator, which features a steel inductively magnetized revolving take-off ring employed to carry the magnetic material beyond the conveyor belt to final delivery.

THE Michigan Alkali Co. has removed its general sales offices to Wyandotte, Mich.

CHEMICAL AND ENGINEERING NEWS

HARRISON E. HOWE, Editor

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New Processes for Old Ones in Wartime[1]

ARTHUR W. HIXSON

Department of Chemical Engineering, Columbia University, New York, N. Y.

IN MODERN all-out global warfare, when the Nation's life is in great peril and the very foundations of civilization are crumbling, the country must use all of its energy and all of its possessions to support two great armies—a combat army and a production army. Industry must largely lay aside its normal peacetime activities and use its facilities for the mass production of highly specialized and efficient instruments of destruction and material for the support of the combat armies. In conversion to wartime service industry must meet new product specifications and output demands that tax existing manufacturing facilities beyond their limits. Normal supplies of raw materials are shut off or drastically limited. New raw materials must be used. Old processes must be adapted to their use or abandoned. New processes must be developed to supplement the old, and new plants must be designed and built to operate them. Many of the traditional processes of peacetime industry have been or are being pulled up by the roots or have had new processes grafted on the old roots. Many plants operating old processes have been shut down and will never open again unless entirely new uses can be found for them. The production army front is just as fluid as the combat army front After every engagement there is a new demand for a new product or for a modification of the old. This is true of the whole gamut of war supplies. Industry must meet these changing demands promptly.

Since many of the products and the processes of manufacture are essentially chemical in nature, the problem of maintaining a fluid production army front has caused an increasingly heavy demand for well-trained chemical engineers. The great demand is for men who are well trained not only in the fundamental sciences and principles of chemical engineering but also in the principles of research and experimental techniques. The government laboratories, Army, Navy, industries, research foundations and institutes call repeatedly and insistently for chemical engineers, with clear vision and bold imagination, who can conceive and develop new processes to meet the wartime demand. Such are the drastic changes which the chemical industries are undergoing and the new demands upon the chemical engineering profession.

How long the industrial dislocation will continue, what additional changes will take place, and what the ultimate result will be no one knows. We do know, however, that we are in the midst of the most profound world-wide, social, political, industrial, and general economic upheaval in the history of civilization. Lesser upheavals in the past have sharply changed the direction of future developments. That this one will do likewise there is little doubt.

What effect will this change have on the course of development of the chemical engineering industries and on the chemical engineering profession in the future? The longer the war continues the more complete the dislocation will be. What kind of training will the chemical engineer of the future need to cope with the new requirements? On what phases of his training will there need to be a shift in emphasis? How will this chemical engineering curriculum have to be changed to meet the new emphasis? What new requirements will there be for the teaching profession in chemical engineering education? There are signs and omens in the dark clouds of this cataclysmic storm, and straws are drifting with accompanying winds. What future developments do the omens portend, and what direction do the straws indicate they will take?

Courses of Development in Manufacturing

When the war is ended, will there be a sudden transition back to the old normal conditions? I think not. The reconversion to normal industry will be slow at first. Time will be needed to determine what course new industrial developments must take. There is likely to be much unemployment among professional men as well as laborers during this period of adjustment, with attendant social disturbances. The new normal will be very different from the old normal.

Many manufacturing processes which had a stable existence in the old order will not be supported by the new economics. They will have to be greatly altered or scrapped. Competent authorities are convinced that the automobile industry has passed its peak. It is believed that some of the largest producers in the industry will not re-enter it. Many of the industries which depended largely on the automobile industry will have to point their activities in new directions. The rubber industry will be very different in the future. Profound changes will have to be made in the petroleum industry if it expects to maintain its dollars and cents position in the American industry of the future. It will undoubtedly become more of a chemical industry than it has been.

The rapid development of aerial transport of freight, as well as passengers, will have a profound effect on all human institutions and relationships as well as on industry. The social, scientific, economic, and political implications of this development are boundless. The relationships between great central power developments and industry will be different.

Aluminum in America will not be made largely from imported bauxites that have to be beneficiated in one part of the country and shipped to remote power sites for conversion to the metal which then has to be reshipped great distances for use. It will be made from domestic high-grade clays located near power sites.

Manufacture of chlorine will not be tied to large power developments and to the coproduction of caustic soda as at present. It will be produced in simple small units from salt and sulfur without the use

[1] Presented before the Society for the Promotion of Engineering Education at Columbia University, June 26, 1942.

of large amounts of power in the localities where the products are needed, with the elimination of transportation costs.

Manufacture of titanium pigments will not depend upon the transportation of ilmenite from Travaucore, in India, but will be produced from domestic titaniferous magnetites with the simultaneous production of magnetite of sufficient purity for use in the manufacture of steel. This notable achievement will be in full swing in 30 days. This may bring about an important change in the geography of our domestic iron and steel production as well as in the titanium pigments industry.

Research well under way at this time will undoubtedly result in the development of new power sources and in new methods of using the resultant energy. Such a development may well sharply alter the whole course of civilization. Other work may result in discoveries that will nullify or limit the use of the present-day types of explosives in warfare. That is not an idle dream.

The sudden shut-off of foreign sources of supply of strategic metals of which we have limited or no domestic reserves is bringing about a new alloy metallurgy involving the use of trace elements and their compounds and new methods of assembly of alloy components into finished products with unusual, useful properties. Introduction into process metallurgy of a new separation technique involving the use of cheap organic solvents with high selective specificity will make profitable the working of low-grade mineral deposits for the production of aluminum, vanadium, tungsten, molybdenum, chromium, uranium, perhaps radium and many of the common metals.

Development of new materials of construction for chemical process machinery is at this moment bringing into industry the practical use of processes heretofore considered impossible. Use of these materials for the construction of heat transfer apparatus, reaction vessels, evaporators, stills, filters, etc., for handling extremely corrosive substances in wide temperature ranges is opening many new fields for chemical process development. These are only a few of the new courses of development in the manufacturing side of industry that could be enumerated.

Trends toward Socialization

On the other side of industry great changes are taking place in the relationship between capital, labor, the public, government, and the professions. Whether we like it or not, the trend is toward more socialization than in the past. Considerable progress in this direction has already been made in the public utility industries, in the field of medicine, public housing and private home construction, and in agriculture. The tax-supported agricultural agent and farm consultant in every county is well known.

That such socialization may extend to the chemical engineering profession is more than a possibility. Several large cities which are industrial centers are now considering the proposal to set up tax-supported consulting engineering departments in the municipal government framework. Recent decisions of the superior courts definitely limiting the value of patent protection is a straw in the wind of socialization.

All of these changes combined will result in a new economic framework on which the chemical and other engineering industries of the future will depend and in which the chemical engineering profession will have to work and serve.

The methods of sales and distribution of manufactured products will be different. New elements will enter into cost determination, and new methods will be prescribed for cost accounting and company reports. The Government will more than likely prescribe many new techniques for the whole field of business management and administration. These may be very complicated in the chemical engineering industries.

There will undoubtedly be a greater trend toward decentralization of industries in the form of smaller manufacturing units. I believe that individual initiative and private enterprise will be encouraged and that the economic hazards of starting and operating small business enterprises will be largely removed by new stabilizing agencies of semigovernmental nature, such as industrial loan corporations similar to the present Home Owners Loan Corporation and the Agricultural Loan Corporation. Obsolescence in all branches of the industry, particularly in the processing branch, will probably run at a much higher rate than in the past. The rapidly recurring costs of replacement may have to be handled by obsolescence insurance agencies subsidized by the Government.

There will be many changes in the American ways of living. New structural materials and new methods for their assembly in small units will bring in new and different types of housing. The chemical engineer will have a greater part in this than in the past. The general introduction of the small family-size helicopter plane with a small automobile as an accessory for shopping purposes may have a wide effect in industry.

The Chemical Engineer in the New Era

The omens in the skies and the straws in the wind seem to indicate that the industrial norm of the future will be very different from the old one. That the new era will require chemical engineers to have new knowledge and new abilities is certain. New processes for old ones in wartime? Yes, but of as great and perhaps more importance to him will be his ability to originate, develop, and operate new processes for old ones in the future under the new fluid normal conditions. He will have to be a man of much broader training than the chemical engineer of the past. He will have to have a more thorough training in the fundamental sciences and in the principles of chemical and allied engineering than in the past and will have to know more about their practical applications. Much greater emphasis will have to be placed on training in the principles of research and experimental techniques, for he will be called on more and more for creative research and development work.

If he is to achieve a high professional development in this field, he will have to know much more than in the past about equipment design, plant design, process control and plant operation, industrial economics, business management, plant administration, sales engineering, public engineering and public relations, labor relations, corporation law, and finance. As a foundation for all of this, if he is to be a leader in his profession or even make a reasonable success, his professional training must have as a foundation a good liberal education in cultural and humanistic subjects. There will be much less chance for success than in the past for the handbook type of chemical engineer whose training consisted of standardized, formalized, and stereotyped instruction in the various subjects of the curriculum which has characterized much of engineering training. The use of dead textbooks and stereotyped instructional methods by incompetent or lazy-minded teachers will not produce chemical engineers who can cope with the future. Instruction in any subject which does not imbue the student with the spirit of research and teach him its methods and the methods and practice of creative thinking is a waste of time and money.

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Annual subscription rate, $2.00. Foreign postage to countries not in the Pan American Union, $0.60; Canadian postage, $0.20. Single copies, $0.15. Special rates to members.
No claims can be allowed for copies of journals lost in the mails unless such claims are received within 60 days of the date of issue, and no claims will be allowed for issues lost as a result of insufficient notice of change of address. (Ten days' advance notice required.) "Missing from files" cannot be accepted as the reason for honoring a claim. Charles L. Parsons, Business Manager, 1155 16th St., N. W., Washington, D. C., U. S. A.

Inspiring teachers—of course we must have them. After an experience of more than 30 years of teaching, research, and an extensive consulting practice in the field of chemical engineering, it is my considered judgment that no teacher can long be inspiring or have any considerable constructive influence in chemical engineering education, or in any kind of engineering education for that matter, who does not have a research program on which he continuously works and publishes. I frequently hear men complain that they do not do research because their teaching load is too heavy. That, in my opinion, in most cases is the excuse of a lazy man or of one whose research initiative is dead. Such a man, in my opinion, has no place on the staff of a modern and dynamic chemical engineering department which hopes to train efficient chemical engineers for the future.

Have I interpreted the signs and omens correctly? You must be the judge. New processes for old ones for wartime and the new peacetime? Yes, and chemical engineers with new visions, new capabilities, new human understandings, and new determinations to lift their profession to new heights of achievements in a democratic society of free people.

Acheson Medal Presentation

THE Edward Goodrich Acheson Medal and $1,000 prize were presented by The Electrochemical Society to Charles Frederick Burgess at the Hotel Statler, Detroit, Mich., on October 8.

Record Year for Cadmium in 1941

PRODUCTION of primary cadmium metal and compounds in 1941 increased 14 per cent over 1940, and established a new record, according to the Bureau of Mines, United States Department of the Interior. Producers' shipments of primary cadmium metal and compounds were 10 per cent larger in 1941 than in 1940. Production and producers' shipments of secondary cadmium (metal and compounds) increased 56 and 55 per cent, respectively, in 1941 compared with 1940.

Consumption of cadmium reached 8,063,000 pounds in 1941, a 31 per cent increase over 1940. About 95 per cent of the cadmium was consumed in electroplating, bearing alloys, and pigments.

George S. Gardner, for the past 10 years a partner in the firm of Brewer & Gardner, consulting chemists, is now associated with the American Chemical Paint Co., Ambler, Penna.

Danger

CURRENT rumors endanger our chemical manpower. Large numbers of chemists and chemical engineers up to 45 years of age have erroneously concluded that their professional services are not to be utilized or retained and that they might as well resign and enlist. Many have already done this. This tendency must be stopped or there will result a more serious loss of technical manpower than that due to the mistaken action of some Local Boards, employers, and technical men who have not understood the seriousness of the situation and the intent of Selective Service as laid down in official occupational directives.

It should be emphasized that there have been no changes in the policy or directives of the Selective Service System on the deferment of chemists and chemical engineers since Occupational Bulletin No. 10 (June 18, 1942) reprinted in full in CHEMICAL AND ENGINEERING NEWS for July 10, 1942. The suggestions for handling deferment, appeal, and the like published in CHEMICAL AND ENGINEERING NEWS for September 10, 1942, still hold. The only point to be added is that *each* deferment should be handled on its own merits at the time and without prejudice because of earlier deferments.

The SOCIETY is prepared to furnish, on request, one set of the following documents:

(*a*) Procedure in requesting deferment for chemists and chemical engineers in war industry and other essential activity.
(*b*) Excerpts from Selective Service Regulations referring to final appeal after refusal by local and state appeal boards.
(*c*) Planographed copy of Occupational Bulletin No. 10.

Any number of extra sets furnished for 3 cents (in stamp) each.

The following occupational bulletins are also important for reference in specific instances. They all list chemists and chemical engineers as being in "critical occupations" to which local boards should give careful consideration.

Occupational Bulletin 15, "Petroleum, Natural Gas and Natural Gasoline Activity". Includes petroleum refining and the production of tar, pitch, coal gas, and coke.

Occupational Bulletin 16, "Smelting, Refining and Rolling of Metals Activity".

Occupational Bulletin 18, "Agricultural Activity". Includes most forms of agricultural production and processing.

Occupational Bulletin 20, "Food Processing".

Occupational Bulletin 21, "Transportation Service Activity". Section 4. Railroad Transportation Service.

The SOCIETY has no copies of these bulletins for distribution, but they are supposed to be on file with the local boards. Any chemist or technical engineer directly interested will probably be furnished a single copy on written request to the Selective Service System, 21st and C Streets, N. W., Washington, D. C.

CHARLES L. PARSONS, *Secretary*

AMERICAN CHEMICAL SOCIETY
1155 SIXTEENTH ST., N. W.
WASHINGTON, D. C.

Data Published on Selective Service

BECAUSE of the wide interest in this subject and the need for obtaining trained men for our Production Army, we give below references to information we have published on occupational deferements, including those of men in training, and the need for technically trained persons. Future developments will be brought to the attention of our readers.

Chemical and Engineering News

(NEWS EDITION previous to 1942)

Vol. 18 (1940), pages 890, 1127
Vol. 19 (1941), pages 129, 311, 457, 459, 489, 520, 587, 681, 797, 1164, 1412, 1464
Vol. 20 (1942), pages 110, 157, 472, 579–80, 788, 812, 837–39, 985, 1099, 1100
Current issue, page 1219

Industrial and Engineering Chemistry

Vol. 33 (1941), pages 1, 135, 283, 561
Vol. 34 (1942), pages 2, 131, 259, 648, 1134.

Lieutenant Ralph E. Meints has been called into active duty in the Chemical Warfare Service, and is assigned to the Production Division at Huntsville Arsenal, Ala He was formerly in the research and development of the National Aniline Division, Allied Chemical and Dye Corp., Buffalo, N. Y.

Geo. W. Muhleman, visiting professor at Alma College, Alma, Mich., for the year 1941–42, has been appointed acting professor and head of the Department of Inorganic Chemistry and Qualitative Analysis at the North Dakota Agricultural College, School of Technology, Fargo, N. Dak.

Herbert E. Smith has been elected president of the United States Rubber Co., chairman of the executive committee, and a member of the finance committee. Mr. Smith has been with the company 29 years and since 1929 has been vice president and a director of the company.



Problems in the Industrial Utilization of Tobacco[1]

M. J. COPLEY, R. K. ESKEW, AND J. J. WILLAMAN

Eastern Regional Research Laboratory, Bureau of Agricultural Chemistry and Engineering, United States Department of Agriculture, Philadelphia, Penna.

SINCE a surplus of certain types of tobacco has developed in recent years, the Eastern Regional Research Laboratory of the United States Department of Agriculture has undertaken a program of research to find more extended industrial uses for tobacco. The program at present is directed principally toward the wider utilization of nicotine, because nicotine is already a commercial product and is one of the most unique constituents now known in this plant. Other constituents, however, show promise as industrial materials and are being investigated.

Nicotine has been an important product for many years. It is derived from tobacco factory by-products, such as stems, scraps, and other wastes and, to a lesser extent, from low-grade leaf of the fire-cured types. About a million pounds of the alkaloid have been recovered annually in this country. Until recently practically all of the nicotine was used in insecticides. Within the past year a considerable demand for it has developed for conversion into nicotinic acid. The main objectives at present, therefore, are more economical recovery of nicotine from tobacco, development of new and more efficient nicotine insecticides, and improvement in the oxidation of nicotine to nicotinic acid.

The principal methods which have been suggested for the recovery of nicotine are steam distillation, water extraction, and organic solvent extraction. Steam distillation is the method largely used in this country, although solvent methods appear to be employed in other countries. Aqueous extracts are often used as such without further isolation of the nicotine and usually near the site of extraction, since their low nicotine concentration prohibits commercial shipment. Steam distillation is cumbersome in that the concentration of nicotine vapor carried by the steam is around 4 per cent at best and, where a batch process is used, the average nicotine content of the distillate is usually less than 1 per cent. This necessitates the handling of a very large volume of distillate for each unit of nicotine. Vacuum distillation of tobacco has been tried with some success. The material is treated with lime and a minimum amount of water to liberate the free alkaloid. The mixture is then subjected to distillation in a vacuum of less than 50 mm. Water comes over first, carrying less than 1 per cent of nicotine. When practically all of the water is removed and the temperature of the material is raised above the boiling point of nicotine at this pressure, nicotine with a relatively small content of water distills over. The resulting distillate, containing 80 per cent or more nicotine, could be purified readily and converted either to the pure alkaloid or to the 40 per cent nicotine sulfate of commerce. To the present this has been done only in a small way using inefficient equipment. The principle, however, seems to be sound, and equipment in which the industrial feasibility of the process can be determined is under construction.

Nonaqueous solvent extraction of nicotine may have possibilities of development. Unfortunately, there are considerable amounts of nonnicotine materials in tobacco which are soluble in the ordinary solvents. It is possible, however, that among the great variety of solvents available, some may be found which have a marked preference for nicotine and could meet other requirements, such as recoverability, cost, and freedom from hazards.

The case for aqueous extraction is further complicated by the still greater quantity of constituents soluble in water. An inexpensive and feasible precipitating agent which will remove the nicotine with a minimum of impurities may be found, however. The nicotine would then be recovered from the precipitate.

In the attempt to find new and more advantageous forms of nicotine for insecticides, several promising lines of work have opened up. What is believed to be a wholly new series of double salts or complexes containing nicotine has been developed. These salts consist of two basic and one acidic radical. An example is copper-nicotine-picrate. Over 40 different salts have so far been prepared involving copper, cobalt, cadmium, zinc, iron, nickel, picrate, benzoate, thiocyanate, cyanide, salicylate, and *o*-benzoyl benzoate. These salts are of constant composition, have high nicotine contents, are extremely insoluble in water, and are prepared readily as impalpable powders without grinding. Their insecticidal value is being tested. Those containing copper may have combined insecticidal and fungicidal value.

Rubber dust, either hard or soft, will absorb about 10 per cent of nicotine and still remain a dust. Above this concentration the mixture becomes gummy, and finally the rubber and nicotine become fluid. These dusts liberate nicotine rather slowly. They should, therefore, be effective insecticides over a period of several days, in contrast to dusts containing lime, where the nicotine is vaporized in a matter of hours. Similar combinations have been found between finely ground plastics of various sorts and nicotine, as well as other volatile insecticides such as ethylene dichloride. Again, it has been found possible to impregnate fine fibers, such as medullary wood fibers, with a dye and then form the nicotine salt of that dye in the fibers. These fibers adhere tenaciously to foliage and fruit.

On January 29, 1941, the Committee on Food and Nutrition of the National Research Council announced that wheat flour would be enriched by the addition of thiamin, nicotinic acid, and iron. This initiated an intensive search for adequate sources of nicotinic acid. In 1940 about 10,000 pounds of this acid had been manufactured for the treatment of pellagra. In addition, it is estimated that upwards of 200,000 pounds will be needed for flour fortification in 1942. Since nicotine has been the best known material for producing nicotinic acid, an unprecedented demand was created for this alkaloid. Quinoline and β-picoline are also possible raw materials but at that time, at least, were not available commercially. Therefore a race developed among these three starting materials. The Eastern Regional Research Laboratory started work immediately to improve the oxidation of nicotine to nicotinic acid.

Since a chemical source of oxygen such as nitric acid is costly for carrying on this reaction, air oxidation was attempted. Vapor-phase catalytic oxidation is being intensively studied. Some success has resulted, but it is premature to discuss the results in detail. Sulfuric acid oxidation in the presence of a catalyst works rather well, but here a chemical source of oxygen is again involved. It would be hazardous to predict from what source the nicotinic acid of the future will be obtained, but we feel that nicotine is still a logical source.

War in the Pacific may impose a still further demand on nicotine because of restricted importations of pyrethrum and

[1] Presented before the Division of Agricultural and Food Chemistry at the 103rd meeting of the AMERICAN CHEMICAL SOCIETY, Memphis, Tenn., April 20 to 23, 1942.



A field of tobacco in Connecticut

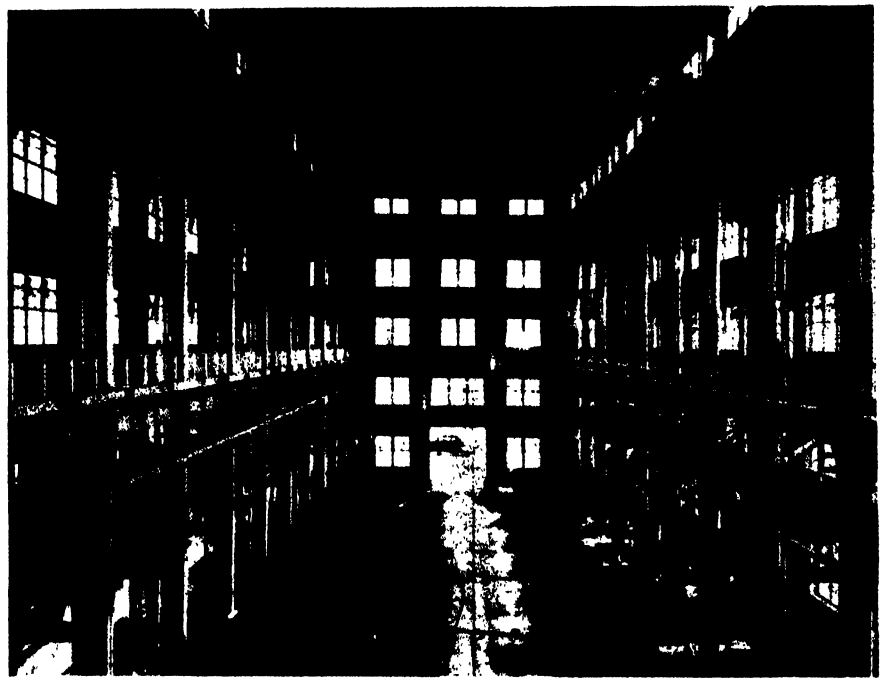
derris for insecticide purposes. Since Africa may be able to supply these materials in sufficient quantity and nicotine can replace them for only certain purposes, it is difficult to predict just what the situation in this regard will be in the near future. The best estimate, however, seems to be that there will be a shortage of something like 300,000 pounds of nicotine this year, from at least three causes—its use in nicotinic acid manufacture, its use to replace derris and pyrethrum, and its increased agricultural use for greater food production. Attempts to make up this deficit are along three lines. First is the development of more effective means of using nicotine as an insecticide. Possibly some of the new compounds mentioned above will help; possibly activators or synergistic materials will be found. Second, a considerable poundage of low-grade leaf tobacco of certain types will be diverted from the ordinary leaf channels to nicotine manufacture. Such diversion has occurred during recent years, and it may be expanded during the present year. A third possible source of additional nicotine might be the growing of *Nicotiana rustica*, a species of tobacco which is not used for smoking in this country and contains about twice as much nicotine as ordinary tobacco. Rustica has been grown experimentally for a great many years in various parts of the country and constitutes a potential source of an appreciable amount of nicotine.

Other phases of tobacco chemistry are also being investigated at the Eastern Regional Research Laboratory. An attempt is being made to develop chemical standards for the grading of tobacco. Different grades are well established in the trade, and they are purchased for particular effects in blending for various tobacco products. A scientific basis, however, for defining these grades and explaining their particular qualities has never been established. Certain of the constituents of tobacco are known to exert a favorable influence on the value of the leaf, and others markedly detract from its worth. Some of these, however, have never been identified, and for others known to be present no satisfactory methods of quantitative estimation are available. This project involves making a careful inventory of the constituents of tobacco, means for determining these constituents quantitatively, and application of this information to the grading of tobacco. This is naturally a long-time undertaking, and as yet it is too early to report results. It may be stated that definite progress has been made in the isolation and identification of certain of these constituents, particularly those that contribute to the aroma of the leaf.

As a result of these analyses, it is possible that some constituents of tobacco which may have industrial uses will come to light. It is known that tobacco contains appreciable quantities of citric and malic acids. In fact, earlier attempts have been made to recover these, and this laboratory is now studying methods for their recovery. Tobacco also contains unique essential oils, of some types in appreciable quantities. Pectin and the enzyme, pectase, are known to occur at least in the stems. A considerable quantity of resins, possibly suitable for coatings and plastics, is also present. The alkaloids, nornicotine and anabasine, occur with nicotine in certain types. Some attempts have been made to convert the residual fiber from nicotine recovery into fiber boards.

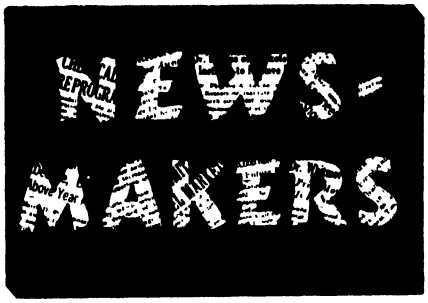
Tobacco, like any other crop, contains a variety of constituents, and every reasonable attempt will be made to evaluate the commercial possibilities of these constituents.

An attempt is being made to keep the research program on tobacco in tune with changing conditions. When this program was first started, the viewpoint was almost



Interior view of the pilot-plant wing of the Eastern Regional Research Laboratory. Findings of the chemical laboratories will be tested on a semiworks production basis in this wing. It is 65 feet wide, 258 feet in length, and has an overhead clearance of 45 feet in the center. Galleries 12 feet wide run the entire length of both sides.

wholly that of finding more extensive uses for a surplus commodity. It was felt that more extended uses for nicotine, for example, would consume more of the lower grades of tobacco and maintain a better price for the other grades. The change in world conditions, however, has now altered this picture. Instead of wondering how more nicotine could be used, we are now wondering where sufficient nicotine can be obtained.



Harold R. Alley, is now associated with Tested Papers of America, Inc., as technical director. The company maintains a sales office and a modern paper testing laboratory in the Carbon and Carbide Building, 230 North Michigan Ave., Chicago, Ill. Mr. Alley was formerly associated with the Testing Department, Commonwealth Edison Co., Chicago.

George J. Bair, formerly an industrial fellow at Mellon Institute, in charge of Garco Products, Inc., has joined the research and development staff of the Corning Glass Works, Corning, N. Y., to assist in the war effort.

Francis Boyer has been elected a member of the board of directors of the Pennsylvania Salt Manufacturing Co., to fill the vacancy resulting from the death of **Samuel D. Warriner** on April 3. Mr. Boyer is executive vice president and director of the Smith, Kline & French Laboratories.

Robert L. Brown, formerly du Pont fellow in chemistry at The Ohio State University, has been employed as research chemist in the Pioneering Research Section, Rayon Technical Division, E. I. du Pont de Nemours & Co., Inc., Buffalo, N. Y.

Charles C. Chamberlain has been named general sales manager of Jenkins Bros., Bridgeport, Conn. Mr. Chamberlain has been publicity manager of Jenkins Bros. since 1940.

Harold F. Cleveland, Springfield, Mass., has been elected national commander of the Chemical Warfare Service Veterans Association.

L. Keith Coad is now a research chemist with the Research Laboratories Division of the General Motors Corp., Detroit, Mich. Mr. Coad has finished his graduate work at the University of Minnesota, and will receive the Ph.D. degree in December.

Howard I. Cole, formerly an expert of the League of Nations, has been commissioned a major in the Chemical Warfare Service with station in the Office of the Chief of Chemical Warfare Service, Washington, D. C. The Leonard Wood Memorial has granted him a leave of absence from his position as director of Chemical Research for the duration.

A. Laurence Curl has been transferred from the Plants Products Section, Agricultural Chemical Research Division, Bureau of Agricultural Chemistry and Engineering, U. S. Department of Agriculture, Washington, D. C., to the Citrus Products Station of the Division in Winter Haven, Fla.

Charles B. DeWitt, formally employed at the pilot plant of Kalunite, Inc., Salt Lake City, Utah, has been transferred to the aluminum reduction plant of Olin Corp., Tacoma, Wash.

Richard B. Ellis is now connected with the Corning Glass Works as a member of the Research and Development Department. At the end of July he left the Research Department of Joseph E. Seagram & Sons, Inc., where he was supervisor of the Analytical Division.

Since the middle of March **W. B. Esselen, Jr.,** has been spending half time in Washington as a consultant in the Packaging Section of the Office of Agricultural War Relations. He is also serving on the Technical Sub-Committee of the Glass Container Industry Advisory Committee of the War Production Board.

Recent additions to the staff of Foster D. Snell, Inc., Brooklyn, N. Y., include **Norman Fine, Alvin Gruder, Anne Sullivan,** and **Herbert Terry.**

Adolph R. Jensen, who received the Ph. D. degree in analytical chemistry at the University of Illinois in August, has accepted a position as assistant research chemist in fuels and lubricants at the Aircraft Engine Research Laboratory, National Advisory Committee for Aeronautics, Cleveland Airport, Cleveland, Ohio.

Z. H. Mischka has been named advertising manager of the American-Marietta Co., Chicago, Ill., succeeding **Marvin E. Smith,** who has entered the service.

Herbert D. Schmidt, formerly New England representative of the American Hard Rubber Co., has become affiliated with the Sales Department of the United States Stoneware Co., with headquarters in New York.

Recent additions to the staff of the Armour Research Foundation, Chicago, Ill., include **Joseph Robert Spraul,** physical chemist, formerly of the research department of the American Can Co.; **Anton Novy,** ceramist, formerly junior metallurgist with the Fansteel Metallurgical Co.; and **Howard T. Francis,** physical chemist, recent graduate of Pennsylvania State College.

Charles A. Thompson, of the Pittsburgh office of Robins Conveying Belt Co., Passaic, N. J., has become a Lieutenant in the United States Navy. A graduate of Carnegie Institute of Technology, Lieutenant Thompson had considerable engineering experience before joining the Robins sales staff.

William E. Vogt has been elected secretary of the Electro Metallurgical Sales Corp., a unit of Union Carbide and Carbon Corp., with headquarters at 30 East 42nd St., New York. Mr. Vogt has been connected with Union Carbide for more than 30 years.



William E. Vogt

James A. Wilson has been promoted to the position of assistant plant manager of the Trenton, Mich., plant of the Monsanto Chemical Co.

Thomas R. Wood, University of Illinois, and **Edward M. Scott,** University of Minnesota, have been appointed postdoctorate fellows in biochemistry in the University of Pittsburgh.

Harry L. Yale, on leave of absence from Shell Development Co., Emeryville, Calif., in order to carry out special research for the National Defense Research Committee, has returned to his former position with that company.

Reclaims and Reclaiming[1]

PAUL M. ELLIOTT

U. S. Rubber Co., Naugatuck, Conn.

Steps in reclaiming are pictured on pages 1252 and 1253.

IN CONSIDERING a process or a product it is usually entertaining and frequently profitable to look into its background. A knowledge of the way a process or product has developed aids in understanding its shortcomings and appreciating its perfections. A consideration, therefore, of the background of present-day reclaiming seems in order.

Prior to the time of Goodyear, rubber was used in the uncured state. Scrap and imperfect goods could be treated with solvent and the rubber recovered as a solution, then be used to make new goods. With Goodyear's discovery of vulcanization the situation was changed. Goodyear termed his product "metallic rubber". This was because heat which ordinarily seriously affected the properties of rubber goods had relatively small effect upon goods produced by his process. Goodyear's cured rubber was by the standards of his day relatively metal-like in resistance to ordinary temperature changes. It was likewise found to be resistant to solvents and could not be milled. As a result, unusable scrap began to accumulate and with rubber at over a dollar a pound the problem was serious. Many men tried their ideas, but almost the first to patent a process for reuse of the scrap was Goodyear himself. In 1853 in England and 1855 in the United States he received patents for the use of mill ground scrap which he called "Crumb". The process worked best with fiber-free scrap and really gave only a cheap filler. Even today many tons of scrap are prepared for reuse each year by simple grinding such as Goodyear proposed.

The next steps forward were taken in 1858 by Hiram Hall and Francis Baschnagel of the Beverly Rubber Works in Massachusetts. In January, Hall patented a process for softening scrap rubber by boiling with water. The softened rubber was then milled with tar. Baschnagel improved the process by using pressure to get temperatures up to 600° F. Here are the basic features of today's heater or devulcanizer process. In later patents that same year Hall proposed treating scrap rubber with various solutions including dilute sulfuric acid, and in 1863 the Hayward Brothers also used dilute sulfuric acid, but either concentrations or heating times were wrong for another 20 years were to pass before the "acid process" as we know it today was evolved.

The next development to last was that of E. H. Clapp who in 1868–70 opened a plant in Boston to reclaim shoes. The shoes were cut and torn apart by hand to separate as much rubber as possible from the cloth. The remaining cloth scrap was then ground and, the novelty, subjected to an air blast to blow out as much as possible of the fine fiber. The rubber was then steamed and milled with oil and sold under the name of "Shoddy". The product was indeed a shoddy material, and the name stuck. Clapp's winnowing has been "rediscovered" many times since his day and still finds use in a variety of applications.

In 1881 Colonel Chapman Mitchell secured his first patent on the "acid process". In spite of the earlier work of Hall and the Haywards, Mitchell so clarified and rounded out the process that he is quite generally credited with its discovery. He boiled the stock for a few hours with 20 per cent acid, washed it well, dried it, mixed it with oils, heated it at 300° F. to restore plasticity, and milled it to blend and smooth the product. In the 80's, Mitchell started the Philadelphia Rubber Works, the first concern organized solely for reclaiming. All reclaiming prior to that time was done by rubber manufacturers in conjunction with the production of rubber shoes or other goods.

The next and one of the most important steps in reclaim development started in the plant of the Boston Woven Hose and Rubber Co. The tale is told of two bright young chemists, fresh from college, who, working together in the laboratories of this company, asked themselves why the rubber stoppers in sodium hydroxide bottles became so soft and whether this observation could be used to improve reclaiming. They disagreed as to the answer and soon split.

Arthur Marks went to Akron with the Diamond Rubber Co., and in 1899 patented his process for treating ground scrap in a jacketed pressure vessel with 3 per cent caustic soda for 24 hours at 125 pounds steam pressure. The process simultaneously removed fiber and plasticized the rubber. It did away with the messy corrosion of the acid process and soon gained widespread favor. It made Marks a fortune and gained for him general credit for discovering the "alkali process" of reclaiming.

Little reference is made in literature to the other chemist, R. B. Price. It is evident, however, that he continued working on his interpretation of the action of sodium hydroxide in the softening of cured rubber. In 1904 Price received a patent for his interpretation of the action of caustic in reclaiming rubber. His idea was to treat ground scrap with caustic of such concentration that the boiling point at atmospheric pressure would be over 232° F., the melting point of sulfur. He used an open vessel at first but later used a closed spherical vessel heated by direct injection of steam into the charge. To exploit his process he organized the Rubber Regenerating Co. which was incorporated in Illinois in 1906 and again in Indiana in 1908. This company later became affiliated with the United States Rubber Co., and what is now known as the Reclaiming Plant of the Naugatuck Chemical Co. was called the Rubber Regenerating Co.

The heater process developed by Hall and Bachanagel still produces about 10 per cent of the total reclaim made in the country. Another 3 per cent is made by the acid process of Mitchell, while by far the largest portion, some 80 per cent of the total, is prepared by the Mark's alkali process. The other 7 per cent of present reclaim production is made by simple grinding and by other miscellaneous processes.

In the early days the reclaiming business was largely the recovery of the rubber portion of old shoes. Even as late as 1905, of a total world consumption of 62,000 tons of crude rubber, some 30,000 tons went into shoes. In this same year bicycle and automobile tires consumed only 12,000 tons. About 1910, however, the picture began to change. The automobile gained in popularity at a tremendous rate, and so larger and larger proportions of tires began to appear in the scrap piles. In 1937 the world used about 1,000,000 tons of crude rubber, and of this total about three-fourths, or some 750,000 tons, went into tires, while shoes consumed only 60,000 tons, about twice the figure for 1905. It is evident, then, that by far the most important item of scrap today is the automobile tire, and in considering present-day reclaiming we discuss almost entirely the production of reclaim from tires. The reclaimers' problem is not a simple one. There are many types of tires and even more types of scrap from other sources.

Reclaim Production

Since many of the properties of reclaim are controlled by the reclaim manufacturer through his choice of process, the

[1] Abstract of paper presented at Yale University, April 1942.

rubber chemist should know how rubber is reclaimed. An understanding of the process will also indicate why production capacity cannot be expanded at a moment's notice.

First there is the problem of scrap. Adequate supplies must be maintained for proper blending and to give stability of costs. The result is huge stacks of old tires and other types of scrap. The tires come loose, but most other scrap is bagged or baled. Special equipment is needed for handling the bales which average 1,200 pounds in weight, and may weigh as much as a ton. Tires are handled largely by hand, but power equipment and conveyors have been devised to minimize handling.

For treating scrap containing fiber, the digester process is generally used. Perhaps the easiest way to follow this process is to follow the path taken by a tire through the Reclaiming Plant. From the storage yards the tires are taken by truck to the bottom of a conveyor on which they go to a storage room. This room serves the dual purpose of acting as a reservoir of scrap for night operations and, during the winter, of permitting much of the ice in the tires to melt. From the storage room the tires are taken by hand truck to the Cracker Department, where they are first cut radially by a device called an alligator shear. The cut tires are conveyed to a bank of debeaders where they are fed manually to a machine which smoothly and rapidly cuts the beads from the tires.

The beads contain many lengths of steel wire imbedded in hard rubber, fabric, and soft rubber in such a way that in ordinary times it is not economical to reclaim the rubber present. In the present situation every effort is being made to reclaim the rubber in tire beads as well as in all other scraps. The cut and debeaded tires are conveyed from the debeading machine to a powerful chopping machine which, by a system of whirling knives, reduces even the largest tire to chunks which will flow easily by gravity to the cracking mills. The cracking mills are large corrugated roll friction mills which crush and grind the chunks of tires to fine bits. From the crackers the finely ground stock falls into bucket elevators which convey it back to the upper floors and feed it to gyratory screens. The screens return coarse material to the crackers for regrinding, and pass fine material through screens of desired mesh to a magnetic separator where all scrap iron is removed. The cleaned stock which still contains brass, aluminum, and some clinging iron is blown to storage bins preparatory to further treatment.

For the removal of fabric and plasticizing of the rubber, the ground scrap together with swelling agents, binding agents, liquid caustic, and water is charged into a vessel termed a digester. Modern digesters are horizontal, jacketed, cylindrical, steel vessels of up to 4,300 gallons capacity, equipped with powerful agitators. In the digester the fabric in the tire is destroyed, the rubber is reverted by the heat, and the oils and binding agents penetrate the rubber particles quite uniformly. Heating cycles vary from 5 to 50 hours at 150 to 200 pounds' steam pressure. At the end of the heating period the valve in the bottom of the digester is opened, permitting internal pressure to blow the entire contents of the digester into a blow-down tank, connected through heat exchangers to the atmosphere.

From the blow-down tank the scrap slurry is carried by screw conveyors to vibratory washing screens. As the stock passes across the screen, jets of hot water wash out completely the soaps, sodiocellulose, and other soluble or emulsified materials. The clean softened rubber drops into a mechanical squeezer where it is pressed to effect the removal of a large per cent of its water content. Screw conveyors carry the still wet stock (it has a moisture content of about 50 per cent at this point) to a continuous drier of a special design. Stock coming from the drier has a residual moisture content of not over 5 per cent and is ready for final blending and mechanical finishing operations of the mill room. It is taken by conveyor to storage bins preparatory to milling operations.

Some fiber-containing stock and much of the fiber-free stock is treated by a somewhat different process, known as the heater or devulcanizing process. The ground scrap is mixed with oils, binders, and some liquid caustic in an internal mixer and then either put in small pans or in a large specially designed boat which can be pushed on rails into the heating vessel. This vessel is cylindrical and has a quick closing door capable of withstanding the steam pressures used in the process. The steam is blown into the vessel and comes into direct contact with the rubber. Steam pressures from 125 to 250 pounds per square inch are now commonly used in the heater process. The heat cycle varies from 5 to 20 or more hours depending on the type of scrap, the pressure of the steam, etc. Any cellulose present in this scrap is so weakened by the heat that it can be blended into the rubber, and the rubber itself is softened and plasticized. Contact with steam has, of course, added moisture to this stock. So, after removal from the heater, the material is broken apart and dried in a continuous drier. It is now ready for the milling operation.

In the mill room massive machines blend together and mechanically complete the plasticization of the intermediates partially softened by the digesting or devulcanizing process outlined above. Selected proportions of various intermediates are mixed with each other and desired quantities of pigments, fillers, or compounding ingredients in Banbury mixers or on open mills. The blended stock is then taken to sheeting mills which squeeze and rub the particles into a more or less continuous sheet some 0.007 to 0.01 inch thick.

From the sheeting mills the stock is fed into a strainer which is a modification of the tubing machine. The rubber is forced by worm feed through screens which are from 15 to 40 mesh depending upon the stock, and all aluminum, brass, copper, residual iron, and unsoftened rubber particles are strained out. The strained stock is conveyed to refining mills. The refining mill is a sturdily built two-roll friction mill. The rolls are ground with a slight crown so that when the mill is tightened the pressure will be slightly greater in the center of the rolls than toward the edges. The difference in pressure in the bite of the rolls brings about a special refining action whereby less completely plasticized particles are forced to the edges of the roll so that they may be separated and reworked or retreated to give a more uniform finished product.

The main mass of reclaim comes from a refining mill as a continuous sheet 0.003 to 0.005 inch thick. The refined stock is put through the finishing mills which are again designed with crown rolls. Finished reclaim comes from these mills as a smooth almost silky sheet 0.002 to 0.003 of an inch thick and is wound on a drum until a sheet from 0.5 to 1 inch thick is built up. The resultant slab of reclaim rubber is removed from the drum by skilled operators, cooled, dusted with talc, and stacked on skids ready for the final inspection and testing. All reclaim is made to rigid specifications and must pass from 12 to 20 tests before being okayed for shipment.

The reclaim manufacturer can vary the process in many ways and so may control the property of the product to give many special characteristics to the finished reclaim. Among the controllable factors may be listed the type of scrap, fineness of cracking, kind and amount of chemicals and oils used in the digester, time and temperature of the heating operation, extent of washing, blending of intermediates, fillers, and modifiers in the Banbury or on the mixing mills, quality of the straining, and nicety of refining and finishing. There is also the possibility of blending digested intermediates with those produced by the devulcanizer and acid processes. Since each process may contribute to the product certain special properties, a wide range of grades and qualities of reclaimed rubber is obtainable. It must also be apparent that, because of the equipment required, the production of reclaim cannot be expanded very much without extensive outlay in new machines.

Compounding

Of great importance is the problem of compounding. Obviously it is not within the scope of this paper to go very deeply into compounding problems, but certain general principles can be considered profitably.

Basically reclaimed rubber is like crude

rubber. It cures with sulfur, requires accelerators for rapid curing, is protected by antioxidants, and reacts as expected to loadings of reinforcing or inert fillers. One should always keep in mind, however, that reclaimed rubber possesses all these characteristics to a different degree than does crude rubber. To illustrate this, let us consider the steps that a compounder might take to convert an existing formula based on crude to one containing a desired proportion of reclaim. There are, of course, many ways to accomplish this. The method outlined is one which is relatively simple and quite generally satisfactory. The steps are as follows:

1. He should select a reclaim that is economically and physically suited to the proposed use. This choice involves many factors considered more fully below.
2. On a rubber hydrocarbon basis he should replace as much as desired of the crude in his formula by the chosen reclaim. That is to say, one should not expect to replace 30 parts of crude in a formula by 30 parts of a reclaim containing only 60 per cent rubber hydrocarbon but should use 50 parts of the reclaim. It is usually satisfactory to consider crude as 100 per cent rubber hydrocarbon, although we know it is not. The rubber content of the reclaim is generally furnished by the reclaim manufacturers. In the past there has been some disagreement as to how "rubber content" should be determined. It is calculated by difference, i. e., the other constituents of the mixture are determined and the unaccounted for portion is considered to be rubber. At present the practice is becoming more uniform and correction is applied for the carbon black and cellulose in the reclaim as well as for extractibles, moisture, combined sulfur, and ash.
3. Since reclaimed rubber is nearly always faster curing than crude, the acceleration of the compound should be reduced or modified to take advantage of this feature.
4. Adjustment should be made for the fillers, reinforcing agents, and zinc oxide available in the reclaim used. Carbon black or clay in the reclaim will contribute towards hardness and abrasion resistance in the cured product. Inert filler which is in the reclaim will in general function much like the same filler added to the mix. If zinc oxide is present in the reclaim in large amounts, it is available not only for the curing of the reclaim but also to a certain extent for curing of new rubber added to the mix. It is to be noted, however, that a certain amount of new zinc is generally necessary to give stocks which age well. To avail himself of the compounding ingredients present in the reclaim, the compounder should substitute the reclaim for the crude on the hydrocarbon basis and then progressively reduce the loading or zinc content of his formula to give him the desired properties in the finished product.
5. Reclaimed rubber may materially alter the processing properties of the compound. This change in properties should be studied for it has in very many cases, particularly with calendered or extruded goods, been found worth while in processing to add some reclaim to the mix.

Choice of Reclaim

The problem of the selection of the best reclaim for the job is always important and is especially so today when it is desired to get the most value from reclaim. The properties of reclaims vary over wide limits and various types may overlap in characteristics.

On the basis of the type of scrap going into the reclaim the following generalizations can be made:

Auto tube reclaims are likely to be "nervy" in processing but will give "rubbery" cured stocks with good tensile.

Whole tire reclaims are flat processing, that is, they show relatively little shrinkage or distortion after calendering or extruding operations. They give stiffer cured stocks showing good aging and abrasion resistance with moderate tensile.

Carcass reclaims are flatter than tube reclaims and give "rubbery" cured stocks with moderate tensile and aging characteristics.

Tread reclaims give excellent resistance to abrasion and good aging with, of course, relatively hard, stiff cured stocks.

Shoe reclaim is very flat and calenders well but generally has a high specific gravity and low rubber content with correspondingly low tensile.

Superimposed on the above characteristics will be those conferred by the reclaiming process. For the most part it is not important whether a reclaim has been devulcanized or digested since proper variations of either process can be made to yield nearly all classes of reclaim. But both processes can be run by alkaline or acid procedures and this change does materially alter the character of the reclaim. To generalize again:

Alkali reclaims tend to be "nervy" and fast curing. They give snappy high-tensile cured stocks. The finished reclaim is usually alkaline.

Acid reclaims are flatter and slower curing. They give less trouble in scorching and are widely used in tubed and calendered goods. They are likely to give lower tensiles. The finished reclaim is generally neutral.

In any class of reclaim we can make the additional statement that high gravity stocks, particularly those which have been built up by the reclaimer through addition of filler, will be flatter and smoother than a similarly well-refined stock of lower gravity.

With all of these variations and their combinations it must be apparent that the specifications of available reclaims should be carefully examined before a choice is made for a specific use. The large reclaim manufacturers all make a relatively complete line of reclaims and have types which they recommend for certain applications. The recommendations will help in making selections, and in special cases the manufacturers will doubtless be glad to aid in making the choice of reclaim.

Present Practice

At present many are wondering how high a proportion of reclaim can be used in various articles. For a number of years the consumption of reclaim has ranged between 25 per cent and 35 per cent of the weight of crude used, and the maximum ratio of use was 50 per cent in 1928. This is, of course, the over-all figure for the industry and includes products made entirely from reclaim and others made entirely from crude. The demand now is for higher and higher reclaim content in many lines, and many products must be made 100 per cent from reclaim. No one can say dogmatically just how high we can go in reclaim content and how little rubber can be used in a given application. Things are being done today which were considered impossible or highly improbable only a few months ago. For example, consider the all-reclaim inner tube. A few months ago it was the general opinion of manufacturers that it would not be feasible to produce such an article. The difficulties of tubing were believed to be such as to preclude its manufacture. However, now it is reported that such a tube has actually been in production.

Also there is the problem of the all-reclaim tire. Production of a tire 100 per cent from reclaim involves many problems in building. In the past there has been no call for such a tire, and therefore these problems have not been studied and worked out completely. It is generally considered economically unsound to build a tire from all-reclaim provided new rubber is available. In recent weeks much publicity has been given to the production of all-reclaim tires, and it seems highly probable that such tires will be made for nonmilitary use. The actual service that would be obtained by a consumer in using an all-reclaim tire would depend on many factors such as the time of year, the speed with which he drives, how fast he accelerates, how he applies the brakes, and the general care that he gives both his car and the tires. In giving figures for the miles that can be obtained from the all-reclaim tire we must know under what conditions the tire was used if we are to compare with the mileage that would be obtained with a first line, all new rubber tire.

Many of the new products being made today may not possess the properties called for by specifications set some time in the past. There are indications, however, that in actual service, which is the only true test, many of these new high-reclaim or all-reclaim products will be acceptable.

Conclusion

The capacity of the reclaim industry is quoted at 350,000 tons per year. This is based on certain assumptions—first, that certain types of reclaims will be produced; second, that the proportions of these reclaims will bear certain ratios to each other so that the complete usage of all available equipment will be ensured; and finally, we are assuming that the scrap needed to produce this reclaim will be available.

Buffalo Echoes

Biological Chemistry

Of the 300 members of the Division of Biological Chemistry about 70 were present at the Buffalo meeting. The joint session with the Division of Agricultural and Food Chemistry on vitamins and nutrition (all day Tuesday) as usual was very well attended. The highlight of the meeting was the Garvan Medal address by Florence B. Seibert, of the Phipps Institute, Philadelphia, on the chemistry of tuberculosis.

The meetings of the Division were well attended and 46 papers were presented.

A Joint Symposium with the Divisions of Agricultural and Food Chemistry and Biological Chemistry on the Correlation of Biological and Chemical Methods of Vitamin Assay is under consideration for the Indianapolis meeting.

E. Brand, *Secretary*

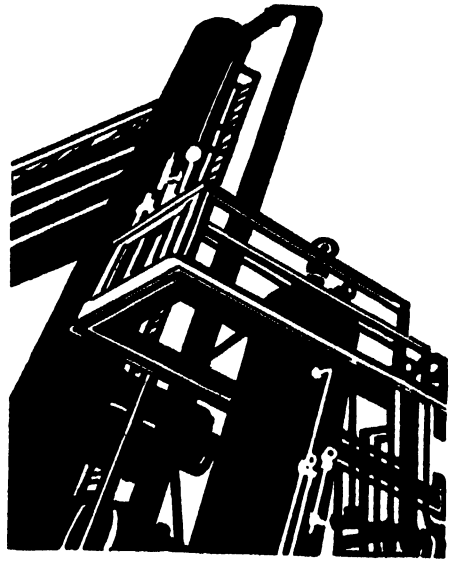
Industrial and Engineering Chemistry

The attendance at division sessions was larger than for any meeting in the past several years. The General Session on Monday afternoon had an average attendance of about 150. A variety of subjects was discussed, including new methods of calculation for countercurrent leaching, industrial preparation of sulfamide, a device for the measurement of detergency, solvent extraction, aging of whisky, and fundamental data on binary liquid mixtures and their industrial utilization. Considerable interest was shown by the press and other quarters in a method for obtaining vanadium concentrates from phosphoric acid mixtures, a process reported to offer a possible method of alleviation for present shortages of this material.

The Symposium on Research Management on Tuesday morning attracted a record attendance, necessitating the opening of additional rooms to accommodate the approximately 300 people who wanted to attend. Dr. Work began the symposium with his definitive paper, "What is Research?" "The Direction of Research" was next handled by Dr. Mees, who discussed the various ways of administering a research laboratory and the attendant costs for these different methods. The paper was stimulating in its entirety and provoked active discussion. Control of "Research Accounting" was presented by Messrs. Sheehan and Curtis, who showed how it was possible quantitatively to define the costs of research and to control the direction of research through an accurate knowledge of expenses. Many of those who rose to discuss the paper were not in agreement with the rigid system advocated, maintaining that research should be controlled by its results and not by its cost. The importance of patents to research organizations was ably treated by Dr. Hamilton and Mr. Deitch, who explained the vital role that protection of inventions plays in the administration of a research laboratory. The pitfalls into which faulty legislation may lead the patent system were brought out in the discussion; this topic will be more completely covered in the final paper.

Dr. Hass described the graduate fellowship system practiced at Purdue and showed the benefits which can arise from cooperative industrial research as carried out at an educational institution. Numerous contacts with technical men of sponsoring companies prove of value to the research fellow and are a real factor in the successful conclusion of the problems assigned. The new chemical industry founded upon Purdue nitroparaffin research serves as an example of the value of such a system. The reduction of facts to numerical values is the first requirement for scientific knowledge of any subject, and Mr. Ayres in his paper, "The Evaluation of Research", reduced the costs of the various steps necessary for the commercial utilization of new processes to relative numerical values. Adequate research is shown to be one of the most profitable of investments owing to the financial savings occasioned by adequate research and development work prior to the commercialization of a process.

The Seventh Unit Process Symposium, with R. Norris Shreve presiding, drew an average attendance of well over 200 on Tuesday afternoon, necessitating the opening of an additional room to accommodate the overflow. First on the program was a paper by H. B. Hass and Carl Bordenca of Purdue. This address discussed the ways in which the chlorinolysis (defined as high-temperature, high-pressure chlorination) of paraffin hydrocarbons could be applied as a means of converting any paraffin or partially chlorinated paraffin into carbon tetrachloride or similar compounds. Although chlorine is now an extremely scarce commodity, it will undoubtedly be plentiful and cheap after the war, when such reactions may well be of commercial significance. The art of synthesizing trialkylated phenols from cresols and a refinery butane-butene fraction was next described by the writer in a paper showing how laboratory reactions are translated to the small-scale pilot plant stage and eventually to the status of commercial chemical manufacturing processes. Continuous methods for alkylating the cresols to di-*tert*-butyl cresols by the use of a bubble-cap type of reactor were described, as well as continuous means for fractionating the alkylated derivatives. Dr. Othmer and his associates presented a series of papers on utilization of such waste products as bagasse and lignocellulose by destructive distillation and on methods of purification of products so derived. "The Partial Pyrolysis of Wood" was discussed by Merritt and White of the University of Michigan.



The symposium was continued on Wednesday morning with additional papers on unit processes, dealing with such subjects as the preparation of strontium carbonate from strontium sulfate and the oxidation and sulfonation of aniline and of members of the naphthalene series. The symposium was concluded with a paper by Pardee and Dodge on "The Catalytic Vapor Phase Alkylation of Benzene with Ethylene", a method advanced for the preparation of the now-strategic war chemical, ethylbenzene. Discussion was particularly active on this latter paper, which attracted considerable comment in petroleum and chemical news periodicals.

The division luncheon was well attended, and those who were fortunate enough to be present heard an inspiring address by Dr. Crossley, of Calco Chemical, "The Dye Industries". He gave a stirring exposition of the opportunities open to the chemical industry for bettering man's lot in this world.

The Ninth Annual Chemical Engineering Symposium, "The Application of Kinetics to Design and Operation of Chemical Engineering Equipment", will be held December 28 and 29 in the Palmer House, Chicago. The fundamentals of reaction kinetics will be outlined by experts from leading universities, but the industrial applications of reaction kinetics will be emphasized by papers from industrial organizations. The symposium is under the joint sponsorship of the University of Wisconsin and the Illinois Institute of Technology. O. A. Hougen, of the University of Wisconsin, will serve as chairman.

Plans for the Indianapolis meeting are still tentative, but an effort is being made to organize a Symposium on The Manufacture and Use of Solvents well in advance.

Whitney Weinrich, *Secretary*

Conference of the Committee on Examinations and Tests Division of Chemical Education, A. C. S.

Buffalo, N. Y., September 5 to 7, 1942

Following the plan adopted at the conference held at the University of Chicago last year, the members of the Division of Chemical Education who volunteered to participate in the construction of new tests and new forms of established examinations met in general sessions to discuss the work of the committee as a whole and in smaller groups to develop tests along lines of their immediate interests. During the first session a report on the 1942 Testing Program was given by Alexander Calandra, of Brooklyn College. This report will appear in full in an early number of the *Journal of Chemical Education*. Theodore A. Ashford, of the University of Chicago, presented a critical item analysis of the 1942 Form. (The subject of his talk, in amplified form, was presented as a paper before one of the sessions of the division at the Buffalo meeting. A booklet containing subdivisions of the 1942 Form, giving sample items and specific directions for the construction of such items, was circulated, thus inviting the cooperation of a large number of teachers in the construction of tests. Copies of this booklet will be sent to those who wish to participate. Inquiries should be addressed to Dr. Ashford directly.) The objectives to be realized in the testing program were stated and the test evaluated in the light of these aims. The 1942 Form was found to be weak only in a few minor details, and it appeared in general to be a satisfactory measuring instrument for the purposes for which it was designed. For reasons of economy of money and effort, it was deemed advisable to recommend the use of the 1942 Form in the 1943 Testing Program.

The committee has made available tests in only three fields—general chemistry, qualitative analysis, and organic chemistry. Requests have been received for tests in quantitative analysis and physical chemistry. It was decided to undertake a revision of the test in qualitative analysis and organic chemistry and to initiate the preparation of the two new tests needed. The result will be a battery of standardized examinations covering the major fields of the elementary chemistry curriculum. This work was started by small groups at the conference, and it is hoped that the tests, at least in preliminary form, may be available during the coming academic year.

In place of a revision of the General Chemistry Test, it was decided to experiment with the construction of a small number of short unit tests to cover phases of the work in the elementary course. These tests would not only measure achievement but would also make it possible to diagnose the difficulties the student experiences when studying the material and thus enable the teacher to reteach those topics which were found to have been inadequately mastered. These diagnostic tests are to cover unit topics such as Hydrogen-Oxygen-Water, Solids-Liquids-Gases and the Kinetic Molecular Theory, and Atomic Structure and the Periodic Table. Work on two units was started at the conference.

Another project started was the construction of a 50-minute examination on laboratory technique. A small committee is compiling test items which will attempt to measure attitudes and information which a student could learn only by laboratory experience. It is hoped that an experimental form of this enlarged version of the Laboratory Section may be available before Christmas.

The cooperation of many teachers is needed for the successful completion of this ambitious program and volunteers are invited to participate. Requests for further information should be sent to the Chairman of the Committee, Otto M. Smith, Oklahoma A. & M. College, Stillwater, Okla.

The committee is comprised of the following members: Theodore A. Ashford, University of Chicago; Alexander Calandra, Brooklyn College; J. S. Coles, Middlebury College; Ed. F. Degering, Purdue University; Laurence S. Foster, Brown University; B. Clifford Hendricks, University of Nebraska; Frank D. Martin, Purdue University; Earl W. Phelan, Georgia State Woman's College; Rufus D. Reed, New Jersey State Teachers' College; Otto M. Smith, Oklahoma A. & M. College (Chairman).

L. S. Foster
Secretary, Pro-tem.

Buffalo Employment Clearing House

The Employment Clearing House conducted as part of the national meeting of the American Chemical Society in Buffalo, September 7 to 11, 1942, was significant in that, for the first time, the employers' representatives outnumbered the applicants. The number of interviews scheduled, 1793, was the largest in the history of this enterprise.

Of the 327 chemists and chemical engineers registered as candidates for employment, only 23 were unemployed at the time of the meeting. Of this small group, 6 are aliens and only 7 are known to have left their previous positions prior to August 1. A total of 233 (71 per cent) were already employed but were looking for opportunities to render increased service in the war effort or for personal advancement. The balance, 71, were students (B.S., M.S., or Ph.D.) whose degrees will be awarded between November 1942 and June 1943.

The 327 candidates averaged about 5.5 interviews each. The 19 women registrants were interviewed 188 times, an average of almost 10 each. Thirteen naturalized U. S. citizens averaged 2.3 and 26 aliens 2 interviews each. Fifty-nine persons were interviewed by 11 or more employers; one person was scheduled for 45 appointments.

Fifty-two per cent of the registrants (171) had received the degree of Ph.D. or equivalent. As usual, organic chemists predominated, constituting one third of the registrants. The number of those with a bachelor's degree and no subsequent university work or experience was unusually low (6.7 per cent). Only 12 analytical chemists were registered and all were interviewed. Only 20 persons above draft age were candidates for new employment.

The records were inspected by 445 employers' representatives. Of these, 352 were connected with industrial concerns, 67 represented educational institutions, and 26 were recruiting for governmental agencies. The latter included the War Production Board, the National Defense Research Committee, the Chemical Warfare Service, Army Medical School, Naval Research Laboratory, an arsenal, six ordnance plants, Tariff Commission, National Bureau of Standards, Food and Drug Administration, Bureau of Agricultural Chemistry and Engineering, Bureau of Mines, Forest Products Laboratory, Tennessee Valley Authority, and three state agencies. The Civil Service Commission maintained an information desk. Its attendant, sent from Washington, interviewed interested persons throughout the week. Most of the employers were seeking trained men to operate the many new plants that are supplying important materials to the combat army. Approximately 50 per cent of them could find the records of no one qualified for the vacancies to be filled.

It is not yet known how many positions the 445 employers were attempting to fill, how many offers were made, or how many of the 327 registrants made new connections. This information is now being sought.

Thomas Matchett, president of the Robins Conveying Belt Co., Passaic, N. J., has been appointed to the Conveyor and Mechanical Power Transmission Industry Advisory Committee of the War Production Board. **R. W. Eichenberger, E. C. Salzman**, and **J. F. Meissner** have been elected vice presidents of the company.

E. W. Ritter, assistant to the president of the Corning Glass Works, has been called to Washington, D. C., for work in connection with the Signal Corps.

POTOMAC POSTSCRIPTS

Technical Group to Assist WPB

DONALD M. NELSON has announced the appointment of a committee of engineers and scientists to determine the manner in which the projected Office of Technical Development should be set up within the War Production Board, and to define the scope, functions, and method of operations which the office should have.

Decision to establish such an office was made earlier, following a report by a previous committee recommending that the War Production Board set up a strong scientific and technical organization to make sure that the Nation's technical ability and resources were utilized to the full in the war production program.

Chairman of the new committee is Webster N. Jones, director of the College of Engineering, Carnegie Institute of Technology at Pittsburgh. Other members are: Lawrence W. Bass, director of research, New England Industrial Research Foundation, Boston; Oliver E. Buckley, president, Bell Telephone Laboratories, New York; Colonel Clarence E. Davies, Ordnance Department, U. S. Army, Washington; Ray P. Dinsmore, manager, Development Department, The Goodyear Tire and Rubber Co., Akron, Ohio; Admiral J. A. Furer, U. S. Navy, Washington; Jerome C. Hunsaker, head of the Departments of Mechanical and Aeronautical Engineering, Massachusetts Institute of Technology, Cambridge, Mass.; H. W. Graham, director of Metallurgy and Research, Jones and Laughlin Steel Corp., Pittsburgh; and S. D. Kirkpatrick, editor, *Chemical and Metallurgical Engineering*, New York.

WPB Industry Advisory Committees

AMONG the Industry Advisory Committees formed by the War Production Board, the following are connected with the chemical industry:

ABRASIVE INDUSTRY, Arthur Batts, Carborundum Co.; J. H. Byers, president, Abrasive Products Co.; R. R. Cole, Phosphate Division, Monsanto Chemical Co.; A. T. Dalton, Chicago Wheel & Manufacturing Co.; E. B. Gallaher, Clover Manufacturing Co.; W. A. Harty, Exolon Co.; C. N. Jeppson, Norton Co.; H. D. Williams, Washington Mills Abrasive Co.; J. Kuzmick, Manhattan Rubber Mfg. Div. of Raybestos Manhattan, Inc.; S. B. Leishman, Gardner Machine Co.; T. J. McIntyre, Macklin Co.; W. L. McKnight, Minnesota Mining & Mfg. Co.; J. W. McLean, Abrasive Co.; A. V. Parker, General Abrasive Co.; and P. R. Shuttleworth, Allison Co.

CARBON BLACK MANUFACTURERS INDUSTRY, E. H. Bucy, government presiding officer. Reid L. Carr, Columbian Carbon Co.; Thomas D. Cabot, Godfrey L. Cabot, Inc.; R. H. Eagles, J. M. Huber, Inc.; L. C. Herkness, Charles Eneu Johnson Co.; Robert I. Wishnick, Continental Carbon Co.; C. E. Kayser, National Gas Products Association; Oscar Nelson, United Carbon Co.; T. P. Walker, Thermatomic Carbon Co.; and H. M. Wilgus, General Atlas Carbon Division.

COBALT INDUSTRY, E. F. Hatch, government presiding officer. C. D. Clawson, Ferro Enamel Corp.; O. J. Hall, Harshaw Chemical Co.; C. T. Hill, Pyrites Co., Inc.; E. M. Hommell, O. Hommell Co.; J. Leroy, African Metals Corp.; Robert Louden, McGean Chemical Co.; George F. Martin, Hilton-Davis Chemical Co.; Lee Shepherd, Shepherd Chemical Co.; and W. F. Wenning, Ceramic Color and Chemical Co.

COPPER, LEAD AND ZINC PRODUCERS INDUSTRY TRANSPORTATION INDUSTRY, George C. Heikes, government presiding officer. A. J. Bien, American Metal Co., Ltd.; J. W. Brown, E. I. du Pont de Nemours & Co.; C. A. Butler, Anaconda Copper Mining Co.; C. C. Lewis, American Smelting & Refining Co.; Walter G. Patton, St. Joseph Lead Co.; A. C. Schweitzer, U. S. Steel Corp.; H. A. Gray, Eagle Picher Mining Co.; James W. Lee, Phelps Dodge Copper Corp.; N. S. Worrell, American Zinc Lead & Smelting Co.; R. E. Taylor, Kennecott Copper Corp.; and Omar O. Victor, U. S. Smelting, Refining & Mining Co.

COAL-TAR DISTILLING INDUSTRY, Edward Casey, government presiding officer. E. W. Clark, Allied Chemical & Dye Corp.; J. N. Forker, Koppers Co.; P. C. Reilly, Sr., Reilly Tar & Chemical Corp.; J. V. Freeman, U. S. Steel Corp.; T. H. Hall, Jr., Public Service Corp. of New Jersey; and Charles R. Faben, Hennison-Wright Corp.

FLUORSPAR MINING INDUSTRY, M. H. Billings, government presiding officer. Ralph B. Derr, Aluminum Company of America; W. N. Smith, Mahoning Mining Co.; K. A. Johnston, U. S. Coal & Coke Co.; J. M. Blayney, Rosiclare Lead & Fluorspar Mining Co.; R. H. Dickson, General Chemical Co.; E. D. Timberlake, Peerless Oil & Gas Co.; F. G. Fabian, Hillside Fluor Spar Mines; Robert N. Frazer, Kentucky Fluor Spar Co.; Miles Haman, Crystal Fluorspar Co.; L. F. Hearne, Eagle Fluor Spar Co.; B. E. Clement, Davenport Mine; and Dr. J. L. Gillson, E. I. du Pont de Nemours & Co.

FROZEN FRUIT AND VEGETABLE INDUSTRY, R. P. Juhnichen, government presiding officer. Ralph O. Dulany, John H. Dulany & Son; M. T. Fannaly, M. T. Fannaly, Inc.; F. J. Becker, Gresham Berry Growers; Edwin T. Gibson, Frosted Foods Sales Corp.; R. M. Hagen, California Consumers Corp.; B. C. Olney, Snider Packing Corp.; A. J. Rogers, Cherry Growers, Inc.; Courtney Seabrook, Deerfield Packing Corp.; J. M. Seaman, Rozeman Canning Co.; R. T. Shannon, R. D. Bodle Co.; T. R. Skinner, Westfield Planters Co-op. Fruit Products, Inc.; and E. E. Huddleson, Santa Cruz Packing Co.

INDUSTRIAL ALCOHOL PRODUCERS, Walter G. Whitman, government presiding officer. James McLaughlin, Carbide & Carbon Chemicals Corp.; Lewis H. Marks, Publicker Commercial Alcohol Co.; Glenn Haskell, U. S. Industrial Chemicals, Inc.; Owsley Brown, Brown-Forman Distilling Co.; Julian P. Van-Winkle, Stitzel Weller Distillery; I. Strouse, Baltimore Pure Dye Distilling Co.; H. F. Willkie, Jos. E. Seagram & Sons, Inc.; W. H. Venneman, Frankfort Distilleries, Inc.; J. B. Cella, Roma Wine Co., Inc.; and Carl J. Kiefer, Schenley Distillers Corp.

MEDICAL AND SURGICAL RUBBER GOODS, C. S. Reynolds, government presiding officer. J. Stone Carlson, Davidson Rubber Co.; Karl Herbruck, Wilson Rubber Co.; Ernest I. Kilcup, Davol Rubber Co.; F. Thatcher Lane, Seamless Rubber Co.; R. L. Limbert, Lee Tire & Rubber Co.; W. B. McIntosh, Pyramid Rubber Co.; W. S. Richardson, B. F. Goodrich Co.; Julius Schmid, Jr., Julius Schmid, Inc.; E. Ward Stearns, Parker, Stearns & Co.; and Ray A. Whidden, Bauer & Black.

PAINT, VARNISH AND LACQUER INDUSTRY, E. H. Bucy, government presiding officer. Walter M. Clark, Muralo Co., Inc.; O. J. S. de Brun, Egyptian Lacquer Mfg. Co.; W. D. Gilman, Gilman Paint & Varnish Co.; Franklin J. Lane, Boston Varnish Co.; W. I. Longworth, Lilly Varnish Co.; Paul R. Croll, Pittsburgh Plate Glass Co.; E. M. Flaherty, E. I. du Pont de Nemours & Co., Robert F. Jaegle, Jaegle Paint and Varnish Co.; M. J. Merkin, M. J. Merkin Paint Co., Inc.; Oakley Paint Co.; Edward H. McIver, Leland-Moore Paint and Oil Co.; McMurtry Manufacturing Co.; H. S. Margetts, W. P. Fuller and Co.; Frank Sulzberger, Enterprise Paint Co.; and A. W. Steudel, Sherwin Williams Co.

POTASH PRODUCERS INDUSTRY, T. E. Milliman, government presiding officer. Morace M. Albright, United States Potash Co.; Cecil B. Baker, American Potash & Chemical Corp.; J. B. Grant, Potash Co. of America; and James P. Margeson, Jr., International Minerals & Chemical Corp.

PULPWOOD INDUSTRY, David Graham, government presiding officer. William T. Brust, Hammermill Paper Co.; R. L. Caldwell, Rhinelander Paper Co.; William D. Comings, West Virginia Pulp & Paper Co.; A. G. Curtiss, Gaylord Container Corp.; William Hilton, Great Northern Paper Co.; Stanton W. Mead, Consolidated Water Power & Paper Co.; James B. Nash, Nekoosa-Edwards Paper Co.; K. A. Swenning, Brown Co.; Walter DeLong, Puget Sound Pulp & Timber Co.; D. S. Denman, Crown Zellerbach Corp.; Thomas Farwell, Ryegate Paper Co.; C. E. Wilds, The Brown Paper Mill Co., Inc.; Irving T. Rau, St. Helens Pulp & Paper Co.; C. E. Smith, The Champion Paper & Fibre Co.; and A. H. Stier, Container Corp. of America.

REFRACTORY MAGNESITE INDUSTRY, R. B. Ladoo, government presiding officer. Max Seaton, Westvaco Chlorine Products Corp.; T. W. Shook, Basic Refractories, Inc.; P. N. Laws, West India Sales, Ltd.; John L. Giles, Michigan Chemical Corp.; H. S. Robertson, Northwest Magnesite Co.; S. M. Shallcross, Warner Co.; and J. D. Baker, Jr., Standard Lime & Stone Co.

SOYBEAN CRUSHERS INDUSTRY, T. L. Daniels, government presiding officer. D. J. Bunnell, Central Soya Co.; H. E. Carpenter, Berea Milling Co.; J. B. De Haven, Allied Mills, Inc.; Roger Drackett, The Drackett Co.; W. A Eastman, Archer-Daniels-Midland Co.; W. E. Flumerfelt, Soy Bean Processing Co.; George Stewart, Swift & Co.; E. D. Funk, Jr., Funk Brothers Seed Co.; E.

F. Johnson, Ralston Purina Co.; H. Kellogg, Jr., Spencer Kellogg & Sons; S. D. Ormsey, Oswego Products Co.; E. K. Scheiter, A. E. Staley Mfg. Co.; H. R. Schults, Standard Soy Bean Mills; and P. E. Sprague, Glidden Co.

Toiletries and Cosmetics Industry Transportation, Robert Blair, government presiding officer. Michael Harris, Max Factor, Inc.; Stuart E. Kaiser, The Andrew Jergens Co.; Howard S. Lyon, Comfort Mfg. Co.; Abe Plough, Plough, Inc.; S. V. Rettino, Bristol-Myers Co.; Horace Rosner, Coty, Inc.; Carl von Rohr, Burma-Vita Co.; and O. D. Wheaton, Wildroot Co., Inc.

Vinyl Resins Producers Industry, Frank H. Carman, government presiding officer. H. S. Bunn, Carbide & Carbon Chemicals Corp.; L. F. Loutrel, Shawinigan Products Corp.; John C. Brooks, Monsanto Chemical Co.; A. E. Pitcher, E. I. du Pont de Nemours & Co., Inc.; J. R. Hoover, The B. F. Goodrich Co.; Bradley Dewey, Dewey & Almy Chemical Co., Inc.; W. C. Goggin, The Dow Chemical Co.; and Henry B. Townsend, General Latex and Chemical Corp.

WPB Activities

Aromatic Petroleum Solvents. Complete allocation of aromatic petroleum solvents other than benzol and toluol, starting October 1, has been ordered in an amendment to Order M-150. Until September 30, deliveries of aromatic petroleum solvents were limited to preference ratings of A-2 or higher. Allocation control will not apply to users requiring 60 gallons or less a month. Applicants for allocation must apply on Form PD-600 by the 10th day of the month preceding the month for which allocation is requested, and suppliers must report their proposed deliveries by the 15th of each month, using Form PD-601.

Caffeine and Theobromine. Conservation Order M-222 places caffeine and theobromine, two important medicinal drugs, under complete allocation control beginning October 1. This control is established because supplies of cocoa beans, coffee, coffee scrapings, tea waste, and maté, the raw materials from which the drugs are made, have been reduced by the present shipping situation. The order is expected to reduce the amounts of caffeine which can be made available for beverage production. It is used chiefly in "cola" beverages. Extent of the curtailment will depend on the supply of raw materials imported into this country and on the military and civilian medicinal needs for both drugs.

Theobromine, which is used exclusively as a medicinal stimulant, can be processed to produce caffeine. Caffeine, which is used extensively in beverage production as well as in medicinal preparations, can also be produced directly from the coffee scrapings, cocoa beans, etc. The conservation order, therefore, restricts the manufacture of caffeine through methylation of theobromine, and prohibits the use and delivery of either theobromine or caffeine except on the specific authorization of the Director General for Operations.

The order affects all importers, producers, refiners and primary distributors but does not affect wholesale and retail druggists, who, by definition in the order, use the drugs only for medicinal purposes. Standard dosage forms (tablets, capsules, etc.) are not covered by the order, which also exempts from the restrictions use or delivery of two pounds or less of either drug in any one month. The drugs will be allocated by the WPB Health Supplies Branch, based on proposed delivery schedules and requests for authorization received each month.

Coconut Oil, Babassu Oil, Palm Kernel Oil and Other High Lauric Acid Oils. Freezing of an additional 25 per cent of inventory stocks of coconut, babassu and palm kernel oils of all persons who have 240,000 pounds or more on hand has been ordered by the Director General for Operations. Twenty-five per cent of all future imports of these oils, or of materials containing them, is also ordered frozen in Supplementary Order M-60-a, thereby adding to the Nation's stockpile of high lauric acid oils. Order M-60, issued March 20, 1942, froze 25 per cent of inventories exceeding 30,000 pounds and applied to all high lauric acid oils. The additional freeze applies only to large inventory stocks and does not include any but the three principal sources of high lauric acid oils. The various end use restrictions of M-60 continue in effect and M-60-a provides only for the additional freezing.

Copper Chemicals. Order M-227 places copper chemicals under allocation control in order to conserve copper scrap. Farmers, however, are permitted to obtain these materials for soil treatment, insecticides, and fungicides without filing PD-600 forms. The allocation of these chemicals, including copper sulfate, carbonate, chloride, oxide, nitrate, and cyanide, takes effect October 1. Small order deliveries may be made by certification from the purchaser to his supplier. Limits on these small deliveries are 450 pounds of copper sulfate or 25 pounds of the other chemicals in any one month. The standard chemical forms, PD-600 and PD-601 must be used by those seeking allocation and by suppliers making deliveries for reports to the War Production Board.

Corundum. The order controlling allocation and use of corundum, M-89, has been issued in amended form by the Director General for Operations to include control over use of corundum in the hands of consumers, and to write into the definition of material covered by the order corundum ores and corundum superfine flour. The amended order provides for new reporting procedures for suppliers and consumers of corundum, and for consumers' applications for authorization to receive corundum. Two new forms, PD-294 and PD-294A, are to be used in complying with the amended order's reporting provisions, in addition to Form PD-293 which was used under the old order. The original order put corundum under complete allocation and use control. The new amendment does not fundamentally alter this control, as its prime purpose is to clarify certain points in the original order.

Cryolite has been put under complete allocation and use control by General Preference Order M-198. Natural and synthetic cryolite may not be delivered, received, or used after October 1, 1942, except by specific authorization of WPB. The sole exception is the receipt and use of cryolite as an insecticide. Requests for authorization to receive or use cryolite are to be made to WPB on Form PD-592. Requests for authorization by producers to deliver cryolite to be used as an insecticide are to be made to WPB by letter. Initial requests to use or receive cryolite are to be accompanied by inventory and consumption Form PD-632.

Cyanamid. To provide adequate supplies for military needs of several important cyanamid derivatives not covered by General Preference Order M-165, the Director General for Operations has issued Amendment 1, expanding the definition of materials covered by the order to include cyanides, melamine, guanidine, and dicyandiamide. These cyanamid derivatives used in nonferrous mining, in explosives, in some instances do not contain cyanamid, but are made from it.

Dichloroethyl Ether. General Preference Order M-226 places dichloroethyl ether under complete allocation and use control and provides that no person may deliver, accept delivery of, or use dichloroethyl ether without specific authorization by the Director General for operations. No exception is made for small quantities. Specific instructions are included in the order for the use of the standard WPB chemical forms, PD-600 and PD-601, by persons desiring to deliver, receive, or use this chemical.

Fats and Oils. Limitations on uses of fats and oils to permit building a reserve supply have been ordered by the Director General for Operations. This action, a revision of Order M-71, establishes new controls over fats and oils, but does not include cocoa butter, butter, wool greases, essential oils, mineral oil, vitamin-bearing oils, and some others. The order is made retroactive to September 1 of this year in that the first period is from September 1 to December 31, 1942. After December 31, the order is applicable to regular calendar quarters. A blanket exemption is granted

to all manufacturers using less than 6,000 pounds of fats and oils in a quarter. None of the restrictions apply to Lend-Lease orders, nor to military purchases of edible products. Inventory restrictions on finished products heretofore in effect are continued. There are no restrictions on inventories of raw materials.

Fertilizers. Nationwide conservation of chemical fertilizers, to save nitrogen for vital war manufacture is provided for in Order M-231, which makes the following prohibitions:

1. Fertilizer containing chemical nitrogen cannot be used on grains sown in the fall of 1942 to be harvested as grain. If the grain is used as pasture or cover crop, the restriction does not apply.
2. Chemical nitrogen fertilizer cannot be used on golf courses, cemeteries, lawns, roadsides, and noncommercial planting of trees, shrubs, and flowers.
3. Delivery and use on crops of any mixed chemical fertilizer within a state not on the list of approved grades for that state as listed in Schedule A of the order is prohibited.
4. Delivery of any fertilizer containing chemical nitrogen prior to November 15, 1942, except for use during 1942 is prohibited.
5. Delivery of any chemical fertilizer in bags of less than 100 pounds is stopped, but provision is made to allow delivery of bags of not less than 80 pounds in a manufacturer's stocks.
6. Delivery of any superphosphate which carries less than 18 per cent available phosphoric acid is prohibited.

Amendment 1, however, permits unlimited use of nitrogen-bearing fertilizer by the Army, Navy, or Coast Guard on new planting of grass on airports or airfields.

Fish Oil. No restrictive orders on the use of fish oil will be necessary, the Fats and Oils section, WPB, announced today, since the catch of fish used in production of fish oil is currently about equal to last year's. The fishing season is now under way and, contrary to earlier expectations largely because of lack of boats, the catch apparently will come close to equaling that of last year. If the present production rate continues there will be a normal supply for all regular users. Speculation about a possible restrictive order on certain types of users, it was explained, has caused some buyers to shy away from the market. As producers do not have more than temporary storage it is imperative that the oil move to consumers' plants as rapidly as possible.

Glycerol. Procedure for glycerol users and producers to file reports and requests for allocations with WPB is changed by Amendment 1 to General Preference Order M-58, announced by the Director General for Operations. The new procedures are to conform to the WPB policy of allocating in advance only shipments of 10,000 pounds or over, and of filling orders from 50 to 10,000 pounds pursuant to directive. The same forms, PD-361, PD-362, and PD-363, are to be used under the new procedure as have been used in the past.

Incendiary Units. The Chemical Warfare Service of the United States Army has been designated as the only agency to authorize the sale and delivery of incendiary units for demonstration purposes. Order L-115, issued on May 7, stipulated that sale and delivery of incendiary units could be made only on the written authorization of the United States Army or the United States Navy. Since the Chemical Warfare Service has been designated by both the War Department and the Navy Department to issue such authorizations, this change (Amendment 1) in wording was made to clarify procedure under the order.

Maintenance, Repair, and Operating Supplies. Chemical producers, by Amendment 3 to Preference Rating Order P-89, are granted new higher preference ratings to enable them to obtain maintenance, repair, and operating supplies. P-89 was issued originally to provide chemical producers with preference ratings high enough to ensure their getting immediate delivery of supplies to avoid or repair breakdowns. The order has been amended several times to increase the ratings assigned as supplies became more difficult to get.

Amendment 3 raises to A-1-a the rating assigned to the industry for obtaining all metals appearing on List 1 of Form PD-25A for the fourth quarter. A similar rating is assigned to fabricated parts and equipment having a unit cost of $250 or less. All other materials needed for maintenance, repair, and operating purposes are assigned an A-1-c.

To repair plant breakdowns and avoid threatened curtailment of production in emergencies, the amendment provides for the assignment of ratings higher than A-1-a upon application, by letter or telegram to WPB, stating all pertinent data.

None of these ratings may be applied to the purchase of metal containers or container materials without specific authorization by WPB. Further conditions of use of these ratings are: Form PD-315 must be filed with WPB; the producer must have a serial number assigned by WPB; the material sought must not be available with a lower rating than assigned by this order; and the materials so bought must not be replaceable by substitutions.

The ratings assigned by this amendment are extendible in accordance with the terms of Priorities Regulation 3.

The formula for calculating permissible inventories under the order is revised to eliminate containers as a factor in computing ratios of allowable supplies on hand.

Naphthenates. Since new war demands have made existing controls over naphthenates insufficient, Order M-142 has been amended to bring them under complete allocation October 1 and to continue allocation control of naphthenic acid. The order also is changed to provide for the use of the standard chemical forms, PD-600 and PD-601, for the allocation of both naphthenates and naphthenic acid. Forms PD-438 and 439, previously used for allocation of naphthenic acid, will be discontinued.

Natural Resins. Restrictions on road-marking paints are revised to allow use of up to one pound of Batu gum, or up to two pounds of Congo Copal gum, or both, per gallon of paint by Amendment 1 to Conservation Order M-56. The original order as amended June 5, 1942 permitted only $1/2$ pound of Batu gum per gallon of paint to be used. Stocks on hand of these two natural resins have remained substantial because of cessation of manufacture of products formerly requiring protective coatings containing them.

Phosphorus, widely used in war production, has been placed under complete allocation control beginning October 1, the Director General for Operations has announced. The action was taken in Order M-230. Allocations must be applied for on Form PD-600, and suppliers are required to report monthly on Form PD-601. Persons seeking 1,000 pounds or less of phosphorus in any one month may obtain delivery by certificate to their suppliers and need not file PD-600.

Research Laboratories, Supplies and Equipment. The Director General for Operations has issued Amendment 2 to Preference Rating Order P-43 restating Amendment 1, which raised from A-2 to A-1-a the rating which certain specifically approved research laboratories could use to obtain reagent chemicals and other materials. In the case of reagent chemicals, the rating can be used by the approved laboratories for both research and educational purposes. In the case of other materials, the rating can be used only for research, and not for educational purposes. The status of the use of materials other than reagent chemicals for educational purposes was left unclear by the omission of certain words from Amendment No. 1.

The Safety and Technical Equipment Branch stated that Order P-43 requires laboratories and suppliers who use the rating to file monthly reports on Form PD-93 on or before the 20th day of each month. Prompt filing of such reports is necessary for continued operation under the order. Communications and reports should be addressed to the Branch, Room 4068, Railroad Retirement Building, Washington, D. C.

Silica Gel. General Preference Order M-219, places silica gel under complete allocation and use control on October 1,

1942. Silica gel, a dehydrated silicic acid, is used principally as a drying agent to remove moisture and to prevent corrosion in shipment and storage and is needed for shipping a wide variety of war materials. Present supply is falling behind demand and in 1943 demand is expected to be several times maximum supply. To guarantee that all available silica gel is directed into the most essential military purposes, today's order provides that no person may deliver or accept delivery of silica gel except by specific authorization by WPB, and that no silica gel may be used except for the specific purposes authorized. Persons desiring to obtain silica gel may apply to WPB on Form PD-600, and persons seeking authorization to deliver, on Form PD-601.

Silicate of Soda. Users of silicate of soda are permitted to build stocks without restriction by Amendment 6 to General Inventory Order M-161. Silicate of soda, which is in relatively plentiful supply, is expected to enter its heavy shipping season in October and November. To remove undue burden on transportation facilities at that time, inventory restrictions are removed to permit users to build stocks at their plants, rather than have supplies accumulate in the hands of producers.

Soluble Nitrocellulose. Two changes in the soluble nitrocellulose order M-196 remove from the restrictions of the order nitrocellulose suitable for dynamite manufacture, since this grade is not suitable for other uses and no need exists for allocating it, and take undissolved film scrap out of allocation control. The amended order gives the Director General for Operations authority to issue directions for the delivery and use of undissolved film scrap, but permits its free circulation where such directions are not issued.

Steel Shipping Drums. The use of new or second-hand steel shipping drums for packing approximately 200 food, chemical, and petroleum products after 60 days from September 14, 1942, has been prohibited in Limitation Order L-197. Effective immediately, the order also prohibits the packing of any product on an additional list of approximately 35 items in a new or used drum manufactured, purchased, or delivered after September 14. This provision does not prohibit the packing of a product on the second list in drums now owned by the packer. The order forbids the use by any person of new or used drums for packing products which he has not packed in drums prior to the issuance of today's order.

Officials of the Containers Branch said that the order is expected to conserve approximately 100,000 tons of steel annually, and release thousands of drums for essential purposes. Most products barred from the use of steel drums are expected to be shifted to tight cooperage (barrels) and in some cases to fiber containers and glass containers.

Among the products which may not be packed in steel drums after the 60-day period are paints, colors, shellac, crude oil, petrolatum, and many chemicals. Among products which cannot be packed in steel drums after September 14, if the drums are not already owned by the packer, are asphalt, floor wax, animal, fish, and vegetable oils, turpentine, liquefied silicate of soda, and printing inks.

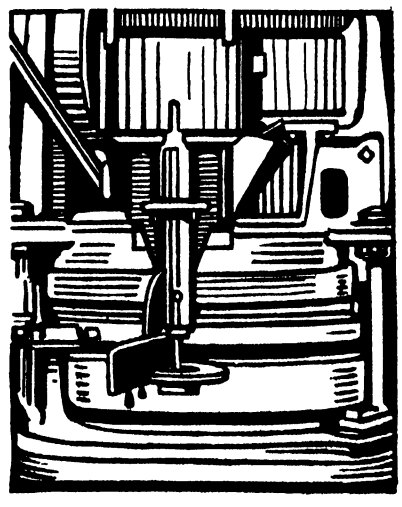
Tar Coatings. Use of tar coatings on cast-iron soil pipe has been prohibited by WPB in an action taken in an amendment to schedule 4, as amended, to Limitation Order L-42. The restriction is expected to result in considerable savings of tar and conservation of transportation facilities. Last year approximately 65 per cent of all cast-iron soil pipe was coated with tar. Consumption for this purpose was about 640,000 gallons. In addition to this savings, it is estimated that 150 tank cars and boxcars required for transportation of the tar will be made available for other purposes.

Tin Survey. The Compliance Branch of the WPB has initiated a survey of the operations of the principal manufacturing users of tin, to determine their degree of compliance with WPB orders issued to conserve this material for essential war uses. The 280-odd firms whose operations are being checked use approximately 90 per cent of all tin consumed in this country.

Attorney-examiners of the Federal Trade Commission have been designated as representatives of WPB to conduct the field work of the survey.

Wage-Hour and Public Contracts Divisions Consolidated

SECRETARY of Labor Perkins has ordered a consolidation of the Wage and Hour and the Public Contracts Divisions of the Department of Labor. The greater efficiency and the avoidance of duplicate effort brought about by the consolidation will make it possible for the two divisions to carry out unimpaired their responsibilities under the Fair Labor Standards Act and the Public Contracts Act despite a cut of nearly $400,000 in the combined budget of the divisions, the Secretary said.



It will also bring about a consistent policy of enforcement and interpretation of the two laws, wholesale coordination of enforcement, and avoidance of any duplication of inspection by having one inspector cover for both acts.

L. Metcalfe Walling, who became administrator of the Public Contracts Division when it was established in 1937 and administrator of the Wage and Hour Division last March, will head the combined agency.

Candy and Chocolate Equipment

THE Food Conversion Section, War Production Board, Washington, D. C., has prepared a list of available equipment in candy and chocolate plants that could be used in the manufacture or processing of certain chemicals. The equipment is located in various parts of the country, and the WPB will be glad to assist in making necessary contacts to bring this idle machinery into production.

Drugs and Cosmetics Section

PERSONNEL of the new Drugs and Cosmetics Section of the Chemicals Branch of WPB as announced by E. W. Reid, chief, follows:

Section chief, F. J. Stock, formerly deputy chief of the Health Supplies Branch until its transfer to Chemicals; deputy chief, C. A. Willard, former chief of the Cosmetics Branch; consultants, Floyd Thayer, A. B. Pacini, John Williams, and Dan Dahle. Unit chiefs are: Biologicals and Medical Chemicals Unit, J. T. Batson; Botanicals and Imports Unit, T. F. Currens; Vitamins and Agar Unit, Mark Merrell; Cosmetics Unit, Robert Blair.

The Drugs and Cosmetics Section of the Chemicals Branch has taken over the functions previously performed by the Drugs and Pharmaceuticals Section of the Health Supplies Branch, and by the Toiletries and Cosmetics Branch of WPB.

New appointments at the Illinois Institute of Technology include: **Howard T. Francis**, physical chemist, metallurgical division, formerly assistant to the supervisor of chemistry, engineering defense training program at Penn State College; **Anton Novy**, ceramics staff, metallurgical division, formerly with the Fansteel Metallurgical Co.; **E. B. Penrod**, research engineer, experimental engineering division, formerly professor of physics at Hillsdale College; and **Joseph R. Spraul**, member of the chemical engineering staff, formerly associated with the American Can Co.

Fifth WPB Report Shows Increasing Scarcity of Materials

A CONTINUED increase in the momentum of the Nation's all-out war effort is reflected in the fifth provisional report on relative scarcity of certain materials, prepared by the Conservation and Substitution Branch of the Conservation Division. Materials are listed in three groups, ranked on the availability of existing supplies. "There is always the possibility of a quick change in the status of an item," said Harvey A. Anderson, chief of the branch. "For this reason the grouping indicates merely the current availability of material within broadly defined categories."

Civilian industry is or has been denied the use of items in Group I and must accordingly use substitutes. All steel and zinc are now placed in this group, as well as many grades of lumber. Scrap materials, such as iron and steel and rubber scrap, fall in this "insufficient for essential needs" category. Silver retains its position in Group II, for the metal is commercially scarce although large stocks exist. The items in Group III are largely the mass products of coal mines, oil fields, quarries, forests, and fields, with few metals or chemicals included. These items should be our first source of substitute materials. Here transportation difficulties, resulting in an unequal distribution of the material, in some instances confuse the situation.

Group I. The available supply of these materials is inadequate for war and essential civilian uses and in many cases for war purposes alone

METALS

- Alloy iron
- Aluminum*
- Aluminum pigments
- Brass*
- Bronze*
- Cadmium
- Chromium
- Cobalt
- Copper*
- Iridium
- Lithium
- Magnesium*
- Molybdenum*
- Nickel and nickel alloys*
- Rhodium
- Steel
- Tantalum*
- Tin*
- Tungsten*
- Tungsten carbide*
- Vanadium*
- Wrought iron
- Zinc

CHEMICALS

- Acrylonitrile*
- Aluminum trihydrate and derivatives
- Ammonia and derivatives
- Ammonium cyanamide
- Ammonium sulfate
- Anthraquinone derivatives
- Arsenic trioxide
- Benzene and derivatives
- Bleaching powder
- Butadiene*
- Butyl alcohol
- Calcium cyanamide and derivatives
- Calcium hypochlorite
- Chlorosulfonic acid
- Cobalt chemicals
- Copper chemicals
- Cresols*
- Diphenylamine
- Glycerol
- Iron oxide, yellow hydrated
- Lauryl alcohol
- Lithium chemicals
- Mannitol
- Naphthalene and derivatives
- Naphthenic acids and derivatives
- Nitric acid
- Pentaerythritol
- Perchloric acid
- Phenol and derivatives*
- Phosphates
  - Tricresyl
  - Triphenyl
- Phthalic anhydride and derivatives
- Silica gel
- Sodium nitrate
- Sorbitol
- Sulfur chlorides
- Toluene and derivatives*
- Urea
- Zinc oxide (French)

MISCELLANEOUS PRODUCTS

- Agar
- Alumina (for metal)
- Asbestos (long fiber)
- Balsa wood
- Bauxite, low-silica
- Burlap
- Carbon black (furnace)
- Copra*
- Corundum
- Cotton
  - Chemical pulp
  - Duck
  - Linters*
  - Raw, long-staple
- Diamond dies, fine sizes
- Down
- Feathers (goose and duck up to 4 in.)
- Gasoline, aviation
- Graphite (crucible grade)
- Hemp
  - Agave fiber
  - Henequen
  - Manila fiber*
- Hemp
  - Cordage
  - Seed
  - Sisal
- Jute
- Kapok
- Kainite
- Lumber, certain grades, hard and soft woods
- Methyl methacrylate sheets
- Mica
  - Block
  - Condenser film
- Nylon
- Oils
  - Cashew nut shell
  - Coconut*
  - Oiticica
  - Palm kernel
  - Rapeseed
  - Sperm
  - Tung*
- Phenol-formaldehyde plastic
- Pig or hog bristles
- Polystyrene
- Polyvinyl chloride
- Pyrethrum
- Quarts crystals
- Quinine
- Rayon, high-tenacity
- Rotenone
- Rubber
  - Chlorinated*
  - Crude*
  - Latex*
  - Reclaimed
  - Synthetic*
- Shearlings
- Shellacs*
- Silk
  - Raw*
  - Noils* and waste
  - Garnetted*
  - Reclaimed
- Spodumene
- Talc, steatite
- Teak
- Tung oil*

* Most critical.

Group II. Materials that are essential to the war industries but the supplies of which are not so limited as those in Group I

When considering the use of an item in Group II as a substitute for an item in Group I, the relative quantity available should be considered. When replacing large tonnage with smaller tonnage items (for example, copper with silver), the supply of the smaller item will be soon exhausted.

METALS

- Antimony
- Beryllium-copper
- Bismuth
- Calcium
- Calcium-silicon
- Columbium
- Ferrosilicon
- Ferrotitanium
- Iron
  - Gray cast
  - Malleable
  - Pig
- Mercury
- Platinum
- Ruthenium
- Silicomanganese
- Silicon and alloys
- Silver
- Spiegeleisen
- Zirconium and alloys

CHEMICALS

- Acetic acid
- Acetic anhydride
- Acetone
- Alcohols
  - Amyl
  - Ethyl
  - Methyl
- Butyl acetates
- Chlorates and perchlorates
- Chlorinated hydrocarbon solvents and waxes
- Chlorine
- Chromium chemicals
- Citric acid
- Lactic acid and lactates
- Maleic acid and anhydride
- Manganese chloride, anhydrous
- Molybdenum chemicals
- Nickel chemicals
- Phosphorus

Sweden's Production of Oilseed Increases

SWEDEN'S 1942 production of oilseeds is estimated at 21,000 metric tons compared with 8,500 tons for 1941, according to the Department of Commerce.

It is anticipated that 7,500 tons of oil and 13,000 tons of oilcake will be produced from the current crop compared with 2,700 tons of oil and 5,500 tons of oil cake last year.

Plantings of oilseeds increased from 20,009 acres in 1941 to 46,980 acres in 1942. Government guarantee of good prices and retention of experts to assist growers have been instrumental in increasing oilseed production.

India's Oilseed Crop Shows Slight Decrease

THE final official forecast of the 1941–42 oilseed crop of India places the yield slightly below the previous season, according to trade reports reaching the Department of Commerce.

Production of mustard and rapeseed is estimated at 1,109,000 long tons compared with 1,103,000 tons last year; linseed production at 361,000 compared with 434,000 tons.

Acrylic acid and acrylates
Alkyd resins
Aluminum chemicals
Aniline and derivatives
Atebrin (for quinine)
Bromine
Ethers
Formaldehyde
Glycol
Iodine
Isopropanol
Ketones
Phosphorus oxychloride
Phosphorus pentoxide
Potassium permanganate
Strontium salts
Xylene

MISCELLANEOUS PRODUCTS

Albumin, blood
Alpha-cellulose (wood pulp)
Aluminum oxide abrasives
Cadmium pigments
Cellophane
Cellulose nitrate, acetate, and other derivatives
Chrome pigments
Cohune nuts and kernels
Coke, petroleum
Cork
Cottonseed
Cryolite
Diamonds, industrial
Ester gum
Flax
Flues, animal and vegetable
Hair, horse-tail and -mane
Halogenated hydrocarbon refrigerants
Hides
Leather
Lumber, certain grades of pine
Magnesite
Mercury pigments
Methyl methacrylate powder
Molasses
Natural gas
Natural resins (except rosin)
Oils
  Babassu
  Castor
  Fish
  Fish liver
  Linseed
  Neat's-foot
  Palm
  Pine
Paraffin
Rayon filament, staple fiber
Refractories (domestic)
  Andalusite
  Dumortierite
  Kyanite
  Sillimanite
Rutile
Silicon carbide abrasives
Tanning materials
Tetraethyllead
Urea-formaldehyde plastic
Vinyl plastics and resins
Vinylidine chloride plastic
Vitamin A products
Vulcanized fiber
Wool

Group III. Materials that are available in significant quantities as substitutes for scarcer materials, and materials that are available in large amounts unless restrictions are imposed by labor, manufacturing, or transportation difficulties

METALS

Ferroboron
Ferromanganese
Gold
Indium
Lead
Osmium
Palladium
Sodium

CHEMICALS

Aluminum sulfate
Barium carbonate
Borax and boric acid
Camphor
Caustic soda
Chromic acid for plating
Hydrochloric acid
Nicotine sulfate
Soda ash
Sodium silicates
Sodium silicofluoride
Sodium sulfide

MISCELLANEOUS PRODUCTS

Asbestos (short-fiber)
Asphalt
Bauxite, low-grade
Bentonite
Brick
Carbon black (except I)
Casein
Cement (portland)
Ceramics
Charcoal
Clay (common)
Coal and coke
Coal-tar pitch
Concrete, plain
Cornstalks
Cotton, raw (to 1 1/8 in.)
Diatomite
Emery
Feldspar
Felt, hair
Fiberboard
Flint
Gilsonite
Glass
Gypsum and products
Hair, cattle, calf, and goat
Ilmenite
Lead pigments
Lignin
  Extender for plastics
  Linoleum paste
Lime
Lithopone
Lumber and millwork
  Low common grades
  Soft and hard woods
  All grades gums
Mica, except block
Mineral wool
Oils
  Cottonseed
  Peanut
  Soybean
  Sunflower seed
Paper
Paperboard
Petroleum products
  Crude oil
  Gasoline, except aviation
  Lubrication oil
Plywood (unrestricted binder)
Pottery
Rosin and derivatives except ester gum
Salt
Silica sand
Soybeans, protein
Starch, domestic
Stone
  Granite
  Limestone
  Marble
  Slate
  Soapstone
Straw
Sulfur
Tile
Titanium pigments
Tripoli
Turpentine
Vermiculite
Wallboard
Wood products
  Sawdust
  Wood fiber
  Wood flour
  Wood pulp
Zinc oxide (Am. process)

Supplementary list. Materials (not all in Group III) on which the Inventory Restrictions of Priorities Regulation No. 1 have been released

Andalusite, domestic
Ball clay
Bentonite
Borax
Boric acid
Caustic soda
Coal and coke
Diatomaceous earth
Dumortierite, domestic
Feldspar
Ilmenite
Kaolin
Kyanite, domestic
Phosphate rock
Pinite
Potter's flint
Pyrophyllite
Salt
Sillimanite, domestic
Soapstone
Soda ash
Spodumene
Stoneware clay
Sulfur
Talc, except steatite
Titanium oxide
Waste paper
Wood and pulp

Production of Alcohol in Syria Decreases

ALCOHOL was formerly manufactured in Syria from molasses imported from Czechoslovakia, according to the Department of Commerce. With the cutting off of imports from that country, manufacturers began to use seeds and grains obtainable locally. The higher cost of these materials resulted in a considerable increase in the price of alcohol, which rose to about $2.75 per gallon at the end of last year. This caused a decreased demand and output for 1941 dropped to 130 tons, about 50 per cent of the normal annual production.

Samuel C. Harris, director of sales, Electrochemicals Department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., completed 25 years of service on September 15. He was honored at a luncheon given by his associates at the du Pont Hotel.



Samuel C. Harris

Philip A. Macy has resigned from the Robeson Process Co. to accept a position as research chemist with the Waterbury Paper Box Co., Waterbury, Conn. He has recently applied for a patent for a new paper cap to take the place of metal on glass bottles.

E. A. Metcalf has been made manager of the Neodesha, Kans., refinery of the Standard Oil Co. of Indiana. **Harold R. Snow**, formerly manager of the Neodesha plant, has accepted a position as assistant general superintendent of the Pan American Refining Co.'s refinery at Texas City, Tex. **H. G. Schnetzler**, chief chemist, will succeed Mr. Metcalf as superintendent at Neodesha, continuing his duties as chief chemist.

George W. Morey has taken leave of absence from the Geophysical Laboratory, Carnegie Institution of Washington, to become general manager of the Parkersburg, W. Va., Division of the Corning Glass Works.

Flash of Genius[1]

JOSEPH N. NIELSEN

THE impression is gained from reading various articles relating to the U. S. Supreme Court's decision in Cuno Engineering *vs.* Automatic Device Corp., that the Court has set up a newly defined standard whereby an invention can be evaluated; but a reading of the decision does not support this view. A crystallization of opinion along the lines thus publicly expressed may, however, work harm in the future prosecution of patent applications and the litigation of patents.

To illustrate the effect of the criterion laid down by the Supreme Court, these articles point to the Edison patents and those of corporation research departments as ones which would not have been granted under the rule, since they are based on patient research with no guiding "flash of genius". This does not follow, because the argument confuses two independent sources of new and useful contributions which the statutes recognize as entitling a person to a patent; one of these is invention and the other is discovery. The Supreme Court case only relates to the first, while research work lies in the realm of discovery.

There is a fundamental distinction between invention and discovery. For an invention there is required a concept or mental image of the invention as a preliminary to (sometimes simultaneous with) a reduction to practice; as expressed in patent law, this concept must be substantially complete, that is, sufficient if communicated to another to enable its embodiment in practical form without the further exercise of invention. In a discovery, however, the concept factor is not necessarily present; an illustration is Edison's phonograph which he did not know he had discovered until he accidentally heard the reproduction. Most inventions are in the nature of improvements in which the mental concept is to a greater or less degree dependent on the knowledge of the art or previous contributions made by others; and likewise most discoveries are in the nature of improvement discoveries which have their origin in the continuations of research along paths which have been marked by others. But even so there is the condition present in inventions that the bridging from the problem to its solution (or a recognition of the existence of a problem) involves a mental act of a character which for the lack of a better term may be called an inspiration; in a discovery the element of surprise lies in the realization of a new and unexpected property or result inherent in the discovery. The existence of an invention may be said to be in general determined by a condition precedent to its completion while a discovery may be said to depend on a condition subsequent.

That which has been herein termed an inspiration can just as well be called a "flash of genius" as the Supreme Court has denominated it. In common patent parlance it is usually called the unobvious, and the Supreme Court terminology says nothing more than this. To insist, as these various articles seem to do, that the Supreme Court test of a "flash of genius" necessitates an order of invention to be found only in few revolutionary inventions and excludes discoveries goes far beyond the facts upon which the decision rests.

The facts as stated by the Court are in effect that the Mead device there in issue consisted of a thermostatic control, which in itself was old, applied to a removable heating unit whereby the circuit was opened when the heating coil reached the predetermined temperature and thus relieving the operator of manually holding the plug. In the Court's opinion the use of the thermostat to break a circuit was analogous to or the same in character as the use of such a device in electric heaters, toasters, or irons; and while ingenuity was required to effect the adaptation it was no more than to be expected from a mechanic skilled in the art. Whether the judgment is right or wrong may be questioned. But it seems evident that the Court did no more than what the Examiners of the Patent Office do every day in their rejections when they hold that a substitution or modification does not involve invention; instead of using the office language the Court denominated the invention as one lacking in "the flash of genius".

The facts of the case are of more than passing interest in that they point to a remedy for one of the besetting sins of patent practice and that is the "use" patent. To illustrate, the Cottrell patents on precipitation were followed by hundreds of patents covering uses of the invention in specific fields where the problem of separating dust and fumes was present; in this way a meritorious invention can be so hedged about that the real inventor is denied the return which the patent statutes are supposed to provide. A corrective for this appears in the reasoning of the decision which in the particular case involved held the cigar-lighter, toaster, and flat iron to be in the same class; this is in line with the "proximate function" principle of classification that Mr. Sewall tried so hard to embody in the Patent Office classification and which official opposition largely nullified. The proximate function common to the three devices mentioned is the heating by electrical means of some object separable therefrom; the differences are dictated by the use or art to which each one relates and consist only in shaping and proportioning the elements of the devices to the object with the bread-holding means added in the case of the toaster, and interposing the smoothing surface in the case of the iron. This principle of proximate function has to my mind a peculiar appropriateness to "use" patents, i. e. adaptations of known practices to specific arts.

An analogous principle applicable to discoveries is the doctrine of "reasonable expectation" explained by Dr. Ely in his paper on "Chemical Inventions and Discoveries" before the Patent Office Society. Instead of following this doctrine, the stock reasoning for supporting the grant of patents on discoveries is reliance upon the inability to foretell what a research will produce; while the established rule may be pertinent in many cases, other improvement discoveries are nothing more than applications of known variants and the results are to be expected rather than the contrary.

As with principles generally, their statement is relatively easy; it is their application to specific cases that is difficult because in the final analysis it reduces to personal opinion. The ones here indicated do, however, have a place in patent practice; and with a recognition of the spirit behind them rather than the letter in which they are expressed, they should offer guidance in the consideration of inventions and discoveries as indicative of the presence as well as of the lack of patentability.

The foregoing considerations indicate to me that the Supreme Court decision is not deserving of the criticisms leveled against it, and the facts of the case do not warrant the inferences that any new measure of patentability has been instituted.

I FOUND much of interest in Mr. Poole's letter but I shall only make a brief comment on the question he raises concerning the alleged "erroneous impression" created by the writer's previous discussion. The impression in question was to the effect that the future of industrial research appears to be endangered because most patents based thereon will probably be invalidated by the courts, if the "flash of genius" patentability test is applied.

The law of course is what the judges, not necessarily what counsel or writers, say it is. However, this is not the place to analyze all of the pertinent cases reported since the "flash of genius" case was published. It is also noted that the U. S. Supreme Court has not again had occasion to pass directly on the question. Nevertheless, one decision may be singled out for special note because of its particular pertinence and because of the high standing of the court which rendered it. Reference is made to *Picard* vs. *United Aircraft*

[1] Reprinted from *J. Patent Office Soc.*, 24, 371 (1942).

Corp., 53 U. S. P. Q. 564, C. C. A. 2, (1942). It is doubted whether anyone who reads this decision carefully can believe that the foregoing impression is erroneous.

THOMAS CIFELLI, JR.

3 CLARENDON PL.
BLOOMFIELD, N. J.
July 27, 1942

Editor, Chemical and Engineering News:

EVER since the appearance of Mr. Cifelli's article[1], people interested in chemical industry and research have been expressing deep concern stemming from what this observer believes is an erroneous impression created by that contribution.

Initially, I, too, was much concerned by Mr. Cifelli's article, and immediately set about securing a copy of the reference in question. I found my interpretation thereof to be at distinct variance with Mr. Cifelli's. Furthermore, I have conferred with eminent patent counsel and have found that such authorities consider the "Flash of Genius Decision" to be strictly free from "new law" and to constitute no more than a conscientious attempt to be consistent with statute and precedent.

It is not the courts but Mr. Cifelli who would write new law. In all this fuss and feathers there has been no recognition whatsoever of the basic principle that invention may not be accomplished by mere exercise of the skill of the art.

To be sure, just when we pass to a point more lofty than can be encompassed by "mere skill" is perforce a matter of opinion. Moreover, I personally feel that to devise the cigaret lighter of the "Flash of Genius Decision" would require more than ordinary skill and that the flash of genius—if we choose to use such phraseology—did occur; but we must not forget that judges usually are skilled only in law, not in the scientific arts. No one, not even the greatest judges, can be expected to possess infallibility or even good judgment in subjects about which they know little. In case any one cares to argue that point, I am quite prepared to cite obviously worse decisions including instances when the boot was on the other foot and "inventions" were validated although no more than mere skill was required for their accomplishment—and precious little skill at that.

When we complain about the philosophy of decisions like this one, which bids fair to become a *cause celebre*, we are away off on a tangent. I agree that it was probably a poor decision but I am just as deeply of the opinion that it was good law, and am still more deeply convinced that attacking the "Flash of Genius" from the viewpoint of law will accomplish nothing toward the real problem's solution. For one thing it is looking for an answer to a doubtfully existent problem, while ignoring a very real and clearly discernible problem.

[1] *Chem. Eng. News*, 20, 523 (April 25, 1942).

This writer, probably in common with many others, has seen intricate technical disputes adjudicated by eminent jurists, who did not know the difference between a mole and a molecule, a cylinder and a piston, or heat and temperature; and under such circumstances it is inconceivable that judgment by men of the highest intelligence and integrity can fail to work frequent and grave injustice.

I imagine that in the hands of our non-scientific jurists about the right number of patents have been and will continue to be sustained—we get sort of an "average" justice in our decisions by having enough invalid patents sustained to offset the number of valid patents which are thrown out. We have something similar to choosing by lot from our country's population which one of us would receive the Priestly Medal and which one would hang for murder. Obviously, if a great advance had been made in chemistry and a murder had been committed, such a system would mete out the right amount of reward and punishment.

The question is: Just what should we scientific people do about jurisprudence which fails to make use of pertinent facts?

If we, operators and research men, yell any old way about the "Flash of Genius Decision", we might possibly stir up enough fuss to get a bill introduced which would in effect declare all patents valid. But more likely—and I believe preferably—than such a bill being passed, one would be enacted which would really give us something to yell about. We cannot expect that under a system of free enterprise people are going to stand for being sued, enjoined, and mulcted for doing the same thing that Grandpa would have done if there had been any point in doing it in Grandpa's time.

Continuing to be a bit dogmatic, there is only one logical solution to the question of how to have valid patents validated and invalid patents voided—viz., have both jurists and scientists judge the evidence. With due respect to our most able judges, they are no better qualified in the legal aspects of science than are our best scientists. In general, the legal problems relating to patents are no more profound than are the scientific aspects, regardless of how many lawyers unskilled in science hold opinions to the contrary.

The idea that the present practice of introducing expert testimony provides the jurist with a sufficient grasp of the scientific facts at issue is a myth. Why the court cannot safely depend on such sources of information is a long story and is, moreover, probably known to most of those who have had much to do with litigation of chemical patents. Briefly, expert testimony is very far indeed from being unbiased, and an impressive qualification carries more weight than does scientific fact. Many years of observation have led the writer to suspect that at least 50 per cent of all suits would have been decided differently if the litigants had swapped witnesses. Further, the instance is rare wherein a judge actually comes to comprehend the scientific facts involved in a case of moderate scientific complexity. The job is too great for any one kind of expert.

A proposal for Law ever to share the bench with Science would doubtless be abhorrent to legalists; but to a progressive jurist any resort which is conducive to more perfect application of the law should be no less than acceptable. In fact, we should be able to work out a scheme whereby competent and unbiased scientific opinion could be assured, short of formally cloaking it with judicial powers. What is important is assurance that such opinion will enter into patent decisions, and will be competent, and unbiased. This in turn means that it be surrounded by the same freedom from economic pressure and political exigency which has proved uniquely conducive to a thoroughly judicial attitude. The scientific, as well as the legal, minds which contemplate the evidence should be those of men appointed for life and compensated on a scale comparable to that of our federal judges. Whether their decision shall be legally binding, or whether their functions shall be advisory only, is not a vital question, but unless such opinion shall decide all scientific aspects of patent disputes it is the writer's firm conviction that we shall have not only more decisions as debatable as "The Flash of Genius Decision", but continue to have many which are grossly unfair.

There is far less improvement to be enjoyed by altering patent law—either of statute or precedent—than by setting up a judicial procedure designed to meet those conditions which are peculiar to patent litigation. Since such cases typically include profound questions, both legal and scientific, and it is a practical impossibility to find the best scientific minds and the best legal minds combined as a single intellect, there is but one apparent answer. Judgment must be the joint responsibility of jurist and scientist.

J. W. POOLE, *Manager*
Research Division

LION OIL REFINING CO.
EL DORADO, ARK.
July 8, 1942

Howard D. Grant has been elected president and **Stevens H. Hammond** executive vice president of the Whiting Corp., Harvey, Ill.

Morris Kaplan, who has been assistant to the chief, Division of Laboratories, Bureau of Customs, Treasury Department, for several years, has become chief chemist of the customs laboratory in Baltimore, Md. **E. F. Kenney** is succeeding Mr. Kaplan in Washington. **Joseph O. Broussard** of the Honolulu customs laboratory is being transferred to the Baltimore laboratory.

New-Construction Possibilities for Chemical Plants

A NEW and revolutionary technique in plant construction which may hold distinct advantages for chemical processing units has been developed in a joint effort by the Truscon Steel Co., Owens-Corning Fiberglas Corp., and The Austin Co. The new building method, called "Ferroglas construction", has been successfully used in two huge new plants erected and completed late last year in the Southwest. Features of this construction, which uses practically only Fiberglas and steel, are excellent insulating properties, low sound reflectivity, high light reflectivity, and, important to the chemical field, little condensation of vapor.

The construction is simple, lends itself to speedy construction, and is uniform, although side-wall and roof techniques are somewhat different. Thus the wall, completely constructed from one outside scaffolding, is built up from the inside with expanded metal mesh, a Fiberglas mat, a 4-inch blanket of Fiberglas, a metal channel, a vapor seal of cold asphalt primer and vapor-resistant paper, a 1-inch Fiberglas insulation board, and on the outside of the building a metal facing panel.

To facilitate construction and to save time, the side-wall channel is filled at the job site with the Fiberglas insulating blanket (secured in position by an asphalt adhesive), the retaining mat, and metal mesh. The complete, filled C-channels, which are made of 22-gage steel, 30 inches wide and 3 inches deep, are then hoisted into position and secured to the connecting plates by metal screws. Thus the only work done from the scaffolding is the application of the remainder of the wall—the asphalt and paper seal to the back of the channel, the rigid 1-inch Fiberglas board, and the outside ribbed metal siding. These exterior facing panels, 30 inches wide and ribbed 10 inches on centers, are fabricated from 18-gage steel and are designed to resist a 30-pound wind load. The ribs, $2^1/_4$ inches wide and $1^{19}/_{32}$ inches deep, form an air space with the rigid insulation board; this space acts as a flue, carrying a current of air which dries any moisture that may condense at these points.

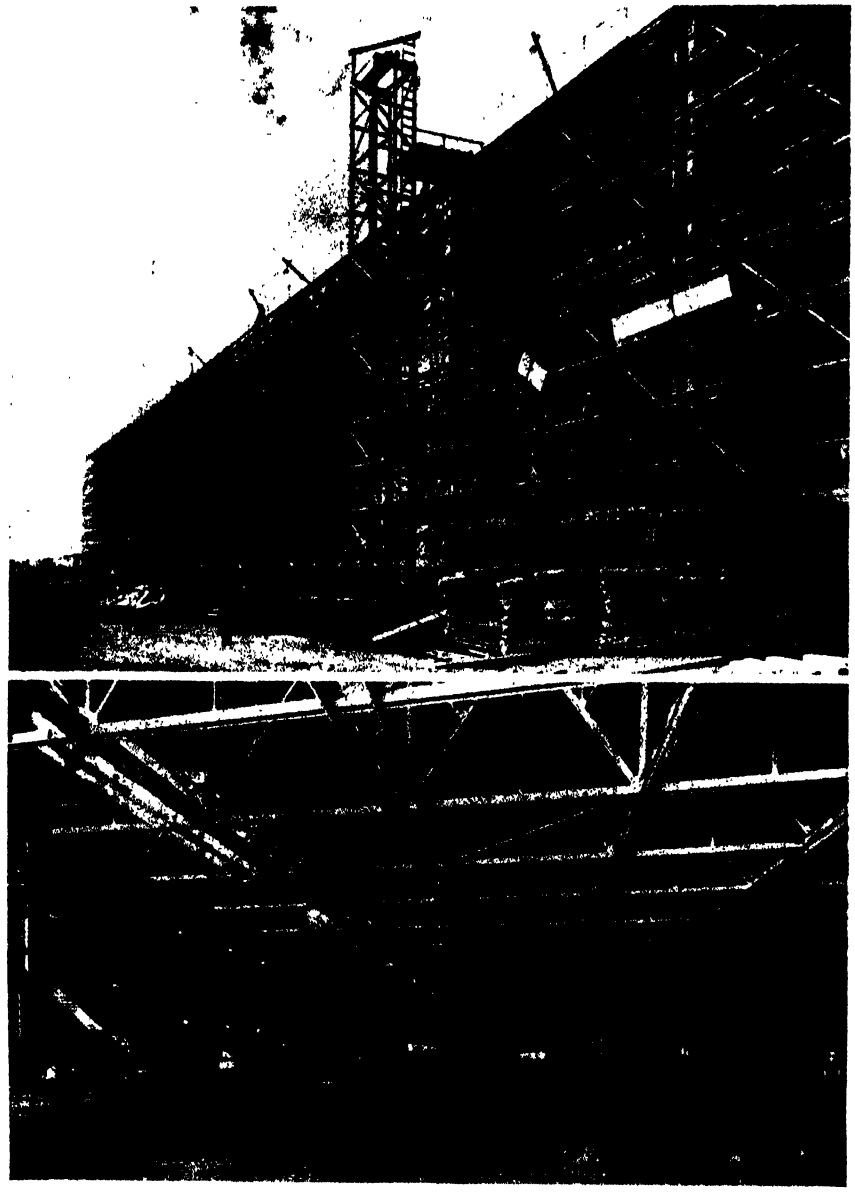
Roofs of Ferroglas construction are built up in layers similar to the sidewall; the chief difference is that there are no prefabricated sections such as the filled channel hoisted into place for the side wall. Expanded metal guards are fastened to the runner channels by clips, and above the expanded metal is placed a colorless, light-reflecting, Fiberglas retaining mat which prevents passage of dust but does not materially reduce the sound absorption qualities of the 3-inch blanket of 1.5-pound-density Fiberglas laid directly on it. These three materials constitute the ceiling of the factory. The roof proper is made of metal roof deck welded to the purlins and having on its upper side a continuous vapor seal which is mopped on. Over this vapor seal a $^{13}/_{16}$-inch thickness of 6-pound-density Fiberglas roof insulation board is laid; finally, a built-up waterproofing, consisting of four layers of roofing paper held in place with melted pitch, is applied over that.

Expansion and contraction in the roof are provided for by means of specially designed expansion joints spaced at intervals of 400 feet. As in the case with the expansion in the side walls, allowance for $2^3/_4$-inch movement is made, yet insulating qualities are not impaired.

Originally this construction was designed to meet the specifications of the Government for various physical efficiencies and for an easily built factory.

The Ferroglas construction averages, for a 6-inch wall, a weight of about 10 pounds per square foot. It has an overall coefficient of heat transfer of 0.07 B. t. u., has low heat capacity, absorbs about 75 per cent of the noise striking its surface, and has excellent light reflection. The roof construction is about 11 pounds per square foot and has a heat transfer of 0.06 B. t. u. The other properties are similar to those of the side wall. Light reflection is of great value for the windowless-type blackout plant such as the two plane factories constructed by this method.

Specifications and actual performance of the construction are shown in Table I.



One of the two new plants in the Southwest which are the first examples of Ferroglas construction. The main building of each is longer than the combined length of the world's four largest ocean liners. More than 19,400,000 board feet of Fiberglas materials are employed in the two plants for sound absorption and heat insulation.

Table I. Specifications and Performance

	Designers' Requirements	Actual Performance
Walls		
Thickness, inches	8	6
Weight, pounds/sq. ft.	20	10
Heat transfer coefficient, B.t.u.	0.14	0.07
Heat capacity	Low	Low
Sound absorption, %	60	75
Light reflection (natural finish)	Greatest possible	Good
Condensation and vapor control, %	100	Excellent
Fire resistance, %	100	Excellent
Bomb and incendiary protection	Shatterproof	Shatterproof
Maintenance	Least possible	Low
Roofs[a]		
Thickness, inches	...	5
Weight, pounds/sq. ft.	...	11
Heat transfer coefficient, B. t. u.	0.125	0.06
Heat capacity	...	Very low

[a] Other characteristics are the same as for walls.

New Alcohol Process Dedicated to Public Use

IN LINE with the Baruch report that newly developed apparatus is available for increasing the production of war alcohol without use of critical materials, Schenley Distillers Corp., New York, N. Y., is preparing applications for a patent on such apparatus, with the patent dedicated to public use. The method developed by Schenley engineers does not use critical materials, and is said to save time and expense in converting beverage distilleries to war alcohol production.

The company in August offered to other concerns in the distilling industry detailed information about construction methods used in putting the first packed column into operation. Work on new packed columns is being rushed at the company's six remaining low-proof spirits plants, so that all production facilities may be devoted to war work.

Who Makes It?

SOURCES of supply for the following are wanted by the National Registry of Rare Chemicals, Armour Research Foundation, 35 West 33rd St., Chicago, Ill.: 1,8-dihydroanthraquinone, calcium sulfaguayacolate, ergotamine tartrate, 2,3,5-trichlorophenoxy acetic acid, 2,3,5-triiodophenoxy acetic acid, 2,4-diiodophenoxyacetic acid, 2,4-dichlorobenzoic acid, 2,3,5-trichlorobenzoic acid, 2-chloro, 3-nitrobenzoic acid, 2,3-dichlorobenzoic acid.

Carl M. Anderson has been appointed executive assistant to the president of Merck & Co., Inc., Rahway, N. J.



WIDE WORLD PHOTOS

Women Chemists Heed War Call

Donna Price, one of the outstanding women chemists at the Hercules Powder Co., Wilmington, Del., tests rosin size for oxygen stability in this oxidation train process.

Metallurgy Training for Women

THE first war-training course in metallurgy, established exclusively for women, opened September 21 at the Illinois Institute of Technology, Chicago, Ill. Since March the institute has trained several hundred women in ordnance inspection, industrial drafting, and industrial chemistry.

Mineral Industries Building, West Virginia University, Dedicated

THE Mineral Industries Building, West Virginia University, will be dedicated at Morgantown, W. Va., on October 16 and 17. In addition to the dedication ceremonies and inspection of the new building, sectional meetings have been planned, covering chemical, metallurgical, and ceramic engineering, geology, and mines and mining, as well as the annual meeting of the Allegheny Section of the S. P. E. E.

Contributions of Chemical Research

A BRIDGE of ships spanning the Atlantic, spaced only a trifle over one mile apart, would be required to bring to America just five of the many vital war products which the chemical industry has developed synthetically since 1917.

The five products are nitrates for explosives production and other uses; rubber for a mechanized army and necessary civilian transportation; dyestuffs for uniforms, various types of military equipment, and civilian clothing; fibers for parachutes, powder bags, and essential industrial uses; and camphor, used medicinally and in the manufacture of many chemical products essential to the war.

To bring these things to America in the quantities either required this year, or actually imported before the chemical equivalent was in production, would require 2,682 sizable cargo ships.

Contract Distribution Branch of WPB Is Discontinued

THE War Production Board has announced discontinuance of its Contract Distribution Branch in Washington, the functions of which will be taken over by the Smaller War Plants Division of WPB and the Smaller War Plants Corporation. The latter organization was set up by Congress for the purpose of bringing more smaller manufacturing plants into the production of war materials and essential civilian goods. This was the motive for setting up the original Contract Distribution Division under OPM, and since these objectives are now assigned to the Smaller War Plants Corporation, the continuance of the CDB would constitute duplicating functions and overlapping of effort. Two units of the Contract Distribution Branch in Washington—the Facilities Records Unit and the Critical Tools Service—are being temporarily continued under the jurisdiction of the Facilities Utilization Division.

Awards in Chemistry at Montana State College

RECOGNITION of good work in undergraduate chemistry at Montana State College took definite form with the establishment of two annual awards, one first made 12 years ago and the other more recently. The older award is sponsored by the Alpha Omicron Chapter of Alpha Chi Sigma and is presented by inscribing the student's name on a bronze plaque located in the main stairway of the chemistry building. The Cyril Evans Award, established in 1940, is a year's membership in the AMERICAN CHEMICAL SOCIETY and is awarded to a student of chemistry, industrial chemistry, or chemical engineering who after nearly two and one half years of study is considered most worthy by faculty and senior students. The Alpha Omicron Chapter Award (known locally as the Alpha Chi Sigma Award) is made to the student of the above majors of study who has earned the highest grade in his freshman year.

The students and graduates listed have been honored by the Alpha Omicron Chapter Award.

The Alpha Omicron Chapter of Alpha Chi Sigma was founded in 1924 largely through the efforts of Oden E. Sheppard, present head of the Department of Chemistry. The charter group included Wm. M. Cobleigh, dean of the Engineering Division for the past 13 years and now acting president of the college; also Herman J. Almquist of vitamin K fame and others who have won prominence. Eight of the charter members took their PhD.'s in chemistry.

The Cyril Evans Award recognizes a more sustained effort in chemistry and its related fields. Although the first requisite for this award is high scholarship, the student must qualify in other respects as well.

Cyril Evans was graduated from Montana State College in 1931 and obtained his M.S. degree in 1934 while assisting in the chemical laboratory of the Montana Agricultural Experiment Station. He obtained his doctorate degree in biochemistry at the University of Minnesota in 1938 and subsequently carried on protein plastic research at Armour Institute. He is now a member of the U. S. Regional Laboratory at Peoria, Ill. Dr. Evans sponsors his award because he feels that membership in the AMERICAN CHEMICAL SOCIETY produces a broader appreciation of chemistry and of human affairs. Those who have received this award are Lester Hogan, who graduated from Montana State College in 1942, and Arthur Fry, a senior in chemistry at Montana State College this year.

All the recipients of the Alpha Omicron Chapter Award graduated with honors from Montana State College and have also been honored by membership in the Scholastic Honor Society of Phi Kappa Phi.

STUDENT OR GRADUATE	YEAR	PRESENT CONNECTION
CHEMISTRY DEPARTMENT		
Edwin N. Lassettre	1930	Ohio State University, assistant professor
Cornelius Giacchetti	1932	Training stopped because of ill health
Robert Tichenor	1936	Harvard University, Ph.D. candidate (Rhodes scholar)
Richard Gluyas	1940	Montana State College, student
R. Bernal Johnson	1941	Montana State College, student
DEPARTMENT OF CHEMICAL ENGINEERING		
Earl Walters	1933	Northern Pacific Railway, water inspector
John R. Bowers, Jr.	1934	McGill University, demonstrator in wood chemistry
Edwin R. Hahn	1935	U. S. Rubber Co., research
William Alexander	1937	Rayonnier, Inc., research
Elbert C. Herrick	1938	Princeton University, Monsanto Chemical Engineering Fellowship
Roland Gumprecht	1939	Chemical Warfare, Second Lieutenant

D. L. Immel has been appointed assistant plant superintendent, Copperweld Steel Co., Warren, Ohio.

Herbert A. Swenson has been granted military furlough from the U. S. Geological Survey, where he has been employed as chemist since 1938, and has been called to extended active duty as first lieutenant in the Chemical Warfare Service.



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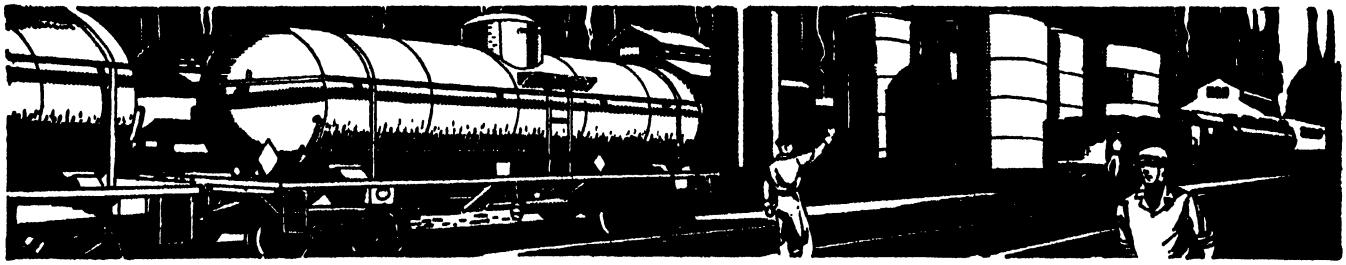
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National Research Council Representatives from A. C. S. on Division of Chemistry and Chemical Technology. *Terms expire July 1, 1943:* G. J. Esselen, Paul M. Gross. *Terms expire July 1, 1944:* L. W. Bass, H. M. Chadwell; *Terms expire July 1, 1945:* Paul D. Bartlett, Per K. Frolich.

Nomenclature, Spelling, and Pronunciation (established 1894). *Chairman*, E. J. Crane, *Chemical Abstracts*, Ohio State University, Columbus, Ohio; Board of Editors of the *Journal of the American Chemical Society;* Editor of *Industrial and Engineering Chemistry;* L. T. Capell, A. M. Patterson, Janet D. Scott.

Paper (established 1908). *Chairman*, Byron L. Wehmhoff, 6506 Brennon Lane, Chevy Chase, Md.; B. W. Scribner, H. J. Skinner.

Patent and Related Legislation (established 1899). *Chairman*, Walter A. Schmidt, 1016 West Ninth St., Los Angeles, Calif.; Robert T. Baldwin, F. E. Barrows, F. G. Breyer, Bruce K. Brown, Henry Howard, Nelson Littell, J. C. Morrell, Elmer Stewart, O. W. Storey, E. H. Volwiler.

Professional Training of Chemists (established 1936). *Chairman*, W. Albert Noyes, Jr., Department of Chemistry, University of Rochester, River Campus, Rochester, N. Y. *Secretary* (member *ex officio*), Erle M. Billings, 343 State St., Rochester, N. Y. *Term expires April 30, 1943:* W. G. Young. *Term expires April 30, 1944:* Harry B. Weiser. *Term expires April 30, 1945:* W. Albert Noyes, Jr. *Term expires April 30, 1946:* S. C. Lind.

Retired Chemists. Committee to Consider Utilizing Their Services in the Present Emergency (established 1942). *Chairman*, J. Sam Guy, 1192 Ponce de Leon Ave., N. E., Atlanta, Ga.; Wm. Lloyd Evans, B. S. Hopkins, S. R. Brinkley, S. C. Lind, E. Emmet Reid, H. H. Willard.

Soap and Soap Products (established 1935). *Chairman*, F. W. Smither, National Bureau of Standards, Washington, D. C.; R. E. Divine, J. E. Doherty, C. P. Long, E. B. Millard, M. L Sheely, H. P. Trevithick.

Standard Apparatus (established 1917). *Chairman*, W. D. Collins, U. S. Geological Survey, Washington, D. C.; J. V. Freeman, R. A. Osborn, Lyon Southworth, Edward Wichers, H. H. Willard.

Standard Methods for the Examination of Water and Sewage, to Cooperate with the Committee of the American Public Health Association (established 1920). *Chairman*, Arthur M. Buswell, University of Illinois, Urbana, Ill.; W. D. Collins, F. W. Mohlman, F. G. Straub.

Standardization of Biological Stains (established 1924). *A. C. S. Representative on the Commission:* John T. Scanlan, Eastern Regional Research Laboratory, U. S. Department of Agriculture, Chestnut Hill, Philadelphia, Penna.

Standardized Methods for Vitamin Research (established 1921). *Chairman*, Edward A. Doisy, 1402 South Grand Ave., St. Louis, Mo.; A. D. Emmett, C. G. King, E. V. McCollum, E. M. Nelson.

Study Problem of the Teaching of Chemistry in High Schools (established 1941). *Chairman*, B. S. Hopkins, Chemistry Laboratory, University of Illinois, Urbana, Ill.; H. N. Alyea, D. M. Kumro, M. V. McGill, A. W. Scott.

Supervision of Chemical Engineering Catalog (established 1915). W. R. Veasey, Dow Chemical Co., Midland, Mich.

Supervisory on Standard Methods of Analysis (established 1910). *Chairman*, H. H. Willard, 208 Chemistry Bldg., University of Michigan, Ann Arbor, Mich.; B. L. Clarke, I. M. Kolthoff, G. E. F. Lundell, W. W. Skinner.

Women's Service (established 1927). *Chairman*, May L. Whitsitt, Department of Chemistry, Southern Methodist University, Dallas, Tex.; Mildred Adams, H. Marjorie Crawford, Rachel H. Edgar, Mildred W. Grafflin, Gertrude Vermillion.

Chapters of Student Affiliates

Agricultural and Mechanical College of Texas, College Station, Tex.
Albion College, Albion, Mich.
Albright College, Reading, Penna.
Birmingham–Southern College, Birmingham, Ala.
Brooklyn College, Brooklyn, N. Y.
Bucknell University, Lewisburg, Penna.
Butler University, Indianapolis, Ind.
California Institute of Technology, Pasadena, Calif.
Central College, Fayette, Mo.
College of Puget Sound, Tacoma, Wash.
College of St. Thomas, St. Paul, Minn.
College of Wooster, Wooster, Ohio.
Colorado State College of Agricultural and Mechanical Arts, Fort Collins, Colo.
Duquesne University, Pittsburgh, Penna.
Fordham University, New York, N. Y.
Franklin and Marshall College, Lancaster, Penna.
Grove City College, Grove City, Penna.
Hamline University, St. Paul, Minn.
Hofstra College, Hempstead, N. Y.
Howard College, Birmingham, Ala.
Indiana University, Bloomington, Ind.
Iowa State College, Ames, Iowa.
Jamestown College, Jamestown, N. Dak.
Lafayette College, Easton, Penna.

Lawrence Institute of Technology, Highland Park, Mich.
Loyola University, Los Angeles, Calif.
Loyola University of the South, New Orleans, La.
Manhattan College, New York, N. Y.
Marietta College, Marietta, Ohio.
Massachusetts Institute of Technology, Cambridge, Mass.
Massachusetts State College, Amherst, Mass.
Newark College of Engineering, Newark, N. J.
Niagara University, Niagara University, N. Y.
Northeastern University, Boston, Mass.
Ohio Northern University, Ada, Ohio.
Ohio University, Athens, Ohio.
Oregon State College, Corvallis, Oreg.
Polytechnic Institute of Brooklyn, Brooklyn, N. Y.
Rensselaer Polytechnic Institute, Troy, N. Y.
Rhode Island State College, Kingston, R. I.
Rice Institute, Houston, Tex.
St. John's University, Brooklyn, N. Y.
St. Louis University, St. Louis, Mo.
St. Norbert College, West DePere, Wis.
San Jose State College, San Jose, Calif.
South Dakota State College, Brookings, S. Dak.
Texas Christian University, Fort Worth, Tex.
Texas Technological College, Lubbock, Tex.
Union College, Schenectady, N. Y.
University of Alabama, University, Ala.
University of Buffalo, Buffalo, N. Y.
University of California, Berkeley, Calif.
University of Connecticut, Storrs, Conn.
University of Delaware, Newark, Del.
University of Denver, Denver, Colo.
University of Detroit, Detroit, Mich.
University of Florida, Gainesville, Fla.
University of Houston, Houston, Tex.
University of Kentucky, Lexington, Ky.
University of Minnesota, Minneapolis, Minn.
University of Montana, Missoula, Mont.
University of Nevada, Reno, Nev.
University of Pennsylvania, Philadelphia, Penna.
University of Pittsburgh, Pittsburgh, Penna.
University of South Dakota, Vermillion, S. Dak.
Virginia Military Institute, Lexington, Va.
Virginia Polytechnic Institute, Blacksburg, Va.
Washington and Lee University, Lexington, Va.
Western State College, Gunnison, Colo.
Westminster College, Fulton, Mo.

A. C. S. New Members Elected September 1 to October 1, 1942

Total Membership as of October 1, 31,602

Akron Section. Bernhard N. Larsen, Leora E. Straka.

Alabama Section. Roberts Bouson, James J. Dwyer[1], William Tillman Haynes, Jr.

California Section. Vernon E. Haury, Milton Kahn[1], Philip Mitton, Oliver Tire & Rubber Co.

Central Pennsylvania Section. Robert I. Dixon[1], Joseph Kalina[1].

Chicago Section. Robert A. Diehm, John P. Edwards[1], John Ralph Ferraro[1], John E. Flanagan[1], Arden R. Johnson, Richard W. KixMiller[1], Thaddeus J. Kowalski[1], Charles Lowe[1], Aaron Miller, Edward J. Shaeffer, Sidney L. Simon.

Cleveland Section. Eric de Reville Falcao, Richard R. Holmes[1], Walter M. Iliff[1], Joseph H. Schneider.

Columbus Section. Howard W. Kruse, L. P. Larson, G. Frederick Smith Chemical Co.

Connecticut Valley Section. Franklin H. Branin, Jr.[1], Harry Pearlman, Alfred G. Rossow, L. Blaine Tewksbury, Jr.

Cornell Section. Milton L. Scott.

Dayton Section. Robert C. Treue.

Delaware Section. Stanley G. Ford.

Detroit Section. Deno Laganis[1], Albert John Sargent, Jr.[1], Robert J. Thorn.

Eastern New York Section. Royal A. Cutler, Jr.[1], Theodore A. Jacob[1].

Indiana Section. Herbert F. Smith.

Kanawha Valley Section. Ben W. Kiff, Andrew T. Walter[1].

Lehigh Valley Section. Michael Bebel[1].

Louisiana Section. Jacob S. Guepet, Charles M. McKay.

Maine Section. Nathan Glover[1].

Maryland Section. Erwin M. Raabe[1], Harry Gordon Steinman.

Michigan State College Section. Heber R. Baldwin, Robert W. Besch[1], Benjamin Hartley Pringle.

Midland Section. Wesley Dean Schroeder.

Milwaukee Section. Fred C. Kraats.

New Haven Section. Doris R. Seeger[1].

New York Section. John R. Abrams, Thomas F. Callahan, Robert T. Florence, Leon Hammer[1], Rev. Alvin A. Hufnagel[1], Martin S. Kulpinski[1], Frank W. Miller, Jr.[1], Mimosa Pfalts, Morton L. Reich[1], Robert G. Seaman, Eugenia P. Tenney[1], I. Louis Wolk, Ernest G. Wollish, Lois M. Zucker.

North Jersey Section. John G. Augenstein, Francis P. Baldwin[1], Edward W. Harvey, Roland A. Morck, Daniel T. Piwowar, M. L. Rushmore, Ernest Solomon, Warren B. Warden, Herbert A. Wells.

Northeastern Section. Richard Bersohn[1], Edward O. Densler, Sidney W. Factor[1], Carl F. Floe, George C. Harris, G. Haugaard, William Jay, III[1].

Oklahoma Section. Harold G. Owen.

Peoria Section. Rexel Scholfield.

Philadelphia Section. Daniel F. Dickel[1], Austin A. Dodge, G. Harvey Saunders[1], Waclaw Szukiewicz, Philip B. Taft, Donald B. Thornton[1].

Pittsburgh Section. G. Leslie Armstrong[1], Carl E. Carlson, James Cooperman, Rufus N. Palmer, Peter V. Paulus, Robert S. Sikora[1], Maurice H. Whitlock[1].

Puget Sound Section. Oscar Fitzalan Orr, Jr.[1]

Purdue Section. Willard S. Breon, Elwyn D. Schall.

Rhode Island Section. Ross E. Van Dyke[1].

Rochester Section. Robert F. Brown, Dana Lee French[1], Alvin D. Keene[1], Leonard R. Sainsbury.

St. Joseph Valley Section. Earl T. Anderson, Joe D. Miller, Robert C. Poock.

St. Louis Section. Robert E. Broholm[1], L. Lynn Nickel, William C. Teach[1].

South Jersey Section. Albert H. Klein, Lewis H. Wilson[1].

Southern California Section. H. D. Chapman, Marcellus T. Flaxman, Oscar Grisat[1], Jack S. Hicks[1], Frank J. Ross, Thomas C. Van Osdall[1].

Syracuse Section. Frank Lawatsch[1], Hutton W. Theller[1], H. Kent Vanderhoef[1].

Toledo Section. R. P. Meyer.

University of Illinois Section. John D. Garber[1], Sol Wexler[1].

University of Missouri Section. Martin B. Williamson[1].

Washington Section. George H. Berryman, Jane C. Ebbs, Elden D. Haller, Paul L. Kingsley, Harold D. Levene.

Western Connecticut Section. Henry James Rand[1].

Western Maryland Section. Albert M. Kaiser.

Western New York Section. Mary H. Aldridge[1], Norman L. Anderson, George J. Antlfinger[1], George C. Aronstamm, John A. Baumann, Robert H. Beeman[1], Leslie E. Chamberlain, John W. Churchill, Clarence E. Coleman, Robert M. Coleman, Robert Kent Gatley, John W. Healy[1], Walter Klabunde, Doris Ann Lyman[1], James E. Mensching, Wayne F. Nelson[1], Ralph B. Payne, Thomas P. Reville, John J. Ronayne, Jr.[1], Raymond A. Russell[1], Arthur E. Weber, Richard G. Werth[1], Robert A. Willihnganz, Robert J. Wineman[1], Emerson L. Wittbecker, John A. Woodard[1], R. Woodell[1].

Wichita Section. W. A. Hartman[1].

No Section. Robert L. Bennett, H. Edward Cable, Montroy J. Cohen[1], Harry E. Crawford[1], Mary Ann Davis[1], Gordon P. Dillon, Edmund Langley Hirst, R. E. Hurst, S. L. Nevins, Richmond J. Roberts, Warnock Work[1].

[1] Junior member.

NECROLOGY

Hector R. Carveth

HECTOR R. CARVETH, internationally known electrochemist, died on September 17 in Niagara Falls, N. Y., as a result of injuries suffered when a cement tank exploded while being tested at the winery of Chateau Gay, Ltd., of which he was president.

Dr. Carveth was born in Fort Hope, Ontario, January 23, 1873, and studied at Toronto University and Cornell University. He was an instructor in chemistry at Cornell from 1900 to 1905, and then became associated with E. G. Acheson, of the Acheson Graphite Co. In 1906 he became works manager of the Niagara Electro-Chemical Co., a subsidiary of Roessler & Hasslacher. During World War I he was in charge of all technical operations of R. & H., with the title of vice president, and in 1928 he became president of the company. He retired in 1932, a year after the company had been absorbed by du Pont, and since that time had devoted himself to private chemical research in the development of sodium. He held many patents on sodium and sodium derivatives.

Dr. Carveth was a member of the AMERICAN CHEMICAL SOCIETY, the Electrochemical Society, The Chemists Club, and the Society of Chemical Industry.

Carl Nelson Hand

CARL NELSON HAND, chemical engineer and retired plant manager of the Rubber Service department of Monsanto Chemical Co., died September 18 at Charleston, W. Va. He was 50 years old.

Mr. Hand, with E. J. Smail, Jr., and C. O. North, founded the Rubber Service Laboratories at Akron, Ohio, in 1922 and was president and general manager until 1929 when Rubber Service became a part of Monsanto Chemical Co. He continued as manager of the Rubber Service department plant at Nitro, W. Va., until his retirement in 1938. Since then he has been engaged in private research work.

Mr. Hand was a graduate of Hobart college and held a chemical engineering degree from the Massachusetts Institute of Technology. Prior to founding Rubber Service Laboratories he was a development engineer for the Goodyear Tire & Rubber Co. For some years he was a member of the AMERICAN CHEMICAL SOCIETY, which he joined in 1927.

Leonard V. Rohner

LEONARD V. ROHNER, research chemist for the Solvay Process Co., Syracuse, N. Y., died July 29 after a short illness.

Mr. Rohner was graduated in chemical engineering from Syracuse University in 1923, and since that time had been in the employ of the Allied Chemical and Dye Corp. in various technical capacities. He had been a member of the AMERICAN CHEMICAL SOCIETY since 1936, and also belonged to Alpha Chi Sigma.

Edward W. P. Smith

EDWARD W. P. SMITH, 56-year-old consulting engineer for The Lincoln Electric Co. and a nationally known authority on arc welding, died suddenly September 19.

A veteran of more than 20 years' service with The Lincoln Electric Co., Mr. Smith had traveled extensively in the last year in the interests of the war production program. Visiting many war industry centers, he had been conducting welding courses and giving lectures on the latest techniques in welding. He gave advice to many war concerns utilizing welding in the construction of war equipment.

Mr. Smith was born in Cleveland and was graduated from Colorado College, Colorado Springs, Colo., with a degree in electric engineering. Before joining Lincoln Electric as a tester he had worked in the electrical inspection department of the City of Cleveland and for the Westinghouse Electric and Manufacturing Co. in Pittsburgh.

He gave special courses at the Lincoln plant each month on designing for welding. He developed several original methods of demonstrating the stresses in metals and was to have been chairman of a number of technical sessions at the convention of the American Welding Society in Cleveland the week of October 12.

Mr. Smith was widely known as a technical writer and contributed many articles to the trade and technical press.

Harry V. Wallace

HARRY V. WALLACE, vice president and director of sales of the Kimble Glass Co., died September 15, at the age of 48.

After experience in the sales field with the Socony-Vacuum Co. and the Owens-Illinois Glass Co., Mr. Wallace joined the Kimble Glass Co., in 1931, as Chicago branch manager. In 1939 he was transferred to Vineland, N. J., and on June 7, 1939, became vice president and director of sales.

Otto Wilson

OTTO WILSON, free-lance research writer, died September 12 in Washington, D. C., at the age of 57.

Mr. Wilson was born in New Bethel, Ind., and was educated at Butler College and Indiana University. During World War I he was a captain in the Chemical Warfare Service. He was a frequent contributor to CHEMICAL AND ENGINEERING NEWS and *Industrial and Engineering Chemistry*.

WE ANNOUNCE with regret the death of the following A. C. S. members:

Paul L. Aultman, technical superintendent, Sun Rubber Co., Akron, Ohio. Member since 1937.

Gustavus R. Glenn, Jr., manager, survey and engineering department, Johnson & Higgins, New York, N. Y. Member since 1934.

Charles S. Roy, Cuffley, Herts, England. Member since 1912.

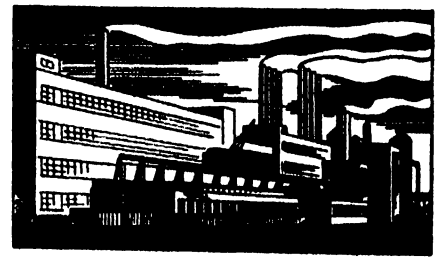
Neal D. Ryan, vice president, Purity Drug Co., Inc., New York, N. Y. Member since 1935.

F. M. Stanton, physician, Columbus, Ohio. Member since 1940.

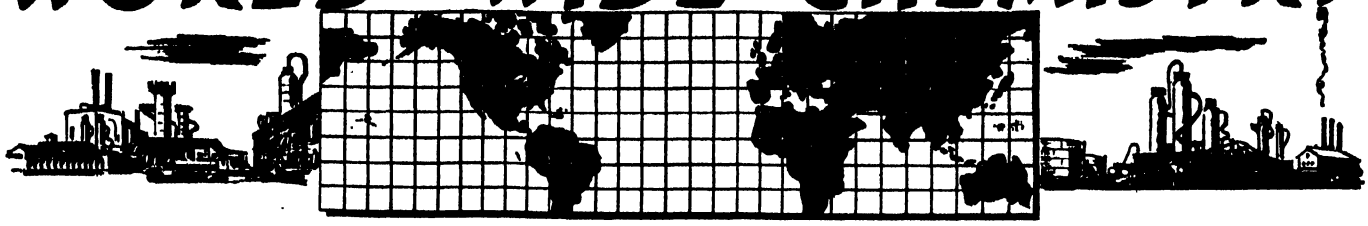
Donald P. Swisher, Chemical Warfare Service, U. S. Army, Butler, Penna. Member since 1929.

Harold L. Taylor, works manager and chief chemist, Nightingale Supply Co., Ltd., Sydney, N. S. W., Australia. Member since 1929.

Albert Wasmuth, chief chemist, Aluminum Co. of America, Spokane, Wash. Member since 1938.



WORLD-WIDE CHEMISTRY



GREAT BRITAIN

The concentration process is progressing in the chemical industries. Soap manufacturers whose business has been severely curtailed by rationing now must have an official license. Paint makers have been informed of further restrictions in raw materials. A survey of drug stocks has been undertaken by the Ministry of Supply to establish the requirements of imported drugs. Labor set free in chemical industries affected by control and concentration orders, however, is placed immediately in other chemical factories unless needed for more urgent tasks elsewhere.

Tar Distillers Tackle Problems

The Association of Tar Distillers has been concerned about the increasingly difficult labor problem. The possibility of employing women is being considered, based on the experience of a number of distillers; it has been approved by the government and the trade unions. The Committee on Building Materials Standardisation in the Ministry of Works and Planning has issued recommendations for the replacement of imported asphalt and bitumen. Mastic asphalt for roofing is to be replaced by built-up tar felts; in damp-proofing, by cement rendering or tar and pitch membrane; on static water tanks, by a layer of tar felt; and for acid-resisting flooring, by acid-resisting vitreous tiles in acid-resisting cement. Instead of tar macadam for road construction, water-bound macadam (possibly with a tar surface dressing) or concrete (either uncarpeted or tarred for camouflage) are suggested. Cold bitumen emulsion as used for damp-proofing wall surfaces, coating static water tanks, blinding concrete roofs, and fixing wood block flooring is replaced by fluxed coal-tar pitch. Bitumen-protected metal for roofing and structures is replaced by black iron dipped in hot pitch.

EDITOR'S NOTE. Those interested in further details should address the correspondent whose name and address appear for each country, and enclose sufficient International coupons to prepay the reply. United States stamps should not be sent.

Vitamin C Preservation In Rose Hips Is Studied

Rose hips collected last autumn in Hertfordshire had the largest vitamin C content, report Ovaltine Research Laboratories, when collected in the middle of November—namely, 400 mg. per 100 grams. During the previous weeks the vitamin C value was slightly lower, and by early December it had declined to two thirds of the maximum. Moreover, the vitamin C content declines as soon as the hips are collected, and drying is not satisfactory. When the rose hips are dried *in vacuo* (for 8 hours at 50° C.) or minced before drying, 10 per cent of the vitamin C is lost. Loss during manufacture can be avoided by heat treatment as soon as possible after collection to destroy the oxidizing enzymes, followed by preparation *in vacuo* of an extract stabilized by mixing with a high concentration of sugar and storing at a low temperature. There is a gradual loss of vitamin C in the interval between preparation and use. This may amount to as much as 50 per cent in the case of rose hip sirup kept until spring. It can be retarded, though not entirely prevented, by storing the sirup in nitrogen-filled containers.

Export License Required for CS_2

Carbon disulfide has been added to the list of chemical products for which export licenses are required to all destinations. Shipping difficulties and growing demands on the part of British manufacturers on war work have compelled the authorities to scrutinize more closely applications for export licenses. New restrictions have been placed on shipments to South Africa and other African countries.

Sewage Sludge Tested as Fertilizer Material

The Agricultural Research Council has undertaken experiments on the use of sewage sludge in agriculture, either alone or mixed with other waste products. Between 500,000 and 1,000,000 tons are available annually, but large differences are found in the sludge from different towns. Therefore its widespread use cannot be recommended before the results of the trials are known.

Study of Silicosis Leads to New Abrasives

Every effort has been made in the pottery industry to discourage the use of siliceous abrasives because of the danger of silicosis. A leading firm has successfully substituted harmless abrasives for sand in cleaning "browned-biscuit" ware. Although the new material is much more expensive, it has been found to be technically efficient. In polishing operations, promising results have been obtained with crushed fused alumina instead of siliceous abrasives.

Restrictions Extended to Substitute Motor Fuels

Restrictions on the use of motor fuel and Diesel oil have been extended to include all kinds of substitute fuels such as coal, steam, electricity, propane, and producer gas. The Ministry of War Transport will have to be convinced of the essential nature of the work performed before vehicles are licensed for the use of any of these fuels. Some alternative fuels, such as propane and butane, are in such great demand for essential purposes that no licenses for their further use in road transport will be given even to firms using them now. Meanwhile, Shell-Mex and B. P. Ltd. state that ample supplies of "Propagas" which can be substituted for acetylene in aluminum welding, annealing, lead burning, metal spraying, etc., are available. The ministry has placed two orders for 5,000 plants each for producer gas apparatus.

Artificial Silk Used for Utility Textiles

The bulk of British textile production now consists of so-called utility materials—i. e., fabrics which have been made to government specification at fixed prices and profit margins with special consideration to savings in material and labor. A

wide variety of fabrics is produced from a limited number of rayon yarns, and this rationalization has contributed to the cheapness of artificial silk materials. Considerable use is made of staple fiber, and viscose and acetate are used in mixtures as well as viscose fiber alone. Most of the staple fiber fabrics are subjected to the crease-resisting process; as a result, chemical manufacturers are receiving many inquiries from textile firms which were not formerly interested in chemicals for finishing textile fabrics. The rationing system has increased interest in materials which help to prolong the life of clothes, and the chemical industry has benefited from the demand for antifelting, crease-resisting, and waterproofing materials.

G. ABRAHAMSON
150 HALFWAY ST.
SIDCUP, KENT
ENGLAND
August 15, 1942



Until the beginning of 1941, cement produced in Brazil was sufficient to meet local requirements and importation was confined to a very limited quantity constituted mainly of special qualities of cement. Because of the increased expansion of building construction, not only private but also governmental, the production of cement in Brazil proved insufficient for the development of building activities. Several studies were carried out in various parts of the country to ascertain the possibility of installing new plants. Besides those referred to in previous letters, a new company is being formed having in mind the installation of a cement manufacturing plant at Paraiso, in the neighborhood of Campos, in the State of Rio de Janeiro. It is reported that the machinery will be bought in the United States and shipped during the current year, thus enabling the factory to start production by the middle of 1943. The new factory will have a capacity of about 800 metric tons per day, the initial production being estimated at 700 metric tons. The plant, besides burning fuel oil, will be adapted to burn Brazilian coal, obtained from the State of Paraná.

Export Regulations Have Been Issued

The Export and Import Department of the Bank of Brazil announced that export licenses are required for export from Brazil of machinery; vehicles; chemical and pharmaceutical products; surgical, electrical, optical, and photographic material; agricultural machinery; and tools in general.

Decree 9618, issued by the Federal Government, approved the specifications and classification control of export of new potatoes and citrus essential oils.

The National Council for Foreign Trade recently fixed minimum prices for export of rock crystals (quartz) for weights up to 10 kg. Crystals weighing more than this will be valued by the National Department of Mineral Production.

The Federal Government has granted a special license for the shipment to a firm in Philadelphia of 2,000 metric tons of zirconium ore from the Poços de Caldas region in the State of Minaes Geraes.

Marahuita Shale Deposit Is Studied

Because of the decrease in imported coal, the Brazilian Government is again studying the use of marahuita for production of city gas. "Marahuita" is the name given by Orville Derby to the shale obtained from the region of Marahú, in the State of Baía. The deposits of shale were recently estimated at about 450,000 metric tons of moist rock, discovered in the middle of the last century. Several tests were carried out in Europe and the United States and two industrial enterprises began using Marahú shale as raw material for oil production. Analyses performed at the Instituto Nacional de Tecnologia showed the following composition: moisture, 2.7 to 46.6 per cent; volatile matter, 30.0 to 75.7 per cent; fixed carbon, 6.4 to 31.5 per cent; ash, 7.7 to 42.5 per cent; and sulfur, 0.2 to 1.4 per cent. The samples analyzed showed a great variety in percentage composition, due to the fact that different kinds of marahuita were tested. Although several attempts were also made on a small scale for commercial exploitation of the Marahú shale, none showed a continuous operation because of the high costs of the oil products obtained. Large-scale experiments are being carried out in collaboration with the gas company in Rio de Janeiro. It was stated that marahuita produces more gas and of a better quality than imported coal. Steps were also taken by the government to obtain, for Rio de Janeiro City, a daily output of 200 metric tons of fuel from the deposits of Marahú; the Minister of Transport and Public Works had recommended the rationing of gas consumption in the city. According to the press, consumers are to be rationed on the basis of their average consumption less 20 per cent. Brazilian coal and marahuita are to be used in place of imported coal as far as possible.

Paper Industry in Brazil Is Active

The consumption of paper of all qualities in Brazil during the last 3 months amounted to the following: 1939, 171,735 metric tons; 1940, 170,619 metric tons; and 1941, 190,176 metric tons. During the same period imports were very irregular, decreasing from 52,612 metric tons in 1939 to 49,711 in 1940, and increasing to 61,405 in 1941. However, local production showed a steady and regular increase, amounting to 119,123 metric tons in 1939, 120,908 in 1940, and 128,771 in 1941. In the local production of paper not only imported but locally manufactured cellulose pulp was used. Imports of cellulose pulp amounted to the following: 1939, 84,480 metric tons; 1940, 63,708 metric tons; and 1941, 79,926 metric tons.

There are in Brazil 38 paper factories, 16 of which are located in the State of São Paulo, 6 in the Federal District, 5 in the State of Rio Grande do Sul, 4 in the State of Minas Geraes, 2 each in the States of Rio de Janeiro and Paraná, and one each in the States of Santa Catarina, Baía, and Pernambuco. The factories in the State of São Paulo produced during 1941 about 52 per cent of the total Brazilian production, the Federal District about 13 per cent, the State of Rio de Janeiro about 13 per cent, the State of Minas Geraes about 7 per cent, the States of Pernambuco and Paraná about 5 per cent each, the State of Rio Grande do Sul 3 per cent, the State of Santa Catarina about 2 per cent, and the State of Baía a little less than 1 per cent. Six factories produced during 1941 more than 6,000 metric tons of all kinds of paper.

The Klabin concern controls two factories, one in the State of São Paulo, the largest in all Brazil, and the other in the Federal District; the two factories produced together more than 15 per cent of the total Brazilian production. Five factories were responsible for more than 40 per cent of the total Brazilian production: Companhia Fabricadora de Papel in São Paulo the Companhia Fabrica de Papel de Petropolis in the State of Rio de Janeiro, Companhia de Melhoramentos de São Paulo in São Paulo, the Companhia Agricola Industrial Cicero Prado in São Paulo, and the Companhia Industria de Papel e Cartonagem in the Federal District. Of the total Brazilian production in 1941, amounting to 128,771 metric tons, 64,702 metric tons were wrapping paper, 29,539 metric tons printing paper, 26,554 metric tons writing paper, and the balance cartons, blotting paper, carbon paper, drawing paper, etc. Of the 61,404 metric tons of imported paper, 45,885 tons were newsprint, and 6,379 metric tons of scraps of paper for industrial and advertising purposes. Glazed paper and tissue paper, as well as paper for packing fruits, were imported in substantial quantities.

In order to meet local demand the Federal Government is granting several concessions for the establishment of pulp plants destined to supply paper factories. Of the plants under construction or starting production, the most important is undoubtedly the pulp plant now being built by Klabin concern in the State of Paraná which will produce very shortly 100 tons of wood pulp, 60 tons of chemically

bleached cellulose, and 40 tons of unbleached cellulose per day. The plant will furnish 160 tons daily of newsprint.

Compulsory Use of Brazilian Fibers Required

Considering that Brazil produces enough fibers to permit their use mixed with imported material, the National Economic Defense Committee approved a resolution by which the compulsory use of Brazilian fibers was increased from 10 to 25 per cent in mixture with jute or other imported material. This increase beginning July 1 will be controlled by the delegates of the committee in the weaving and spinning plants. The prices for the blended fibers will be also adjusted, taking into consideration the increase in the percentage of national fibers.

Exports of Mineral Products Improved

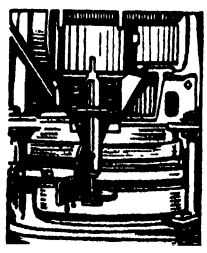
According to the *Bulletin of the Federal Council of Foreign Trade*, Brazilian exports of mineral products during the first 4 months of the current year showed an increase in value over the same period of 1941 of about 55 per cent. Rock crystal was the principal export product, the total value of shipments amounting to 53.1 per cent of the total value of exports of minerals, compared to about 12 per cent during the same period of 1941.

Metallic ores come second, having risen from 31,079 contos de réis in the first 4 months of 1941 to 38,807 contos de réis in the same period of 1942. Manganese and rutile ores are responsible for this increase in value. However, metallic ores represented 25 per cent of export value in 1941 against only 20 per cent in 1942.

The value of exports of precious and semiprecious stones fell in January–April 1942 as compared with the same period of 1941, owing to a marked decrease in exports of diamonds and aquamarines. Similarly, iron and steel products showed a considerable decrease in exports during 1942. Exports of mica showed a slight increase, while exports of coal increased from only 487 contos de réis in the first 4 months of 1941 to 2,181 contos de réis in the same period of 1942.

C. E. Nabuco de Araujo, Jr.

Caixa Postal 970
Rio de Janeiro
August 24, 1942



Germany

Expansion of various chemical enterprises in the eastern provinces of Germany is typical of the trend towards the east, which is a notable feature of present industrial development. Among the industries trying to move eastward are cement works, of which there is a surplus in western Germany and the Low Countries, whereas plants in the east can scarcely meet demands. Transport of bulky commodities from western to eastern Germany is difficult, and at least one cement plant is therefore to be transferred bodily to the east and re-erected.

Synthetic Rubber Is Utilized in Transportation

The various types of synthetic rubber produced in Germany are being used for numerous purposes in connection with transportation. Perbunan gives excellent service for spring suspension and is said to be superior to steel in some respects. On street cars experiments have been carried out with Buna-suspended wheel sets and Perbunan suspension springs between bogie and chassis. There is a possibility that use will be made of synthetic rubber for motor bedding and electric switches. Soft Buna has been employed for torsion suspension in the form of elastic coupling and for torsion vibration absorbers for Diesel engines where these parts are subject to considerable strain. Buna coatings, either alone or mixed with polyvinyl chloride type resins, have been utilized for various parts of vehicles. It is claimed that these coatings permit the use of ordinary iron for parts which otherwise would have to be made of expensive heat- and corrosion-resisting metals. The railway company has introduced Perbunan in place of leather for air-tightening steering valves and brake cylinders.

Paint Materials Subjected to Control

Paint manufacturers have been instructed to reduce the number of paints produced in 1941 by half. Special shades and kinds will no longer be made. It is hoped that the reduction in the number of paints made will help to offset the effect of further withdrawals of labor.

The manufacture of lacquer has been hampered by the shortage of imported materials, but it is claimed that years ago 70 per cent of all raw materials were synthetic, and that this proportion has increased since. Lacquer production is now concentrated in about 300 factories, as compared with 900 at the beginning of the war. In future, lacquer manufacturers are to be given greater freedom in the choice of raw materials.

The shortage of vegetable drying oils has stimulated research into mineral oil substitutes. It is claimed that large quantities of drying oils can be produced from high-molecular carbon substances with high hydrogen contents, such as paraffin wax, ozocerite, ceresin, crude vaseline, and crude lubricating oils rich in hydrogen, by treating them with metal or boron halides in the presence of acid halides. One hundred parts of a product obtained by repeated cracking of paraffin wax at 500° C., for instance, are dissolved in 30 parts of ethylene chloride; 30 parts of aluminum chloride are added and 15–20 parts of phosgene are allowed to penetrate the mixture at 50–60° C. for several hours. The aluminum chloride is then dissolved in dilute hydrochloric acid, the aqueous solution is removed, and the solvent separated by distillation from the reaction product. This process yields 90 parts of a drying oil with an iodine value of 115. Cracking gases also supply a raw material for the process, and ethylene chloride can be replaced by carbon tetrachloride. Aluminum, zinc, iron, and titanium chlorides are the metal halides mostly used; boron fluoride can also be employed. Iodine values between 100 and 160 are obtainable. The drying oils thus produced are used either alone or in admixture with vegetable oils. The drying time can be shortened by use of the oxides, acetates, or borates of lead, manganese, and cobalt.

Corrosion-Resisting Materials Developed

Chilled castings of 65–70 per cent ferrosilicon have been used in the I. G. Farbenindustrie works at Höchst (Main) as a corrosion-resisting material, especially in large boilers up to 6 cubic meters in volume. They withstand all acids except fluoric but do not protect against strong alkalies. Pressure resistance is 4000 kg. per sq. cm., tensile strength is between 60 and 100 kg. per sq. cm., expansion at rising temperatures is half that of steel, and the modulus of elasticity is five times that of steel. Ferrosilicon plates welded to steel are soldered with tin-free solders, and joints are protected with a new acid-resisting putty. This treatment is claimed to be equivalent to enamel in many respects and superior to it, in that it can be applied to large vessels, possesses greater mechanical strength and heat conductivity, and can be easily repaired. No serious complaints were reported in operation during more than two years.

Less than 6 ounces of chromium per square meter are said to be required to confer corrosion resistance on pipes and other metal surfaces by the so-called BDC-Inkrom process, which is being used on a large scale. The steels employed as base do not contain any other alloy metals but are specially selected for the process. Volatile chromium compounds

are made to react with the surface of the article to be protected at about 1000° C., either directly, in a salt melt, or by means of ceramic products in which they are stored. The chromium content of the protected steel decreases inwardly at a regular rate, from 35 per cent on the surface. Corrosion resistance is normally complete down to $^1/_{32}$ inch and is reported to be equivalent to that of a high-chromium steel.

Methane Motor Fuel Extracted from Gas

The Berlin Gasworks Company expects to produce methane from city gas for use as a motor fuel. A plant supplying 300 cubic meters of methane to a filling station would use about 2,500 cubic meters of city gas with a methane content of 20 per cent, of which more than half would be extracted. The remaining 220 cubic meters would still have a methane content of 9 per cent and a calorific value of 8,600 kg.-cal., and could be used to regulate the calorific value of the gas sold by the company, for which water gas or generator gas is now employed.

Seed Potatoes Treated with Gas

A 20–100 per cent increase in the yield of potatoes can be obtained, according to reports of the German Botanical Society, by treating seed potatoes with gas or ethylene. The tubers of plants grown from seed potatoes which had been exposed for 24 hours to atmospheres containing 7.5, 15, or 30 per cent of gas at 18° C. were more numerous, larger, and richer in vitamin C. Care in selecting the amount of gas seems necessary. It is claimed that this process is cheaper than the application of hormones.

Products are Recovered from Carbonization Plants

Lurgi Company and I. G. Farbenindustrie have jointly developed a method for extracting phenol from waste liquors of hydrogenation and low-temperature carbonization plants, the Phenosolvan process; it is said to be profitable with as low a phenol content as 3–4 grams per liter. The price of the recovered phenol is sufficient to meet the cost of the Phenosolvan used, but further treatment of the waste liquor is required for the extraction of volatile fatty acids and other substances before it can be released into rivers. Phenosolvan is a mixture of aliphatic esters with optimum extractible properties. After use it can be largely recovered by distillation with steam, so that the consumption of Phenosolvan is less than 200 grams per cubic meter of water treated.

Gas is obtained as a by-product in the hydrogenation, Fischer-Tropsch, and low-temperature carbonization plants, but in the early days the gas was used mostly for furnaces, tar stills, etc. One low-temperature carbonization plant using lignite, however, subjects the surplus gas to special treatment and sells the resulting product to a gasworks.



A synopsis of industrial advances in Palestine during the past 20 years was given by M. A. Novomeysky, managing director of Palestine Potash Ltd., before the recently organized Palestine Industrial Council at its first meeting held in Jerusalem the middle of February 1942.

Industrial Council Has Been Organized

With the establishment of a special Labor Department by the mandate government, the organization of an industrial council seemed desirable. This council, like the Federation of British Industries and similar organizations, among other things will regulate relations between industry and its employees, discourage and settle labor differences, cooperate in labor legislation, promote industrial hygiene, which is still neglected in Palestine, and direct the vocational development of the workers and the rising generation. The members of the executive committee are: M. G. Pallak, Portland Cement Co., Haifa, A. M. Ruthenberg, Palestine Electric Corp., Haifa, M. A. Novomeysky, Palestine Potash, Jerusalem, and Julius Simon, Palestine Economic Corp., Jerusalem. The new organization is expected to maintain friendly relations with the Manufacturers' Association of Palestine and also to arrange for occasional joint conferences.

Manufacturers' Association Sponsors Industrial Exhibit

The Manufacturers' Association, with an adequate modern office building in Tel Aviv and local sections in Haifa and Jerusalem, has as its president Arie Shenkar, of the Lodzia textile factory in Tel Aviv, and embraces numerous small and medium-sized factories, but not the above-mentioned large factories, the largest in the country, although they are in sympathy with it. In recent years the association, in collaboration with the Pro-Palestine Products Committee and the Foreign Trade Institute, has been busily engaged with the exportation of Palestinian goods to neighboring countries. The association also took part in the Palestine Government Industrial Exhibition sponsored by the mandate government in Cairo last year. The exhibit was designed to bring before the Middle East Command the products Palestine can supply for army purposes, to show Egyptian importers and merchants the goods Palestine manufactures, and to promote relations between the industries of Palestine and Egypt. It occupied 11 rooms in a skyscraper in Cairo's business center, where the offices of Imperial Chemical Industries in Egypt are also located. Over 300 Palestinian firms were represented, and a good detailed catalog of over 200 pages gave information concerning more than 10,000 objects on display. An exhibit well worth seeing was in the room devoted to the products of the Dead Sea and a model of the potash plant there. The Palestine Indicator Factory, Jerusalem, had on display indicator test papers, a hemometer, soda tablets, war-gas test papers, and the like.

War Gives Great Impetus to Industry

The Egyptian industry because of its raw materials, chiefly cotton and sugar, moves in an entirely different course from that of Palestinian industry (for example, mention is scarcely made of a pharmaceutical industry in Egypt) and thus the industries of the two countries are not in competition. Egypt's industry has experienced healthy development during recent years. At the close of 1940 it employed about 1,200,000 people, in comparison with about 40,000 in small Palestine, and the invested capital amounted to 130,000,000 pounds. Prior to the war Palestine's industry suffered greatly as a result of importation from highly developed industrial countries and of dumping, particularly from Japan. The war has brought a great upswing to the industry, as a result of orders for war supplies and stoppage of imports, without extending it until now to full utilization of production capacity. The High Commissioner, Sir Harold MacMichael, in his New Year radio message correctly said that few countries produce such a relatively large number of scientists and experienced technicians as Palestine.

Palestine Actively Engages in Search for Raw Materials

A conference recently held in Jerusalem for Middle East representatives of the United Kingdom Commercial Corporation was convinced of Palestine's ability to supply many needs of Turkey, Syria, Iraq, and Egypt. Moreover, the government has set up various war committees, which among other things are busy with the importation of raw materials, in which the country is known to be poor. Re-

cently more attention has turned to the question of raw materials in the country, and as a result the counterwaste movement is making good progress here.

Orange Industry Suffers from the War

The orange industry, the principal export industry of Palestine, has suffered greatly as a result of the war, because the chief purchasing countries have been cut off. Although the orange harvest for 1941–42 amounted to about 6,000,000 cases in comparison with 15,000,000 before the war, at most only a third of the production was consumed in Palestine by the military authorities and in the neighbor countries. The home industry requires about 750,000 cases of oranges for the manufacture of alcohol, acetic acid, citric acid, pectin, acetone, salt, concentrates, marmalade, jam, sirup, ethereal oils, and certain medicinal preparations. The skins are utilized for feeding purposes.

New Factories Are Established

Among new factories may be mentioned: Carbidan, the first carbide plant, in Ramat Gran; Malton Chemical Works Ltd., producer of lactates and lactose, also in Ramat Gran; Jordan Chemical Works, manufacturers of modern solvents, in Tel Aviv; Palacid Ltd., producer of nitric acid and pure sulfuric acid, in Haifa Bay; Vita, in Tel Aviv, producers of ether, anesthesia ether, and mineral and medicinal waters; Taassiyah Chemith, Tel Aviv, manufacturer of sulfite, liquid ammonia, and insecticides; and Topas-Werke, producer of pectin, citrus alcohol, and lemon oil. Since the World War I about 1,800 factories have been established by private capital. Industrial production now reaches a value around 14,000,000 pounds in comparison with 9,500,000,000 pounds before the present war. E. Schmorak, director of the Industry and Commerce Department of the Jewish agency in Jerusalem, demands for Palestinian industry in the postwar period a protective tariff and abolition of the "open-door" policy (paragraph 18 of the Mandate); promotion of expertation; and the establishment of a credit institute to provide capital for a china industry, for long-time loans, and to attract capital from abroad. In any event Palestine needs a well-planned industrial policy, which heretofore has been lacking.

Chemical Prices Listed

Highest prices are noted mainly in certain foods. Wide fluctuations prevail in the chemical market, and this condition made welcome an announcement of prices by the Imperial Chemical Industries (Levant) Ltd., Jaffa-Tel Aviv, the middle of February, as follows:

Chemical	Package	Retail Selling Price per Package, Pounds
Caustic soda, 76 to 77%	340 kg., drum	10,400
Soda ash, light solid	100 kg., bag	2,000
Sodium bicarbonate, technical	50 kg., bag	1,450
Ammonium bicarbonate	5 kg., tin	430
Bleaching powder, 39%	150 kg., drum	4,650
Sodium silicate, 59.4%	45 gal., drum	10,120
Sodium sulfide	232 kg., drum	14,200
Lithopone, 30%	100 lb., paper bag	2,150
Sulfuric acid, 98% H_2SO_4	1000 kg.[a]	45,500
Ammonia, anhydrous[b]	153 lb., cylinder	17,350

[a] In customer's containers in Haifa.
[b] Wholesale only.

Olive Oil Produced by Primitive Method

According to figures given by the government statistician olive oil production for the season 1940–41 was 10,535 tons and came from 605 presses, of which 75 per cent was still operated by animal power with an average yield of 10 tons per press, whereas the rest, motor-driven, averaged 40 tons each.

Feedingstuffs Are Studied

In connection with efforts to improve the profitableness of cattle raising in Palestine as much as possible by rational feeding, A. Bondi and co-workers in the Agricultural Research Station at Rehovot have conducted extensive investigations on feedingstuffs by means of digestion experiments. The composition and feed value of 40 feedstuffs (green plants, hay, and concentrates) were determined[1]. Palestinian feeds often show a lower content of dry matter than the same feedstuffs in northern countries[2]. The digestibility of the dry fodder from domestic plants is as good as, and in certain cases even better than, that from plants in northern climates. The total content of digestible nutrients (T. N. D.) is thus frequently higher than in other regions, if it be reckoned on the basis of dry weight, whereas it is lower on the basis of green weight. Present obstacles in the way of importing vitamin A concentrates, known to be particularly valuable in poultry feed, prompted an investigation by Bondi and Uri[3] to determine the carotene content of about 40 domestic plants at different stages of growth and to establish the quantity of each plant that would be necessary to supply the vitamin A requirements of the hens. In the same experiment station, experiments were also conducted on ensiling carbohydrate-rich feeds[4]. These experiments were carried to a successful conclusion without difficulty. Protein-rich feed plants make good ensilage, provided they are mixed with citrus by-products. The preserving effect of citrus fruits is attributable to their high contents of acid and sugar. The losses that occur in hay curing under conditions that prevail in Palestine are usually considered insignificant and under some circumstance may even be completely eliminated[5].

[1] Bondi, A., and Meyer, Ch., Agr. Research Sta., Rehovot, *Bull. 27*.
[2] News Ed. (Am. Chem. Soc.), 19, 789 (1941).
[3] Bondi, A., and Uri, D., *Hassadeh*, 1940–41, 19–21.
[4] Bondi, A., *Taassiah welkalkalah* (Industry and Economics), 1940; Bondi, A., Meyer, Ch., and Volcani, R., *Empire J. Expil. Agr.*, 9, 73 (1941).
[5] Bondi, A., Meyer, Ch., and Reis, A., *Hassadeh*, No. 6, p. 21.

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February 27, 1942
Translation by W. L. Hill

New Chemical Industries Established in Australia

Local production is now supplying some of Australia's chemical needs, according to government sources originating in Australia. Iron ammonium citrate (green), used for medicinal purposes and for sensitizing blueprint paper for munition and engineering drawings, is now being made in South Australia. That state is also producing anhydrous basic subacetate of lead (Horne's dry lead), formerly imported from Germany. This product is used by the Queensland sugar industry.

The manufacture of industrial plastics is another new industry recently established in South Australia.

New Dyestuffs Factory Is to Be Built in Spain

A projected new dyestuffs factory, authorized to be built at Barcelona, Spain, by the S. A. Fabricación de Anilinas y Productos Químicos, is expected to be in production by the end of the year. It is anticipated that exports of finished products will pay for imported raw materials.

Local efforts to produce 12,000 tons of superphosphate annually under auspices of the Palestine Government are reported Orders sufficient to provide for immediate requirements until full production is attained have been announced.

Spanish Chemical Situation Reported

THE National Syndicate of Chemical Industries has recently issued a report from Spain, reviewing the Spanish chemical situation in 1941. It was a year of considerable difficulties and the industry had to deal with shortages of raw materials and fuel and with the obstacles to foreign trade caused by the war.

The fertilizer shortage, which was very acute in 1940, was relieved last year. Imports of nitrogenous fertilizers increased from 65,000 tons to 110,000 in 1941. Imports of Chilean nitrate remained at about the same level; 50,000 tons were imported in 1941. Ammonium sulfate imports showed a large increase, from 11,000 tons in 1940 to 35,000 in 1941, with 12,000 tons coming from the United States. About 10,000 tons of synthetic sodium nitrate were imported from France.

The import of 485,000 tons of Moroccan phosphate considerably improved the phosphatic fertilizer situation over 1940, when only 250,000 tons were imported. Larger imports of phosphate made possible the manufacture of about 1,000,000 tons of superphosphate, an amount sufficient for domestic needs.

Wax from Sugar Cane Investigated

TO RELIEVE the present acute shortage of wax in South Africa, consideration has been given to manufacturing it from sugar cane, according to the British press. Experiments are being conducted to find a practical method of extracting the wax from filter cake, which, it is said, contains a relatively high proportion of sugar cane wax.

The production of glycerol from molasses has already started on an industrial scale.

New Chemicals Made in South Africa

MANY new products are being made by South African chemical companies, reports the Department of Commerce and Industries in a recent communication from South Africa. A group important to the leather industry includes chrome salts, sodium sulfide, lactic acid, and sulfonated oil.

Other new products are chlorine and aluminum sulfate for water purification, casein glues, nitrocellulose finishes, and ceresine disks for food packing.

FORMATION of a new German company, which it is believed plans to exploit German rights in various Scandinavian patents in the cellulose industry, is reported from abroad. The company will "purchase and develop" such processes, it is stated.

Caustic Soda to Be Produced in Brazil

REPORTS have reached this country that a British mission is investigating the possibility of establishing large-scale caustic soda production in Brazil, that country's imports in 1941 having included 35,000 metric tons of caustic soda, and 21,000 tons of soda ash, with a total value of $3,450,000.

Other Brazilian imports are given as lead arsenate, white zinc sulfide, potassium chlorate, potassium chromate, copper sulfate, sodium cyanide, tannic acid, and formic acid.

Swedish Metal Imports Decline

SWEDISH imports of metals and minerals were valued at 93,100,000 crowns in the period January to April 1942, compared to 116,500,000 crowns in the same period of 1941, while exports of the same commodities in the first four months of 1942 amounted to 105,300,000 crowns, compared to 1941 exports for the same period, amounting to 146,000,000 crowns.

German Pharmaceutical Situation Becomes Serious

THE pharmaceutical situation as reported in the German press is becoming more serious. Aspirin and narcotics formerly bought freely from pharmacists are obtainable only on submission of an order signed by a medical practitioner. The number of brands and types of packages of medicinals have been drastically reduced and supplies to the Balkans and Scandinavian countries curtailed.

CANADIAN zinc deposits, discovered near the Labrador border and believed to be of considerable importance, are reported through official sources from that country. A zinc refinery is said to be under consideration, aided by a government subsidy. The short open season, three months, and lack of transportation are cited as obstacles.

PLANS for manufacture of its own supply of carbon bisulfide by the Borregard Cellulose Works are reported from Norway, the company's capital having been increased from 10,000,000 to 12,000,000 kroner for the purpose.

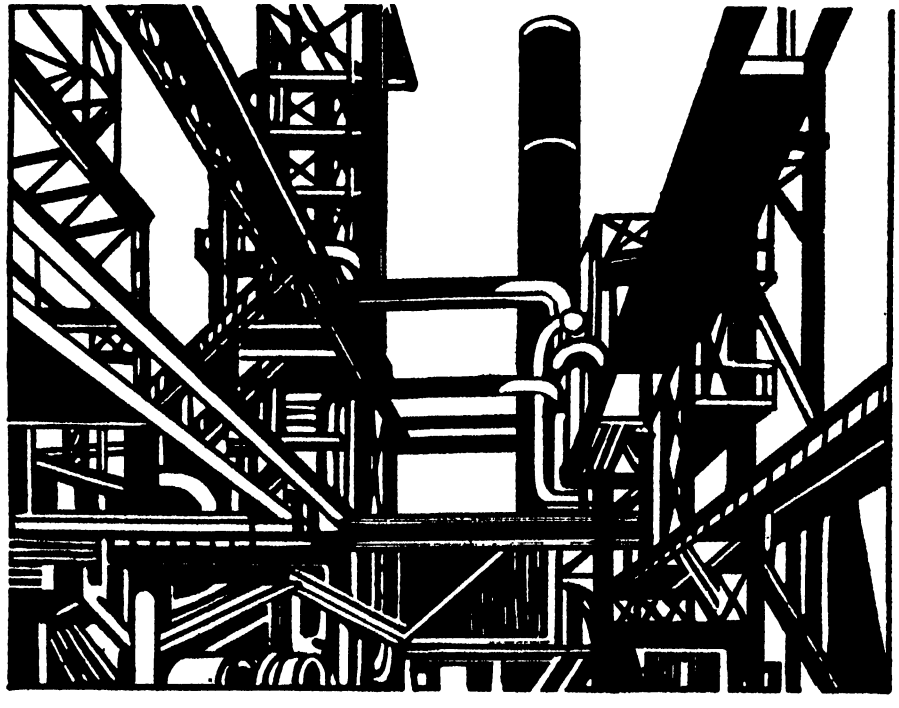
EXPERIMENTAL use of cement sheets and certain chemicals in a composition for roofing material in low-cost housing in Rhodesia is reported from that country in Africa.

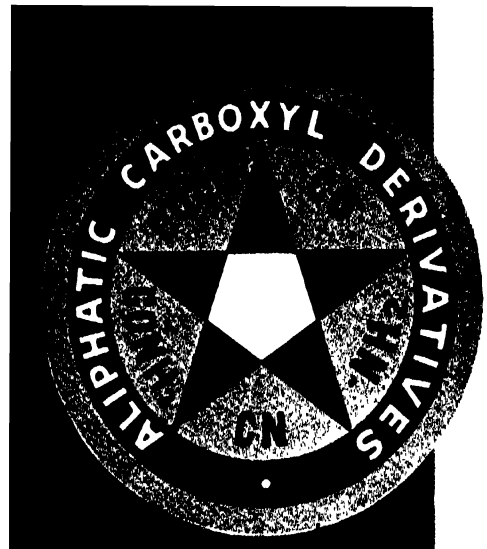
ITALIANS are experimenting with copper recovery from vine leaves sprayed with copper sulfate, reporting that 5 pounds of copper per acre have been recovered. The method consists of burning the leaves and extracting the copper from the ashes.

IRELAND is reported to be ready to export optical glass sand, commercial production from the top of Muckish Mountain being said to be profitable.

THE Swedish A-B Bofors chemical company has added a number of new products to its output since the war, including nitrobenzole, acetanilide, chloramine, and toluene sulfonic acids. It plans to produce analine oil and salt, but does not project dyestuffs manufacture.

THE Swedish Government has established the A-B Skogsindustier to supervise state-owned saw mills, cellulose factories, and distillation plants, including important units at Karlsborg and Pitea.





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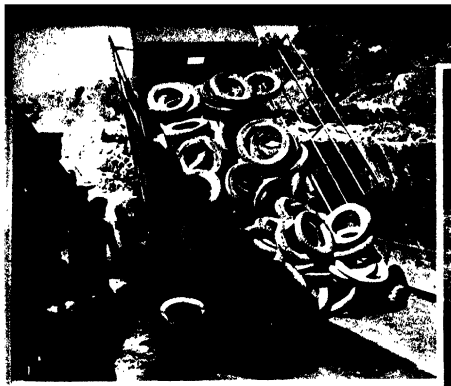
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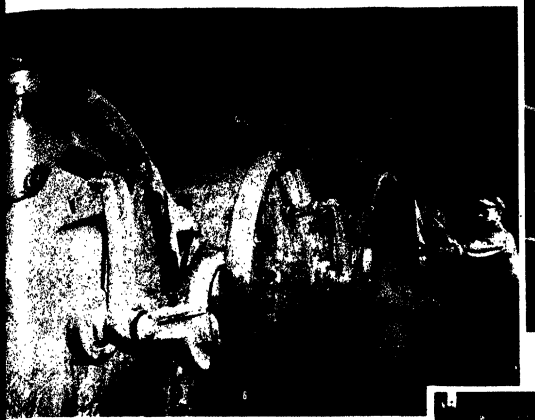
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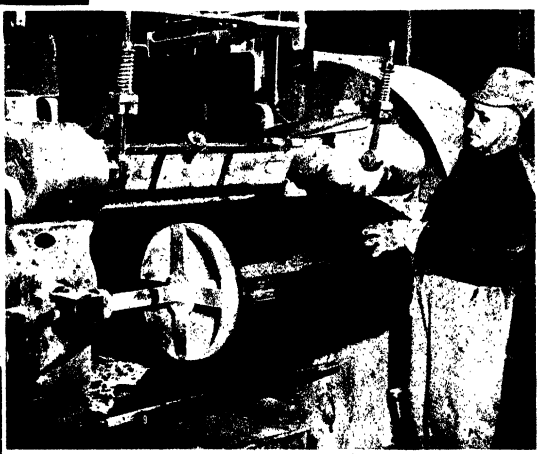
See "Reclaims and Reclaiming", page 1223



UNITED STATES RUBBER CO. PHOTOS

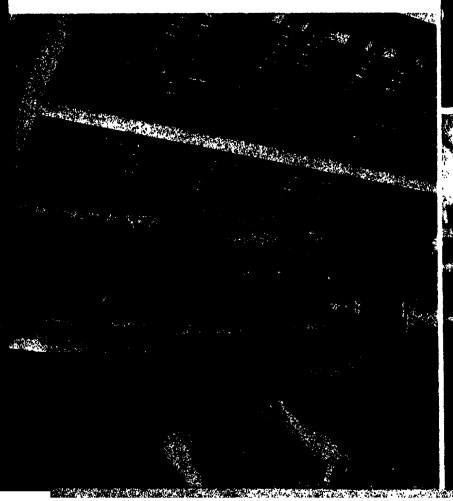
(1) Truckload of used tires is shown being dumped at a Connecticut reclaim plant of the United States Rubber Co. The tires will be carried into the plant on the conveyor shown at left. (2) Before rubber can be ground up for reclaiming metal bead must be removed from the used tires. Worker is running a tire through rotating knives to remove the steel wires formerly thrown away but now reclaimed. (3) Tires are fed into the machine by toothed feeder roll in the center. The mechanic is adjusting the knives which revolve on drum at high speed. The chopper, one of the largest of its kind, is wide enough to take any passenger-sized tire. (4) Tires are pulled over to the shearing blade and after cutting are then pushed onto the conveyor belt for delivery to the debeaders. (5) The electromagnet shown here removes particles of metal from the rubber ground up in the reclaim process.

(6) Devulcanizers perform an important step in the reclaiming process of old rubber. (7) Conveyer in center delivers digested, washed stock to the feed hopper of the continuous dryer. Above the conveyer are shown flights which deliver the stock to the dryer. (8) Reclaimed rubber stock comes out of an automatic dryer after being chopped up, devulcanized, and washed to remove the dissolved fabric and chemicals. From here it goes to mixing mills where it is plasticized. (9) The operator pictured here is performing the final operation—cutting from the drum of the refining mill a slab of finished stock for delivery to the shipping room. (10) Old galoshes and garden hose shown in the form of finished slabs of reclaimed rubber are taken by a worker from the conveyer line, after being dusted with talc to prevent their sticking together, and piled for storage or shipment.

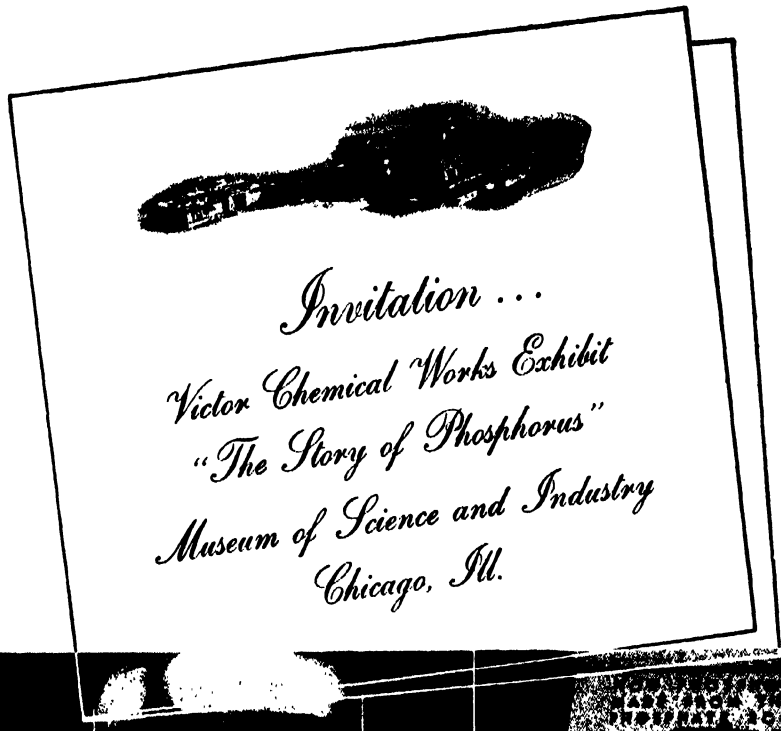




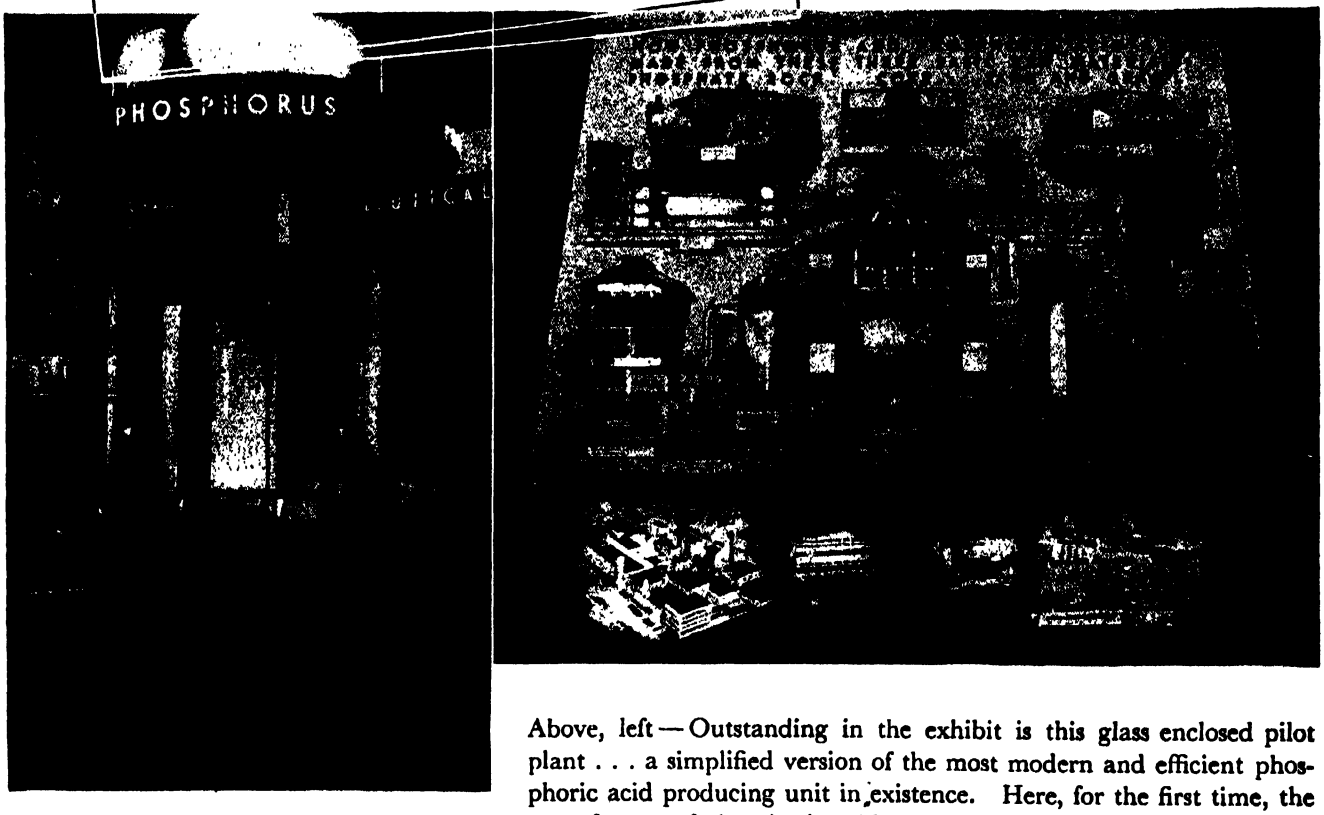








You are cordially invited to inspect the recently completed Victor Exhibit in Chicago's famous Museum of Science and Industry. It tells the story of phosphorus . . . and the important role played by phosphorus compounds in serving mankind . . . through a miniature pilot plant in actual operation, colorful translites, and ingenious working models that operate at the push of a button. Two of the many displays of interest to layman and technical expert alike are illustrated below.



Above, left — Outstanding in the exhibit is this glass enclosed pilot plant . . . a simplified version of the most modern and efficient phosphoric acid producing unit in existence. Here, for the first time, the manufacture of phosphoric acid can actually be seen . . . an operation heretofore concealed within the confines of brick and steel.

Above — In this animated production diorama . . . complete with miniature steam shovels in simulated action, model furnace, condenser, burner, hydrator, precipitator, storage tank, tank cars, etc. . . . is told the story of phosphorus from raw phosphate rock to ultimate conversion into a host of phosphatic compounds.

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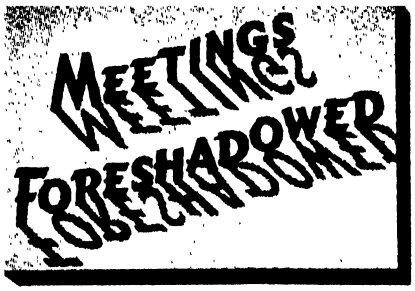
Phosphoric Acid
Pyrophosphoric Acid
Polyphosphoric Acid
Phosphorus
Phosphorus Oxychloride
Phosphorus Trichloride
Phosphoric Anhydride
Alkyl Acid Orthophosphates
Ammonium Phosphates
Alkyl Ammonium Phosphates
Fireproofing Compounds
Calcium Phosphates
Magnesium Phosphates
Potassium Phosphates
Sodium Phosphates
Sodium Pyrophosphates
Potassium Pyrophosphate
Alkyl Acid Pyrophosphates
Formic Acid
Aluminum Formate
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American Chemical Society[1]

105TH MEETING. Indianapolis, Ind., April 12 to 16, 1943.

106TH MEETING. Minneapolis, Minn., September 6 to 10, 1943.

NATIONAL CHEMICAL EXPOSITION and NATIONAL INDUSTRIAL CHEMICAL CONFERENCE. Sherman Hotel, Chicago, Ill., November 24 to 29, 1942.

CHEMICAL ENGINEERING SYMPOSIUM. Palmer House, Chicago, Ill., December 28 and 29, 1942. "The Application of Kinetics to Design and Operation of Chemical Engineering Equipment". Ninth Annual Symposium.

NEW YORK GROUP, DIVISION OF RUBBER CHEMISTRY. Building Trades Club, New York, N. Y., October 16, 1942, 4:30 P. M. Fall meeting.

ORGANIC CHEMISTRY SYMPOSIUM. Boston, Mass., December 28 to 30, 1943. Tenth National Symposium.

Other Scientific Societies

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Netherland Plaza Hotel, Cincinnati, Ohio, November 16 to 18.

AMERICAN PETROLEUM INSTITUTE. Palmer House, Chicago, Ill., November 9 to 13. Annual meeting.

AMERICAN SCIENCE TEACHERS ASSOCIATION. Hotel Pennsylvania, New York, N. Y., December 29 and 30.

AMERICAN WELDING SOCIETY. Hotel Cleveland, Cleveland, Ohio, October 12. Annual meeting.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA. William Penn Hotel, Pittsburgh, Penna., November 9 and 10. Third annual water conference.

INDUSTRIAL HYGIENE FOUNDATION. Mellon Institute, Pittsburgh, Penna., November 10 and 11. Annual meeting.

OPTICAL SOCIETY OF AMERICA. Hotel Pennsylvania, New York, N. Y., October 30 and 31. Annual meeting.

NATIONAL LUBRICATING GREASE INSTITUTE. New Orleans, La., October 26 to 28.

NATIONAL SAFETY CONGRESS AND EXPOSITION. Sherman Hotel, Chicago, Ill., October 27 to 29.

SOCIETY OF CHEMICAL INDUSTRY, Montreal Section, Rubber and Plastics Division. McGill Faculty Club, Montreal, Que., November 13.

SOCIETY OF RHEOLOGY. Hotel Pennsylvania, New York, N. Y., October 30 and 31. Annual meeting.

[1] The list of the SOCIETY's National Officers and Directors, Editors, members of Council, Divisional and Local Section Officers, Committees, and Chapters of Student Affiliates appears in CHEMICAL AND ENGINEERING NEWS three times a year—usually February 10, May 10, and October 10. The latest list is printed on page 1239 of this issue.

Local Sections

SECTION AND PLACE	OCT.	SPEAKER	SUBJECT
Akron, Women's City Club	20	**H. L. Haller**	The Search for New Insecticides
Binghamton, N. Y., Carlton Hotel	20	**C. H. Werkman**	The Role of Carbon Dioxide in the Metabolism of Plants and Animals
Chicago, Medinah Club, 505 North Michigan Ave.	22	**Howard I. Cramer**	Synthetic Rubbers
Cleveland, Engineering Society, 2136 East 19th St.	21	**H. L. Haller**	
Columbus, Room 100, Chemistry Building, Ohio State University	23	**H. L. Haller**	Insecticides in Relation to the War
Cornell, Ithaca, N. Y.	19	**C. H. Werkman**	The Role of Carbon Dioxide in the Metabolism of Plants and Animals
Delaware, Auditorium, Y. M.-C. A., Wilmington	21	**C. C. Furnas**	The Next Hundred Years
Eastern New York	22	**C. H. Werkman**	The Role of Carbon Dioxide in the Metabolism of Plants and Animals
Erie, Penna., Villa Maria College, Ninth and Plum Streets	19	**H. L. Haller**	The Search for New Insecticides
Georgia, Banquet Room, Britain Dining Hall, Georgia School of Technology, Atlanta	19	**Harry N. Holmes**	
Maryland, Remsen Hall, Johns Hopkins University, Baltimore	30	**Milton Harris**	Recent Developments in Textile Fibers
Mid-Hudson, Sanders Laboratory of Chemistry, Vassar College, Poughkeepsie, N. Y.	21	**C. H. Werkman**	The Role of Carbon Dioxide in the Metabolism of Plants and Animals
Milwaukee, Marquette University Science Building	30	**G. L. Clark**	Wartime Testing and Research with X-Ray and Electron Microscope
Minnesota, Room 100, Chemistry Building, University of Minnesota, Minneapolis	20	**George O. Burr**	Applications of Spectroscopy to Chemistry
North Carolina, Duke University, Durham	22	**Harry N. Holmes**	A Chemist's Adventures in Medicine
Rochester, Cutler Union, Prince Street Campus, University of Rochester	19	**Donald K. Tressler**	Dehydrated Vegetables—Their Manufacture and Nutritive Value
South Carolina, Science Building, University of South Carolina, Columbia	20	**Harry N. Holmes**	Vitamins and Public Health
South Jersey, Du Pont-Penns Grove Country Club, Penns Grove	20	**Colin G. Fink**	Chemistry and Art
Syracuse, Bowne Hall, Syracuse University	23	**C. H. Werkman**	The Role of Carbon Dioxide in the Metabolism of Plants and Animals
University of Illinois, Urbana	22	**H. B. Hass**	Nitroparaffins
Virginia, University of Richmond, Richmond	23	**Harry N. Holmes**	Strategic Raw Materials and the National Defense
Virginia Blue Ridge, Railroad Room, Hotel Roanoke, Roanoke	24	**Harry N. Holmes**	Strategic Raw Materials and the National Defense
Western Connecticut, Piccadilly Restaurant, 71 Federal St., Stamford	26	**C. L. Mantell**	Powder Metallurgy
Western Maryland, Fort Cumberland Hotel, Cumberland	16	**J. H. Mathews**	The Use of Scientific Methods in the Identification of the Criminal
Wooster (Ohio)	22	**H. L. Haller**	

National Chemical Show to Aid WPB Salvage Campaign

WITH the Industrial Salvage Section, Conservation Division of the War Production Board participating, the National Chemical Exposition set for November 24 to 29 at the Sherman Hotel in Chicago definitely will be a contribution to the war effort.

Arrangements have been concluded by the Industrial Salvage Section with the Chicago Section of the AMERICAN CHEMI-

CAL SOCIETY, sponsor of the show, for adequate space for an educational exhibit which will stress the campaign to salvage approximately 100,000 pounds of essential chemicals.

Exhibit space has been assigned to more than 100 firms in the chemical and allied industries including manufacturers of equipment, precision instruments, materials, and products. A feature exhibit will be a gallery of micrographs contributed by 40 laboratories which are using the electronic microscope. Another contribution designed to be of aid to the war effort will be a special exhibit of "alternates and substitutes".

Leaders in the chemical industry, educators, and other authorities will appear on the conference program which will extend through the period of the exposition. The conference will be in the nature of a forum. The general subject of applied chemistry and chemical research, with particular emphasis on fields related to the war effort, will be featured.



Industrial Research Institute Meeting

THE Industrial Research Institute held the largest meeting in its history in Buffalo, N. Y., on September 4 and 5, with headquarters at the Hotel Statler. Seventy-five industrial executives and research directors, representing member companies, and their guests participated in round-table discussions of current research management problems.

Patent trends and pending legislation were reviewed by H. S. Demaree, The Hoover Co., at the opening session, following which E. R. Schaeffer, War Production Board, outlined the production requirements plan and its effect on research laboratories. The mass spectrometer as a new research tool was described by Harold Washburn.

The principal speaker at the Saturday morning round-table session was C. E. K Mees, Eastman Kodak Co., who outlined his philosophy of the direction of research. A project was initiated that will have as its purpose the development of a monograph on the organization of industrial research laboratories, based on member experience.

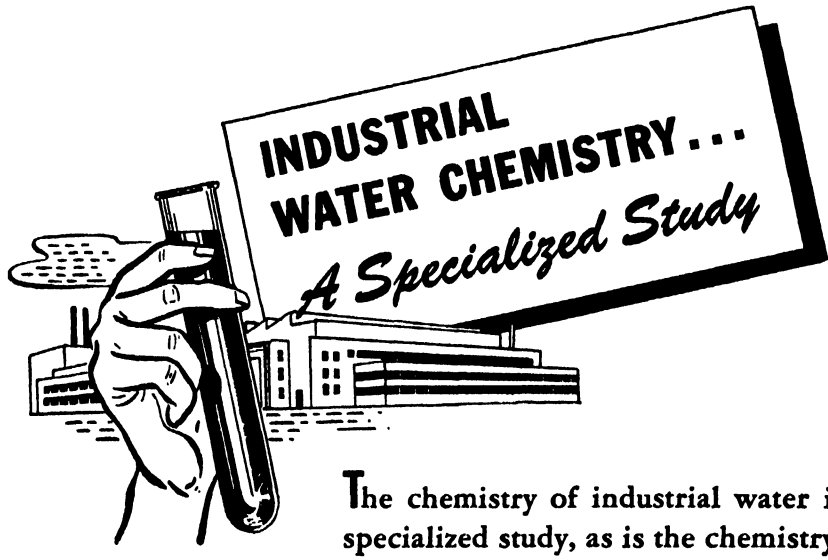
New Brunswick Group Meetings

ONE solution of the problem of transportation to meetings has been offered by the North Jersey Section which has authorized the holding of four group meetings during this year at New Brunswick. This recognizes that over 300 members reside in Middlesex and Somerset counties at the southern end of the section's area. Chairman C. S. Fuller has appointed the following committee to act for the section in holding these meetings: C. A. Amick, L. L. Johnson, W. A. Lott, E. B. Middleton, William Rieman, III, and H. L. Davis, chairman.

The first meeting of the group is to be held Wednesday, October 21, 1942, at 8:00 P. M. in the Rutgers University Chemistry Lecture Room. M. L. Crossley, research director of American Cyanamid Co., will speak on, "The Chemistry of Infectious Diseases". The fundamental attack which Dr. Crossley and his associates are making on the vital problems involved will make this meeting of unusual interest.

Power Exposition Transferred to Other Quarters

THE 15th Exposition of Power and Mechanical Engineering, scheduled to be held in Grand Central Palace, November 30 to December 5, will be transferred to Madison Square Garden, and held November 30 to December 4. The change is due to the fact that the U. S. Army has taken over the four exposition floors of the palace to be used as an induction center for the duration.



The chemistry of industrial water is a specialized study, as is the chemistry of rubber, plastics, petroleum or foods. And today, with industry operating at unprecedented production levels, the proper conditioning of water is a matter of the greatest importance.

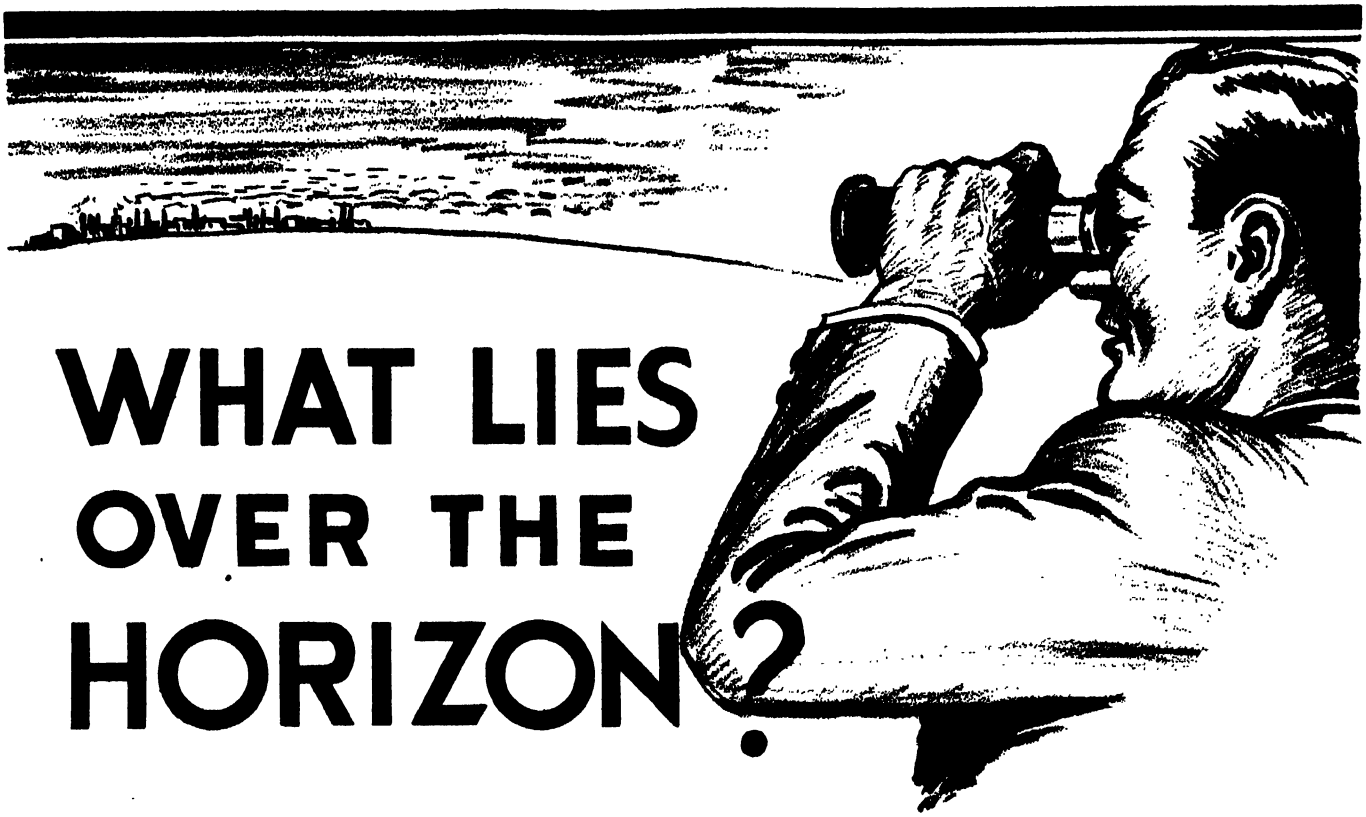
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WHAT LIES OVER THE HORIZON?

NO ONE has an exact picture of what is in the future for our country. We all know, though, that those who are looking forward now, are those who in our post war economy, will be prepared to help our nation affect the transition that is to be.

Furfural

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FURFURAL - FURFURYL ALCOHOL - HYDROFURAMIDE
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The Recovery of Vapors. *Clark Shove Robinson.* 273 pages. Reinhold Publishing Corp., 330 W. 42nd St., New York, N. Y., 1942. Price, $4.75.

THIS is a revised edition of a book entitled "The Recovery of Volatile Solvents", published by the same author in 1922, and presents the basic theory and the fundamental practices involved in the recovery of industrial solvents and vapors. Classical elementary principles of chemical engineering and underlying basic theory as related to adsorption, scrubbing, condensation, compression, and cooling are reviewed and illustrated by numerous examples. Various processes of recovery, descriptions of apparatus commonly used, and certain of the factors important in the design of equipment are discussed briefly.

The text contains much of the original edition without revision. The only completely new chapter, in addition to the "Introduction", is the one on "Commercial Activated Carbon Systems". As acknowledged in the preface, excessive space has been devoted to many of the older methods for recovering solvents which have since been rendered obsolete. The author's justification for this is that "a description of the early art helps to explain present practice".

This book cannot be considered a reference book or treatise on the subject of solvent recovery and hence has little value for the expert in the field. Its merit lies rather in affording the beginner in the field a basic course of study for grasping the fundamental theory of the various processes of solvent recovery.

A. B. JAPS

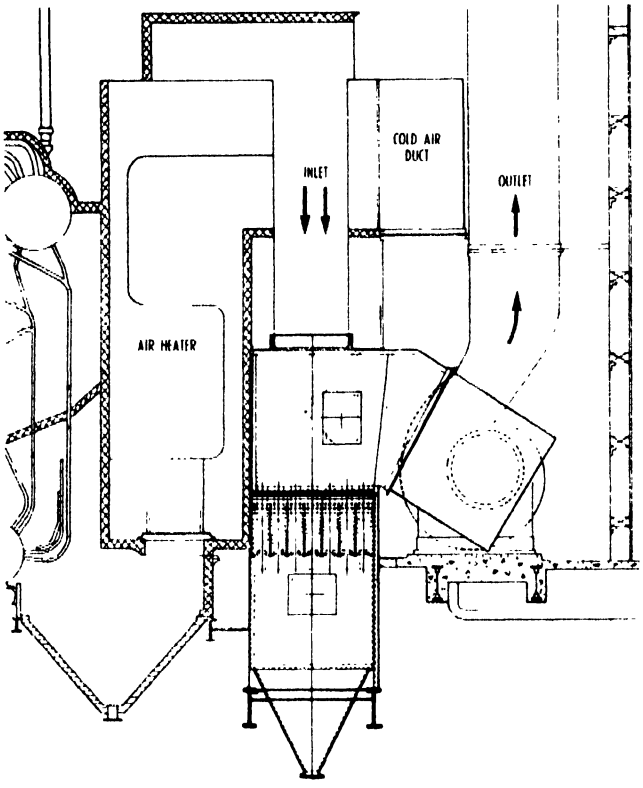
Ultraviolet in Science and Industry. *Hanovia Chemical and Manufacturing Co.* 24 pages. Alpine Press, Inc., Newark, N. J., 1942. Price, 50 cents.

THIS booklet describes in a very brief manner a number of applications of ultraviolet light in science and in industry, principally those resulting from the production of fluorescence in different substances. After a brief historical introduction there is an equally brief discussion of the effects of ultraviolet radiation in the promotion of fluorescence and chemical action, in the enhancement of the potency of vitamins, and in bactericidal action.

Various lamps and lamp units manufactured by the Hanovia company are described including the hydrogen discharge lamp and the mercury arc lamps. Some specific uses of the quartz mercury arc lamp in the analysis of substances by examining the fluorescent light produced are described and the techniques employed are given. Other applications of ultraviolet light in museum and libraries, for crime detection, in various industries, and in physical, chemical, and biochemical research are mentioned briefly. Among those more completely

CONTINUED ON PAGE 1260

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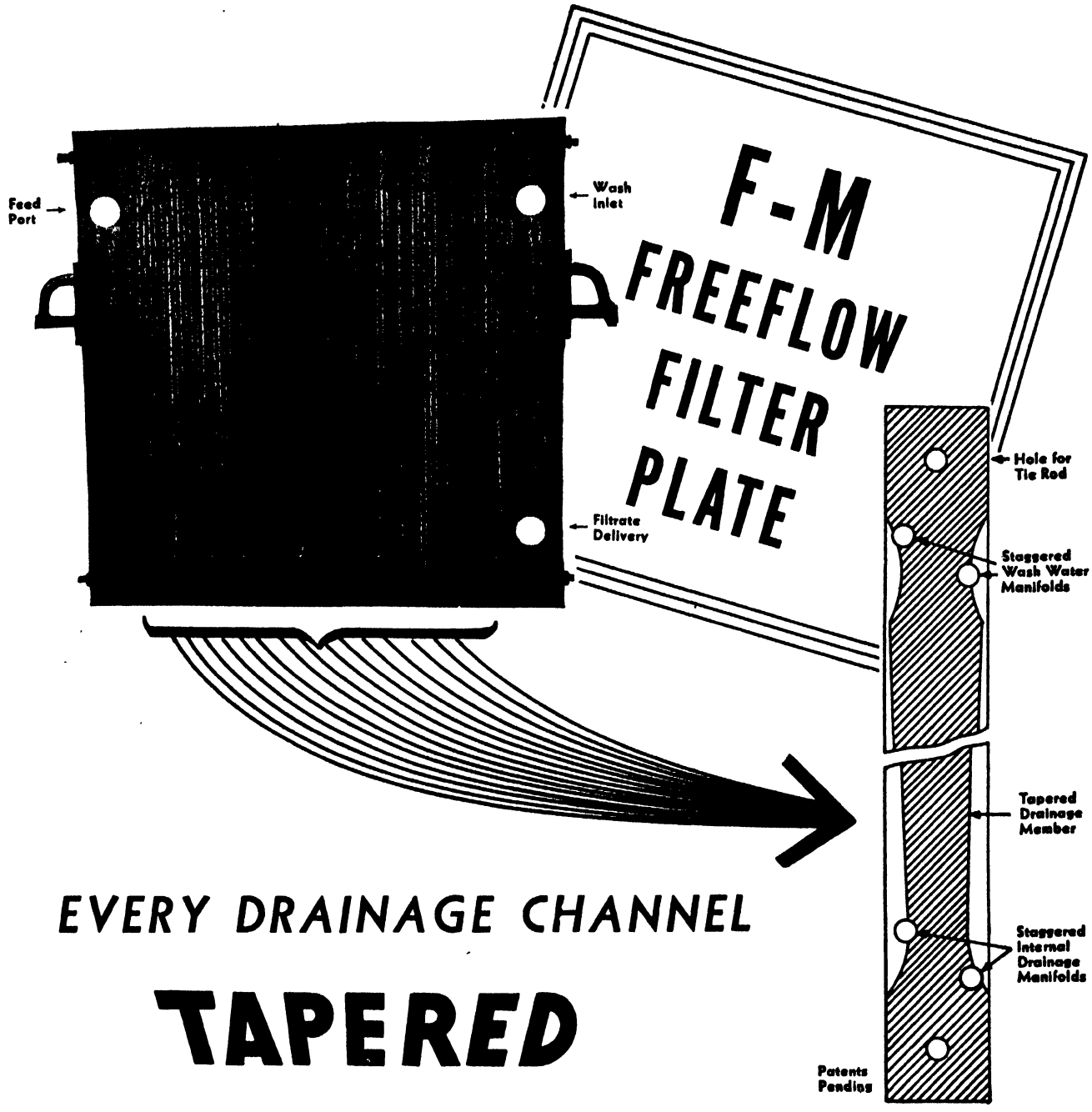
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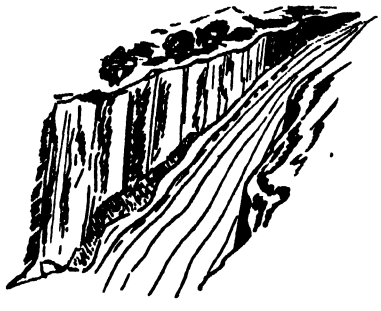
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Beyond the Flyleaf

CONTINUED FROM PAGE 1258

described are the identification of various fats and oils in foods and as adulterants in foods. The detection of other types of adulterants is likewise mentioned. The discovery of stains, blood spots, poisons, substitute dyes and paints in works of art and in clothing or in body cavities is discussed. The advantage in the use of fluorescence in the study of details of fossils is pointed out. Brief accounts are given of various techniques in the use of ultraviolet light and some accessory equipment is listed.

The style is semi-technical and in parts reads very much like a catalog or descriptive bulletin issued by a manufacturer. It can be read with profit by nontechnical persons.

A number of errors appear, a few typographical, and, more to be regretted, some errors in usage. On page 4 appears a statement, "current is applied", which does violence to the sensibilities of a physicist. A similar statement appears on page 5 in "wattage consumed". On page 4 the text reads, "the quartz mercury arc primary spectrum is not continuous but is a strong band spectrum consisting of a series of lines". The term "band spectrum" has a very definite meaning in physics and applies to the spectra of diatomic or multiatomic molecules and not to a spectrum like that of the quarts mercury arc which is called by physicists a line spectrum in counter-distinction to a band spectrum.

The chief value of the booklet lies in its listing and brief description of the uses of ultraviolet radiation in science and industry. More extensive works must be consulted for details.

O. S. DUFFENDACK

Metallurgy of Copper. *Joseph Newton* and *Curtis L. Wilson.* 518 pages. John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y., 1942. Price, $6.00.

IT HAS been 18 years since either a new edition or a new textbook has appeared on copper metallurgy. This book is in the main a compilation of the American literature during the past 15 years. However, the authors have done well in combining the theoretical description of the various processes used in the smelting and refining of copper with examples of modern practice so that the book gives an easily readable and well-connected description of the metallurgy of copper of today. In doing this the authors have drawn heavily on the "Copper Volume" Volume 106 (1933) of the American Institute of Mining and Metallurgical Engineers, there being no less than 130 references to that volume. Since most of the references are within the last 10 years, the book is free from antiquated and historical processes, but as a result many familiar names and processes are missing.

In addition to the metallurgy of copper about one quarter of the book is a compilation of the properties and uses of copper and the economics of the copper industry, both in this country and abroad. Consequently the book gives a comprehensive view of the copper industry as a whole which will be of value not only to students but also to those interested in the copper industry.

The authors have been unfortunate in selecting an old table of the electrode potential of the metals, and the noble metals are given as negative to hydrogen, whereas the modern concept of electrochemistry considers these metals as positive to hydrogen. It is confusing, particularly to students, to have these signs vary in the different textbooks.

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Magnesium Plant Begins Production

THE world's largest magnesium plant, Basic Magnesium, Inc., is the latest of five important magnesium plants to begin production in recent weeks. The others are the Dow Chemical Co. plant in Texas, the Ford Motor Company plant in Michigan, the Permanente Metals Corp. plant, in California and the New England Lime Co.'s Connecticut plant. All five plants were financed and are owned by the Government through the Defense Plant Corporation. The total cost approximates $175,000,000.

All the new plants were completed in record time, ranging from ten months for the huge Basic Magnesium plant to four months for the ferro-silicon plants. Three more ferro-silicon plants are nearing completion and will commence operations later this year. Four additional electrolytic plants are under construction. Completion of the program will place the United States far in the lead of all other countries as a magnesium producer. Only small quantities were produced in this country before the war, with Germany as the world's leader.



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and BERT ALLEN STAGNER, Ph.D.

Consulting and Research Chemist; Member, American Institute of Chemical Engineers; Formerly: Supervisor Chemical Research, Union Oil Company of California; Research Fellow, Mellon Institute of Industrial Research

The rapid development of petroleum technology has necessitated a revision of the original volume published in 1933. The newest practice in regard to treatment with sulfuric acid, tetraethyl lead, octane rating, etc., is described in detail. The present emphasis on all phases of this vitally important subject makes this book a particularly timely one, especially since the petroleum problem today is rather one of refining capacity than of crude production. For this reason technical improvements are of the utmost importance for the pressing problems of national defense.

—CHAPTERS—

Preface. Composition of Petroleum; Treatment with Sulfuric Acid; Sulfuric Acid Sludge and Hydrogen Sulfide; Recovery and Manufacture of Sulfuric Acid; Treatment with Alkaline Reagents; Sweetening Operations, Elimination of Elemental Sulfur, and Reduction of Total Sulfur in Light Distillates; Refining by Adsorption; Refining with Solvents; Detonation and Antidetonants; Inhibitors of Atmospheric Oxidation of Petroleum Products. Antioxygens; Gums and Cracked Petroleum Products; Deterioration of Lubricating and Similar Oils. Addition Agents; Supplementary List of United States Patents on Petroleum Refining; Appendix; Special Tables; Patent, Author, and Subject Indexes.

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New Arc Welding Handbook Discusses Design and Practice

A MANUAL of arms for welders in shops, shipyards, airplane factories, ordnance plants and arsenals, The Lincoln Electric Co.'s seventh edition of Procedure Handbook of Arc Welding Design and Practice, explains various methods and techniques used in welding, with a view to speeding up welding design and engineering and making it easier for the thousands of men in training to learn the essentials of welding in the shortest possible time.

This 1308-page handbook, containing 1810 illustrations, gives new and significant information on welding symbols, new allowable stresses, preheating for welding, stress relieving, procedures, speeds, and costs, "Fleet-Fillet" technique, general metallurgical characteristics of metals and alloys, weldability of aluminum alloys, tubular construction, and appearance and styling of welded design.

Copies of the book may be secured from The Lincoln Electric Co., Cleveland, Ohio, for $1.50 postpaid.

Accident Rates in the Chemical Industry

THE National Safety Council, Chicago, Ill., has just issued its annual statistical report on accidents in the chemical industry. This is a 16-page planographed booklet, available at 20 cents a copy. It shows the high lights of 1941 experience, experience in various types of plants, and comparisons with other industries, and includes tables of injury rates of individual industrial units.

New Edition of Welding Handbook

TO ANSWER the metal industries' demand for general up-to-date information in concise form on welding, the American Welding Society has published a second edition of its Welding Handbook.

The primary purpose of this volume is to give engineers an authoritative reference book on the technical phases of welding. The material has been arranged, however, in logical sequence with enough explanatory matter so that it may be used as a textbook in engineering schools and as a reference book in trade schools. Subjects covered include, first, the physics and metallurgy of welding and the weldability of steels; second, the welding and allied processes; third, the materials used; fourth, training, inspection and safety; fifth, design considerations and testing of welding; and sixth, the applications of welding. Outstanding authorities were chosen to prepare the respective chapters.

Copies of the handbook may be secured from the American Welding Society, 33 West 39th St., New York, N. Y., by members for $5.00. The price for nonmembers is $6.00.

Accidents in Industry

MANY industrial workers literally fell down on the job in 1941—and their falls cost a lot of money as well as time and pain. The 1942 edition of Accident Facts, the National Safety Council's statistical yearbook, shows that falls of one kind or another accounted for 23 per cent of all compensation paid for accident cases in industry last year.

"Handling objects" resulted in a larger number of accident cases than falls—24 per cent of the total, against 18 per cent for falls—but "handling objects" accidents were less severe and drew only 15 per cent of all compensation paid.

Falls and operations involving the handling of objects of one kind or another, combined, caused 42 per cent of all compensated occupational accidents and drew 38 per cent of all compensation paid. Machinery, vehicles, falling objects, hand tools, and actions of "stepping on or striking against" each contributed smaller numbers of accidents and drew smaller fractions of the total compensation bill.

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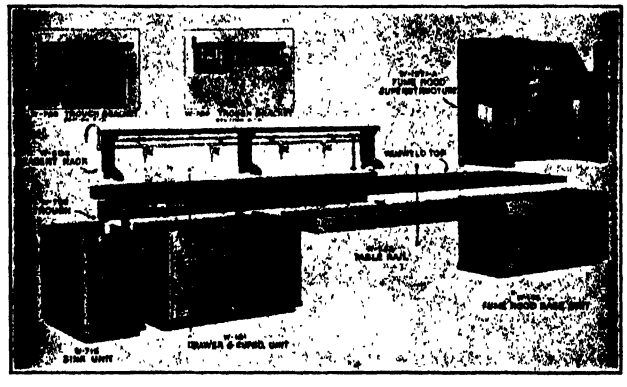


In the case of Barnstead Electric or Gas-Operated Water Stills, make sure enough water is in the evaporator before starting. And for all Barnstead Stills, make sure they are regularly cleaned. Barnstead makes this easy for you. The extra-duty steam heated stills for distilling hard water—the stills that need cleaning more regularly—have convenient openings for getting at the heating coil and still's interior.

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Faster cooking—allowing you to start with less viscous oils without exceeding normal kettling times, or materially shortening the cook when using heavier bodied linseed oils.

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If you are currently working on high-priority applications, you should immediately familiarize yourself with the possibilities inherent in Pentalyn M-linseed varnishes.

From all present indications, this is one of the major resins of the future. Further information, on Pentalyn M or any other Hercules resin, is readily available. Write today.

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Yellow Springs, Ohio

Industrial Chemistry as an Occupation

STUDENTS, teachers, parents, and others interested in industrial chemistry will find helpful information in a six-page leaflet on "Industrial Chemistry as an Occupation", published by Occupational Index, Inc., at New York University. In quantities the price is five dollars a hundred. Single copies are 25 cents, cash with order.

This is one of a series of 67 such leaflets describing opportunities in 67 different occupations. Each covers the nature of the work, abilities and training required, income, and miscellaneous advantages and disadvantages.

Plastic Manufacture Discussed for Layman

A NONTECHNICAL discussion of the manufacture of plastics from raw materials to finished products has recently been issued by Durez Plastics & Chemicals, Inc., Walck Road, North Tonawanda, N. Y. This 8-page booklet illustrates and describes the manufacturing process, compression molding, and uses of phenolic plastics and resins in a very easy-to-read style. It contains a brief review of recent books and suggests sources for comprehensive study of the subject.

Specification and Description of Color

THE American War Standard Specification and Description of Color, Z44-1942, has been issued by the American Standards Association, 29 West 39th St., New York, N. Y., and is available at 25 cents a copy. This was approved June 17, 1942.

Molten Salt Baths

MOLTEN SALT BATHS" is the title of a new 72-page illustrated manual published by the Electrochemicals Department of E. I. du Pont de Nemours & Co., Inc.

Case hardening of ferrous metals in baths containing sodium cyanide, use of simple cyanide baths as reheat media for high carbon and oil hardening alloy steels and for carbonized work, and nitriding of high-speed steel and other high alloy tool steels in molten cyanide baths are described. The du Pont accelerated salt bath for efficient production of mixed carbon-nitrogen cases on plain carbon and on alloy carburizing steels and the du Pont carburizing salt for production of deep cases at usual carburizing temperatures also are covered in the manual.

Information is given on salts for heat treatment of steel and other metals and for heat coloring of finished and polished steel parts, as well as on salt bath equipment, cyanide disposal, modern analytical methods, safety in operation, first aid, and medical aid.

Copies of the manual will be sent by the Electrochemicals Department of the du Pont company, Wilmington, Del., to executives and engineers who request it on business letterheads.

Acetic Acid

THE Vinegar Cruet Goes to War" is a nontechnical article on acetic acid included in the August 6 issue of *Domestic Commerce* to attract the attention of nonchemical businessmen to one phase of the far flung activities of the chemical industry. Written by W. S. Gaylord, Chemicals Staff, U. S. Bureau of Foreign and Domestic Commerce, the article appears in Vol. 30, No. 6, of *Domestic Commerce*, which is issued weekly by the U. S. Department of Commerce and may be obtained at 5 cents a copy.

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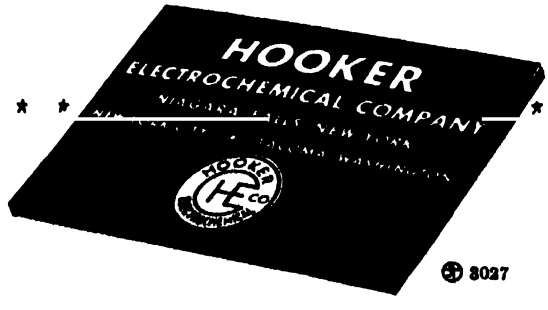
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To be awarded the Joint Army-Navy "E" Flag for "high achievement" in the production of war materials is something to make *any* company feel proud. We at Hooker are no exceptions.

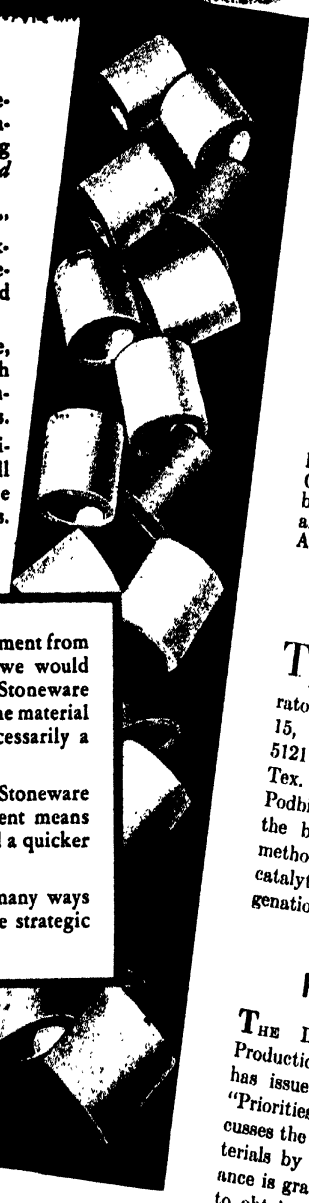
Yet the cooperation of others was essential in winning this flag for our Niagara Falls plant. Our customers have given us splendid support. Our suppliers have been invaluable. We are deeply appreciative of the honor paid us by the Army and Navy authorities. We acknowledge that, in awarding us the "E", they have recognized the all-important contribution of chemistry to the war effort.

Chemicals are swords for war and ploughshares for peace. We are happy to play our part in the never-ceasing search for new ways to help America in this war and beyond.



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"U. S." white porcelain or chemical stoneware raschig rings are outstanding in the fundamental qualities required of a good raschig ring: *mechanical strength, chemical purity, and uniformity.*

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Write for Bulletin No. 54 on Modern Tower Packing

As a manufacturer of corrosion-resistant equipment from natural rubber, synthetics, alloys and ceramics, we would like to point out that "U.S." Standard Chemical Stoneware is made 100% from non-critical materials, and is one material of construction for which priorities are not necessarily a pre-requisite to obtain.

The substitution of "U.S." Standard Chemical Stoneware for synthetic, metal and rubber process equipment means more planes . . . more tanks . . . more guns . . . and a quicker victory.

Our engineers will be glad to explain the many ways in which versatile chemical stoneware can release strategic materials for the more vital needs of war.

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Army-Navy E Awards

RECENT presentations of the Army-Navy Production Award, the Army-Navy E, have been made to the Leeds & Northrop Co., Philadelphia, Penna., which received the burgee from Admiral Henry A. Wiley, U. S. Navy, retired, on September 5; to the H. K. Porter Co., Pittsburgh, Penna., which received the award on August 27 from Colonel J. S. Seybold; to Handy & Harman, New York, N. Y., which received the award August 15 from Lieut. Commander R. W. Rose; to the Foster Wheeler Corp., New York, N. Y., which received its second award at Danville, N. Y., on August 17, the presentation being made by Rear Admiral Clark H. Woodward; and to the Goodyear Tire & Rubber Co., Akron, Ohio, on September 15, by Major General William N. Porter, Chemical Warfare Service.

On September 18 the Army-Navy E was presented to E. R. Squibb & Sons, in recognition of efforts to supply critical drugs, biologicals, and other essentials. Rear Admiral Harold W. Smith made the presentation. Buffalo Pumps, Inc., received the award from Rear Admiral Wat T. Cluverius. On September 1 the Victor Chemical Works, Mt. Pleasant, Tenn., was given the award for excellence in production of war equipment, Brigadier General Haig Shekerjian of Edgewood Arsenal delivering the principal address. The Struthers Wells Corp. received the Army-Navy E on September 9 from Lieutenant Colonel A. F. Witte of the Cleveland Ordnance District to the Chain Belt Co., Milwaukee, Wis., on September 19, by Captain D. D. Dupre, U. S. Navy, and Lieut. Colonel D. J. Martin, U. S. Army.

Fractionation Clinic

THE Podbielniak Fractionation Clinic has been established as a special laboratory (September 1 to about November 15, 1942) at the Petreco Tretolite Co., 5121 South Wayside Drive, Houston, Tex. Its purpose is to assist users of Podbielniak fractionation apparatus in the best application of apparatus and methods to effective control of alkylation, catalytic cracking, isomerization, dehydrogenation, and similar processes.

Priorities and Industry

THE Division of Information, War Production Board, Washington, D. C., has issued an 84-page booklet entitled "Priorities and Industry". This discusses the over-all pattern, control of materials by priorities, how priority assistance is granted, and what you should do to obtain priorities assistance. The appendexes give a list of regional directors and district managers, with addresses, WPB regulation on delegations of authority, text and summaries of priorities regulations, and directive for wartime construction.

Business Statistics

We are indebted to the Manufacturing Chemists' Association, 608 Woodward Bldg., Washington, D. C., for the following figures showing business conditions.

Monthly Statistical Report on Business Conditions

	Seasonally Adjusted			Without Adjustment		
	Aug. 1942	July 1942	Aug. 1941	Aug. 1942	July 1942	Aug. 1941
(Base 1935–39 = 100)						
Industrial production[a]	183[b]	180	161	186[b]	181	163
Chemical production	168[b]	172	145	165[b]	165	142
Steel production	216	221	197	216	221	197
Freight car loadings	143	142	139	144	142	140
(Base 1923–25 = 100)						
Construction contracts, residential	57[b]	74	112	57[b]	75	111
All other	264[b]	313	184	286[b]	360	199
Department store sales, value	128[b]	121	134	101[b]	83	106

	Aug. 1942	July 1942	Aug. 1941
Index of factory employment[c]:			
All manufacturing	145.3[b]	142.2	133.1
Chemicals	193.5[b]	195.2	180.1
Drugs	163.2[b]	161.5	135.7
Fertilisers	96.9[b]	93.8	80.6
Compressed gases	162.7[b]	164.5	140.4
Index of factory pay rolls[c]:			
All manufacturing	214.4[b]	204.3	158.1
Chemicals	310.2[b]	313.4	247.2
Drugs	213.7[b]	207.7	165.0
Fertilisers	119.4[b]	118.4	90.8
Compressed gases	233.8[b]	232.7	167.0
(Base 1926 = 100)			
Wholesale price indexes:			
All products (except farm products and foods)	95.6[b]	95.7	90.8
Chemicals	96.3	96.5	87.5
Drugs and pharmaceuticals	129.0	129.1	100.1
Fertilizer materials	78.3	78.5	75.3
Purchasing power of the dollar:			
All products (except farm products and foods)	$1.047	$1.046	$1.101
Chemicals	1.039	1.036	1.142
Drugs and pharmaceuticals	0.775	0.775	0.999
Fertilizer materials	1.278	1.273	1.328

[a] Source of statistics in first six items: Federal Reserve Board.

[b] Preliminary figures.

[c] U. S. Department of Labor.

Student Subsidy and Allocation

In the face of a rapidly growing national shortage of engineering personnel, Dean Thorndike Saville of New York University College of Engineering, has called for the prompt establishment of a government-sponsored program which would select, finance, and allocate those high school graduates who show promise in engineering.

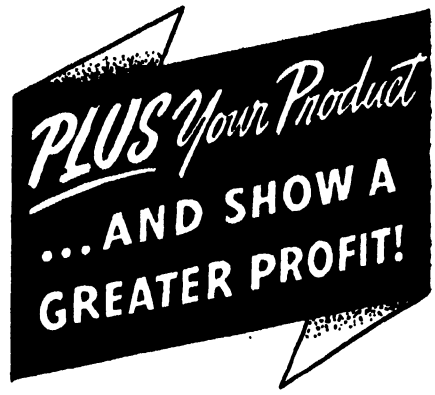
In a report to Chancellor Harry Woodburn Chase, Dean Saville said that high school graduates with obvious aptitudes for engineering study were presently caught in a welter of confusing information, and that many were lost to the profession in complete disregard for well-defined national needs.

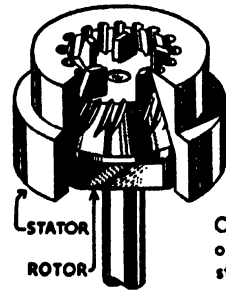
He pointed to the conflicts now affecting students between Selective Service principles and directives; the recruiting practices of the military services; the policy of the Air Corps, Signal Corps, and Army Enlisted Reserves; the "V" programs of the Navy and the requirements of the R. O. T. C. He said:

There is the vaguest and most unsatisfactory coordination among them and none at all with the equally important needs of industry and the government technical services connected with war activities.

Obviously, we should regularize coordinate, and compromise. No activity essential to the war effort can obtain, for some time, all of the engineering talent which it needs. Some 50,000 additional engineering personnel will be needed within a year. The engineering colleges will graduate between 18,000 and 20,000. And yet high school students lacking means for a college education, and others enticed by the high wages of the war employment offices, and the civil service, are lost to professional training in complete disregard of the national need for engineers.

Therefore, in engineering, as in other necessary professions in which shortages exist, there should be a government-sponsored program which will select, finance, and allocate high school students with the proper aptitudes. This allocation may even be effected by induction into a special students training corps for assignment to engineering colleges. Upon completion of approved curricula, which may be of varying lengths of time to meet specific needs, or when their records indicate an inability to complete their





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course successfully, they should be allocated on a quota system to work for which they are best fitted from the standpoint of the national need existing at that time. All agencies, whether they be civilian or military, which are connected with important war work, should be considered in the final allocation of trained technical personnel.

I feel that it is essential to invoke promptly some form of public subsidy if the nation is to have an adequate supply of properly trained and motivated engineering graduates. A policy of government selection, finance, and allocation should be based upon the expectation of a long war, and should be adopted after agreement between engineering colleges' administrators, and officials charged with the training of technical personnel for war purposes.

The mechanism for all of this will be hard to devise, will be productive of fundamental changes in the present recruitment of students, and will pose serious post-war problems of readjustment. But the mechanism can be reasonably simple; it is desperately needed, and the efforts of students and faculty will be amazingly enhanced to the prodigious benefit of morale and effective national service.

It seems that the national needs in engineering education are at present about as follows:

(*a*) Many more well-selected high school graduates tested for engineering ability and aptitude and assigned to engineering colleges.

(*b*) A determination of the number of different kinds of engineering graduates estimated as needed in 1943, 1944, 1945 and for each year until the end of the war.

(*c*) A quota of freshmen assigned each year to each engineering college. This should be determined in part by the capacity of the college, and in part by its special facilities. Some colleges should be required to concentrate on large numbers in fields in which they are superior, and abandon other fields for the duration.

(*d*) The college authorities should determine the financial needs of the students. They are experienced in this. Subvention should be furnished to the degree necessary from public funds. As an alternative all students might be paid while in college. This might be accomplished by induction into a special students training corps, or perhaps less desirably by induction into the armed services and assignment to college training.

(*e*) Upon completion of an approved college curriculum, students should be assigned to technical work in the armed services, the civilian technical agencies of government, or to war industry according to the amount of training they have had, their physical condition, and the national needs existing at that time.

(*f*) Upon failure in college from any cause, assignment would be similarly made.

(*g*) Accredited institutions should participate without reference to particularities of curricula or variations in length of term.

It is my feeling that defective as it doubtless is from lack of consideration of all the items to be taken into account, some such program would go far toward solving the present uncertainties in training objectives on the one hand, and on the other hand would assist materially in a long-range plan for producing the right kind of engineers in more adequate numbers for the all-round job of winning the war.

Plastic War Production Association Formed

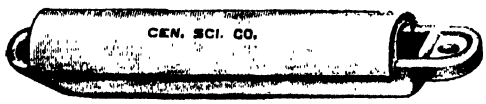
A POOL of plastics companies in the New York area, known as the Plastic War Production Association, has been formed with headquarters at 122 East 42nd St., New York, N. Y. The association will pool the engineering, research, and manufacturing facilities of its members for the benefit of government branches placing war contracts, and will endeavor to develop new applications of plastics to conserve vital metals.

Leitz Seized by Alien Property Custodian

AMONG the concerns, the capital stock of which has recently been seized by the Alien Property Custodian, is E. Leitz Inc., New York, N. Y., dealer in photographic equipment, and optical and scientific instruments.

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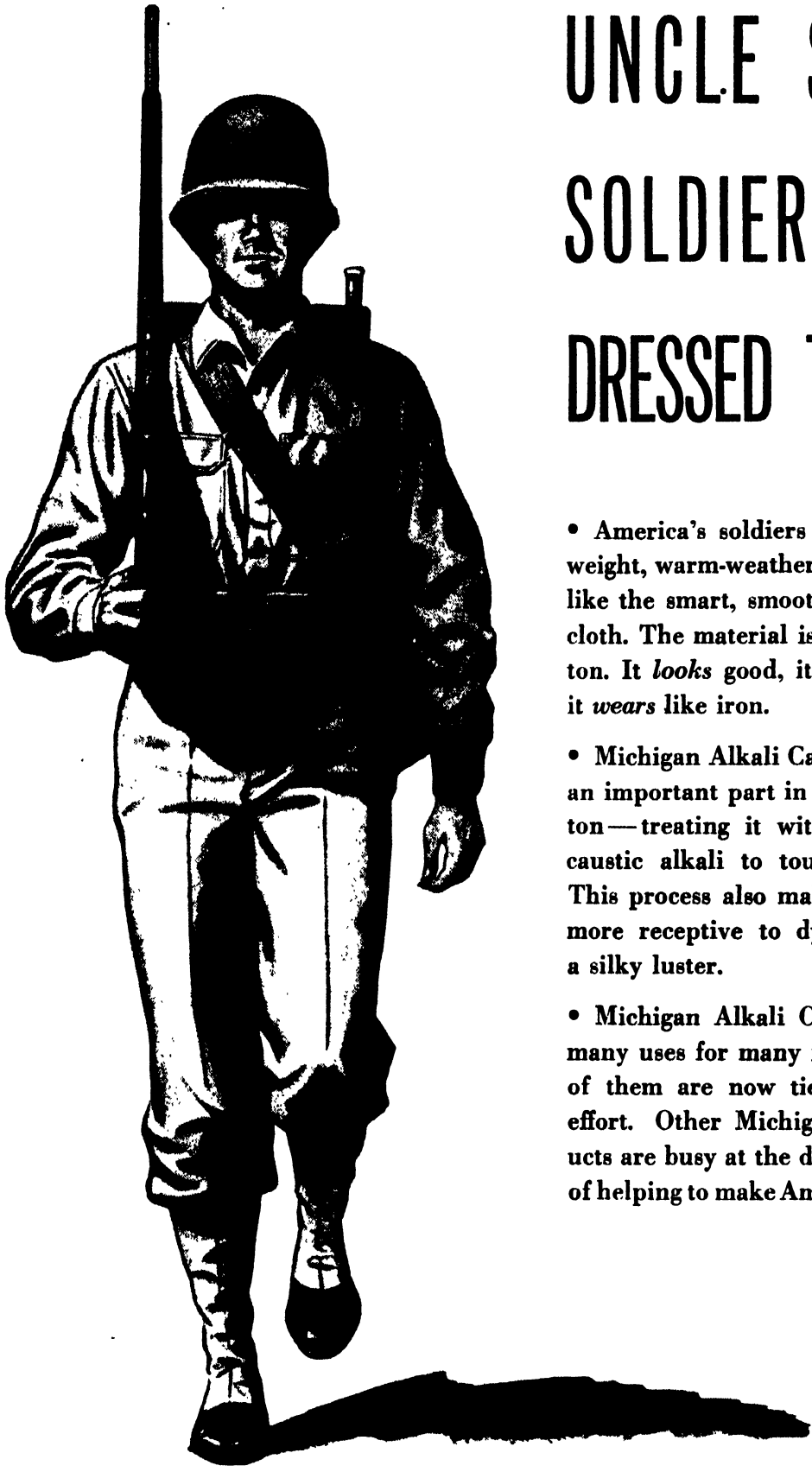
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Transportation of Explosives

THE Interstate Commerce Commission, Washington, D. C., has issued a mimeographed leaflet, No. 3666, covering proposed changes in regulations for transportation of explosives and other dangerous articles.

PRODUCTION of from 3 to 4 tons weekly of carbide is reported for a factory recently constructed in Eire, where annual consumption is given as approximately 700 tons. Increased output at the new plant will supply about a third of such requirements, it is thought.

NORWAY is developing her own tar products to take the place of former imports. The output of carbolic acid is increasing, and crude pyridine is being manufactured. Road tar is also being made in larger quantities, a report from that country states, and pitch and distilled tar have been used in making roofing materials.

CANADA has continued reduced duties of 5 per cent ad valorem on imports into Canada from non-Empire sources of casein, other than rennet casein, for use in Canadian manufactures, the Department of Commerce has been advised.



WIDE WORLD PHOTOS

Lend-Lease Produces Giant Orange Squeeze

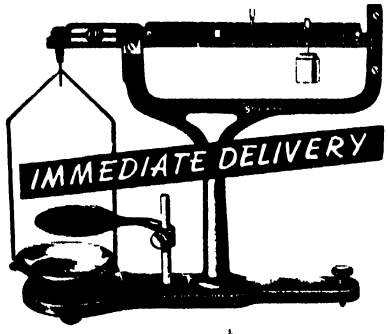
Orange juice prepared for Lend-Lease shipments to United States troops abroad and to Allied Nations is concentrated and pasteurized at 170° F. and then sealed into gallon cans. This filling and sealing equipment boasts a capacity of 500 cans per hour.

for FAST, ACCURATE WEIGHING

SCHAAR Triple Beam BALANCE

211 GRAM CAPACITY
Without the Use of Separate Weights
10 MG. SENSITIVITY

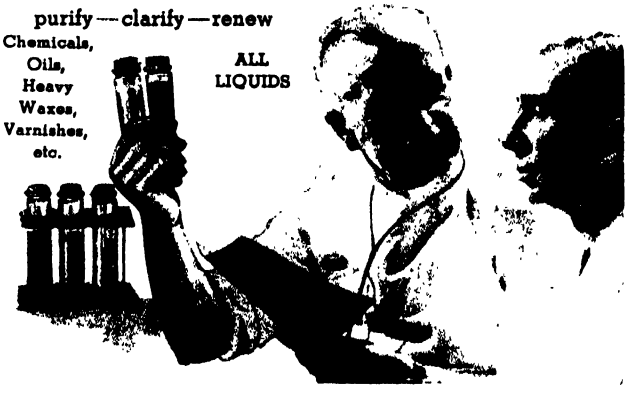
Here is a low-priced balance which will be found most useful wherever fast, accurate weighing is required. With its sensitivity of 10 milligrams and its capacity of 211 grams—without the use of any loose weights—it has innumerable applications in the analytical or in the educational laboratory. Weighing is greatly speeded up by the ingenious provision for damping: the beam can be stopped by simply pressing the finger against the beam-end, which swings in a slotted recess.



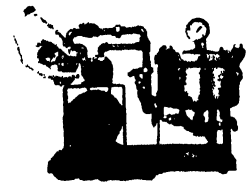
No. 577 Schaar Triple Beam Balance, 211 Gram Capacity, Finished in Black Enamel..... $20.00

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Industries Using Penchlor Acid-Proof Cement

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Chemical	Lacquer	Smelting
Coke and Gas	Leather	Spark Plugs
Distilling	Metal Pickling	Steel
Electrochemical	Oil	Tanning
Electroplating	Paper and Parchment	Textile

Where conditions require a cement of unusual strength and high resistance to abrasion, consider these Penn Salt *resin* cements: *Asplit*®, for conditions always acid . . . *Causplit*®, for alternate acid and alkaline conditions. These are easy to handle and will withstand a wide range of corrosive conditions up to 350 degrees F.

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THE WALL STREET OF CHEMISTRY

	Annual Earnings 1941	Annual Earnings 1942	Per Common Share 1941	Per Common Share 1942
Aluminum Industries	$.....	$ 306,029	$....	$3.09
Davison Chemical Corp.	652,311	1,077,281	1.26	2.09
Faultless Rubber Co.	128,411	130,367	1.96	1.99
Lehn & Fink Products Corp.	770,360	648,182	1.92	1.62
Masonite Corp.	2,010,886	1,448,434	3.56	2.39
Paraffine Cos.	1,600,038	1,816,730	3.16	3.61
Potash Co. of America	1,309,782	1,400,020	2.38	2.55
Vanadium-Alloys Steel Co.	906,620	1,248,026	4.56	6.31
Vick Chemical Co.	2,804,026	2,211,430	4.12	3.25
Virginia-Carolina Chemical Corp.	359,936	1,345,703	...	...
Westinghouse Electric & Manufacturing Co.	20,716,817	18,280,821	7.75	5.70
Nine Months' Earnings				
West Virginia Pulp & Paper Co.	3,382,624	2,314,151	2.97	1.79
Six Months' Earnings				
Air Reduction Co.	3,337,756	2,818,423	1.23	1.04
Atlas Powder Co.	.....	495,010	...	1.94
Freeport Sulphur Co.	1,651,405	1,285,028	2.07	1.61
General Aniline & Film Corp.	2,348,318	1,292,247	3.20	1.76
Intercontinental Rubber Co.	149,909	177,554	0.25	0.30
McKesson & Robbins, Inc.	.....	1,360,995	...	0.72
Mathieson Alkali Works	997,345	556,092	1.10	0.57
Pennsylvania Glass Sand Corp.	395,231	210,230	0.99	0.41
United Dyewood Corp.	127,272	121,770	4.36	4.17
Weston Electrical Instrument Corp.	482,188	358,218	3.00	2.23

Despite vulnerability to higher corporate taxes, leading chemical shares continue to enjoy higher market evaluations per dollar of earnings than other leading corporate securities, as indicated by comparison with the Dow-Jones Industrial Averages, according to a report by E. F. Hutton & Co. On the average these shares are selling at 21.0 times estimated 1942 profits on a 50/90 per cent tax basis and 32.4 times on a 50/100 per cent tax basis.

D. M. Musser, formerly with Mellon Institute, is now engaged in research work with the Pacific Mills, New York, N. Y.

Merck Training School

The Merck Training School, sponsored by Merck & Co., Inc., Rahway, N. J., has started classes in subjects essential to the war effort. Among the subjects included are chemistry, chemical equipment, shop mechanics, blueprint reading, power plant engineering, electricity, English, mathematics, and stenography. While all new employees are required to attend safety classes, first aid instruction will be included on a voluntary basis.

In addition to the classroom, a demonstration room has been set up with numerous kinds of chemical equipment, which will be used to acquaint new employees with the various types of machinery used in a modern chemical plant. In addition, an industrial library and reading room have been established in which employees will have access to trade and industrial journals and technical books.

Acid Open Hearth Research Association

The Acid Open Hearth Research Association was formed in Pittsburgh, Penna., September 14, 1942, with the purpose of conducting practical and technical research upon the problems governing the production of steel in the acid open hearth steel furnaces. G. R. Fitterer, Department of Metallurgy, University of Pittsburgh, has been appointed director of research, and J. W. Linhart, research metallurgist. The work will be conducted under the auspices of the University of Pittsburgh with full study of actual furnace heats in the plants of the 19 member companies. Secretary of the new association is Fred C. T. Daniels, 901 Bingham St., Pittsburgh, Penna.

Survey of Manpower Resources

Senator Claude Pepper has introduced a resolution calling for the creation of a special committee of five Senators "to make a full and complete study and investigation in cooperation with the Manpower Commission of the manpower resources of the United States and how such manpower resources should be employed to the best advantage in agriculture, industry, the armed services, and other activities as consistent with the spirit of our institutions and the national emergency best to promote the war and victory for our cause".



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FIRE PREVENTION WEEK

THE nation is preparing to defend itself from fire that may be caused by incendiary bombs. Equally vital is the need to prevent the slowdown of war production by fires that may result from sabotage or ordinary causes. And, at this time when we are facing material shortages, replacements in the home and elsewhere must be reduced to a minimum.

The seriousness of the situation has been recognized by every organization concerned with fire safety, and, for the first time, the sponsors of Fire Prevention Week are joined, this year, by the U. S. Office of Civilian Defense, which is charged with civil protection in wartime.

By virtue of the President's proclamation, the U. S. Office of Civilian Defense now calls upon the entire Nation to heed the danger of fire, a danger which threatens our lives, menaces the security of our homes, and waits, ready in an instant, to sabotage our war industries.

OBSERVE FIRE PREVENTION WEEK OCTOBER 4th — 10th

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"General Grants"—
THEY'RE TOUGH, FAST AND HARD HITTERS!

Challenged by an aggressive enemy with years of war machine building experience, American engineers, in record time, designed, tested and built the famed "General Grant" tanks. Heavily gunned, tough and fast in the field, these steel monsters can out-fight, out-shoot and outmaneuver anything the Axis powers have yet rolled out.

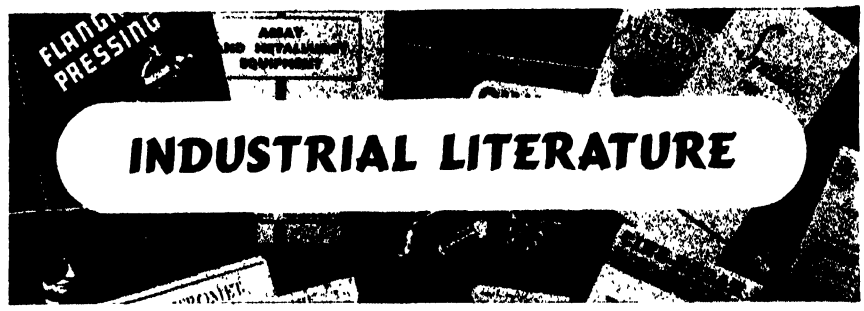
But it takes water to build tanks—water for the men who work in the plants—for those who produce the steel for those who operate and service them—and for millions of other people in the Service of Supply. Before plants could be built, armies trained and munitions made, there had to be an abundance of water. Upon the old, reliable and capable shoulders of the Layne Organization fell much of the task of producing that water. Layne swung into action and in record time, built deep well water systems by the hundreds, thus making possible unprecedented war and production programs.

Layne's reputation like that of the "General Grant" tanks, has been won on the field of action. Layne wells and pumps are doing an outstanding job—operating day and night, producing millions and millions of gallons of water for almost every phase of America's war effort. For late bulletins, wire or write LAYNE & BOWLER, INC., Memphis, Tenn.

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Layne-Louisiana Company.....Lake Charles, La.
Louisiana Well Company.....Monroe, La.
Layne-New York Company.....New York City
Layne-Northwest Company.....Milwaukee, Wis.
Layne-Ohio Company.....Columbus, Ohio
Layne-Texas Company.....Houston, Texas.
Layne-Western Company.....Kansas City, Mo.
Layne-Western Co. of Minn.....Minneapolis, Minn.
International Water Supply, Ltd...London, Ont.



Listed publications should be requested directly from the company concerned. Use business stationery, mention bulletin numbers, and refer to this journal. Publications will be sent free unless otherwise noted.

Automatic Reduced Voltage Starters. This 16-page bulletin gives a description of this new line of starters, a complete discussion of the factors that enter into the selection of such units for squirrel-cage motors and of the company's automatic resistance starters of various types and sizes. *Bulletin CEN.* ALLEN-BRADLEY Co., 1311 South First St., Milwaukee, Wis.

Automatic Time Controls. An 8-page pamphlet on Vernier-Set and Cycle-Progress timers, Series 2800. Applications, construction, types, and operating features, ratings and arrangements are given in detail. Included are combinations of timers and auxiliary equipment. *Pamphlet CEN.* AUTOMATIC TEMPERATURE CONTROL CO., INC., Philadelphia, Penna.

Bakelite Laminating Plastics. This 24-page booklet tells what laminated plastics are and the various types of stock available. It is illustrated with photographs showing the manufacture of laminated materials and their essential uses in the aircraft, chemical process, and other industries. *Booklet CEN.* THE BAKELITE CORP., UNIT OF CARBIDE AND CARBON CORP., 30 East 42nd St., New York, N. Y.

Chemical Feeders. This bulletin describes a new displacement pump type unit in which the operating parts are isolated from the material to be handled. Specifications and construction details are also given. This feeder is either manually or automatically controlled. *Bulletin BLW 25 CEN.* WILSON CHEMICAL FEEDERS, INC., Buffalo, N. Y.

Cleaning Compound. This product, called "Trojan Electro-Purjit" is a fused chemical, claimed to be better than gasoline or naphtha for cleaning machinery. It will not burn and is harmless to hands and clothes. It dissolves rust, grease, and weather corrosion from glass; eliminates acids and alkalis; cleans and disinfects greasy, oily cement, wood, and other type floors. *Bulletin CEN.* TROJAN PRODUCTS AND MFG. CO., 3130 South Wabash Ave., Chicago, Ill.

Coal Crusher and Breakers. This 20-page bulletin describes the development of these units and shows the mechanical principles involved in crushing and breaking coal sizes. Construction features, capacities, dimension charts, line drawings, and photographs complete the bulletin. *Bulletin 342 CEN.* MCNALLY PITTSBURG MFG. CORP., 307 North Michigan Ave., Chicago, Ill.

Contact Making Clock. This bulletin describes a new unit for use where an accurate and dependable impulse timing element is required. It can also be used as an impulse timer for various time-recording instruments. An illustration, with descriptive details and diagrams of the construction features is given. *Bulletin S-3 CEN.* R. W. CRAMER CO., INC., Centerbrook, Conn.

Defibrators. This 15-page catalog gives a detailed, illustrated description of the construction and operation of the Asplund Defibrator. Installations and uses are described, with photographs, as well as products made with the Defibrator. *Catalog 2 CEN.* THE AMERICAN DEFIBRATOR, INC., New York, N. Y.

Fire and War Gas Extinguisher. This extinguisher is recommended as a decontaminator for chlorine, phosgene, and chloracetophenone. It is effective in combating automotive, airplane, industrial, and marine fires. *Bulletin CEN.* O. H. ADAMS CO., Milwaukee, Wis.

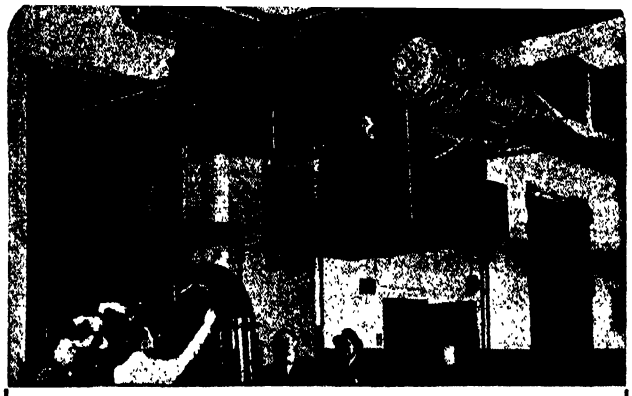
Flowmeters. A 56-page edition of a complete flowmeter line catalog describes electric, mechanical, linameter, ring balance, liquid level and weir meters; 2-penelectric flow recorders with ratio indicating pointer, an improved low-pressure electric type meter; and an ultra high-ring balance meter. The catalog is well illustrated and includes a discussion of flow-metering benefits, with complete listings of specifications and ranges. *Catalog CEN.* COCHRANE CORP., 17th St. and Allegheny Avenue, Philadelphia, Penna.

Industrial Instruments. A 48-page catalog describes a full line of instruments for the measuring and control of industrial process conditions. There are 10 sections, with over 200 illustrations, six of which group and describe the instruments, accessories, and supplies appropriate to a particular field of application, while the remaining four cover combination instruments, panels, valves, etc. Thorough cross-indexing plus an ingenious use of color makes this catalog a convenient and useful reference handbook. *Catalog 95-A CEN.* THE FOXBORO CO., Foxboro, Mass.

Malacca Plastic Rubber. A 2-page bulletin describes the properties and uses of Malacca plastic rubber. *Bulletin CEN.* ROBINS CONVEYING BELT CO., Passaic, N. J.

Manual for New Employees. A 72-page pocket-size booklet answers prac-

CONTINUED ON PAGE 1276



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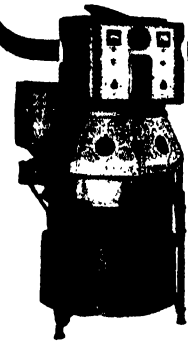
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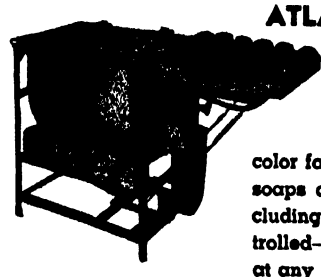
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- **Reduce years of actual use to just a few days testing.**
- **Recognized by manufacturers and consumers as the standard accelerated test equipment for more than a quarter-century.**
- **Used in 36 countries . . . all over the world.**
- **Many Federal Specifications call for tests with Atlas-Ometers.**

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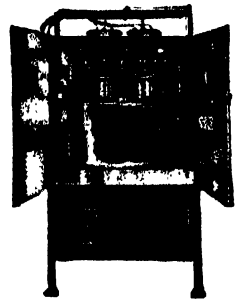
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WEATHER-OMETER

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A continuous showing will provide a liberal education in chemical processing. Subjects covered will include plastics, rayon, chemical stoneware, glass, bread, coke, white lead, glass insulators, gelatin capsules, steel, aluminum and many others important to the American way of life.

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An imposing list of leaders in every field will display and introduce many new items to the profession. These remarkable exhibits, in themselves, will completely justify attendance.

SCIENTIFIC EXHIBIT
The "Electronic Microscope" will be exhibited by RCA Manufacturing Company. See actual micrographs from this Electronic Microscope.

SPECIAL EXHIBITS
The War Production Board (W.P.B.) exhibit demonstrates reclamation and recovery of vital chemical products.

"Successful alternates and substitutes"—the extensive exhibit prepared by Dr. Harrison E. Howe.

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Industrial Literature

CONTINUED FROM PAGE 1274

tically every kind of problem that confronts the new employee. Illustrated with cartoons and with photographs of key executives. *Manual CEN.* MANNING, MAXWELL & MOORE, INC., Bridgeport, Conn.

Pumps for Vacuum and Pressure. This bulletin describes in full the Motoair motor and pump in one integral unit. Installations, illustrations, specifications, and uses of the unit are given. Space saving, positive vacuum or pressure, no pulsation or vibration, positive oil control are some of the features claimed. *Bulletin CEN.* MOTOAIR DIVISION, NEW JERSEY MACHINE CORP., 1505 Willow Ave., Hoboken, N. J.

Rubber Guidebook. Designed to present maximum information in easily accessible, indexed, condensed form, this new 30-page booklet lists the applications and properties of many types of products for industrial and aeronautical purposes using natural, synthetic, or reclaimed rubber. Some subjects covered are properties of Ameripol, sponge products, extruded rubber goods, anode process of rubber coverings, hard rubber parts, and rubber cements. Subzero, thickness, and hardness tests in oil and suggested uses for Ameripol compounds are given. *Booklet 2-8981-GA CEN.* B. F. GOODRICH CO., Akron, Ohio.

Sugar Factory Equipment. A complete, 63-page illustrated catalog of equipment for the sugar industry shows the various pieces of equipment and actual installations in factories. Specifications, metals used, and prices are given in detail on various types of chains, sprocket wheels, feeders, transmission machinery, elevators, idlers, conveyors, minglers, shredders, stackers, and other units. *Catalog 766 CEN.* THE JEFFREY MANUFACTURING CO., Columbus, Ohio.

Thermocouple Gage. A 4-page illustrated folder describes the all-metal Type D thermocouple gage. *Folder CEN.* NATIONAL RESEARCH CORP., 100 Brookline Ave., Boston, Mass.

Trucks. This bulletin describes a new 10,000-pound capacity, heavy-duty crane type truck. This mobile crane is adapted to every industry where heavy loads must be lifted. Special features assure safety in operation. The No-Plug travel controller makes careful and correct operation compulsory, and design results in lower dead weight despite heavier construction throughout. *Bulletin 1612 CEN.* THE BAKER INDUSTRIAL TRUCK DIV., BAKER-RAULANG CO., 2168 West 25th St., Cleveland, Ohio.

Variable-Speed Drive. Description of a new variable-speed multiple V-belt-drive called the "Allspeed drive", said to be exceptionally compact, ball-bearing equipped, and so designed that it can be operated in any plane. It can be direct-coupled with a standard motor and the output shaft can be run at motor speed, and is flexible enough so that it can be applied to any type of machine within its power range. *Bulletin CEN.* WORTHINGTON PUMP AND MACHINE CO., Harrison, N. J.

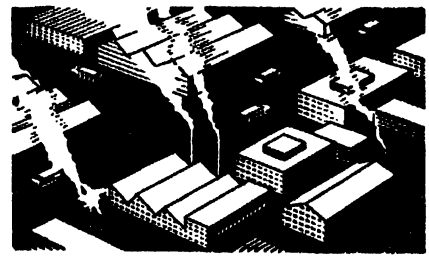
V-Belts. A handbook on the wartime care of all types of V-belts. This book includes the anatomy of the V-belt, the principle of the V-belt drive, and post-mortems on actual damaged belts. How to obtain proper tension, what to do about worn sheaves, what determines the life-expectancy of a V-belt are some of the facts revealed. *Booklet CEN.* TEXROPE DIV., ALLIS-CHALMERS MFG. CO., Milwaukee, Wis.

Vitamin A Meter. An illustrated bulletin on the Lumetron photoelectric meter for this vitamin includes data on principle of operation, calibration, optical, and electrical system. *Bulletin CEN.* PHOTOVOLT CORP., 95 Madison Ave., New York, N. Y.

Water Handbook. This publication well deserves the title "handbook". It not only discusses chemical analysis, but the correct interpretation of these analyses. In the first section 25 different methods of water analyses are discussed at length with procedures and calculations. Such water analyses as hardness, alkalinity, phosphate, sulfite, turbidity, oil, calcium, and specific conductance are covered. With but one exception all tests are simple, accurate determinations requiring little or no previous chemical background. The second section of the book is devoted to interpretations of the tests and their applications to plant control. Included here are discussions of such subjects as carbonate and non-carbonate hardness, pH control, steam purity, intercrystalline cracking, corrosion, and many others. Scattered throughout are 16 useful technical graphs and 15 illustrations of different pieces of testing equipment. This handbook will be sent to any interested person upon receipt of 50 cents. *Water Handbook, CEN.* W. H. & L. D. BETZ, Frankford, Philadelphia, Penna.

Water Softeners. This bulletin describes the hot process of water softening. Each unit is taken up carefully, and a flow sheet of the softener is given in detail. Illustrations of the settling and chemical agitating tanks, valves, distributing nozzles, pumps, proportioning meter, and decanting gear are included. *Bulletin W-212-B2 CEN.* WORTHINGTON PUMP AND MACHINERY CORP., Harrison, N. J.

Wire Cloth. A new folder on a complete line of wire and wire cloth, covering major applications, types of metal used, the basic types of weaves, crimp, and special weaves available. Examples of weaves are given full size, reel covers, bolting cloth, and panels are shown in reduction. Complete production services are also described. *Folder CEN.* BUFFALO WIRE WORKS CO., INC., 320 Terrace, Buffalo, N. Y.





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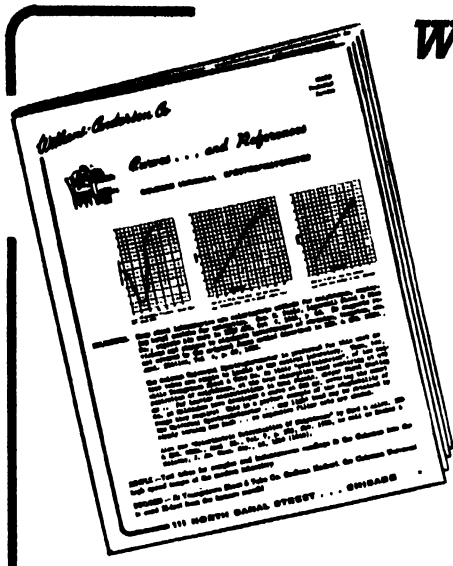
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Issue of the 10th closes—20th of preceding month; **mails 7th of month.**

Issue of the 25th closes—5th of the month; **mails 22nd of month.**

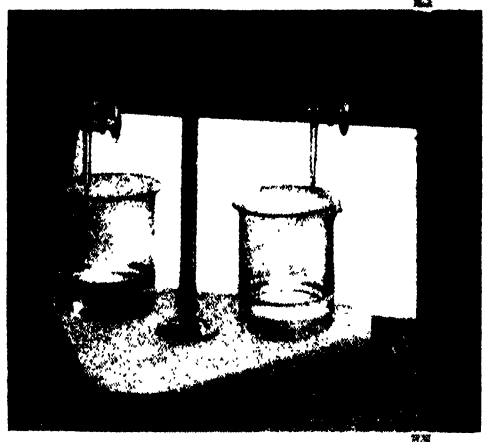
We urgently ask that advertisers make it a point of having complete copy in our hands *before* the closing dates shown to enable prompt publication and mailing.

For Titrations

• Supplies soft, glareless fluorescent illumination of daylight quality, correct intensity and color characteristics to beakers in which titrations are being carried out.

A *parabolic* reflector directs light against a flat, white, acid resistant vitreous enameled inclined background—eliminating direct illumination and so preventing glare and undesirable illumination intensities.

The outer surface of the lamp is finished in a dark blue vitreous enamel. Fitted with snap-switch, connecting cord and plug. Length, 12½ inches; height, 8 inches; depth, 4½ inches.



S-44290 Sargent Fluorescent Titration Lamp. Complete with fluorescent tube, type T-5. For operation from 115 volt 60 cycle circuits $13.00



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The lamp can be attached to all makes and styles of balances. Mounted at the front of a balance case, the *parabolic* reflector directs all light through the front door over the entire working area of a balance to uniformly illuminate beam, chain scale, pointer index and pans. Objectionable shadows and poorly lighted areas are entirely eliminated.

The lamp is supported by a simple clamp and permits free movement of the sliding balance door. Bulk and weight of the reflector are greatly reduced by making a separate unit of the auxiliary.

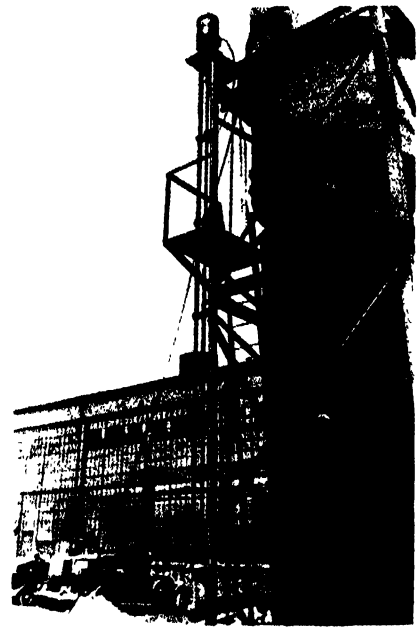
Both inside and outside of the reflector are finished in an acid resisting vitreous enamel. Exterior is dark blue.

S-3820 Sargent Fluorescent Balance Lamp. Complete with fluorescent tube, type T-5. For operation from 115 volt 60 cycle circuits $11.50

E. H. SARGENT & CO., 155-165 E. Superior St., Chicago
Michigan Division: 1959 E. Jefferson, Detroit, Mich.

All Outdoors a Well for Pump Test

A VERTICAL pump that required a 25-foot setting, a special unit for a western railroad, used to solve a local water-supply difficulty where water with a heavy sand loading had been causing trouble, presented a problem in testing.



When the pump was completed at the plant of the American Manganese Steel Division, Chicago Heights, Ill., how was it to be tried out? The puzzle was effectively worked out by suspending the unit from one of the company's high dust collector towers as shown in the illustration.

Salvage Campaign

THE salvage campaign at the plants of Merck & Co., Inc., Rahway, N. J., Philadelphia, Penna., and Elkton, Va., has returned 640,292 pounds of scrap iron and 5,199 pounds of scrap rubber, with substantial quantities of copper, aluminum, and brass.

Based on figures issued by the Government, the amount of scrap iron salvaged by Merck & Co. will take care of scrap requirements for 24 anti-aircraft guns, 14 tank guns, 28 machine guns, 16 tanks, 50 aerial bombs, as well as more than 100 hand grenades, aircraft cannon, trucks, and howitzers. The scrap rubber salvage to date would provide material for 3 gun carriages, a 10-ton pontoon bridge, a medium bomber, and some gas masks and boots.

Nonadhesive Films

THE United States Stoneware Co., of Akron, Ohio, has perfected nonadhesive Tygon formulations to provide easily removed temporary protection to highly polished surfaces against rust, corrosion, grease, finger markings, dust, scratches, etc.

Tygon Temprotec, in clear or transparent colored formulations, is applied by brush, dip, spray, or roller coating. It air-dries within a few minutes at normal room temperatures to form a durable, elastic film, unaffected by oil, grease, gasoline, or corrosive atmospheric fumes or condensates.

Plastic Hose for Stirrup Pumps

RECENT difficulties of Office of Civilian Defense officials in procuring plastic hose for stirrup pumps provide a graphic illustration of the greatly accelerated pace at which America's research laboratories are working to solve war production problems.

When OCD found in May that rubber hose could not be used for the pumps, plastics producers were asked to find a substitute, and a special formulation of Monsanto Chemical Co.'s Saflex was developed.

At the same time producers of rubberized fabric were searching for a new synthetic rubber for Army raincoats, water bags, life rafts, and collapsible boats and pontoons. To fill this need, Monsanto announced in July the development of a new Saflex formulation that could be vulcanized almost exactly like rubber and had other important advantages over materials previously available. As a result, all production will probably be required for direct Army and Navy use.



Loose Pulley Oiler

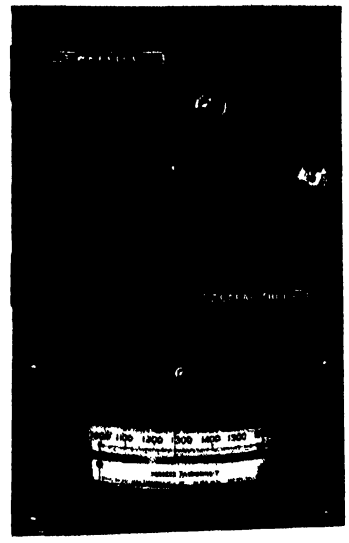
FOR use on loose pulleys, idler pulleys, clutches, eccentrics, and similar rotating machine parts, a new wick-type lubricator has been announced by the Oil-Rite Corp., Milwaukee, Wis.

This lubricator consists of a simple glass oil reservoir mounted on a hollow metal stem. This stem is sealed from the oil in the reservoir, except for two small ports at the very top. Inside the stem is a cylindrical felt wick, which extends through the pulley hub to rest directly on the shaft. A compression spring is wrapped around the wick to hold it firmly in position against the shaft. As the pulley rotates, and the lubricator with it, centrifugal force throws the oil against the top of the reservoir, and into the two ports in the stem. These admit oil to the wick, which filters out all dirt and sediment, and conducts the oil directly to the face of the shaft.

Exhauster and Ventilator

A NEW exhauster and ventilator called the "Octopus" is announced by Chelsea Fan & Blower Co., 1206 Grove St., Irvington, N. J. Specially designed for use in ship holds, mines, sewers, tunnels, and welding departments, the unit may be placed or hung in any convenient place between the working area and the open air.

THE Cochrane Corp., Philadelphia, Penna., announces the appointment of the Energy Control Co., as flowmeter representative for eastern Pennsylvania, southern New Jersey, Delaware, and Maryland.



Wheelco is still

FIRST

. . . in pioneering new applications for engineered electronics in temperature control.

The famous Wheelco "Electronic Principle" Control System provides faster, more accurate control than any other type of control and is constantly being applied to more control problems.

In 1941, Wheelco incorporated the instantaneous control action of the "Electronic Principle" and extreme accuracy of temperature measurement into the UNIVERSAL Temperature Controllers, which are the first to provide such plus values as interchangeability of all component parts, interchangeability of scale ranges, ready accessibility of all parts for individual checking and many other features. UNIVERSAL Controllers include Capacitrols, Potentiotrols, Limitrols and Resistance Therm-otrols.

In 1942, Wheelco continues to pioneer new control applications for the "Electronic Principle." *Write for FREE Bulletin No. Z6000.*

1935

"Electronic Principle" Temperature Control (D2)*.
Limitrols (D202)*.
Indicating Pyrometers (D302)*.
"ELECTRONIC PRINCIPLE" TEMPERATURE CONTROL — since proved superior to other types of controllers.

1936

Flame-otrol (L2)*.
Portable Indicating Pyrometers (D602)*.
FLAME-OTROL — only combustion safeguard for all fuels approved by both Underwriters' Laboratories and Factory Mutual Laboratories.

1937

Proportioning Control (D2)*.
Portable Potentiometers (A502)*.
Heat-eyes (S2)*.
Time Delay Relays (S302)*.
PROPORTIONING CONTROL for continuously varying fuel input to maintain constant temperature — applied to "Electronic Principle" Controllers.

1938

Potentio-trols (A2)*.
Program Control (D2)*.
Rheotrols (J302)*.
Flame-eyes (L302)*.
Automatic Ignition Flame-otrols (L2)*.
POTENTIO-TROLS — potentiometric method of temperature measurement combined with "Electronic Principle" Control.

1939

Indicating Therm-otrol (G502)*.
Indicating Thermometers (G303)*.
Recording Thermometers (G403)*.
"ELECTRONIC PRINCIPLE" INDICATING THERMOMETER CONTROLLERS — for low temperature applications.

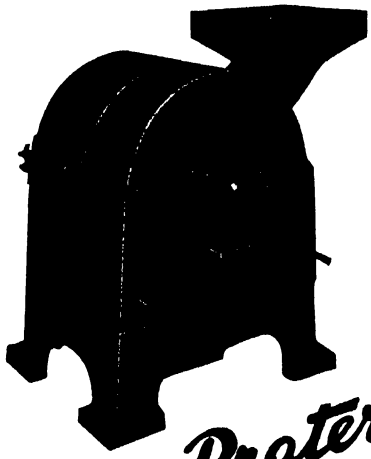
1940

Recording Therm-otrol (G502)*.
The THERM-OTROL — Recording Control Thermometer. Available in any type of measuring and control system for ranges from —50°F. to +1000°F. or equivalent °C.

*(No.) indicates Bulletins describing instrument. Write for them!

Wheelco Instruments Co.
851 W. HARRISON STREET CHICAGO, ILL.
Wheelco—Originator of "Electronic Principle" Temperature Controls.

THE GOODS OF WAR AND THE GOODS OF PEACE—



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The process industries are facing terrific demand. Not only must they take on the burden for goods of war — they must also supply materials to replace those ordinarily used for goods of peace. Dependable high production equipment is a necessity.

Many of the newer phases of processing rely on Prater Processing Equipment. In the soya industry, grinding is almost 100% by Prater Mills.

Every Prater Mill is sold on a basis of guaranteed output per horsepower hour and control of quality of grind, and grain size, after analysis of your problem.

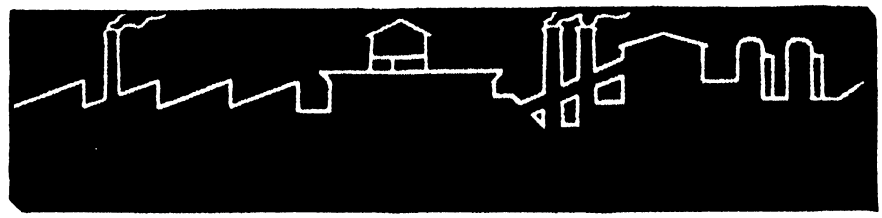
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Guayule Rubber

MOUNTING demand for guayule rubber resulting from its widened use for compounding with synthetic rubbers has led to doubling the productive capacity of Cia. Hulera de Parras, according to an announcement by the American Cyanamid & Chemical Corp., New York, N. Y., representative of the Mexican company. The increased capacity is being put in with the cooperation of U. S. Government agencies and is expected to be completed early in October.

Present rapid extension of use of guayule is based on the improved properties which it imparts to synthetic rubbers, particularly of the Buna S type. Guayule not only serves as an additive and extender for the synthetic, but also increases adhesiveness.

Production of Commercial Explosives

COMMERCIAL explosives, not used directly in war but extremely vital to the war effort, are being produced this year in quantities approximating an all-time high. It is possible that the United States will use 450,000,000 pounds of dynamite this year, it is announced by E. I. du Pont de Nemours & Co., Inc.

In normal times, the United States uses on the average 1,000,000 pounds of dynamite each day. In addition, some 60,000,000 pounds of black powder are used annually for commercial purposes.

New Timing Device

THE Tandem Timer is a new timing device of the Industrial Timer Corp., 113 Edison Pl., Newark, N. J., for production departments, laboratories, and life testing of electrical apparatus. It is essentially a control unit with two individual and variable plug-in type timing elements. With the timing elements adjusted to their correct respective time intervals, each cycle of operation will follow the other continuously in regular sequence. When the timer dials are once set at the time interval desired, further adjustments are unnecessary until a new sequence is required.

Electric Etcher

THE Ideal Commutator Dresser Co., Sycamore, Ill., has designed a new model etcher to cover an extremely wide range of etching heats. This unit, called the No. 18 machine shop metal etcher, has 14 heats from 115 to 1300 watts. With it, one can etch everything from thin, delicate metal parts to large, smooth castings.

New Fiber Container to Replace Metal

AFTER many months of experimentation, the American Can Co., Maywood, Ill., has developed a revolutionary method for the making of cans with fiber bodies on machines used for the manufacture of metal containers. This new method, which American Can will make available to the entire industry, as soon as it has been thoroughly tried and perfected through actual production, is considered the most important development within the can manufacturing industry in the past decade.

No new machinery is required. The fiber sheets are fed into existing machines geared for manufacturing metal cans and give a reasonable facsimile of the old container. The manufacturer of a product which uses the cans also may use his existing packaging machinery.

Carbon Dioxide Engine for Electrical Fires



THE Alfite carbon dioxide engine is said to be the only 100-pound engine approved by the Underwriters' and Associated Fac-



tory Mutual Laboratories for use on both electrical and oil fires. It is a product of American-La France-Foamite Corp., Elmira, N. Y.

Electronic Crest Voltmeter

A NEW electronic crest voltmeter, announced by the General Electric Co., Schenectady, N. Y., is designed to measure ignition voltages of internal combustion engines; surge voltages caused by corona and surface discharges in the insulation on such electric equipment as motors, generators, and cables; and other repeated-

impulse voltages up to 30,000 volts. The instrument, weighing only 23 pounds, fills the need for a portable crest voltmeter for both laboratory and production testing.

Synthetic to Replace Rubber

A NEW synthetic which is replacing rubber in army raincoats has been announced by the Stanley Chemical Co., East Berlin, Conn.

When the manufacture of automobiles was stopped, the Government had on its hands large quantities of the plastic used in the production of safety glass. It also had the annoying problem of replacing rubber in raincoats, tarpaulins, hospital sheets, pontoons, and scores of other items.

Major Frank M. Steadman, Research and Development Section, Quartermaster Depot, Philadelphia, had an idea that those problems could be made to cancel. He was right.

First from the research laboratories, then from the Stanley plant in carload lots, came a new synthetic formulated from safety glass plastic and named "Haydenite" for Stanley's technical director, E. M. Hayden, claimed to be better than rubber, cheaper than previous waterproof coatings, and easier to apply than other synthetics.

Chamber for Testing Instruments

A CHAMBER for testing instruments under extremes of cold and heat has been developed by American Coils, Inc., Newark, N. J. Its range of operating temperatures extends from −55° to +70° C. It includes apparatus for mechanical refrigerating and electrical heating.

Model RTC-1 consists of a two-stage condensing unit, heat exchanger, liquid subcooler, coil or evaporator, expansion valves, cabinet and forced draft strip heater, along with thermostats and other controls and connections for each. Operation is completely controlled from a front panel board, where the master switch is located along with the off-fan control, light switch, and receptacle switch.

New Circuit Breaker

A NEW high-speed air circuit breaker developed by the General Electric Co., Schenectady, N. Y., minimizes "arc back", a problem engineers have been battling since the first commercial mercury arc rectifier installation. The breaker was described in a paper presented at the summer convention of the American Institute of Electrical Engineers in Chicago by J. W. Seaman of the company's Switchgear Division and L. W. Morton of the Power Rectifier Engineering Department. Application of the new Type AG-1 breaker will lessen the possibility of power interruptions in war plants using direct current for the reduction of vital metal, such as aluminum and magnesium, and for various continuous processes.

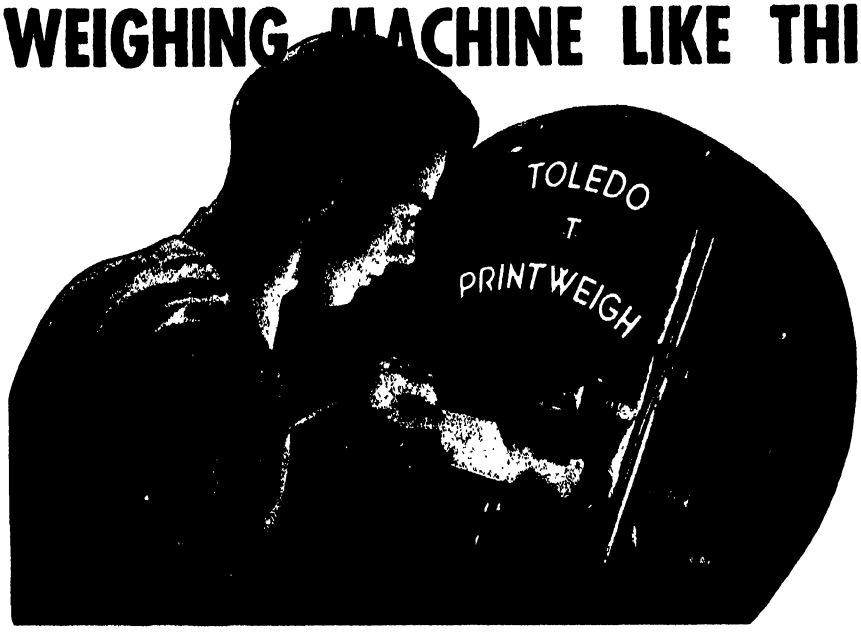
Protective Cream

INDUSTRIAL skin disorders which, according to statistics of a major insurance company, comprise two thirds of all occupational diseases, are being brought under closer control by protective creams, according to G. W. Sherin, chemical specialties expert of the du Pont company, Wilming-

CONTINUED ON PAGE 1287

NO OTHER

WEIGHING MACHINE LIKE THIS



IT PRINTS WEIGHTS...FAST! In these days when speed is so vital in production, Toledo's answer is the Printweigh which combines unerring *printed* records with greatest *speed.*

IT PRINTS BIG FIGURES... *unmistakably big*...on thick tickets...on large or small sheets...on strips...with extra copies.

IT'S SIMPLE IN OPERATION! Prints *direct*... no complicated mechanism...*dependable*...operates in as little as 3/5 second.

AND ABOVE ALL ....ACCURATE

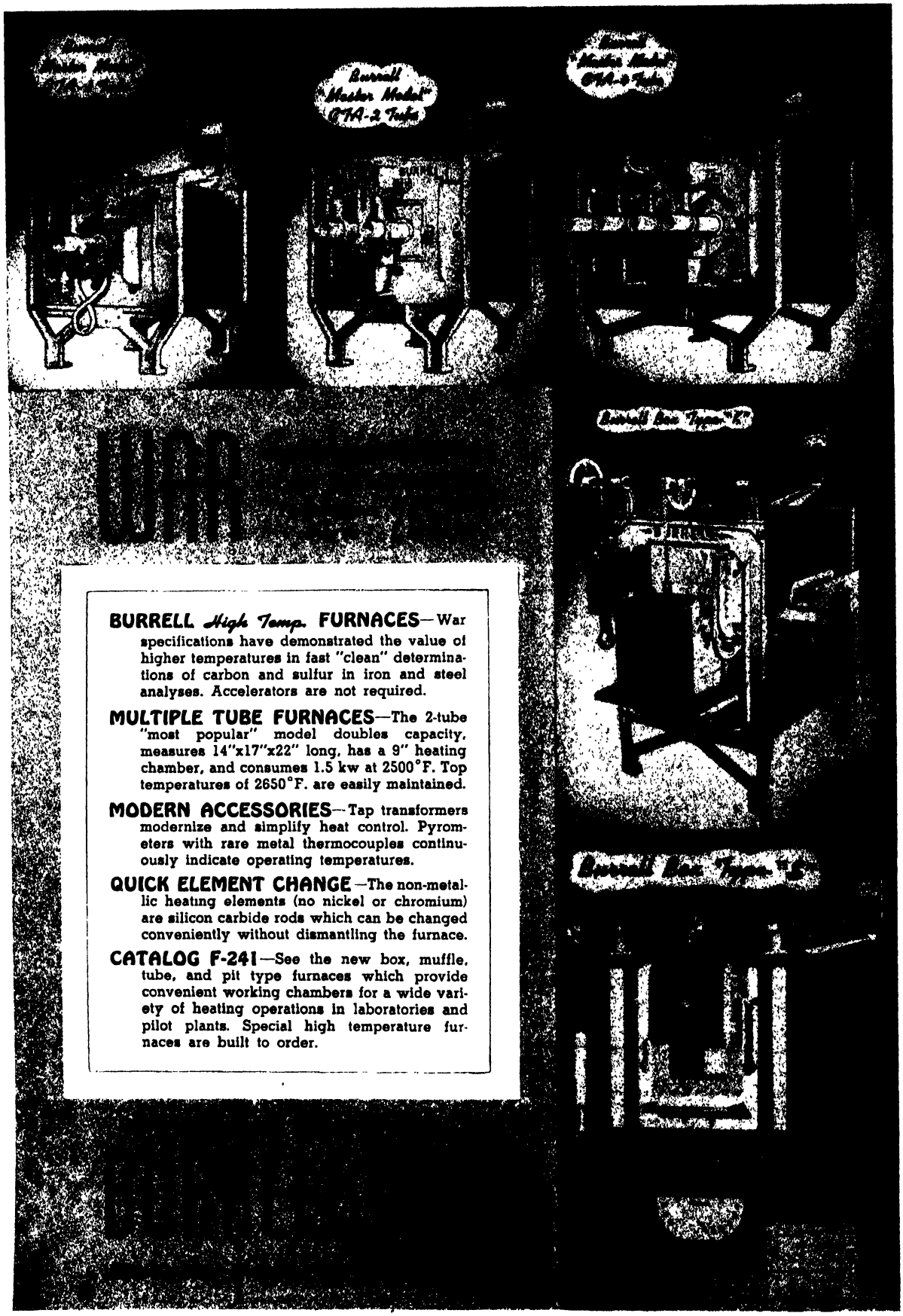
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BURRELL *High Temp.* FURNACES—War specifications have demonstrated the value of higher temperatures in fast "clean" determinations of carbon and sulfur in iron and steel analyses. Accelerators are not required.

MULTIPLE TUBE FURNACES—The 2-tube "most popular" model doubles capacity, measures 14"x17"x22" long, has a 9" heating chamber, and consumes 1.5 kw at 2500°F. Top temperatures of 2650°F. are easily maintained.

MODERN ACCESSORIES—Tap transformers modernize and simplify heat control. Pyrometers with rare metal thermocouples continuously indicate operating temperatures.

QUICK ELEMENT CHANGE—The non-metallic heating elements (no nickel or chromium) are silicon carbide rods which can be changed conveniently without dismantling the furnace.

CATALOG F-241—See the new box, muffle, tube, and pit type furnaces which provide convenient working chambers for a wide variety of heating operations in laboratories and pilot plants. Special high temperature furnaces are built to order.

CHEMICAL MARKET PRICES

October 2, 1942

Compiled from weekly current price listings in the *Oil, Paint, and Drug Reporter*, with permission of the publisher under its copyright. These prices, unless otherwise specified, are those prevailing in the New York market for technical grades in usual large commercial quantities.

Acetaldehyde, drums, c/l., wks.	lb.	.11
Acetamide, tech., kegs, 500-lb. lots, works	lb.	.30
Acetanilide, tech., powd., bbls.	lb.	.27
Acetic anhydride, drums, c/l., frt. allowed	lb.	.11½
Acetone, C. P., drums, c/l., dlvd.	lb.	.08½
Acetophenetidin, bbls., 1000 lbs.	lb.	1.00
Acetophenone, drums, 100 lbs.	lb.	1.55
Acid, abietic, drums, c/l.	lb.	.08¾
Acetic, 28%, bbls., c/l.	100 lbs.	3.38
56%, bbls., c/l.	100 lbs.	5.58
Glacial, synth., drums, c/l.	100 lbs.	9.15
Glacial, U. S. P., drums, works	100 lbs.	10.95
Acetylsalicylic, U. S. P., bbls.	lb.	.40
Anthranilic, tech., bbls.	lb.	.95
Battery, cbys., c/l., E. wks.	100 lbs.	1.60
Benzoic, tech., bbls.	lb.	.43
Boric, tech., gran., bags	ton	99.00
Butyric (99%), drums, c/l., wks.	lb.	.22
Chloroacetic, mono-, tech., bbls. wks.	lb.	.17
Chlorosulfonic, drums, c/l., wks.	lb.	.03
Chromic, 99%, drums	lb.	.16¼
Cinnamic, bottles	lb.	3.50*
Citric, cryst., bbls., c/l.	lb.	.20
Cresylic, H. B., 210–215°, drums, c/l., wks., frt. equal	gal.	.81
Formic, 90%, cbys., f. o. b. works, c/l.	lb.	.10½
Gallic, tech., bbls.	lb.	1.10
Hydriodic, 57%, 5-lb. bot.	lb.	2.90
Hydrobromic, 34%, cbys.	lb.	.35
Hydrochloric, 20°, tank, wks.	100 lbs.	1.75
Hydrofluoric, 30%, bbls., wks.	lb.	.06
60%, lead cbys.	lb.	.14
Hydrofluosilicic, 30%, bbls., wks.	lb.	.09
Hypophosphorus, U. S. P., 30%, 5-gal. demis.	lb	.75
Lactic, dark, 22%, bbls.	100 lbs.	2.90
Light, 22%, bbls., wks.	100 lbs.	3.90
Maleic, powd., drums	lb.	.30
Mixed, tanks, wks.	N unit, lb.	.05
	S unit, lb.	.0085
Naphthenic, 220–230, drums	lb.	.13
Nitric, C. P., cbys.	lb.	.13
36°, cbys., c/l., wks.	100 lbs.	5.00
Oxalic, bbls., wks.	lb.	.11¼
Phosphoric, U. S. P., 50%	lb.	.10½
Picramic, kegs	lb.	.65
Picric, bbls.	lb.	.35
Pyrogallic, tech., bbls.	lb.	1.45
Salicylic, tech., bbls.	lb.	.33
Stearic, distilled, d. p., bags, dlvd.	lb.	.14
Sulfanilic, tech., 250-lb. bbls.	lb.	.17
Sulfuric, 66°, cbys., c/l., E. wks.	100 lbs.	1.50
66°, tanks, E. wks.	ton	16.50
60°, tanks, E. wks.	ton	13.00
Oleum, 20%, tanks, E. wks.	ton	19.50
Tannic, tech., bbls.	lb.	.71
Tartaric, U. S. P., cryst., bbls.	lb.	.70½
Tungstic, pure, 100-lb. pkg.	lb.	2.86
Alcohol, ethyl, 190 proof, from molasses, drums, c/l.	gal.	8.19
Amyl, from pentane, tanks	lb.	.131
Butyl, normal, tanks, frt. allowed	lb.	.12½
Cinnamic, bottles	lb.	3.00
Denatured, C. D. 14, drums, c/l., wks., E.	gal.	.65
Diacetone, tech., drums, c/l.	lb.	.11
Furfuryl, tech., drums, c/l., wks.	lb.	.20
Isobutyl, ref., drums, works	lb.	.0860
Alcohol, isopropyl, ref., 91%, drums, c/l., f. o. b. dest	gal.	.40½
Wood, *see* Methanol		
Aldol, 95%, drums, c/l., wks.	lb.	.12
Alpha-naphthol, bbls.	lb.	.52
Alpha-naphthylamine, bbls.	lb.	.32
Alum, ammonia, lump, bbls., wks.	100 lbs.	4.25
Chrome, bbls.	lb.	.12½
Potash, lump, bbls., wks.	100 lbs.	4.50
Soda, bbls., wks.	100 lbs.	3.25
Aluminum, metal, 98–99%, drums, c/l.	lb.	.15
Chloride, anhyd., commercial, drums extra, c/l., wks.	lb.	.08
Stearate, bbls., c/l.	lb.	.23
Sulfate, comm'l, bags, c/l., wks., frt. equal	100 lbs.	1.15
Iron-free, bags, wks.	100 lbs.	1.75
Ammonia, anhydrous, fertiliser, f. o. b. wks., frt. equalized	ton	90.00
Pure, cyls.	lb.	.16
Ammonia, aqua, 26°, tanks (on NH_3 content), f. o. b. wks.	lb.	.04
Ammonium bicarbonate, drums	lb.	.0564
Bifluoride, bbls.	lb.	.16
Bromide, bbls.	lb.	.31
Carbonate, tech., bbls.	lb.	.08¼
Chloride, gray, bbls.	100 lbs.	5.50
U. S. P., gran., bbls.	lb.	.10
Iodide, 25-lb. jars	lb.	3.65
Linoleate, 80%, anhyd., bbls.	lb.	.12
Nitrate, tech., bags, c/l., wks.	100 lbs.	4.35
Oleate, bbls.	lb.	.14
Oxalate, kegs	lb.	.23
Persulfate, cases	lb.	.25½
Phosphate, dibasic, tech., bbls.	lb.	.07¼
Sulfate, bulk, c/l., f. o. b. cars, ports contract	ton	29.20
Sulfide, liq. 40–45%, basis 100%, tanks, dlvd.	lb.	.07½
Amyl acetate, from pentane, tanks, frt. allowed	lb.	.14½
Chloride, mixed, tanks, wks.	lb.	.06
Mercaptan, drums, l. c. l., wks.	lb.	1.10
Oleate, drums, l. c. l., wks.	lb.	.31
Stearate, drums, l. c. l., wks.	lb.	.32½
Amylene, tanks, wks.	lb.	.09
Anilin oil, drums	lb.	.15
Anthraquinone, subl., bbls.	lb.	.70
Antimony, chloride, soln., cbys.	lb.	.17
Needle, Bolivian, 67%	lb.	.18½
Oxide, bags, c/l.	lb.	.15
Salts, 65%, bbls.	lb.	.40
Argols, test 75–80%, basis 100%, f. o. b. Spanish ports	100 kilos	105.00
Arsenic, metal, kegs	lb.	No prices
White, c/l., kegs	lb.	.04
Arsenous chloride, cans	lb.	4.85
Barium carbonate, natural, 99%— 200 mesh, bags, c/l., wks.	ton	43.00
Chloride, tech., cryst., bgs., c/l.	ton	77.00
Dioxide, drums, wks.	lb.	.10
Hydroxide, bbls., wks.	lb.	.06
Nitrate, casks	lb.	.11
Barytes, floated, 350-lb. bbls., wks.	ton	27.65
Benzaldehyde, tech., drums	lb.	.45
Benzidine base, bbls.	lb.	.70
Benzol, tanks, frt. allowed E. of Omaha	gal.	.15
Benzoyl chloride, carboys	lb.	.23
Benzyl acetate, F. F. C., drums	lb.	.59*
Beta-naphthol, tech., bbls.	lb.	.23
Beta-naphthylamine, tech., kegs	lb.	.51
Bismuth, metal, ton lots	lb.	1.25
Bismuth nitrate, cans	lb.	1.30
Oxychloride, kegs	lb.	3.10
Subnitrate, powd., barrels	lb.	1.20
Blanc fixe, dry, bags, c/l.	ton	60.00
Bleaching powder, drums, wks.	100 lbs.	2.25
Bone black, 4, bbls., c/l., frt. allowed E.	lb.	.11
Borax, tech., gran., bulk, c/l., frt. allowed	ton	41.50
Bordeaux mixture, drums	lb.	.11
Bromine, cases	lb.	.25
Bromoform, cbys.	lb.	1.42
Butyl acetate, drums, c/l., frt. allowed	lb.	.14½
Aldehyde, drums, l. c. l.	lb.	.16½
Lactate, drums	lb.	.26½
Stearate, drums	lb.	.31
Cadmium, metal, ingots, cases	lb.	.90
Bromide, 25-lb. jars	lb.	1.65
Sulfide, boxes	lb.	1.10*
Caffeine, 100-lb. drums, 10,000 lbs. or more	lb.	2.60
Calcium acetate, bags	100 lbs.	3.00
Arsenate, bgs., c/l.	lb.	.07
Carbonate, precip., bags, 50 lbs., c/l., wks.	lb.	.02½
Chloride, bags, flake, c/l., dlvd.	ton	18.50
Gluconate, U. S. P., bbls., 150 lbs.	lb.	.52
Phosphate, dibasic, 38–40% P_2O_5, bags, Atlan. pts.	unit-ton	No prices
Tribas, bbls.	lb.	.0635
Calomel, bbls., kegs, 50 lbs. or more	lb.	2.95
Camphor, synthetic, gran., powd., drums, ton lots	lb.	.42
Carbasole, 95%, drums, ton lots, wks.	lb.	.70
arbon bisulfide, drums, c/l.	lb.	.05
Black, reg., uncomp., bgs., c/l., works	lb.	.03625
Dioxide, liq., cyl.	lb.	.06
Tetrachloride, drums, c/l., frt. allowed	gal.	.73
Casein, dom., 20–30 mesh, bags, c/l.	lb.	.19½
Cerium oxalate, bbls., wks.	lb.	.35
Charcoal, willow, powd., bbls.	lb.	.06
China clay, bulk, c/l., wks.	ton	7.60
Chloral hydrate, drums	lb.	.90
Chlorine, liq., c/l., cyl., dlvd.	lb.	.05¼
Tanks, wks., frt. equal	100 lbs.	1.75
Chlorobenzene, mono-, drums	lb.	.07
Chloroform, tech., drums	lb.	.20
Chromium acetate, 24%, powd., bbls.	lb.	.22
Coal tar, crude, bbls., c/l., wks.	bbl.	8.25
Cobalt oxide, black, kegs	lb.	1.84
Copper carbonate, 52–54%, bbls.	lb.	.18
Chloride, bbls.	lb.	.23¼
Cyanide tech., bbls.	lb.	.34
Metal, elec.	lb.	.12
Oxide, black, bbls., tons, wks.	lb.	.19½
Sulfate, bbls., c/l., wks.	100 lbs.	5.15
Copperas, cryst., bulk, c/l., wks.	ton	14.00
Cream of tartar, bbls.	lb.	.57½
Cresol, U. S. P., drums, c/l., wks.	lb.	.10¼
Crotonaldehyde, 97%, c/l., wks.	lb.	.15
Cyanamide, 21% N, pulvd., works, contracts	unit-ton	1.52½*
Diamylamine, drums, c/l., wks.	lb.	.61
Diamylene, tanks, wks.	lb.	.09½
Diamyl phthalate, tanks	lb.	.21
Diatomaceous earth, dom., bags, c/l., Pacific Cst.	ton	22.00

Dibutylamine, drums, l. c. l., wks.	lb.	.64
Dibutylphthalate, drums, c/l., dlvd.	lb.	.21
Tartrate, drums	lb.	.92
Dichloroethyl ether, drums, c/l., wks.	lb.	.15
Diethanolamine, drums, c/l., wks.	lb.	.23½
Diethylaniline, drums	lb.	.40
Diethyleneglycol, drums, c/l., wks.	lb.	.14
Monobutyl ether, drums, wks.	lb.	.22½
Monoethyl ether, drums, c/l., wks.	lb.	.14½
Diethyl phthalate, drums, c/l.	lb.	.22
Sulfate, tech., drums, wks.	lb.	.15
Diglycol oleate, light, bbls.	lb.	.17
Dimethylaniline, drums	lb.	.23
Dimethyl phthalate, drums, c/l., dlvd.	lb.	.20
Dinitrobenzene, tech., drums	lb.	.18
Dinitrochlorobenzene, bbls.	lb.	.14
Dinitronaphthalene, bbls.	lb.	.35
Dinitrophenol, bbls.	lb.	.22
Diphenyl, bbls., c/l., wks.	lb.	.15
Diphenylamine, bbls.	lb.	.25
Diphenylguanidine, bbls.	lb.	.35
Epsom salt, tech., bags	100 lbs.	1.80
Ether, concn., drums	lb.	.11
Nitrous, bots., 100 lbs.	lb.	.93
Ethyl acetate, 85–90%, tanks, frt. allowed	lb.	.11
Acetoacetate, drums, c/l., wks.	lb.	.37½
Bromide, drums	lb.	.50
Chloride, drums	lb.	.18
Formate, drums	lb.	.27¼
Methyl ketone, drums	lb.	.09
Ethylene dichloride, drums, c/l., wks., frt. allowed	lb.	.0742
Glycol, drums, c/l.	lb.	.14½
Monobutyl ether, drums, wks.	lb.	.16½
Monoethyl ether, drums, wks.	lb.	.14½
Monoethyl ether acetate, drums, wks.	lb.	.11½
Monomethyl ether, drums, wks.	lb.	.15½
Feldspar, 20 mesh, bulk, wks.	ton	9.75
Film scrap colors, dk., cs., 1000 lbs., E. wks.	lb.	.13½
Fluorspar, 95%, bags, f. o. b. mines	ton	34.00
Formaldehyde, bbls., c/l.	lb.	.05½
Fuller's earth, bags, c/l., mines	ton	8.50
Furfural, tech., drums, contract, works	lb.	.10
Glauber's salt, bbls., c/l.	100 lbs.	1.05
Glycol phthalate, drums	lb.	.38
Stearate, drums	lb.	.26
Hexamethylenetetramine tech., drums	lb.	.32
Hydrogen peroxide, 100 vol., cbys., c/l.	lb.	.16
Hydroquinone, kegs	lb.	.90
Indigo, synth., liq., bbls.	lb.	.16½
Iodine, resubl., jars	lb.	2.00
Iodoform, drums, 100 lbs.	lb.	3.95
Iron acetate, N. F. IV, cbys.	lb.	.15
Iron chloride, tech., cryst., bbls., wks., frt. allowed	lb.	.05
Isopropyl acetate, tanks, frt. allowed	lb.	.10
Lead acetate, white, broken	lb.	.12½
Arsenate, bbls.	lb.	.11
Metal, N. Y.	1 lb.	.0650
Oxide, litharge, bbls., 20-ton lots.	lb.	.0790
Peroxide, powd., tech.	lb.	.23
Red, bbls., 20-ton lots	lb.	.09
Sulfate, bbls.	lb.	.0725
White, basic carb., bbls.	lb.	.0825
Lecithin, edible, drums, c/l.	lb.	.34
Tech., dms., c/l.	lb.	.28
Lime, live, chemical, bulk, wks.	ton	7.00
Lime-sulfur, dry, bags, c/l.	lb.	No prices
Lithopone, ordinary, bbls.	lb	.04½
Magnesite, calcined, dom., bags	ton	84.00
Magnesium carbonate, tech, bags, c/l.	lb.	.06¼
Chloride, drums	ton	32.00
Fluosilicate, cryst., bbls.	lb.	.18
Oxide, light, bbls.	lb.	.26
Manganese chloride, bbls.	lb.	.14*
Dioxide, 85–90%, bbls., c/l., wks.	ton	74.00
Sulfate, anhyd., bbls., wks.	lb.	.11¼
Mannitol, commercial, bbls., wks.	lb.	.35
Menthol, nat., cans	lb.	13.00
Mercury bichloride, cryst., drums, 50 lbs. or more	lb.	2.39
Mercury, flasks, 76 lbs., mines	flask	191.00
Meta-phenylenediamine, kegs	lb.	.65
Meta-toluylenediamine, kegs	lb.	.70
Methanol, synthetic, drums, frt. allowed, c/l.	gal.	.34½
Tanks, frt. allowed	gal.	.28
Methyl acetate, 97–99%, tanks	gal.	.09½
Chloride, cylinders	lb.	.32
Formate, l. c. l., drums	lb.	.89
Hexylketone, drums, tech., wks.	lb.	.60
Salicylate, drums	lb.	.35
Monoamylamine, drums, c/l., wks.	lb.	.61
Monobutylamine, drums, l. c. l., wks.	lb.	.51
Monoethanolamine, drums, wks.	lb.	.24
Naphthalene, crude, dom., 74 deg., bags, c/l., wks.	100 lbs.	2.75
Nickel salt, single, bbls.	lb.	.13
Niter cake, bulk	ton	16.00
Nitrobenzene, drums	lb.	.08
Nitrocellulose, alcohol-sol., bbls., wks.	lb.	.28
Nitromethane, drums, l. c. l., wks.	lb.	.25
Octanol, normal, drums	lb.	.85
Oil, castor, No. 3, tanks	lb.	.12¾
China wood, dms.	lb.	.39
Coconut, crude, tanks	lb.	.0835
Cod, Newf., bbls.	gal.	.90
Corn, crude, tanks, mills	lb.	.12¼*
Cottonseed, cooking, bbls.	lb.	.16¾
Linseed, raw, tanks	lb.	.1260
Menhaden, crude, tanks, f. o. b. Baltimore	gal.	.0880
Neat's-foot, pure, bbls.	lb.	.19¼
Oiticica, bbls.	lb.	.25
Oleo, No. 1, bbls.	lb.	.13¼
Olive oil, denat., bbls.	gal.	3.50
Edible, Calif., drums	gal.	4.00
Palm, Niger, bbls.	lb.	.0825
Peanut, crude, tanks	lb.	.13
Perilla, drums	lb.	.2450
Rapeseed, denatured, c. i. f.	gal.	.1150
Red, bbls.	lb.	.11¾
Soy bean, crude, tanks	lb.	.12¼*
Sperm, 38°, bbls.	lb.	.1301
Whale, bbls., natural, refined	lb.	.1070*
Ortho-dichlorobenzene, drums	lb.	.06
Ortho-nitrochlorobenzene, kegs	lb.	.15
Ortho-nitrotoluene, drums	lb.	.09
Ortho-toluidine, bbls.	lb.	.19
Para dichlorobenzene, drums, c/l.	lb.	.11
Para-formaldehyde, drums	lb.	.23
Paraldehyde, tech., drums	lb.	.12
Para-nitraniline, drums	lb.	.45
Para-nitrochlorobenzene, drums	lb.	.15
Para-nitrotoluene, bbls.	lb.	.30
Para-phenylenediamine, bbls.	lb.	1.25
Para-toluidine, bbls.	lb.	.48
Paris Green, 250-lb. kegs	lb.	.24
Perchlorethylene, drums, c/l, wks.	lb.	.09
Phenol, drums, c/l., wks.	lb.	.12½
Phenolphthalein, yellow, drums, ton lots	lb.	.80
Phenylethyl alcohol, bottles	lb.	2.10
Phloroglucinol, tech., tins, wks.	lb.	15.00
c. p., tins, wks.	lb.	20.00
Phosphorus, red, cases	lb.	.40
Oxychloride, 175-lb. cylinders	lb.	.15
Trichloride, cyl.	lb.	.15
Phthalic anhydride, bbls., c/l.	lb.	.14½
Platinum, metal, solid	os.	36.00
Potash, caustic, solid, drums	lb.	.06¼
Potassium acetate, tech., bbls.	lb.	.28
Bicarbonate, gran., bbls.	lb.	.19
Bichromate, casks, c/l., wks.	lb.	.09½
Bromide, U. S. P., gran., bbls.	lb.	.27
Carbonate, 80–85%, calc., casks.	lb.	.06½
Chlorate, cryst., kegs	lb.	.11*
Chloride, tech., cryst., bgs.	lb.	.08*
Cyanide, drums	lb.	.55
Meta-bisulfite, bbls.	lb.	.18
Muriate, fert., bulk	K_2O unit	.53½
Permanganate, tech., drums	lb.	.19¾
Prussiate, red, bbls.	lb.	.70
Yellow, casks	lb.	.17
Pyridine, denat., drums	gal.	1.71
Pyrocatechin, c. p., drums	lb.	2.15
Quinine, 100-os. cans	os.	.97½
Resorcinol, tech., kegs	lb.	.68
Rochelle salt, powd., bbls.	lb.	.43½
Saccharin, drums	lb.	1.45
Salt cake, bulk, wks.	ton	15.00
Saltpeter, gran., bbls.	100 lbs.	8.20
Silica, amorph., 96%, 325 mesh, bags, c/l., wks.	ton	17.00
Silver nitrate, vials	os.	.26½
Soda, ash, 58%, light, paper bags, contract, wks.	100 lbs.	1.05
Caustic, 76%, solid, drums, contract, wks.	100 lbs.	2.30
Sodium acetate, flake, 60%, bbls.	lb.	.05
Alginate, drums	lb.	.79
Antimoniate, bbls.	lb.	.15
Benzoate, U. S. P., bbls.	lb.	.46
Bicarbonate, U. S. P., powd., bbls., c/l., wks.	100 lbs.	1.85
Bichromate, c/l., wks.	lb.	.07½
Bisulfite, bbls.	100 lbs.	3.00
Bromide, U. S. P., bbls.	lb.	.27
Chlorate, cryst., bags	lb.	.06¼
Chloride, bags	ton	15.70
Cyanide, 96–98%, dom., drums	lb.	.14
Fluoride, white, 90%, bbls., c/l., frt. alld.	lb.	.08
Metallic, untrimmed bricks, drums, f. o. b. Niagara Falls	lb.	.15½
Metasilicate, gran., bbls.	100 lbs.	2.50
Naphthionate, bbls.	lb.	.50
Nitrate, crude, bulk, works	ton	27.00
Nitrite, bbls.	lb.	.06¾
Perborate, bbls.	lb.	.14¼
Phosphate, disodium, cryst., bags, c/l., wks.	100 lbs.	2.55
Phosphate, trisodium, bags, c/l., wks.	100 lbs.	2.70
Picramate, kegs	lb.	.65
Prussiate, yellow, bbls.	lb.	.11
Silicate, drums, c/l., 40°	100 lbs.	.80
Silicofluoride, dom., bbls.	lb.	.09
Stannate, drums	lb.	.33½
Sulfate, anhyd., bags	100 lbs.	1.70
Sulfide, cryst., bbls.	100 lbs.	2.40
Solid, 60%	100 lbs.	3.15
Sulfocyanide, c. p., bbls.	lb.	.55
Thiosulfate, reg., cryst., bgs.	100 lbs.	2.25
Tungstate, tech., kegs	lb.	No prices
Strontium carbonate, tech., bbls.	lb.	.25*
Nitrate, bbls.	lb.	.07¼
Sulfur, bulk, mines	ton	16.00
Chloride, drums	lb.	.03
Dioxide, commercial, cyl., wks.	lb.	.07
Tetrachloroethane, 50-gal. drums	lb.	.08
Thiocarbanilid, bbls.	lb.	.24
Tin, Straits	lb.	.52
Crystals, bbls.	lb.	.39
Oxide, bbls.	lb.	.55
Tetrachloride, anhydrous, drums, bbls.	lb.	No price
Titanium dioxide, bags	lb.	.14¾
Toluene, tanks	gal.	.28
Triamylamine, drums, c/l., wks.	lb.	.98
Triamylborate, drums, l. c. l., wks.	lb.	.33
Tributylamine, drums, c/l., wks.	lb.	.78
Trichloroethylene, drums, wks, frt. allowed	lb.	.08
Tricresyl phosphate, tech., drums	lb.	.25
Triethanolamine, drums, c/l., wks.	lb.	.19
Triphenyl phosphate, barrels	lb.	.31
Tungsten, tech., powder	lb.	2.60
Urea, dom., 46 + % N., bags, f. o. b. wks. or seaboard	ton	80.00
Vanillin, 25-lb. tins	lb.	2.35
Whiting, comm., dry-grd., bags, c/l., wks.	ton	18.00
Xylene, 10°, tanks	gal.	.30
Xylidine, drums	lb.	.35
Zinc ammonium chloride, bbls.	lb.	.0565
Chloride, tech., fused, drums	lb.	.05
Dust, bbls., c/l.	lb.	.1035
Metal slabs, at N. Y.	lb.	.0865
Oxide, Amer., bags	lb.	.0725
Stearate, tech., bbls.	lb.	.30
Sulfate, cryst., bgs., c/l., wks.	100 lbs.	3.60

* Nominal.

EMPLOYMENT INFORMATION

RATES to be paid in advance. Standard setting 5c a word, minimum charge $2.00 each; include 8 words for box address. Exceptions see ⟶ Display, $10.00 per column inch. 2 inches maximum, larger units at regular display unit rates. No discounts or allowances.
SEND advertisements with remittance to INDUSTRIAL AND ENGINEERING CHEMISTRY, 332 West 42nd St., New York, N. Y., to reach there not later than 10:00 A.M. on the 5th and 20th, closing dates for editions of CHEMICAL and ENGINEERING NEWS of the 25th and 10th, respectively. Insertions made in order of receipt provided necessary remittances are complete. EMPLOYERS are requested to mention in their announcements the section of the country in which the open position is located to ensure replies only from those who are geographically available.
In printing these advertisements the SOCIETY assumes no obligations as to qualifications of prospective employees or responsibility of employers.

UNEMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking employment for themselves are allowed in one calendar year 3 announcements free (one per issue) set in standard style and limited to 50 words each, including 8-word box address, and 3 additional standard announcements at 50% of regular rate. Further announcements and excess words at full rate.

EMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking new positions are permitted 3 standard announcements during the calendar year at 50% of the regular rate—include 8 words for box address.

EMPLOYERS seeking chemists and chemical engineers are permitted 3 standard announcements, not to exceed 50 words each including box address and not more than one per issue, during the calendar year without charge, provided they agree in writing to acknowledge all replies (excess words 5c each), otherwise full rate applies.

The AMERICAN CHEMICAL SOCIETY is vitally interested in the welfare of its members and in seeing that the chemical industry is manned with competent chemists and chemical engineers. These pages are part of our service in that connection. In addition most of the larger sections of the AMERICAN CHEMICAL SOCIETY and several of the smaller ones have active employment committees. Local section secretaries in your area will inform you as to any employment aids that may be available locally.

An Employment Clearinghouse is operated at each national meeting of the SOCIETY for the purpose of bringing together representatives of industry looking for chemists and members and student affiliates in attendance wishing to make such contracts. For further details, consult the preliminary and final programs as printed in the NEWS EDITION prior to each meeting.

In the New York area, special employment facilities are offered by the Employment Bureau of the Chemist's Club, 52 East 41st St., New York, N. Y. In the Chicago area, the Chicago Section maintains an employment service at 505 N. Michigan Avenue, Chicago, Ill.

Those replying to announcements should be careful to send copies and not original documents. Advertising circulars will not be forwarded and to that end all letters will be opened at the forwarding office.

SITUATIONS OPEN

Those announcements in which the letter "P" is part of the address key have paid in full and are not committed to acknowledge replies. The Society regards acknowledgment by employers of all applications as an act of common courtesy but can assume no responsibility for their failure to do so.

EXECUTIVES, CHEMICAL ENGINEERS AND CHEMISTS with exceptional backgrounds of experience should use our confidential and individual method of contacting responsible employers. No limit to territory. We negotiate all overtures. Established 1915. The National Business Bourse, 20 W. Jackson Blvd., Chicago, Ill.

FOOD TECHNOLOGIST. Applications will be welcomed from men with outstanding records to serve as junior chemists in eastern research laboratories, engaged in essential work. Prospects for advancement excellent for men of right qualifications. Please submit record of training and experience, personal history and recent small photo.
Box 76-TP-7, Ind. & Eng. Chem., Easton, Pa.

CHEMIST with some petroleum experience. Needed in Chicago area for development of petroleum products and rust preventives. State age, draft status, degree, and salary desired in opening letter.
Box 79-TP-8, Ind. & Eng. Chem., Easton, Pa.

WANTED—GRADUATE chemist, research experience with drying and semi-drying oils Extensive knowledge of analytical oil determinations required.
Box 17-NP-9, Ind. & Eng. Chem., Easton, Pa.

CHEMIST WANTED: preferably in the field of metallic soaps, though a broad knowledge of organic may be substituted. Should be capable of research and development. Permanent position, aggressive concern, Ohio location. In reply state salary desired, draft status and education in detail.
Box 20-N-9, Ind. & Eng. Chem., Easton, Pa.

MIDWESTERN CHEMICAL company has excellent opportunity for woman chemist to serve as technical secretary and librarian. Give full information and salary expected in first letter.
Box 40-TP-9, Ind. & Eng. Chem., Easton, Pa.

PHARMACEUTICAL CHEMIST in established, well equipped midwest laboratory. Must be able to direct development of profitable ethical medicinals to point of commercial manufacture. Would help if he has contacts in institutions to ease clinical trials. An excellent permanent place for man who fits. Write completely of technical education, field of experience and draft status.
Box 55-TP-9, Ind. & Eng. Chem., Easton, Pa.

METALLURGIST—experienced in research and development of magnesium alloys, capable of conducting independent research and having some experience in production methods of light alloys. Give details of education, experience, publications, references. State age, salary desired. Send small photograph (not returnable).
Box 64-TP-9, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER with experience in chemical plant design, mechanical engineering, product design, and with a thorough knowledge of rubber and plastic technology, to work for plant in Middle West. Must be draft exempt and not employed at your highest skill in any other war plant.
Box 81-TP-9, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER or CHEMIST. Recent graduate with some experience, as assistant in research and development along electrochemical and metallurgical lines. Should be capable analyst and handy with tools. Location New England. Give full details, scholastic record, experience, salary desired and recent photograph.
Box 15 N-10, Ind. & Eng. Chem., Easton, Pa.

WANTED IMMEDIATELY
MECHANICAL OR CHEMICAL

Engineer familiar with the coppersmithing industry in all its branches by west coast corporation. Applicant must be capable of handling men, familiar with tools, dies, patents, shipbuilding pipe design, distillation, drafting, heat exchange, etc. State age, salary open.

Box 20-NP-10, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST wanted: For research on dyestuffs and intermediates. State experience in detail, education, marital status, age, and enclose photo. Location New Jersey.
Box 21-N-10, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST

or chemical engineer for industrial development work in cellulose plastic field with large corporation in upper New York state. Recent graduate preferred. Give training, experience, references and personal data.

Box 24-NP-10, Ind. & Eng. Chem., Easton, Pa.

RESEARCH FELLOWSHIPS in physical chemistry. Eighteen hours' course work can be taken per year towards Ph.D. Women or men with M.S. degree preferred. Submit applications to Thos. De Vries, Department of Chemistry, Purdue University, Lafayette, Ind.

POSITION AVAILABLE in Patent Department of Shell Development Company in San Francisco. This company is the research company for Shell Oil Company, Incorporated, and has a large laboratory nearby for research on petroleum and derivatives for chemical industry. Wanted a chemical specification writer, preferably with sufficient experience for independent work. Law training not needed, knowledge of German and French highly desirable. If interested please write for application form.
Box 28-NP-10, Ind. & Eng. Chem., Easton, Pa.

STARCH CHEMIST for research. Ph.D. or equivalent in practical experience, with background in chemistry and/or technology of starch. Location, Midwest. Give details of training, experience, salary requirements, and draft status.
Box 30-N-10, Ind. & Eng. Chem., Easton, Pa.

EXPERIENCED MAN wanted: An old established firm in the Middle West wishes to employ a man who is thoroughly experienced in the design installation, and afterwards the operation of a plant for the manufacture of synthetic resins. If you are interested please reply to
Box 31-N-10, Ind. & Eng. Chem., Easton, Pa.

WANTED: CHEMICAL Engineer; 1 or 2 years' experience, preferably in pilot plant scale work on the processing of organic chemicals or petroleum products; for research and development work in large kraft pulp mill by-products plant. Location South-East.
Box 32-N-10, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST with 3 or preferably 4 years' chemical training for paint & varnish development laboratory, no experience necessary. Apply L. K. Scott, Devoe & Raynolds Co., Inc., 1481 So. 11th St., Louisville, Ky.

WOMAN CHEMIST. Recent graduate for part time clinical laboratory work and part time graduate study in biochemistry. Stipend and remission of fees. Give complete training, personal data, photograph and date when available.
Box 41-N-10, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ASSISTANT (girl) for research in University located in New York City, college degree and some experience in an organic chemistry laboratory are essential. Experience in handling of small animals is also desirable. Write fully in application, state salary acceptable.
Box 49-NP-10, Ind. & Eng. Chem., Easton, Pa.

CHEMIST ABLE to conduct research work with minimum supervision wanted primarily for development of synthetic drying oils. Man with draft deferment because of physical impairment preferred. Send inexpensive photograph and give complete personal, professional and academic data in first letter. All letters acknowledged. Address P.O. Box 377, Dayton, Ohio.

EXPERIENCED CHEMICAL engineer. Excellent opportunity for man of outstanding qualifications in research laboratories located in the East, occupied with essential activities. Please submit college record, experience, accomplishments, and small photo.
Box 55-NP-10, Ind. & Eng. Chem., Easton, Pa.

CHEMIST WITH sales experience preferred for well-established organization, to contact various industries in Midwest States. Excellent opportunity. State in detail past record and experience, age, salary, references, etc.
Box 57-NP-10, Ind. & Eng. Chem., Easton, Pa.

CHEMISTS WITH Bachelor or Master degrees for positions in laboratories of Analytical Chemistry, Biochemistry, Organic Chemistry and Physical Chemistry in eastern organization engaged in essential activities. Opportunities for qualified men. Submit details concerning training, experience, personal history, and small photo.

Box 56-NP-10, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST, superior type, for eastern research laboratories prominent manufacturer building materials. Must be capable making wide variety of analytical investigations and expert on analysis of silicates. Permanent position, interesting work and opportunity to advance. Reply, giving full details, attaching recent photograph.
Box 58-N-10, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST for research on vitamins in grain products. Preference given to married man with doctor's degree. Please submit information on training and experience, draft status and salary desired, with small photo. Location in Ohio.
Box 59-N-10, Ind. & Eng. Chem., Easton, Pa.

AN ANALYTICAL woman chemist desired by medium sized firm located in vicinity of Newark, New Jersey. Supply details concerning training, experience and personal data.
Box 60-N-10, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 1286)

Address communications to the box number indicated and Mail to Easton, Penna.
The American Chemical Society has no information concerning the position advertised, or in regard to those seeking employment.

(Situations Open Continued)

WANTED: ANALYTICAL chemist experienced in general metallurgical analysis, and able to supervise the operation of spectrograph, for new defense metallurgical plant on West Coast. Married man preferred but applications from women will be considered.
Box 61-N-10, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, hospital, expert in use of clinico-chemical methods, with some administrative ability. Permanent position. Opportunity for research. Salary $2200 with maintenance. Graduate degree or equivalent experience required. Submit reprints, references, photograph, list of relevant courses and grades to John G. Reinhold, Biochemical Laboratory, Philadelphia General Hospital.

ANALYTICAL CHEMIST, with Bachelor or Master degree, as drug analyst, in south central State Food and Drug Laboratory. Training and experience in drug control and sanitary chemistry essential. Give age, draft status, education, experience, salary desired, and when available.
Box 65-N-10, Ind. & Eng. Chem., Easton, Pa.

RESEARCH FELLOWSHIP in organic analysis available immediately. Work for advanced degree majoring in organic or analytical chemistry. Qualifications: B.S. or M.S. in chemistry. Stipend $770 yearly. Send applications to P. J. Elving, Dept. of Chemistry, Purdue University, Lafayette, Ind.

Excellent opportunity for

TECHNICAL SERVICE MEN

with company manufacturing special adhesive tapes, widely used both by war and peacetime industry. Company is subsidiary of Johnson & Johnson. At present, work will largely involve introduction of and assistance in development of new tapes for applications in essential industries. Applicants should be chemists or engineers with personalities suited to sales service work. In reply, give complete information and attach recent photograph. All correspondence strictly confidential.

INDUSTRIAL TAPE CORPORATION
NEW BRUNSWICK, NEW JERSEY

RESEARCH CHEMISTS. Well qualified research and development men, experienced with rubber, resins, high molecular polymers or adhesives, wanted by rapidly growing eastern company. Permanent positions. Please give complete details in first letter; i.e., education, experience, photograph, salary requirements, etc.
Box 83-N-10, Ind. & Eng. Chem., Easton, Pa

SITUATIONS WANTED
(A.C.S. MEMBERS)

FOOD CHEMIST with over twenty years' wide experience in the Food Industry, in direction, research, process development, quality control, and factory problems. Desires a responsible position.
Box 69-N-8, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. 14 years' experience various fields. Organic, pharmaceutical, cosmetic bio-chemistry. Analysis, Research, Development, Production control. Three languages. Imaginative, inventive, adaptable worker. Married with child. Age 39. Immediately available. Desires position. Location anywhere.
Box 29-N-9, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL CHEMIST, with business and executive experience. University graduate, twenty years' excellent record in research, development, sales and service with State, Federal institution and corporation. Publications, patents, sales literature. Desires active employment. References from all employers. Listed in American Men of Science. Draft 3-B.
Box 59-N-9, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST—Experienced in plant biochemistry and pharmaceutical chemistry. Six years' research isolation, identification, analysis plant compounds. Experience in microanalysis, and organic synthesis. Ph.D. 1935. Major organic; minors, physical chemistry, bacteriology. Fifteen publications. Employed. Desires permanent position with chance for advancement. Age 33, married, two children, 3-A, Protestant.
Box 39-T-9, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, Ph.D., industrial organic chemist, 25 years' industrial and research experience, process developments, production problems, among others rayon, cellulose and derivatives. Patents, publications, new projects, languages, business knowledge. Married, one child. Available on short notice.
Box 31-T-9, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL CHEMIST seeks position of responsibility in chemical production directly concerned with war effort. Location immaterial. Now employed in East. Five years' industrial experience in plant control and operation chiefly in field of distillation. Experienced in handling labor. B.S. degree in organic chemistry from large middle western university. 3-A draft classification. Protestant.
Box 35-T-9, Ind. & Eng. Chem., Easton, Pa.

SPECIAL PRODUCTS research and development chemist. Twelve years' experience in development and production of automotive, aeronautical, and household special products, including lubricating oils and petroleum specialties. Capable of directing development and production of products in these and allied fields. Now employed but would like to relocate, preferably in Dallas area. Age 39.
Box 52-T-9, Ind. & Eng. Chem., Easton, Pa.

ESSENTIAL INDUSTRY employment desired by a physical chemistry major with minors in organic and chemical and metallurgical engineering. Ph.D. course work and research completed but lack languages and preliminary examinations. Single, 30, 2-A. Prefer processing or metallurgy. Employed.
Box 71-T-9, Ind. & Eng. Chem., Easton, Pa.

SYNTHETIC RESIN chemist. Five years' experience in technical research on synthetic coatings and adhesives. Also experienced in photochemistry and textiles. Has shown originality and has obtained practical results. Married, 2 dependents. Age 29. Harvard training. Now employed.
Box 72-T-9, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST—Spectroscopist, M.S. Experienced in inorganic chemical analysis; also in the development of spectrochemical methods. Familiar with physical methods of analysis. Experience in supervising. Training in physical, organic and inorganic chemistry. No routine. Employed, Gentile, married, draft status 3-A.
Box 78-T-9, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.S. 1941. Year's synthetic organic research experience. Thorough chemical training at accredited university including year of organic research and micro-analysis. Desires position as research assistant with view toward future business administration. Age 24. Draft status, 4-F. Available shortly.
Box 80-T-9, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER (B.S.; N.Y. License) with Ph.D. (Physical Chemistry, Chicago) 49, employed. Industrial experience in direction of research and literature studies on fuels, food and explosives. Special experience in photomicrography and report writing. Desires position as Research Director or Assistant Research Director specialising in the development of new products.
Box 16-N-10, Ind. & Eng. Chem., Easton, Pa.

CHEMIST EXECUTIVE

15 years' experience in research, development and production of
ORGANIC FINE CHEMICALS AND FINISHES FOR TEXTILE AND LEATHER
and other fiber materials, full production line in sulf. oils, surface active materials, detergents, starch, protein and resin finishes, synthans, etc.; now employed. Desires new position. Only interested in independent responsible work.
Box 19-N-10, Ind. & Eng. Chem., Easton, Pa.

PHARMACIST-CHEMIST (Ph.D.). Would like to change position. Great experience in deodorization and selective Hydrogenation of fish oils, all control tests, developing of new methods, new pharmaceutical products, emulsions, cosmetics. No draft status, Catholic, first class references. New York or Philadelphia area preferred.
Box 23-N-10, Ind. & Eng. Chem., Easton, Pa.

RESPONSIBLE POSITION wanted by a valuable man now directing development. Age 39. Well experienced in rubber and synthetics, bonding of rubber to metals, chemical bonding of aluminum to itself and other materials, soap chemistry, practical applications of commercial products, etc. Can quickly apply my versatile talents to these, similar, or other fields. Have sound reason for desiring change in position.
Box 25-N-10, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST: M.S. in chemistry 1939, University of Pennsylvania. Organic major, analytical minor. Desires preferably research position with company having war contracts. 3 years' college teaching experience. Available immediately for position in Philadelphia and vicinity. Protestant. Married.
Box 26-N-10, Ind. & Eng. Chem., Easton, Pa.

PHARMACEUTICAL CHEMIST, B.S., Phar.D., Columbia University. Three years of graduate research, one year of product development work. Age 28, draft deferred, member Sigma Xi. Desires position to do research, product development, testing or other.
Box 29-N-10, Ind. & Eng. Chem., Easton, Pa.

YOUNG WOMAN chemist, several years' responsible experience in industrial research organization. Desires editorial or market research position. Expert stenographer; knowledge of French and Spanish. Would consider A-1 secretarial position. Location immaterial.
Box 33-N-10, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, A.M., with 17 years' research and development experience in textiles, paper, printing, coatings, resins, colloids. Special interests in surface chemistry, wetting agents, dispersions, rheology. Age 41, married, one child. Employed midwest, seeking position in New England or North Atlantic States. Excellent references.
Box 35-N-10, Ind. & Eng. Chem., Easton, Pa.

SYNTHETIC ORGANIC chemist. M.S. research and development experience in plastics. Desires organic research position (plastics or other industry) contributing directly to war effort. Young, married, responsible. Presently employed. Metropolitan location preferred.
Box 36-N-10, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL, INORGANIC chemist, Ph.D., with several years' industrial and teaching experience. Supervision: Research on methods, inorganic projects, analysis, control. American, honor societies. Desires position where deferment can be obtained. Any location.
Box 38-N-10, Ind. & Eng. Chem., Easton, Pa.

RESEARCH and DEVELOPMENT chemist, Ph.D., chemical engineer, fermentations, cereal chemistry, foods. Fifteen years director consulting laboratories, some plant experience, excellent record and credentials. Publications, patents, four languages, office experience. Draft 3-A. Wishes responsible position or opportunity for advancement, preferably defense work.
Box 40-N-10, Ind. & Eng. Chem., Easton, Pa.

ORGANIC PH.D. December 1942. Research in synthetic organic Minors, mathematics, biochemistry, bacteriology, age 24. Graduate assistant and fellow for two years. Draft 2-A. Teaching or industrial research or development desired. Location immaterial.
Box 42-N-10, Ind. & Eng. Chem., Easton, Pa.

SYNTHETIC RESINS, paint, varnish, and lacquer products, research chemist, draft exempt, desires position as technical director, superintendent or assistant, 18 years' experience in directing research and production. Thorough knowledge of Government specification work. Employed at present.
Box 43-N-10, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S. 2½ years' experience in Biochemistry, 4 months' industrial experience. Desires position in Organic or Biochemistry, preferably New York or New Jersey area. Married, age 28, deferred draft classification. Excellent references.
Box 44-N-10, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER—Ch.E., Columbia. Seven years' experience inorganic chemical research, development and supervision. Sigma Xi, Tau Beta Pi. Keen, versatile, desirous of responsible position with progressive company. Married, age 31. Available one month's notice.
Box 45-N-10, Ind. & Eng. Chem., Easton, Pa.

EXPERIENCED CHEMICAL Engineer; available for work in defense industry. 18 years' experience in plant and research work. Oils and fats, metallurgy, petroleum, textiles.
Box 46-N-10, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST, age 40, Protestant, married, one child, U. S. citizen, draft 3-B. 12 years' experience in various fields: cyanogen compounds, diaze compounds, petroleum refining, biochemistry. Capable in directing research and development work. Languages: Dutch, German, French. Desiring position in directing research and development work in a field connected with national defense.
Box 47-N-10, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST and biochemist, with minor in physical chemistry, Ph.D. 1941, now employed in industrial research laboratory seeks new research position preferably in pharmaceutical industry.
Box 48-N-10, Ind. & Eng. Chem., Easton, Pa.

WRITER on technical subjects desires part-time assignments. B.S. and graduate work in chemistry. Employed in plastics research, New York area. Knowledge of journalism, economics, statistics.
Box 51-N-10, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 1287)

(Situations Wanted Continued)

CHEMIST, CEREAL and Foods, Ph.D. with seven years' industrial and research experience. Married, draft 3-A. Available on reasonable notice.
Box 52-N-10, Ind. & Eng. Chem., Easton, Pa.

DEVELOPMENT & SALES engineer, Ph.D. with fifteen years' experience and currently employed, wants position with healthy reputable rubber company with opportunity to become member of firm. Last ten years have been in technical sales and development work for a large rubber company. Extensive experience with aqueous rubber compounds. Now concerned exclusively with the manufacture of articles from synthetic rubber and substitutes. Qualified to evaluate and develop new products. American citizen, 46, married, two children. Available 60 days. Location U. S., Canada, or Mexico.
Box 54-N-10, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, available for spare time work. Broad training and experience, including catalysis, petroleum and fuels technology, explosion processing, pharmaceutical synthesis, metallurgical chemistry. Specialist in new process development and plant design. Currently employed, with contract permitting outside work of practically unlimited scope. Central eastern U. S. war work only.
Box 63-N-10, Ind. & Eng. Chem., Easton, Pa.

For SYNTHETIC RUBBER, plastics, petroleum industries: Ph.D. 1938 leading mid-Western University. Main experience: carbon black for rubber industry. Preparation, reactions of substituted butadienes, unsaturated aldehydes, aldol condensations. Capable of directing work, resourceful, cooperative. Languages. Employed, available short notice. Single. Two dependents.
Box 64-N-10, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, Ph.D., now in class 2-A, in charge of small laboratory for pharmaceutical manufacturer, seeks position in closer connection with defense work. Experience in drug analysis and research.
Box 66-N-10, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. Five years' industrial research and development experience in synthetic organic chemistry. Prefer position in charge of a small group with a company doing defense work preferably in the field of organic chemicals, or drugs, plastics and rubber.
Box 73-N-10, Ind. & Eng. Chem., Easton, Pa.

PRODUCTION CHEMIST: Married, draft deferred. Ten years' industrial experience in synthetic and natural hormones, pharmaceuticals, research and development. Supervisor last three years. Responsible war work desirable. Job location immaterial.
Box 74-N-10, Ind. & Eng. Chem., Easton, Pa

PHARMACOLOGIST: Married, draft deferred, B.S., M.S., nine years' industrial experience in pharmacology, endocrinology, bio-assays, physiology, pathology, bacteriology, toxicology, haematology. Last four years director and consultant work. Responsible war work only.
Box 75-N-10, Ind & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, Chemist, B.Ch.E., M.A. organic. 7 years' experience research and plant development in cellulose, foods, petroleum, chemicals. Age 28, married. Draft deferred. Consider chemical engineering position in petroleum, synthetic rubber, or synthetic organic. Location immaterial. Available immediately.
Box 76-N-10, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST. M.S. 1941, course work toward doctorate. Training in organic chemistry includes synthesis, research and micro-methods of analysis. Desires position in research or production. Draft deferred.
Box 77-N-10, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER: B.S. 1937, desires chemical engineering development work in field essential to the war effort. 5 years' experience in industrial application of, and research relating to, resins and plastics. Extra training in plastics, colloidal and organic chemistry, and chemical engineering. Good character and personality, progressive, practical, has ideas and sense of responsibility. American, white, single, age 27, draft, 2-B.
Box 79-N-10, Ind. & Eng. Chem., Easton, Pa.

PETROLEUM SPECIALTY chemist. Broad experience in the development and manufacture of such products as: soluble cutting oils, sulfurized oils, naphthenic acids, metallic salts of organic acids and specialty compounded oils.
Box 80-N-10, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., with some knowledge of patent law. Six years' experience in technical literature work, including patent and literature searches, abstracting and editing. Desires opportunity to do patent work. Female. Metropolitan N. Y. area.
Box 81-N-10, Ind. & Eng. Chem., Easton, Pa

ORGANIC CHEMIST. M.S., 1940. Industrial research and production experience; organic analysis. Desires position with progressive company which employes on basis of merit.
Box 84-N-10, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED (NONMEMBERS)

CHEMICAL ENGINEER, first class experience design, installation, development, and operation organic chemical plants. Capable taking complete charge of project from laboratory stage to operating plant. Desire permanent connection with responsibility. Married. One child.
Box 79-T-9, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, M.S., excellent educational background, six years' experience in manufacturing and development of pharmaceutical products. Desires position more closely affiliated to war effort. Age 29, married, draft classification 3-A.
Box 10-N-10, Ind. & Eng. Chem., Easton, Pa.

SECRETARY—ASSIST executive. College graduate with 9 years' diversified experience. Knowledge of chemistry and business administration.
Box 11-N-10, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ANALYST. Age 47, 20 years' laboratory experience. I.C.S. graduate. Desires employment in Eastern States for duration of war.
Box 13-N-10, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER: experienced in maintenance and production of organic chemicals. B.Ch.E. degree. Draft deferred.
Box 18-N-10, Ind. & Eng. Chem., Easton, Pa.

YOUNG WOMAN, 29, college graduate 1934. Majored chemistry. Employed 6 years' in statistical capacity; desires return to technical field.
Box 39-N-10, Ind. & Eng. Chem., Easton, Pa.

GRADUATE ANALYTICAL chemist, 44, desires position at reasonable salary, preferably in war industry. Six years' industrial experience in analytical and chemical process control work. Married, young child, draft classification 3-A. Excellent health, energetic and cooperative.
Box 53-N-10, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, B.S. 1940, chemical bacteriological, and business training. Presently employed as assistant to director of research in field of synthetic resins—hospital chemist, 1½ years. Interested in work involving more research.
Box 67-N-10, Ind. & Eng. Chem., Easton, Pa.

TECHNICAL RESEARCH Librarian. Young woman, age 22, graduate of recognized college (A.B.—1940). Chemistry major with two years' experience in abstracting, searching, etc. Knowledge of technical French and German and of typewriting. Accurate and conscientious worker, able to accept responsibility. Satisfactory references. New England preferred.
Box 70-N-10, Ind. & Eng. Chem., Easton, Pa.

Industrial News

CONTINUED FROM PAGE 1281

ton, Del. A greaseless substance, called Pro-Tek protective cream, a product of the du Pont laboratories, is applied to the hands, arms, and under the nails. It forms an invisible film which gives physical protection against grime and some irritating substances. At the end of the working period it can be washed off with soap and running water, carrying the grime with it.

Plastic Fuse for Trench Mortar

A POUND of bar-stock aluminum is saved and made available for vital parts of airplanes by every trench mortar fuse that is turned out by one of the General Electric Co.'s plastics factories. With the huge number of these fuses being made, the saving of aluminum reaches respectable figures.

Electric Furnace Repaired in Operation

WORKING next to tons of molten slag at the base of the largest electric furnace in the world, the men of the mechanical crew of Monsanto Chemical Co.'s Monsanto, Tenn., phosphorus plant have turned a threatened breakdown into a brilliant production victory.

When the big furnace developed a break the men in the plant volunteered to make repairs while the unit was in operation, the first time a job of this magnitude was ever attempted, and the success of the job ensured the continued record-breaking flow of vital elemental phosphorus to war uses.

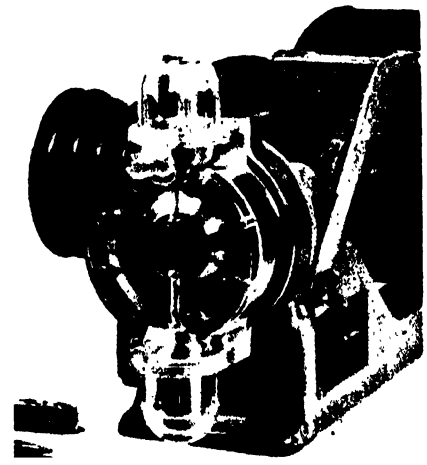
Lever-Seald Plug Valves

THE Homestead Valve Manufacturing Co., Coraopolis, Penna., has announced a new line of Lever-Seald plug valves for 150 pounds' working pressure. Face-to-face dimensions of each valve in the new line are the same as those of the corresponding size of wedge-gate valve. Thus they are instantly interchangeable with wedge-gate valves, without piping changes. Sizes range from 1½ inches to 10 inches in either semisteel or steel.

Explosionproof Timers

TO MEET the demands for explosion-proof timers suitable for operations in atmospheres containing gasoline, naphtha, petroleum, benzene, acetone, lacquer solvent, natural gas, etc., The R. W. Cramer Co., Inc., Centerbrook, Conn., has placed on the market a line of timers.

Crystalite Reagent Heads



TRANSPARENT Crystalite moldings, which permanently withstand chemical solutions and at the same time permit full visibility of vital working parts, are being used for sight feeders and reagent heads on Chlor-O-Feeders, Chem-O-Feeders, and other water-purification equipment manufactured by %Proportioneers, Inc.%, Providence, R. I. Hypochlorite solution, soda ash, and alum are among the chemicals to which the plastic heads have demonstrated complete resistance with no loss of transparency. The injection-molded Crystalite parts are permanently able to withstand hard knocks and shocks.

Brass and Copper Cleaner

A BRASS and copper cleaner has been developed by the Nielco Laboratories, 19720 Florence Road, Detroit, Mich., to improve cleaning, reduce the time required, eliminate vapor degreasers and the use of bright dip where possible. Two formulas have been developed to meet these requirements, one for use in still tanks and the other for washing machines and agitated tanks.

MISCELLANEOUS

BUSINESS OPPORTUNITIES • FOR SALE • WANTED • ETC.

Five cents a word, minimum charge $2.00; display available at $7.50 per inch; in advance. No discounts or allowances

GUARANTEED NEW AND REBUILT EQUIPMENT

for Immediate Delivery
Save Time, Money, Manhours

DRYERS

1 Devine Vacuum Shelf Dryer; 16 shelves; 67" x 167"
2 Devine 5' x 30' Rotary Vacuum Dryers
1 Buffalo 24" x 20" Vacuum Drum Dryer with auxiliaries
1 Electrically heated and operated Conveyor Dryer, 7' x 7' x 6'
8 Rotary Kilns; 7' 6" x 60'; 1/2" steel plate

STILLS

1 10' Dia. Copper Calandria Type Vacuum Pan; print available
1 Devine 100 gal. Cast Iron Vacuum Still
2 Copper Jacketed Vacuum Pans; 100 gal. and 350 gal.
1 1600 gal. Cast Iron Jktd. and Agit. Vacuum Still

MIXERS

3 W. & P. BB Jktd. Mixers; 5 gal., 9 gal. and 50 gal.
2 W. & P. 150 gal. Jktd. Vac. Type Mixers Size 17V11BB
1 W. & P. 200 gal. Unjktd. Mixer Size 17XBB
3 Barber Extra Heavy Duty Steel Jktd. Mixers; 2000 gal.

JACKETED KETTLES

Kettles in copper from 25 gal. to 500 gal.
3 Aluminum Kettles; 2-150 gal. and 1-300 gal.
3 Steel 1200 gal. Kettles with agitators
2 500 gal. Welded Steel Kettles
1 Duriron 475 gal. Jktd. and Agitated Kettle
1 300 gal. Glasslined 42" x 56" Kettle

FILTERS

1 Valles Aluminum Filter; 72 sq. ft. filt. area
2 Sweetland Filters; No. 5 and No. 7
1 42" Sperry 57 plate Filter Press; cast iron
4 Filter Press Skeletons; 3-30" and 1-42"

TANKS

15 Welded Steel Horizontal Tanks; 5000 gal. to 10,000 gal.
1 Rubber Lined 2300 gal. Steel Tank; 10' x 7' x 5'
35 Open Top Steel Tanks; 250 gal. to 5000 gal.

Send for Specifications

FIRST MACHINERY CORP.

FMC

9th St. & EAST RIVER DRIVE
NEW YORK CITY

MICRO-ELEMENTARY ANALYSES: C, H, N, S, P, Halogens, Methoxyl, Mol. wt., etc., U.S.P. and other official tests, Purity tests, Microinorganic assays, Spot tests, Micro-distillations, Toxicological investigations, and typical micro-chemical research work. Dr. Carl Tiedcke, 366 Fifth Avenue, New York, N. Y.

WANTED to BUY: Steel autoclave with agitator. Capacity 300 to 1000 gal. Working pressure not less than 500 lbs.
Box 12-N-10, Ind. & Eng. Chem., Easton, Pa.

WANTED: In good condition; one vacuum pump (with mounted motor), one Freas gravity convection incubator, one electrolytic analyser for 110 volt 60 cycle A.C. current. Dept. Chemistry, Saint Augustine's College, Raleigh, N. C.

WANTED: Thorpe, Dictionary of Applied Chemistry, Volumes I to V, Fourth Edition. Advise condition and price. Johns-Manville Research Laboratories, Manville, New Jersey.

WANTED: 5 kilos Caesium Chloride, 500 grams Gadolinium Nitrate, 25 grams Praseodymium Metal, 50 grams Scandium Oxide, 100 grams Gallium, 10 grams Dysprosium Salt, 100 lbs. Boron Trichloride, 100 pounds Pollucite.
Box 69-N-10, Ind. & Eng. Chem., Easton, Pa.

WANTED: Chem. Reviews, Vol. 4, No. 2, Vols. 18 to 27 incl.; Chem. Abstracts Vols. 1, 2, 25, 26, 28, 29; first and second decennial indexes; J. Am. Chem. Soc., Vols. 1 to 38 incl.; J. Chem. Ed., Vol. 12. State condition and price.
Box 71-N-10, Ind. & Eng. Chem., Easton, Pa.

WANTED: Frankly we are swamped with inquiries from Government agencies, war plants, research and industrial laboratories for equipment of every description. We have been commissioned to buy from one to a hundred complete laboratories, stock lock and barrel, or any laboratory equipment of standard make. We urge you to offer us now the equipment you do not need or use. We are prepared to pay the highest possible prices in accordance with Government regulations; which are most liberal. Write or wire us what you have to sell for immediate consideration. The Laboratory Exchange, 24 E. 21st St., N. Y. C.

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The Economic Status of the Members of the American Chemical Society

Approved Report of the Committee on Economic Status

George Calingaert, Walter A. Schmidt, Walter G. Whitman, Frank C. Whitmore, L. W. Bass[1], Chairman

Prepared for the Committee by Andrew Fraser, Jr., Washington, D. C.

Preface

THIS report on the Economic Status of the Membership of the AMERICAN CHEMICAL SOCIETY is the result of cooperation between the Committee on Economic Status and the United States Bureau of Labor Statistics.

The interest of the bureau in this survey stems from the fact that it had made a detailed analysis of the economic status of the engineering profession in the United States for the period 1929 to 1934, the results of which were published as Bulletin No. 682. This survey was conducted under the direction of A. F. Hinrichs, Acting Commissioner of Labor Statistics, by Andrew Fraser, Jr.

A contact was established for the committee with the bureau through the kindness of Charles L. Parsons, Secretary of the AMERICAN CHEMICAL SOCIETY, who was informed that its experience with the engineering survey and its other resources would be made available to the Committee on Economic Status in its proposed survey.

In his capacity as chairman, L. W. Bass agreed to act as liaison for the committee, and in a very short time an agreement was reached with Henry J. Fitzgerald, administrative officer of the bureau.

The principal features of this agreement were that a questionnaire of a form acceptable to both parties was to be reproduced by the SOCIETY. On the return of the questionnaires to the bureau it would transfer the data to punch cards and prepare in its Machine Tabulation Division such information as the committee desired. One stipulation was that as much information as possible would be made available to the committee in time for presentation as a preliminary oral report at the April 1942 convention of the SOCIETY to be held in Memphis, Tenn. The bureau stipulated that full responsibility for the interpretation of the data would rest upon the Committee on Economic Status.

Thanks to the efforts of J. J. Mahaney, technical analyst, and his assistant, Joseph D. Drager, the necessary tabulations were transmitted in accordance with a program laid out by the committee and the bureau jointly.

By the end of February 1942 the committee had given its approval to the procedures that would be required to prepare text tables in time for the Memphis meeting. These procedures were organized in detail by Andrew Fraser, Jr. The tremendous volume of clerical work involved in this task was under the direct supervision of Fred D. Lindsey, assisted by Eugene Ysita and Mrs. Anne De Coursey.

The Committee on Economic Status wishes to express its appreciation for the cooperation of the Bureau of Labor Statistics, the clerical staff, and particularly the membership of the SOCIETY, whose willingness to fill out and return the questionnaires was a major factor in the success of this survey.

Section 1. Scope and Method

The purpose of undertaking this survey was to determine the economic status of the members of the AMERICAN CHEMICAL SOCIETY. In assuming this responsibility in September 1941 the Committee on Economic Status was confronted with a series of problems with respect to the extent and method of obtaining the requisite data. It had, for example, to reconcile the possible information with the fact that the membership embraced not only chemistry, but also the allied field of chemical engineering and other fields of scientific work.

To meet the diversified activities of this group of professional workers it was agreed that their economic status would be reflected in an analysis of answers to questions covering year of birth, sex, educational level, year of entering the profession, geographic environment, annual income, monthly salary rate, occupational status, source of employment, and field of specialization. And such data were to be requested for 9 years in the period 1926 to 1941. It was also agreed that the most expedient method of obtaining this information would be that of a mail questionnaire. In the handling of these problems the committee is indebted to the Bureau of Labor Statistics for its assistance, which resulted in the compilation of a completely precoded questionnaire. Such a questionnaire is believed to be unique in the field of statistical surveys. By furnishing the respondent with all necessary codes pertaining to each question, the considerable clerical time required to edit and code questionnaires prior to the preparation of punch cards is eliminated. The questionnaire was reproduced in the NEWS EDITION of the AMERICAN CHEMICAL SOCIETY, volume 19, page 1246 (1941).

The questionnaire was mailed on November 25, 1941, to the 24,990 regular

[1] Communications regarding this report should be addressed to L. W. Bass, Director, New England Industrial Research Foundation, 137 Newbury St., Boston, Mass.

TABLE 1.—DISTRIBUTION IN PERIOD 1926 TO 1941 OF ALL MEMBERS REPORTING, BY MAJOR FIELD

MAJOR FIELD	YEAR 1941	1940	1939	1938	1937	1934	1932	1929	1926
	NUMBER								
ALL MAJOR FIELDS	19,009	18,877	18,470	17,944	17,297	14,620	12,894	10,629	8,538
CHEMISTRY	13,641	13,545	13,292	12,968	12,548	10,614	9,343	7,643	6,120
CHEMICAL ENGINEERING	4,168	4,140	4,004	3,820	3,612	2,964	2,586	2,148	1,712
OTHER FIELD OF SC. OR ENG.	938	934	917	901	885	811	753	649	535
ANY OTHER FIELD	229	227	226	224	222	203	136	166	150
EDUCATIONAL LEVEL N.R.	33	31	31	31	30	28	26	23	21
	PERCENTAGE								
ALL MAJOR FIELDS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
CHEMISTRY	71.8	71.8	71.9	72.3	72.5	72.6	72.5	71.9	71.7
CHEMICAL ENGINEERING	21.9	21.9	21.7	21.3	20.9	20.3	20.1	20.2	20.0
OTHER FIELD OF SC. OR ENG.	4.9	4.9	5.0	5.0	5.1	5.5	5.8	6.1	6.3
ANY OTHER FIELD	1.2	1.2	1.2	1.2	1.3	1.4	1.4	1.6	1.8
EDUCATIONAL LEVEL N.R. (1)	.2	.2	.2	.2	.2	.2	.2	.2	.2

1 THE ABBREVIATION N.R. USED IN THIS AND ALL SUCCEEDING TABLES OF THE REPORT REFERS TO THOSE WHO DID NOT REPORT A SPECIFIC ITEM AS REQUESTED IN THE QUESTIONNAIRE.

TABLE 2.—DISTRIBUTION IN 1941 OF ALL MEMBERS REPORTING, BY MAJOR FIELD, CLASS OF MEMBERSHIP, AND SEX

MAJOR FIELD	TOTAL	MALE REGULAR MEMBERS	FEMALE REGULAR MEMBERS	MALE JUNIOR MEMBERS	FEMALE JUNIOR MEMBERS	SEX NOT REPORTED REGULAR MEMBERS	SEX NOT REPORTED JUNIOR MEMBERS
ALL MAJOR FIELDS	19,009	16,104	665	1,255	45	898	42
CHEMISTRY	13,641	11,538	599	814	43	619	28
CHEMICAL ENGINEERING	4,168	3,593	7	367	1	187	13
OTHER FIELD OF SC. OR ENG.	938	772	46	54	-	65	1
ANY OTHER FIELD	229	180	13	17	1	18	-
EDUCATIONAL LEVEL N.R.	33	21	-	3	-	9	-
	PERCENTAGE						
ALL MAJOR FIELDS	100.0	84.8	3.5	6.6	.2	4.7	.2
CHEMISTRY	100.0	84.6	4.4	6.0	.3	4.5	.2
CHEMICAL ENGINEERING	100.0	86.2	.2	8.8	(1)	4.5	.3
OTHER FIELD OF SC. OR ENG.	100.0	82.3	4.9	5.8	-	6.9	.1
ANY OTHER FIELD	100.0	78.6	5.7	7.4	.4	7.9	-
EDUCATIONAL LEVEL N.R.	(2)	-	-	-	-	-	-
	PERCENTAGE						
ALL MAJOR FIELDS	100.0	100.0	100.0	100.0	(2)	100.0	(2)
CHEMISTRY	71.8	71.7	90.1	64.9	-	69.0	-
CHEMICAL ENGINEERING	21.9	22.3	1.1	29.2	-	20.8	-
OTHER FIELD OF SC. OR ENG.	4.9	4.8	6.9	4.3	-	7.2	-
ANY OTHER FIELD	1.2	1.1	2.0	1.4	-	2.0	-
EDUCATIONAL LEVEL N.R.	.2	.1	-	.2	-	1.0	-

1 LESS THAN 0.05 PERCENT
2 FEWER THAN 100 MEMBERS REPORTED

and junior members of the AMERICAN CHEMICAL SOCIETY who had reported residence in the United States and possessions. The closing date for the survey was fixed for January 25, 1942. By that time the Bureau of Labor Statistics had received and transmitted for the preparation of punch cards 19,009 usable questionnaires or 77.6 per cent of the original mailing list. This high proportion of returns from a mail questionnaire survey is unique. The extent of cooperation reflected is a source of profound satisfaction to the Committee on Economic Status.

ADEQUACY OF THE SAMPLES. For each of the 9 years for which data were requested the number of usable returns ranged from 8,538 in 1926 to 19,009 in 1941 (Table 1). It should be pointed out that the term "major field" as used in this report refers to field of basic education or training as given in response to question 3 of the questionnaire. It is not necessarily a classification of the type of professional work in which a member is engaged, because it is generally known that a small proportion of professional workers transfer to a field of activity different from the one in which the basic training was obtained.

It has already been noted that the returns for 1941 embraced 77.6 per cent of the original mailing list. For years prior to 1941 similar over-all comparisons are not feasible. But since the questionnaire requested information on retirement, the two major factors that might affect the adequacy of these several samples are deaths and turnover in membership. Analysis reveals that even if allowances were made for these two factors, the necessary adjustments would not affect the figures to any appreciable extent.

The question of the distributions of the several samples by age is also important. Fortunately, in these regards, as will be seen in the ensuing discussions on annual incomes and monthly salary rates, there is a consistency of movement from 1926 to 1941.

In terms of membership, therefore, it is reasonable to assume that in any one of the 9 years the returns are adequate and representative. This assumption, it should be noted, makes possible, with only slight qualifications, historical comparisons among the several topics relevant to economic status.

THE COMPONENTS OF THE SAMPLE. Analysis of the 19,009 returns for 1941 by major field, type of membership, and sex (Table 2) shows that the membership of the AMERICAN CHEMICAL SOCIETY is predominatingly male. For all major fields combined 16,104 or 84.8 per cent were male regular members, 1,255 or 6.6 per cent comprised male junior members, whereas only 710 or 3.7 per cent included females. Unfortunately, 940 or 4.9 per cent of members reporting in 1941 did not furnish information with regard to sex. These questionnaires, however, were not discarded. Wherever possible the answers given by these respondents to other questions were included in the tabulations. It was not possible, however, to include the replies from two of the members who actually reported they were both male and female.

Within each of the four major fields of activity the relatively highest proportion of males, 95 per cent, was reported for chemical engineering. The absolute number of the members reporting this field of activity in 1941 was 4,168. The other 5 per cent included 0.2 per cent of female regular members and 4.8 per cent who did not code the questionnaire for sex. In the major field of chemistry on the other hand, out of a total of 13,641, the two classes of male membership covered 90.6 per cent, 4.7 per cent were females, with sex not reported by 4.7 per cent. The highest proportions not reporting sex were found in other fields of science or engineering, and any other field with, respectively, 7.0 and 7.9 per cent. In both of these major fields males also predominate.

Within each of the three classes of membership among which comparisons can be made, the majority of the mem-

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bers reported that their major field of activity in 1941 was chemistry. Next in order comes chemical engineering, followed by other fields of science or engineering and any other field. For all members combined the respective proportions are 71.8, 21.9, 4.9, and 1.2 per cent. The corresponding distributions are somewhat similar for male regular and male junior members. However, among female regular members no less than 90.1 per cent reported chemistry as their major field.

For the years prior to 1941 the distributions of the membership by major field are almost uniform, as can be seen by referring to the percentage distributions in Table 1.

It should be remarked here that in any one year a complete response to any one question was not obtained. In general, the answers to any one question in a particular year do not fall below 95 per cent.

Section 2. Educational Qualifications of the Membership

Further light is thrown on the components of the sample by considering the four major fields in relation to educational level, to which question only 0.2 per cent failed to respond. Such comparisons are, of course, possible only for 1941 (Table 3), owing to the fact that the educational level reported for this year would not necessarily have been the same in prior years.

With only 5.3 per cent reporting incomplete college training, or no college training, it is apparent that the membership is predominated by college graduates. Among those with college training the highest proportion—namely, 38 per cent—embraced members who had obtained doctor's degrees. Graduate training at the master's level included 24.1 per cent, whereas 32.4 per cent of the members were classified as having no degree higher than the bachelor's.

This pattern of distribution by college educational level is, however, not common to all four major fields. In these regards, the most striking contrasts occur among the 13,641 members in the field of chemistry. This number, it will be noted, embraced 71.8 per cent of the total returns for 1941. But this proportion comprises no less than 33.5 per cent with doctor's degrees, 16.6 per cent with master's degrees, and 18.1 per cent with bachelor's degrees.

In the field of chemical engineering, on the other hand, there is relatively a decrease in the proportion of postgraduates. The emphasis of this training occurs at the master's level. This is evidenced by the fact that among the 4,168 members reporting chemical engineering as their major field, 2,325, representing 12.2 per cent of the total membership, had bachelor's degrees only, 1,161 or 6.1 per cent had graduated as master's, but only 447 or 2.3 per cent of the total membership reported they had obtained doctor's degrees in chemical engineering.

Among the members classified in "other field of science or engineering" and "any other field" the respective proportions within each of these major fields classified as doctor's, master's, and bachelor's show little variation. In the former field, but relative to the total membership, the proportions range from 1.1 to 1.9 per cent and in the case of the latter field each is less than 1 per cent.

Among male regular members the distributions by educational level and major field are similar to those for the membership as a whole. Relative to male regular members, however, the proportions of female regular members with doctor's and master's degrees are much higher. The respective percentages for females are 46.5 and 31.4 per cent of all female regular members in contrast to 35.9 and 16.2 per cent for all male regular members.

In the case of the 1,255 male junior members, the highest proportions by educational level cover those with bachelor's degrees. The actual proportions in the fields of chemistry and chemical engineering are, respectively, 35.9 and 22.2 per cent of all male junior members. For this same class of membership the corresponding percentages for the two postgraduate levels combined are 16.0 and 4.4 per cent.

Among junior members is to be found the highest proportion (16.9 per cent) with incomplete college or no college training. Of this group as much as 13.0 per cent reported chemistry as their major field.

From this general analysis of the components of the sample the important fact emerges that the membership of the AMERICAN CHEMICAL SOCIETY is not confined to the field of pure chemistry. Also to be noted is the fact that there is a sufficient number of returns from members

TABLE 3.—DISTRIBUTION IN 1941 OF ALL MEMBERS REPORTING, BY MAJOR FIELD AND EDUCATIONAL LEVEL

MAJOR FIELD AND EDUCATIONAL LEVEL	TOTAL	MALE REGULAR MEMBERS	FEMALE REGULAR MEMBERS	MALE JUNIOR MEMBERS	FEMALE JUNIOR MEMBERS	SEX NOT REPORTED REGULAR MEMBERS	SEX NOT REPORTED JUNIOR MEMBERS
				NUMBER			
ALL MAJOR FIELDS	19,009	16,104	665	1,255	45	898	
CHEMISTRY	13,641	11,588	599	814	42	619	28
DOCTORS	6,359	5,781	310	41	1	225	1
MASTERS	3,153	2,608	209	159	10	165	2
BACHELORS	3,436	2,705	79	451	29	160	12
INCOMPLETE COLLEGE	575	370	1	135	2	57	10
NO COLLEGE	118	74	-	28	1	12	3
CHEMICAL ENGINEERING	4,168	3,593	7	367	1	187	13
DOCTORS	447	423	4	3	-	17	-
MASTERS	1,161	1,040	3	53	-	64	1
BACHELORS	2,325	1,948	-	278	1	90	8
INCOMPLETE COLLEGE	206	162	-	29	-	13	2
NO COLLEGE	29	20	-	4	-	3	2
OTHER FIELD OF SC. OR ENG.	938	772	46	54	-	65	1
DOCTORS	354	309	23	1	-	21	-
MASTERS	219	179	13	12	-	15	-
BACHELORS	315	250	10	30	-	24	1
INCOMPLETE COLLEGE	43	28	-	11	-	4	-
NO COLLEGE	7	6	-	-	-	1	-
ANY OTHER FIELD	229	190	13	17	1	18	-
DOCTORS	67	52	8	2	-	5	-
MASTERS	55	48	2	2	1	2	-
BACHELORS	80	61	2	7	-	10	-
INCOMPLETE COLLEGE	11	6	1	3	-	1	-
NO COLLEGE	16	13	-	3	-	-	-
EDUCATIONAL LEVEL N.R.	39	21	-	3	-	9	-
				PERCENTAGE			
ALL MAJOR FIELDS	100.0	100.0	100.0	100.0	(1)	100.0	(1)
CHEMISTRY	71.8	71.7	90.0	64.9	-	69.0	-
DOCTORS	33.5	35.9	46.5	3.3	-	25.2	-
MASTERS	16.6	16.2	31.4	12.7	-	18.4	-
BACHELORS	18.1	16.8	11.9	35.9	-	17.9	-
INCOMPLETE COLLEGE	3.0	2.3	.2	10.8	-	6.3	-
NO COLLEGE	.6	.5	-	2.2	-	1.3	-
CHEMICAL ENGINEERING	21.9	22.3	1.1	29.2	-	20.8	-
DOCTORS	2.3	2.6	.6	.2	-	1.9	-
MASTERS	6.1	6.5	.5	4.2	-	7.2	-
BACHELORS	12.2	12.1	-	22.2	-	10.0	-
INCOMPLETE COLLEGE	1.1	1.0	-	2.3	-	1.4	-
NO COLLEGE	.2	.1	-	.3	-	.3	-
OTHER FIELD OF SC. OR ENG.	4.9	4.8	6.9	4.3	-	7.2	-
DOCTORS	1.9	1.9	3.4	.1	-	2.3	-
MASTERS	1.1	1.1	2.0	1.0	-	1.7	-
BACHELORS	1.7	1.6	1.5	2.3	-	2.7	-
INCOMPLETE COLLEGE	.2	.2	-	.9	-	.4	-
NO COLLEGE	(2)	(2)	-	-	-	.1	-
ANY OTHER FIELD	1.2	1.1	2.0	1.4	-	2.0	-
DOCTORS	.3	.3	1.2	.2	-	.6	-
MASTERS	.3	.3	.3	.2	-	.2	-
BACHELORS	.4	.4	.3	.6	-	1.1	-
INCOMPLETE COLLEGE	.1	(2)	.2	.2	-	.1	-
NO COLLEGE	.1	.1	-	.2	-	-	-
EDUCATIONAL LEVEL N.R.	.2	.1	-	-	-	1.0	-

1 FEWER THAN 100 MEMBERS REPORTED
2 LESS THAN 0.05 PERCENT

engaged in the field of chemical engineering to justify detailed comparisons of economic status with members in the field of chemistry. Among all four fields similar comparisons are not warranted. However, by combining the returns from those classified in "other field of science or engineering" and "any other field" broad comparisons are possible for three groupings of the members with respect to major field of work. The first topic to be presented on this basis is that of geographical environment.

Section 3. Geographical Environment of the Membership

This discussion of geographical environment covers two distinct features. In one of these the emphasis is placed upon tracing changes in the geographical location of the membership in the period 1926 to 1941. This particular analysis also reveals the relative importance of the several locations with regard to employment opportunities. This is followed by an analysis of the distributions of the membership by size or population of community within each geographical division in the year 1941 only.

DISTRIBUTIONS BY GEOGRAPHICAL DIVISION. When the 9 distributions by geographical location for the period 1926 to 1941 were compared, the changes from year to year were seen to be so slight as to justify actual presentation of the data compiled for the years 1926, 1934, and 1941 only (Table 4). The intermediate year 1934 was chosen primarily because, as will be seen later, it coincides with the period of lowest incomes and earnings of the membership. Since both parts of this analysis are based primarily on proportions rather than absolute numbers, it is pertinent to note that in 1941 only 2 per cent of the members reporting failed to answer the questions on geographical location. The respective corresponding proportions for 1926 and 1934 are 3 and 6 per cent. The absolute number of usable returns for the years 1926, 1934, and 1941 are, respectively, 8,237, 13,726, and 18,701.

Without regard to major field of training the data in Table 4 clearly indicate that the Middle Atlantic Region has persistently offered the largest number of employment opportunities to the membership. Furthermore, over the period 1926 to 1941 the proportions reported for this region show little variation. In each of the years, 1926, 1934, and 1941, these averaged approximately one third of the total returns. The actual proportion in 1941 was 34.3 per cent. Among the three states included in the Middle Atlantic Region it is to be noted that 15.5 per cent of the membership in 1941 were located in New York. By contrast the proportions reporting from New Jersey and Pennsylvania were, respectively, 9.2 and 9.6 per cent. Over the period 1926 to 1941 only the state of New Jersey shows a relative perceptible increase from 7.0 per cent in 1926 to 9.2 per cent in 1941.

The area second in importance to the membership as regards employment opportunities appears to be the East North Central Region. For 1926 the reports covered 22.7 per cent of the members reporting. The proportion reported for this region in 1941 was 23.6 per cent. The state data shown for this region also reveal no appreciable change over the period 1926 to 1941. In 1941 the state of Illinois embraced 8.4 per cent of the membership as against 6.7 per cent in the state of Ohio and 8.5 per cent for all other states in the region combined.

Considered together, therefore, the analysis thus far shows that nearly 60 per cent of the membership in each of the 9 years in the period 1926 to 1941 were located in the Middle Atlantic States and the East North Central Region.

Among the other 8 regions of the Continental United States there is also little variation in the several proportions with respect to geographical location. This is evidenced by the fact that while in 1926 the proportions ranged from 2.1 per cent in the Mountain Region to 8.9 per cent in the New England Region, in 1941 the range was from 1.5 to 7.5 per cent, with the same two regions occupying, respectively the lower and upper extremes of the range.

Actually, among all 8 regions only 3 show very slight changes. In the South Atlantic Region, for example, the relative increase in the proportions reported was from 7.5 per cent in 1926 to 9.7 per cent in 1941. Slight decreases on the other hand seem to have occurred in the West North Central Region and the New England area. The decrease reported for the former region was from 8.4 per cent in 1926 to 5.5 per cent in 1941. Over the same period the latter region shows a decrease from 8.9 to 7.5 per cent.

For the data shown in Table 4 with respect to major field, the patterns of geographical location in the Continental United States are virtually the same as that for the membership as a whole.

The United States territories and possessions apparently offered little employment opportunity to the membership. Over the period 1926 to 1941 these geographical divisions accounted for only 0.3 per cent of the returns in any one year. Foreign countries on the other hand claimed the services of 3.5 per cent of the membership in 1926. By 1934 the proportion had declined to 2.0 per cent. In 1941 only 0.2 per cent of the members

TABLE 4.— DISTRIBUTION IN 1926, 1934 AND 1941 OF ALL MEMBERS REPORTING, BY MAJOR FIELD AND GEOGRAPHIC DIVISION

GEOGRAPHIC DIVISION	TOTAL	CHEMISTRY	CHEMICAL ENGINEERING	ALL OTHER FIELDS (1)	TOTAL	CHEMISTRY	CHEMICAL ENGINEERING	ALL OTHER FIELDS (1)	TOTAL	CHEMISTRY	CHEMICAL ENGINEERING	ALL OTHER FIELDS (1)
	1941				1934				1926			
	NUMBER											
ALL DIVISIONS	18,701	13,408	4,115	1,178	13,726	9,892	2,850	984	8,237	5,880	1,679	678
MIDDLE ATLANTIC	6,406	4,608	1,406	392	4,463	3,153	981	329	2,590	1,829	550	211
NEW YORK	2,900	2,115	586	199	2,200	1,595	431	174	1,276	923	232	121
NEW JERSEY	1,717	1,248	390	79	1,011	690	262	59	579	410	133	36
PENNSYLVANIA	1,789	1,245	430	114	1,252	868	288	96	735	496	185	54
EAST NORTH CENTRAL	4,412	3,138	1,019	255	3,209	2,281	729	199	1,867	1,276	447	144
ILLINOIS	1,580	1,158	325	97	1,115	822	231	62	650	441	162	47
OHIO	1,248	858	320	70	979	670	248	61	565	378	144	43
OTHER STATES	1,584	1,122	374	88	1,115	789	250	76	652	453	141	58
SOUTH ATLANTIC	1,823	1,341	396	86	1,184	901	222	61	815	465	112	38
NEW ENGLAND	1,402	1,016	288	98	1,061	797	198	66	730	514	160	56
PACIFIC	1,372	995	276	104	922	667	171	84	543	390	104	49
CALIFORNIA	1,102	849	232	87	757	544	142	71	439	309	88	42
OTHER STATES	213	152	44	17	165	123	29	13	104	79	15	10
WEST NORTH CENTRAL	1,022	744	190	88	1,020	763	169	88	690	529	92	69
WEST SOUTH CENTRAL	850	525	279	46	537	329	175	33	271	178	74	19
EAST SOUTH CENTRAL	542	377	133	32	351	252	91	18	185	138	31	16
DISTRICT OF COLUMBIA	498	408	51	39	388	328	24	36	256	202	27	27
MOUNTAIN	274	196	53	25	257	191	38	28	170	135	17	18
U. S. TERR. & POSSESSIONS	60	41	12	7	43	27	11	5	31	19	9	3
FOREIGN COUNTRIES	37	19	12	6	271	203	51	17	289	211	57	21
NOT REPORTED	309	233	53	22	894	722	114	58	901	240	33	28
	PERCENTAGE											
ALL DIVISIONS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MIDDLE ATLANTIC	34.3	34.5	34.2	33.4	32.5	31.9	34.4	33.6	33.3	31.3	32.9	31.1
NEW YORK	15.5	15.9	14.3	17.0	16.1	16.1	15.2	17.8	15.4	15.8	13.9	17.7
NEW JERSEY	9.2	9.3	9.5	6.7	7.4	7.0	9.2	6.0	7.0	7.0	7.9	5.3
PENNSYLVANIA	9.6	9.3	10.4	9.7	9.1	8.8	10.1	9.8	8.9	8.5	11.1	8.0
EAST NORTH CENTRAL	23.6	23.4	24.8	21.6	23.3	23.1	25.6	20.2	22.7	21.6	26.6	21.2
ILLINOIS	8.4	8.6	7.9	8.2	8.1	8.3	8.1	6.3	7.9	7.5	9.6	6.9
OHIO	6.7	6.4	7.8	5.9	7.1	6.8	8.7	6.2	6.9	6.4	8.6	6.3
OTHER STATES	8.5	8.4	9.1	7.5	8.1	8.0	8.8	7.7	7.9	7.7	8.4	8.6
SOUTH ATLANTIC	9.7	10.0	9.6	7.3	8.6	9.1	7.8	6.2	7.5	7.9	6.7	5.6
NEW ENGLAND	7.5	7.6	7.0	8.3	7.9	8.1	6.9	8.7	8.9	8.7	9.5	8.3
PACIFIC	7.3	7.4	6.7	8.8	6.7	6.7	6.0	8.5	6.6	6.6	6.1	7.7
CALIFORNIA	6.2	6.3	5.6	7.4	5.5	5.5	5.0	7.2	5.3	5.3	5.2	6.2
OTHER STATES	1.1	1.1	1.1	1.4	1.2	1.2	1.0	1.3	1.3	1.3	.9	1.5
WEST NORTH CENTRAL	5.5	5.5	4.6	7.5	7.4	7.7	5.9	8.9	8.4	9.0	5.5	10.2
WEST SOUTH CENTRAL	4.5	3.9	6.8	3.9	3.9	3.3	6.1	3.4	3.3	3.0	4.4	2.8
EAST SOUTH CENTRAL	2.9	2.8	3.2	2.7	2.6	2.5	2.8	1.8	2.2	2.2	1.8	2.4
DISTRICT OF COLUMBIA	2.7	3.0	1.2	3.3	2.8	3.3	.8	3.7	3.1	3.4	1.6	4.0
MOUNTAIN	1.5	1.5	1.3	2.1	1.9	1.9	1.3	2.8	2.1	2.3	1.0	2.7
U. S. TERR. & POSSESSIONS	.3	.3	.3	.6	.3	.3	.4	.5	.4	.3	.5	.4
FOREIGN COUNTRIES	.2	.1	.2	.5	2.0	2.1	1.8	1.7	3.5	3.6	3.4	3.1

1 INCLUDES ALL MEMBERS REPORTING OTHER FIELD OF SCIENCE OR ENGINEERING, ANY OTHER FIELD, AND FIELD NOT REPORTED

TABLE 5.—PERCENTAGE DISTRIBUTION IN 1941 OF ALL MEMBERS REPORTING WITHIN EACH MAJOR FIELD AND GEOGRAPHIC DIVISION, BY POPULATION OF COMMUNITY

GEOGRAPHIC DIVISION	TOTAL	POPULATION OF COMMUNITY IN THOUSANDS: UNDER 5	5 TO 25	25 TO 100	100 TO 500	OVER 500	NOT REPORTED (1)
ALL FIELDS							
ALL DIVISIONS	100.0	9.2	16.8	13.7	19.9	39.7	0.7
MIDDLE ATLANTIC	100.0	7.1	15.6	11.6	13.4	51.3	0.8
NEW YORK	100.0	4.4	8.6	10.1	14.9	61.2	0.8
NEW JERSEY	100.0	10.8	29.3	17.0	19.7	22.8	0.9
PENNSYLVANIA	100.0	9.1	14.4	8.9	4.8	63.0	0.8
EAST NORTH CENTRAL	100.0	5.5	13.7	13.6	20.2	46.6	0.4
ILLINOIS	100.0	3.6	9.3	11.5	4.4	70.8	0.4
OHIO	100.0	5.0	7.5	8.4	30.4	28.3	0.4
OTHER STATES	100.0	7.8	23.1	19.6	12.1	37.0	0.4
SOUTH ATLANTIC	100.0	15.9	18.8	20.3	29.0	14.4	0.7
NEW ENGLAND	100.0	9.6	16.5	20.0	24.3	28.3	1.3
PACIFIC	100.0	12.0	14.5	5.8	16.8	44.6	0.1
CALIFORNIA	100.0	10.2	12.9	10.2	13.9	52.6	0.2
OTHER STATES	100.0	22.1	23.5	8.0	45.9	0.5	-
WEST NORTH CENTRAL	100.0	13.9	22.7	9.5	21.9	31.5	0.5
WEST SOUTH CENTRAL	100.0	15.9	30.5	22.8	26.5	3.5	0.8
EAST SOUTH CENTRAL	100.0	13.8	27.9	16.4	41.0	0.7	0.2
DISTRICT OF COLUMBIA	100.0	-	0.4	1.8	8.6	88.0	1.2
MOUNTAIN	100.0	24.8	37.9	7.7	27.0	1.5	1.1
U.S. TERR. & POSSESSIONS	(2)	(2)	(2)	(2)	(2)	(2)	(2)
FOREIGN COUNTRIES	(2)	(2)	(2)	(2)	(2)	(2)	(2)
CHEMICAL ENGINEERING							
ALL DIVISIONS	100.0	9.0	17.1	13.8	19.6	40.1	0.4
MIDDLE ATLANTIC	100.0	7.3	15.0	11.0	13.0	53.2	0.5
NEW YORK	100.0	3.6	6.7	9.2	12.6	67.2	0.7
NEW JERSEY	100.0	12.6	25.4	14.4	21.4	25.4	0.8
PENNSYLVANIA	100.0	7.4	17.0	10.2	5.6	59.6	-
EAST NORTH CENTRAL	100.0	7.3	14.5	12.3	20.0	47.5	0.4
ILLINOIS	100.0	3.7	9.5	8.9	3.1	74.5	0.3
OHIO	100.0	3.8	7.1	9.1	50.2	27.2	0.6
OTHER STATES	100.0	9.0	23.5	17.9	8.8	41.5	0.3
SOUTH ATLANTIC	100.0	15.2	21.2	22.2	28.8	12.6	-
NEW ENGLAND	100.0	6.6	19.1	19.1	21.2	33.3	0.7
PACIFIC	100.0	14.1	13.0	3.0	18.5	47.5	-
CALIFORNIA	100.0	13.4	12.1	6.0	12.1	56.4	-
OTHER STATES	(2)	(2)	(2)	(2)	(2)	(2)	(2)
WEST NORTH CENTRAL	100.0	10.0	16.8	10.0	20.5	42.7	-
WEST SOUTH CENTRAL	100.0	14.7	29.7	29.0	24.0	2.2	0.4
EAST SOUTH CENTRAL	100.0	12.0	30.1	16.4	40.6	0.8	-
DISTRICT OF COLUMBIA	(2)	(2)	(2)	(2)	(2)	(2)	(2)
MOUNTAIN	(2)	(2)	(2)	(2)	(2)	(2)	(2)
U.S. TERR. & POSSESSIONS	(2)	(2)	(2)	(2)	(2)	(2)	(2)
FOREIGN COUNTRIES	(2)	(2)	(2)	(2)	(2)	(2)	(2)
CHEMISTRY							
ALL DIVISIONS	100.0	9.3	16.8	13.8	20.1	39.6	0.8
MIDDLE ATLANTIC	100.0	7.1	15.9	12.1	13.7	50.3	0.9
NEW YORK	100.0	4.6	8.8	10.6	15.9	59.1	0.8
NEW JERSEY	100.0	10.1	30.4	17.9	19.1	21.8	0.7
PENNSYLVANIA	100.0	8.3	13.5	8.4	4.7	64.0	1.1
EAST NORTH CENTRAL	100.0	5.7	13.5	14.0	20.1	46.2	0.4
ILLINOIS	100.0	3.6	9.2	12.3	4.6	69.9	0.4
OHIO	100.0	5.6	6.9	7.9	31.1	28.2	0.3
OTHER STATES	100.0	8.0	23.0	20.3	12.6	35.6	0.5
SOUTH ATLANTIC	100.0	16.0	17.7	20.2	30.9	14.2	1.0
NEW ENGLAND	100.0	10.7	16.1	21.1	25.2	25.7	1.2
PACIFIC	100.0	11.2	15.3	10.4	18.8	44.1	0.2
CALIFORNIA	100.0	8.8	13.6	11.0	14.2	52.2	0.2
OTHER STATES	100.0	24.3	24.3	6.6	44.1	0.7	-
WEST NORTH CENTRAL	100.0	14.7	25.0	10.1	21.6	27.9	0.7
WEST SOUTH CENTRAL	100.0	16.6	31.0	20.0	27.4	4.0	1.0
EAST SOUTH CENTRAL	100.0	14.6	27.6	13.4	40.6	0.8	-
DISTRICT OF COLUMBIA	100.0	-	0.5	1.5	9.1	87.7	1.2
MOUNTAIN	100.0	24.5	40.8	8.2	24.0	1.5	1.0
U.S. TERR. & POSSESSIONS	(2)	(2)	(2)	(2)	(2)	(2)	(2)
FOREIGN COUNTRIES	(2)	(2)	(2)	(2)	(2)	(2)	(2)
ALL OTHER FIELDS (3)							
ALL DIVISIONS	100.0	8.3	16.0	11.0	19.0	44.1	1.1
MIDDLE ATLANTIC	100.0	7.4	16.2	8.4	10.2	56.6	1.5
NEW YORK	100.0	4.5	12.1	5.0	11.1	65.8	1.5
NEW JERSEY	(2)	(2)	(2)	(2)	(2)	(2)	(2)
PENNSYLVANIA	100.0	8.9	14.0	8.9	8.9	67.5	-
EAST NORTH CENTRAL	100.0	5.9	13.3	13.3	21.6	47.5	-
ILLINOIS	(2)	(2)	(2)	(2)	(2)	(2)	(2)
OHIO	(2)	(2)	(2)	(2)	(2)	(2)	(2)
OTHER STATES	(2)	(2)	(2)	(2)	(2)	(2)	(2)
SOUTH ATLANTIC	(2)	(2)	(2)	(2)	(2)	(2)	(2)
NEW ENGLAND	(2)	(2)	(2)	(2)	(2)	(2)	(2)
PACIFIC	100.0	14.4	11.5	12.5	20.2	41.4	-
CALIFORNIA	(4)	(2)	(2)	(2)	(2)	(2)	(2)
OTHER STATES	(2)	(2)	(2)	(2)	(2)	(2)	(2)
WEST NORTH CENTRAL	(2)	(2)	(2)	(2)	(2)	(2)	(2)
WEST SOUTH CENTRAL	(2)	(2)	(2)	(2)	(2)	(2)	(2)
EAST SOUTH CENTRAL	(2)	(2)	(2)	(2)	(2)	(2)	(2)
DISTRICT OF COLUMBIA	(2)	(2)	(2)	(2)	(2)	(2)	(2)
MOUNTAIN	(2)	(2)	(2)	(2)	(2)	(2)	(2)
U.S. TERR. & POSSESSIONS	(2)	(2)	(2)	(2)	(2)	(2)	(2)
FOREIGN COUNTRIES	(2)	(2)	(2)	(2)	(2)	(2)	(2)

1 INCLUDES THOSE NOT REPORTING POPULATION OF COMMUNITY

2 FEWER THAN 100 MEMBERS REPORTED

3 INCLUDES ALL MEMBERS REPORTING OTHER FIELD OF SCIENCE OR ENGINEERING, ANY OTHER FIELD, AND FIELD NOT REPORTED

reporting gave foreign countries as their geographical location.

DISTRIBUTIONS BY SIZE OF COMMUNITY. The distributions by size or population of community shown in Table 5 are based on the 18,701 returns received for the year 1941.

For all geographical divisions and all major fields combined the distributions of the membership in 1941 among the 5 sizes of communities range from 9.2 to 39.7 per cent. The lower extreme of this range refers to communities with populations of under 5,000 persons; the upper extreme on the other hand has reference to communities with populations of over 500,000 persons.

The three intermediate values of this range in proportions do not parallel the increases by size of community. Actually the lowest proportion of 13.7 per cent includes members who reported they were located in communities of from 25,000 to 100,000 population. In the 5,000 to 25,000 population areas as much as 16.8 per cent of the membership were employed. The proportion in areas with populations ranging from 100,000 to 500,000 is 19.9 per cent.

Within each of the geographical divisions the distributions are similar to that for the membership as a whole. Such differences as do exist can be explained on the grounds that there are only a few localities in the United States with populations of over 500,000. Similar remarks apply to the data shown separately for the field of chemistry and the field of chemical engineering. The returns for all other fields have significance only when considered as a whole.

Structure of Biotin

DISCOVERY of the structure of biotin was announced October 9 by Vincent du Vigneaud at a meeting of the New York Section of the AMERICAN CHEMICAL SOCIETY. The discovery is expected to pave the way to the synthesis of this supervitamin, only about 0.1 ounce of which makes up the world supply at the present time.

The empirical formula of the biotin molecule was established about two years ago at the Cornell University Medical College, and the announcement of its architectural structure culminates a series of investigations initiated early in 1940, when biotin was identified with vitamin H and with co-enzyme R. Biotin can now be known as 2'-keto-3,4-imidazolido-2-tetrahydrothiophene-*n*-valeric acid.

Mead Johnson B Complex Award

NOMINATIONS for the 1943 award of $1,000 established by Mead Johnson and Co. to promote researches dealing with the B complex vitamins must be submitted by January 10, 1943. The award will be given to the nonclinical laboratory or clinical research worker in the United States or Canada who, in the opinion of the judges has published during the previous calendar year the most meritorious scientific report dealing with this field. Formal presentation will be made at the annual meeting of the American Institute of Nutrition at Cleveland, April 7, 1943. Nominations, with data relative to the nominee and his research, should be sent to Arthur H. Smith, Wayne University College of Medicine, Detroit, Mich.

Quinine Wanted

IT WAS REPORTED that malaria so weakened General MacArthur's troops on the Bataan peninsula that they were unable to hold out as long as they would if they had been given adequate supplies of quinine. We know that atabrine and plasmochin are being used as invaluable substitutes for quinine, and yet there is some question whether or not they are perfect substitutes. With so many of our armed forces stationed in the tropics as well as in our own South where malaria is an enemy, it would seem that we should uncover all reserves of quinine in this country.

In order to learn something of the possibilities along this line, your President, on his recent New England lecture tour, made an appeal to chemists who might possibly have considerable reserves of quinine. Organic chemists, as is well known, find quinine very useful in preparing pure crystalline derivatives of certain substances, and it was thought that they might have some on hand which they could spare. The results of the appeal were most encouraging. At Yale one pound was offered, at the University of Vermont half a pound, and in Boston a pound or more. At this rate one might guess that 50 or 100 pounds could be secured from the universities and the medical schools. It would certainly be worth several times its weight in gold at this time. At the risk of seeming officious, I am asking every chemist who can sell the Government any amount of quinine at this time to write me, so that I can forward all the letters to the proper medical authorities. If they do not want it, that is their responsibility. Please do not send me any quinine, for that will not be the best way to manage it.

HARRY N. HOLMES
OBERLIN COLLEGE
OBERLIN, OHIO

New Occupational Bulletins

FOUR new occupational bulletins, Nos. 22, 23, 24, and 25, have been issued, all activities certified by the War Manpower Commission as being essential to the support of the war effort, and each definitely including chemists and professional and technical engineers as essential men to these activities. The subjects are as follows:

Occupational Bulletin 22, "Metal Shapes and Forging Activity".
Occupational Bulletin 23, "Educational Services".
Occupational Bulletin 24, "Production of Chemicals and Allied Products Activity".
Occupational Bulletin 25, "Ammunition, Ordnance, and Accessories Production Activity".

Of these four, we are reproducing the following two in full.

Occupational Bulletin 23. Educational Services

1. The War Manpower Commission has certified that educational services are essential to the support of the war effort.

2. This bulletin covers the following essential activities which are considered as included within the list attached to Local Board Release No. 115, as amended:

(a) *Educational services:* Public and private industrial vocational training; elementary, secondary, and preparatory schools; junior colleges, colleges, universities and professional schools; educational and scientific research agencies; and the production of technical and vocational training films.

3. In considering registrants engaged in educational services there must be taken into consideration the following:

(a) The kind of institution in which the registrant is engaged;
(b) the occupation of the registrant in that institution; and
(c) the classroom studies under the registrant's instruction, supervision, or administration jurisdiction. Attached is a list of occupations by institutions and classroom studies in educational services which require a reasonable degree of training, qualification, or skill to perform the duties involved. It is the purpose of this list to set forth by institutions and classroom studies the important occupations in educational services which must be filled by persons capable of performing the duties involved in order that the essential portions of the activity may be maintained. Item 4 of the list does not include classroom studies but occupations which shall be considered in the same manner as any other occupations. The entire list is confined to occupations which require more than six months of training and preparation.

4. In classifying registrants employed in these activities, consideration should be given to the following:

(a) The training, qualification, or skill required for the proper discharge of the duties involved in his occupation;
(b) the training, qualification, or skill of the registrant to engage in his occupation; and
(c) the availability of persons with his qualifications or skill, or who can be trained to his qualification, to replace the registrant and the time in which such replacement can be made.

Critical Occupations

1. ELEMENTARY, SECONDARY, AND PREPARATORY SCHOOLS

(a) Superintendents of elementary, secondary and preparatory school systems; and
(b) Teachers who are engaged in full-time instruction in one or more of the following subjects:

Aeronautics
Biology
Chemistry
Mathematics
Physics
Radio

2. JUNIOR COLLEGES, COLLEGES, UNIVERSITIES AND PROFESSIONAL SCHOOLS, EDUCATIONAL AND SCIENTIFIC RESEARCH AGENCIES

(a) Presidents, deans, and registrars in junior colleges, colleges, universities, and professional schools; and
(b) Professors and instructors engaged in full-time instruction and research in one or more of the following subjects:

Agricultural sciences
Architecture, naval
Astronomy
Bacteriology
Biology
Chemistry
Dentistry
Engineering sciences
Geology
Industrial management
Mathematics
Medicine and surgery
Metallurgy
Meteorology
Navigation, aerial and marine
Oceanography
Pharmacy
Physics
Physiology
Veterinary sciences

3. PUBLIC AND PRIVATE INDUSTRIAL VOCATIONAL TRAINING

(a) Superintendents of public and private industrial vocational training; and
(b) Teachers who are engaged in full-time instruction in one or more of the following subjects designated to prepare students for war activities:

Trade, vocational and agricultural subjects (such as, machine shop practice, aircraft, sheet-metal work, and similar subjects) and in vocational rehabilitation.

4. PRODUCTION OF TECHNICAL AND VOCATIONAL TRAINING FILMS

(a) Persons engaged full-time and exclusively in the production of technical and vocational training films for the Army, Navy, and war production industries.

Animator
Cameraman
Cutter
Film editor
Project supervisor
Technical consultant
Technical writer
Sound engineer

Occupational Bulletin 24. Production of Chemicals and Allied Products Activity

1. The War Manpower Commission has certified that the production of chemicals and allied products is an activity essential to the support of the war effort.

2. This bulletin covers the following essential activities as listed in the amendment to Local Board Release No. 115:

(a) *Production of chemicals and allied products:* Glycerin; turpentine, rosin and other naval stores; wood tars, oils, acids, and alcohols; lubricating oils and greases; animal and vegetable oils; fertilizers; tanning materials; salt; synthetic rubber; primary coal-tar products; plastics; compressed and liquefied gases; refined sulfur; sulfuric and other acids; caustic and other sodas; industrial alcohols; electrochemical and electrometallurgical products such as carbide, sodium and potassium metals and high-percentage ferro-alloys; drugs and medicines; insecticides and related chemical compounds; nylon and other synthetic textile fibers used in military equipment exclusively; grease and tallow; candles. (Explosives, flares, and other fireworks generally classified as chemical products are included with ammunition.)

3. The following list of occupations in the production of chemicals and allied products are occupations requiring a reasonable degree of training, qualification, or skill to perform the duties involved. It is the purpose of this list to set forth the important occupations in the production of chemicals and allied products which must be filled by persons capable of performing the duties involved, in order that the activity may maintain efficient production. This list is confined to those occupations which require six months or more of training and preparation.

4. In classifying registrants employed in these activities, consideration should be given to the following:

(a) The training, qualification, or skill required for the proper discharge of the duties involved in his occupation;

(b) the training, qualification, or skill of the registrant to engage in his occupation; and

(c) the availability of persons with his qualifications or skill, or who can be trained to his qualification, to replace the registrant and the time in which such replacement can be made.

Critical Occupations

Accountant, cost
Bacteriologist
Biologist
  Immunologist
  Nematologist
  Parasitologist
  Pathologist
Blacksmith (all around)
Bleacher operator
Bricklayer, ref.
Calender operator
Carpenter, maintenance
Centrifuge operator
Chemical operator
  (A title covering workers who actually operate equipment that requires the exercise of independent judgment, extensive responsibility for product or equipment, and the application of acquired skill, such as, autoclave operator, acetylator operator, still operator. It does not include "operators" who tend equipment in accordance with specific instructions, such as contact acid operator or drum filler.)
Chemist
Coppersmith
Double-rolling-mill operator
Dialyzer operator
Electrician (all around)
Engineer, professional and technical
Engineer, power house
Entomologist
Filterman, paraffin
Fire chief
Foreman, chemical operations
Gas-producer man
Glass blower
Glycerin refiner
Instrument repairman
Lead burner
Lubricating oil treater
Machine fixer, rayon
Machinist (all around)
Manager, employment and personnel
Manager, production
Manager, traffic
Master mechanic, maintenance
Mechanic, maintenance
Molder, plastics
Oxygen-plant operator
Pharmacist
Physicist
Pipe fitter
Processman, rayon making
Rubber coverer
Sheet-metal worker (all around)
Soap maker
Spinning-bath man
Tool-and-die maker
Viscose blancher
Welder (all around)
Yardmaster

Planographed copies of these bulletins for use by local boards can be furnished from this office on request, but to meet the expense thereof three cents in stamps should be forwarded for each copy required.

CHARLES L. PARSONS, *Secretary*

AMERICAN CHEMICAL SOCIETY
1155 SIXTEENTH ST., N. W.
WASHINGTON, D. C.

Portrait of Alexander Lowy Presented

A PORTRAIT of the late Alexander Lowy, professor of organic chemistry in the Department of Chemistry, University of Pittsburgh, since 1918, has been completed. This memorial was established by the chemistry alumni and the many friends of Dr. Lowy as a tribute to a great teacher and a great man. It is to be presented on October 30 by Alexander Silverman, head of the Department of Chemistry, to Chancellor John G. Bowman, who will receive it in behalf of the university.

National Industrial Chemical Conference

IN CONNECTION with the 1942 National Chemical Exposition, scheduled for November 24 to 29 in Chicago, a National Industrial Chemical Conference will be held. On November 25 plastics and paper will be discussed, Norman L. Shepard presiding. On November 26 there will be a joint meeting with the Chicago Section of the AMERICAN CHEMICAL SOCIETY featuring the electron microscope. On November 27 the subject will be "Food and the Relation of Food to the Chemistry of Plants and the Soil", and "The Cyclotron and Its Uses in Research", while on November 28 a Symposium on Industrial War Problems will be offered.

A continuous program of industrial movies will be shown during the exposition, and the War Production Board is preparing a special exhibit to demonstrate the reclamation and recovery of solvents, paints, oils, and by-products.



Conference on Electron Microscope

A CONFERENCE on the electron microscope is to be a feature of the National Chemical Exposition, scheduled for November 24 to 29 in Chicago, under the auspices of the Chicago Section of the AMERICAN CHEMICAL SOCIETY.

RCA is making available an electron microscope that will be set up at the exposition, with qualified attendants to explain its operation and possibilities. V. K. Zworykin is to talk on "The Electron Microscope in Relation to Chemical Research".

In addition, G. L. Clark, University of Illinois, is arranging for a conference to be held November 27 and 28 of all laboratories and research workers that at present own electron microscopes. There are some forty in use in the country, and this is the first time the research workers using them have had a group meeting to discuss their use, swap ideas on techniques, and possibly allocate fields to prevent duplication and overlapping of work. In connection with the conference an exhibit of the best micrographs made by various workers is being arranged.

Utilization of Scientific Workers in the War Effort

THE *Chemical Bulletin*, official organ of the Chicago Section of the AMERICAN CHEMICAL SOCIETY, contains in its September 1942 issue an informative article by B. E. Schaar on "Utilization of Scientific Workers in the War Effort". This discusses the governmental setup where the scientific and technical skills are most likely to be needed, listing the agencies of greatest interest to scientific workers, and gives several suggestions as to ways of answering the question "What can I do?"

Defense Activities in Minneapolis

A MIMEOGRAPHED news letter is issued monthly by the Minneapolis Defense Council, Inc.. 125 City Hall, Minneapolis, Minn. The letter for September 28 is an 18-page publication that discusses the salvage campaign, blackout tests, women's activities, the volunteer service bureau, and service men's recreation.

Correction

CHEMICAL AND ENGINEERING NEWS wishes to correct an error in the title of the picture appearing on page 1198 of the September 25 issue, which actually shows *new* members of the staff of the Central Technical Laboratory of the Armstrong Cork Co. in Lancaster Penna., and is not a photograph of the entire organization. The entire staff numbers several times the group pictured.

Fibers of Brazil

C. E. NABUCO DE ARAUJO, JR.
Caixa Postal 970, Rio de Janeiro, Brazil

THE industrial utilization of Brazilian fibers may be divided into two periods: the first includes the fibers used from the beginning of our colonization, and the second covers those utilized during the industrial period which began 20 years ago.

Cotton

Cotton was used by the aborigines and, especially due to Jesuit influence, had an important place during the colonial period. The difficulty of obtaining fabrics from Portugal encouraged the Jesuits to teach the art of weaving cotton. This development became so important that the Portuguese Government, almost three centuries later, authorized the employment of weaving experts in the first factories built in the colony.

Cotton exportation was started soon after the discovery of Brazil by Cabral and steadily increased up to the nineteenth century. Export commenced to decline soon after the War of Secession, regaining a place of prestige only after the coffee crisis in 1940. Table I shows that cotton production in Brazil in 1941 was more than four times as great as that of the 1925–29 average. With such a crop Brazil began to occupy an important position in worldly production, being exceeded only by the United States of America, India, and Russia. Fabrics made from Brazilian cotton are well known to other South American countries, which purchase more than $5,000,000 worth yearly.

Table I. Cotton Production

Year	Tons	Index
1925-29 (av.)	119,090	100
1930	95,486	80
1931	112,789	95
1932	76,416	64
1933	151,253	127
1934	284,604	239
1935	297,306	250
1936	351,543	295
1937	405,543	341
1938	448,700	377
1939	475,000	398
1940	468,695	393
1941	521,600	438



Cutting and sun drying sisal in the state of São Paulo

Other Textile Fibers

During the last 20 years progress in rayon production has been considerable, especially the utilization of native raw material, cotton linters. From 32 tons in 1926, production reached approximately 8,000 tons in 1941, manufactured by three factories at São Paulo; prospects are that this figure will increase in the next few years. Rayon is made by the cellulose acetate, viscose, and nitrocellulose processes. The Brazilian Government is encouraging natural silk growing by the creation of experimental centers of sericulture in several states. The extraordinary possibilities of sericulture in the Amazon Valley are known, where one culture of silkworms per month or 12 per year are possible. Brazil produces about 900 tons of cocoon and 100 tons of raw silk per year.

Linen is now widely cultivated in the states of Rio Grande do Sul and Paraná. In Rio Grande do Sul it is grown especially for its linseed oil content, whereas in Paraná it is utilized by the spinning and weaving industry founded by European settlers.

Wool production has also reached a high level during the last 30 years. The number of sheep has increased threefold, and today we are producing approximately 18,000 tons of wool. About one third is consumed in the domestic market. Wool production in Brazil is exceeded in South America only by Argentina and Uruguay.

Indigenous Coarse Fibers

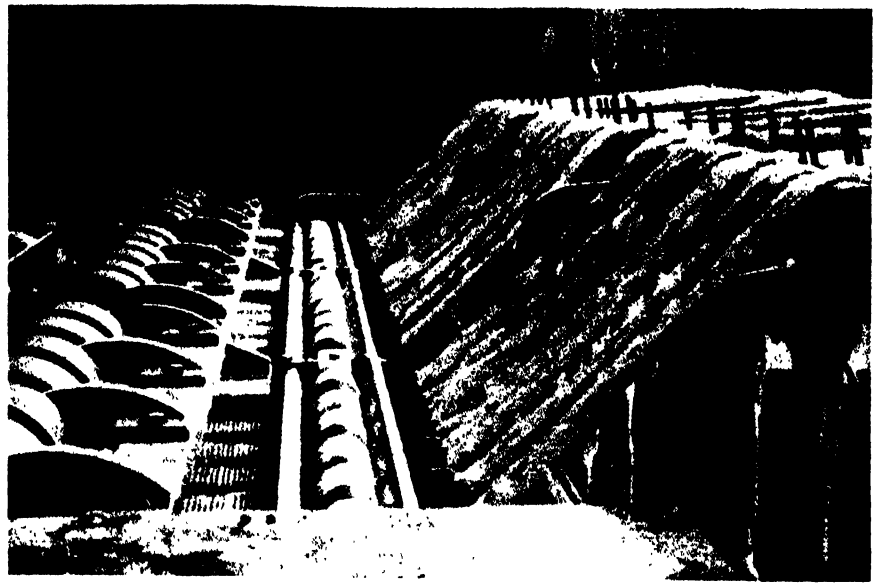
The most interesting fibers for this study are those which have been utilized recently for the manufacture of bags, rope, cord, string, hawser, fabric, etc.

Piaçava (*Attalea funifera* Mart.) is ob-

tained from a wild tree which grows abundantly in the state of Baía. Another variety (*Leopoldina piaçaba*) is found in the Amazon Valley, in Maranhão, and in the Tocantins River valley. The fiber found in Baía is harder and longer, and is generally preferred for the manufacture of brooms, carpets, brushes, and cords. However, there is no cultivation or systematic planting of this palm tree. The mesocarp of the Amazon variety has a nutritive value similar to that of the babaçú. Brazil produces approximately 7,000 tons of piaçava per year, of which 5,000 tons or 70 per cent is exported.

Among fibers recently utilized industrially, caroá *Neoglaziovia variegata* Mez is important. Research carried out in the United States and in Brazil has demonstrated the strength of this fiber for use in several products, including paper. Caroá is found in large quantities in most of the northern states of Brazil, from Baía to Piauí. It grows in a dry warm region of more than 8,000,000 hectares and may be considered a Brazilian plant, since there seems to be no reference to it in any other country. It used to be harvested by the most primitive processes. However, more modern methods are avoiding the wastage of smaller leaves of the shorter fibers, the industrial utilization of which is being steadily improved. Caroá fiber has an average moisture content of 9–11 per cent, approximately 70 per cent cellulose (of which more than 67 per cent is alpha-cellulose), 12 per cent woody matter, and the balance soluble material. Caroá is composed chiefly of lignocellulose. The fibers are not uniform and have a yellowish color.

Caroá has been largely employed as a substitute for jute and in the manufacture of rope, string, tarpaulins, carpets, and paper. Lately, caroá has been blended with cotton in the manufacture of summer fabrics. Bags made with caroá are lighter and more resistant and have a better appearance than similar ones prepared with Indian jute. Cocoa, castor seeds, and more recently coffee are almost exclusively exported in caroá sacks. The residue left after the separation of the caroá fiber is used as cattle fodder.



Treatment of caroá fiber at Caruaru, Pernambuco

Caroá can be harvested at any season. It is defibered by appropriate machinery, sent to the dryers, and baled for spinning. Mucilaginous and agglutinating substances are separated by mechanical and chemical processes, leaving the fiber ready for spinning. The fiber later goes to the beaters and smoothers, is treated by an oil-water emulsion, and is cut and carried through combers, carders, stretchers, and twisters, before spinning. The construction of a large factory for the production of cellulose is under study, with the purpose of utilizing the residues of decortication. Light and thin papers used in air mail correspondence and in copy books are now being manufactured; it is planned to make also thicker paper, as well as cardboard, cloth, paper bags, etc.

In 1941 the production of caroá fiber reached about 5,000,000 kg. In 1943, with the installation and operation of more than 2,800 machines to separate the fibers, production is expected to reach more than 10,000,000 kg.

The papoula de São Francisco or Brazilian hemp (*Hibiscus ferox*, *Hibiscus radiaturas* Cav., *Hibiscus unidens* Linn., all similar to *Hibiscus cannabinus* L.) grows on the banks of the São Francisco River which winds through the states of Minas Geraes and Baía. Recent plantations have been started in the state of São Paulo. It is a wild plant which is easily cultivated on siliceous-argillaceous land. The fiber is being used to a small extent in the manufacture of string, rope, cord, and sacking. Its seeds produce a drying oil which can be used in paint and varnish. Papoula de São Francisco is composed chiefly of lignocellulose. The fibers are uniform and yellowish in color. They contain 73–77 per cent cellulose, 10–11 per cent moisture, 0.5–1 per cent ash, the balance being impurities.

Guaxima or uacima are the usual names given to certain plants of the Malvaceae Esterculiaceae, and Tiliaceae families. The most important, however, the malva violeta (*urena lobata*, L.) and malva veludo (*Pavonia malacophila*), are found in the northern part of Brazil in São Paulo. The fiber of these plants is being used, without mixture with any other fiber, in the manufacture of bags, cord, rope, string, fishing lines, etc. Malva violeta is also known as aramina in São Paulo; malva veludo is called "carrapicho" in northern Brazil. Carrapicho is native to Baía and Pernambuco.

The fibers of all types of guaxima are uniform and are whitish yellow in color. They are also composed chiefly of lignocellulose—65–73 per cent in the *Urena* types and 75–77 per cent in the *Pavonia* types. Moisture varies from 11 to 14 per cent and the ash content, from 0.2 to 0.5 per cent.

Tucum is a palm tree which yields an excellent fiber and is especially suitable for fish nets because of its extraordinary resistance, flexibility, and durability. Its nuts yield an oil similar to olive oil. The residue left after extraction of the oil is



Sun drying papoula de São Francisco fiber

Table II. Properties of Fibers

Fiber	Botanical Name	Tensile Strength, Grams		Elasticity, Mm.		Torsion Resistance, No. of Twists		Moisture, %	Regain, %
		Dry	Wet	Dry	Wet	Dry	Wet		
Caroá	*Neoglaziovia variegata* Mes.	254.94	194.72	1.342	8.720	154.89	211.69	10.86	12.19
Papoula de São Francisco	*Hibiscus cannabinus* L.	118.40	44.67	0.873	...	89.10	111.95	11.79	13.35
Guaxima	*Urena lobata* L.	134.19	99.61	0.858	0.931	65.00	72.38	13.50	15.60
Tucum	*Bactris setosa* mart.	209.38	218.00	2.074	2.124	199.89	236.08	9.74	10.80
Malvalistro	*Sida micanthra* St. Hil.	121.68	110.72	0.689	0.694	54.39	67.61	12.51	14.31
Macambira	*Bromelia laciniosa* Mart.	417.80	388.60	1.631	1.928	98.34	139.16	11.79	13.37
Linho da Nova Zeelandia	*Phormium tenax* Forst.	442.00	373.40	1.678	1.135	55.25	66.45	12.21	13.92
Pita	*Fourcroya gigantea* Vent.	299.00	288.70	2.388	3.625	79.58	162.38	10.83	12.14
Espada de S. Jorge	*Sansevieria* sp.	357.40	315.10	1.958	2.400	147.88	190.26	11.29	12.74
Canhamo de Sunn	*Crotalaria juncea* L.	150.10	159.27	0.979	0.939	70.99	102.27	10.02	11.16
Abacaxí	*Ananas sativus* Lind.	95.50	61.54	1.047	4.553	194.68	253.52	12.73	13.86
Quiabeiro	*Abelmoschus esculentus* L.	288.86	233.78	0.653	0.814	48.53	47.37	10.00	11.14
Juta dos Parintins	*Corchorus capsularis* L.	68.00	38.70	0.598	0.722	65.49	62.98	12.93	14.50
Sisal	*Agave sisalina* Perrine	1379.00	659.00	3.730	3.466	84.52	110.04	10.48	11.71

used as cattle feed. These trees belong to the *Bactris* and *Astrocaryum* genera; the most important is *Bactris setosa* Mart., a thorny plant about 3 meters high with thorny and fan-shaped leaves 2 meters in width.

The chemical composition of tucum fiber is similar to that of the others described. It is chiefly lignocellulose, and is uniform and greenish in color. About 10 per cent moisture, 1–2 per cent ash, and 81 82 per cent cellulose make up tucum fiber.

Ramie cultivation has recently been started by farmers in the Amazon Valley. It is the only fiber comparable in resistance to tucum. However, ramie has not yet been industrially utilized, although it has been mixed with jute and other Brazilian fibers in the manufacture of bags and cords. Ramie consists mainly of cellulose, water, and natural impurities; the individual fibers are about 25 cm. in length.

Curauá (*Bromelia sagenaria* A. da C.), paco-paco (*Psendabutilon spicatum* H. B. K.), and malvalistro (*Sida micratha* St. Hil.), also known as malvaiso or malvapreza, are wild plants. The first two grow in the northern states from Ceará to Pará, and the latter grows in central and northern regions. Macambira (*Bromelia laciniosa* Mart.) is also found where caroá grows—i. e., the north where fibers of the plants generally known as gravatás are encountered. The fiber of these species is commercially exploited only on a small scale. However, the adaptation of these species to industrial uses has been demonstrated by technical research. Malvalistro fibers are very uniform, have a good tensile strength and a golden yellow color. The fiber is composed of 61–65 per cent cellulose, 0.5–1.5 per cent ash, and 11–12 per cent water, besides natural impurities. Macambira has a yellow color, and is composed of about 70 per cent cellulose, 0.5–1 per cent ash, and 11–12 per cent water. Both fibers are lignocellulose in nature.

Paco-paco is similar to malva laranja (*Wissadula* sp.), and its fiber is composed of lignocellulose with about 73-74 per cent cellulose, 0.5–0.7 per cent ash, and 12–13 per cent water. The fibers are uniform and white, and have good tensile strength.





New Zealand Flax

Foreign Fibers

Farmers of the Amazon valley have tried to cultivate not only ramie but also Indian jute. No practical results were obtained from seeds secured in either São Paulo or from Japan. The following year,



Cutting papoula de São Francisco

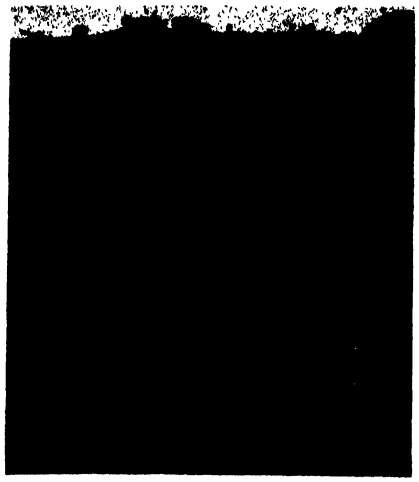
seeds from India were employed, but the fiber produced did not show the same characteristics as the Indian product. In 1934 some good samples of *Corchorus capsularis* were raised. Since then plantations have been gradually improved, and a crop of about 400 tons of fiber is expected this year.

"Juta dos Parintins" is the name given to the jute obtained in the Amazon valley. Brazilian jute is similar in composition to that from India. The fibers are very uniform and have good tensile strength. With a whitish yellow color, the fibers contain 71–72 per cent cellulose, 12–13 per cent water, and about 0.7 per cent ash.

Another foreign fiber which has grown well in some Brazilian soils is sisal (*Agave sisalina* Perrine). The best results have been obtained in Baiá and Paraíba. Sisal is being mixed with other native fibers in the manufacture of binder twine, cord, and rope. Brazilian sisal fiber is uniform but harder and less flexible than other native fibers. It is composed of about 70–71 per cent cellulose, 1–1.5 per cent ash, and 10–11 per cent water.

Some of the properties of fibers cultivated or native in Brazil are given in Table II.

A recent government decree has made it obligatory to use native fibers in the manufacture of burlap bags, rope, string, cord, and various fabrics. This is contributing to the industrialization of a great



Caroá plantation in the state of Pernambuco

variety of native fibers and thus enabling the country to become independent of importations of these products.

Brazil is also exporting to other South American countries, not only the raw fibers but also fabrics produced locally, as well as some clothes in which caroá and other native fibers are mixed with cotton as raw material.

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(2) Ministry of Foreign Affairs, "Brazil 1940–41".
(3) Ministry of Labor, Industry, and Commerce, various bulletins and folders.
(4) Nabuco de Araujo, C. E., Jr., "Desenvolvimento industrial do Brasil", 1941.

Atabrine in Mass Production

ATABRINE, substitute for quinine, is now being produced at the rate of about a half billion tablets per year, according to Science Service. High-speed laboratory machines are spewing tablets of the bright yellow crystals at an ever-increasing rate.

Known chemically as quinacrine hydrochloride, atabrine has been admitted to the new edition of the U. S. Pharmacopoeia. Supplies of chemicals to make the medicine are reported as adequate for our needs, and as production goes up, cost goes down.

Reclaimed Rubber Tires for Civilians

THE B. F. Goodrich Co., Akron, Ohio, has announced that from a technical and manufacturing standpoint the rubber industry can provide the country's motorists with the replacement tires they need, using available reclaimed rubber and other materials being produced under the government program. Factories are prepared to produce the tires as soon as permission from Washington is received.

The Chemist's Chance—But Is the Chemist Ready?

MAY I contribute a little wind to fan the flame which Mr. Eisenschiml kindled in the March 25 issue of CHEMICAL AND ENGINEERING NEWS (page 368)?

I most heartily agree with Mr. Eisenschiml that the chemist's chance has arrived but I am not thoroughly convinced that the rank and file of the profession are prepared for the mountainous task facing us. It is my opinion that the parable of the "Ten Virgins" applies to chemists today (see Matthew, Chapter 25, verses 1 to 14, inclusive). However, most of us should be classed with the five foolish and not the five wise. We have not provided ourselves with the "essential" oil which it takes to make our light shine when the bridegroom arrives.

Why do I take this point of view? Not because I am one who stands as a success in the profession, for I am only a "mine run" chemist. I thoroughly believe that the chemist does not apply the same keen analytical ability to his personal problems that he applies to technical problems. Most of us assume that we are very important to the general welfare of society which is probably true. But most of us are employed by practical businessmen who are in business to make money and not for the general welfare of society.

More than 20 years ago I sat in a general meeting of the AMERICAN CHEMICAL SOCIETY at Chicago and listened to Mr. Wilson, president of Wilson and Co., the great meat packers. Mr. Wilson made one remark which angered me and kept me angry for several years. But that remark of a mature and highly successful businessman which angered me as a youth has given me hope in maturity. Mr. Wilson's statement was, "You chemists will have to learn the businessman's language because he won't learn yours". Even a generation ago we had flaming youth, and I certainly flamed white hot at the idea that I should have to learn to be a businessman so that I could do my job as a chemist. But years of experience and observation have taught me the wisdom of his words. Chemistry, today, is big business—tremendously big business—and the chemist who has not caught the meaning of a "chemical age" in the terms of practical business has nothing but the laws of chance to depend upon for his personal success. May I say from my own personal experience that the rare occasions in my life when that will-o'-the-wisp called success has flitted in my vicinity it has been when I was able to correlate what little I knew about useful chemistry and practical business into a hard-headed business deal which either made or saved the company money. In this connection I think of chemists like Dr. Burton (Standard Oil of Ind.), Dr. Baekeland and Mr. Redman of Bakelite fame; also, A. B. Davis of Hilton-Davis Co. and a few others. Yes, my colleagues, I am thoroughly convinced after more than 20 years of investigating Mr. Wilson's statement that he was correct. The chemist must learn the businessman's language and he must learn it with astounding rapidity if he is to acquire the place in the sun which he desires for himself and his profession.

There has been much discussion of the differentiation between the routine analyst or chemical technician and the chemist or chemical technologist. Perhaps it is a bit disconcerting to most of us who call ourselves chemists, but it is none the less true, that before one can emerge from analyst to chemist he must learn the meaning of the results he is turning out daily in terms of their utilitarian value to the industry and to the particular phase of the business involved. Being an analyst is only one phase of being a chemist, a pertinent fact many chemists have ignored.

Only a few days ago I was rummaging in a second-hand book store in search of a used set of the textbooks supplied by the Alexander Hamilton Institute for their course in modern business administration, when I noted on the shelves two books on Abraham Lincoln by our own Otto Eisenschiml. Why do I mention this? Only to illustrate my next point that success in chemistry involves writing or authorship. It may be papers on one's own research but for the most of us it resolves itself into expressing some simple chemical fact in clear, concise, and entertaining language so that business executives and engineers can read, will read, and after reading will take action! That takes literary ability of a rare and convincing nature.

The chemist must be a convincing and an entertaining speaker. To succeed in modern industry he must have the silver tongue of the late William Jennings Bryan and the chemical astuteness of Louis Pasteur or Michael Faraday, both of whom founded professions.

The Apostle Paul once said, "I am all things to all men". No doubt he was the Biblical prototype of the modern chemist who must be analyst, businessman, author, orator, salesman, and, as all chemists learn sooner or later, plumber, pipefitter, carpenter, mechanic, baker, beggar, candlestickmaker.

This is the only way except luck by which a man can become a chemist in this day of swift-moving events. The man who is not willing to make of himself a polygon of achievements will probably not go very far as a chemist but he will be a howling success as a bellyacher.

H. E. CORY

5535 MADISON AVE.
INDIANAPOLIS, IND.

September 14, 1942.

Developments in Lake Texcoco

ALICE R. GERSTEL, Calzada Villalongín 158, Mexico, D. F., Mexico

When in 1520 Hernán Cortés, the conqueror, reached the Valley of Anáhuac, 7000 feet above sea level, he found the Aztec capital Tenochtitlán—today Mexico City—built on numerous islands within an enormous lake. In this lake many of his Spanish soldiers drowned when attacked by the Aztec warriors, and with the soldiers were lost the rich legendary treasures of Moctezuma, the king whom they had "conquered".

Lake Texcoco, an inland sea without outlet and enclosed by mountains on all sides, then covered a great part of the upland valley. During the intervening centuries the lake shrank more and more; at the end of the past century it covered about 44 square miles. As the lake receded, the city encroached upon the lake, and during the rainy season the outlying districts were frequently flooded. To eliminate this danger, the government decided finally to carry out the age-old project of Netzahualcóyotl, King of Texcoco, to drain the lake. In 1900 the tunnel of Tequixquiac, 7.5 miles long, was built, and a great part of the lake drained into the Salado River, affluent of the Tula River which discharges into the Moctezuma, then into the Panuco, and finally into the Gulf of Mexico.

Popular belief had it that the lake was drained to recover the drowned treasures of Moctezuma, but as waters receded the lake surrendered no treasure and not even fertile land on which to grow crops, for the soil was highly alkaline.

Although the danger of flood was eliminated, a new danger arose. Every year during the spring months, just before the beginning of the rains, wind storms would swirl clouds of dust over the city. Water supplies became infected, and for days on end the natives felt the grit of the contaminated dust between their teeth and in the bloody spume many coughed up.



Above. Air view of the *Caracol*, showing the snail-like construction and the colors in the different ponds. *Below.* Concrete walls separating the ponds of the *Caracol*

Present Status

Unsettled conditions during the first decades of the century prevented attempts to do away with the new and remnants of the old danger. In 1936 President Cárdenas started an enormous development with the aim of solving several problems together: (1) satisfactory flood protection for the City of Mexico, (2) elimination of dust storms, (3) increased economic and cultural standard for the 50,000 natives from the lake villages who lived miserably on fishing and wild duck hunting, (4) improvement of 70,000 acres of alkaline barren lands, and (5) exploitation and utilization of enormous amounts of salts contained in the water and the subsoil. The purpose of this latter plan was to create an industrial center to produce caustic soda, soda ash, potash, sodium sulfate, and borax, and eliminate imports of these chemicals, amounting to 100,000 tons per year.

Today with more than $3,000,000 invested in the development, much has been accomplished. Twenty-seven thousand acres of the total surface of the lake have been reclaimed. Of these, 750 acres have been planted with 1,500,000 trees, mostly eucalyptus which are noted for their ability to thrive in alkaline soil. Poplars and other types of trees are planted also, and rich meadows are springing up. Now under cultivation are 3,700 acres, growing crops of corn, wheat, oats, barley, sorghum, beans, sunflower, soybeans (a novelty in Mexico), and fodder beets. More than 25,000 acres have been trench-ploughed, raked, and leveled.

There are two problems in reclaiming the land for farm use. The first involves draining the salty water, and the second, a supply of water for irrigation. Construction of 6,800 miles of subsurface drains is taking care of the first problem. There are 279 miles of surface drains, into which the subsurface drains discharge; the surface drains discharge into canals which, in turn, feed into a main canal 21.7 miles long, and this leads to the *Caracol*, a solar evaporation basin.

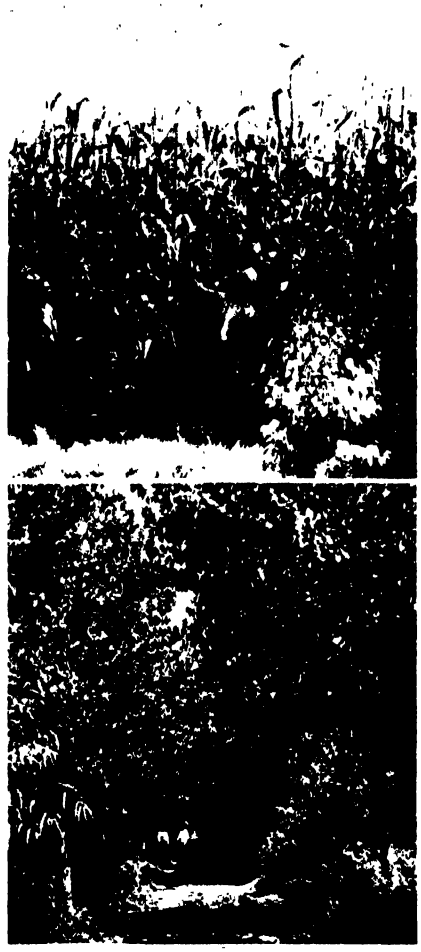
For the irrigation of the reclaimed lands, more than fifty artesian wells with a total depth of 18,000 feet have been sunk.

The waste waters of Mexico City are also being used through a sewer canal; and the Unido and the Guadalupe Rivers have been diverted into the area, the flow being controlled by two main and eight secondary intakes. All of the canals are provided with locks to regulate flow. There are also two distributing ponds, controlled by four irrigation pumping plants with a capacity of 18,000 gallons per minute. Another 756-horsepower pump with a capacity of 90,000 g. p. m. also provides water, and there is an auxiliary plant, mounted on a boat, with a 60-horsepower pump and 4,500 g. p. m. capacity.

Salt Plant

The experimental salt plant is in charge of Hermion Larios, a member of the AMERICAN CHEMICAL SOCIETY. José L. Favela is head of the whole development, called "Works of the Valley of Mexico"; he conceived most of the general plan and directed its execution. Mr. Larios is the inventor of the *Caracol* (snail), a storage basin for solar evaporation completed only a few months ago, which owes its name to its snail-like form. It is a huge canal about 12 miles long running between walls of concrete slabs; it circles from an outer spire, which serves as a storage tank, in spiral form to the center. The waters of the *Caracol* cover 2,025 acres, and it has a total evaporation capacity of 78 inches. Rainfall averages 27 inches per year, so that the effective evaporation of the *Caracol* becomes 51 inches. This ingenious salt work, unique in the world, has a total evaporation capacity of 10,000,000 tons of water per year.

To protect the levees against the force of the waves, 41 miles of concrete slabs have been used to cover them. These

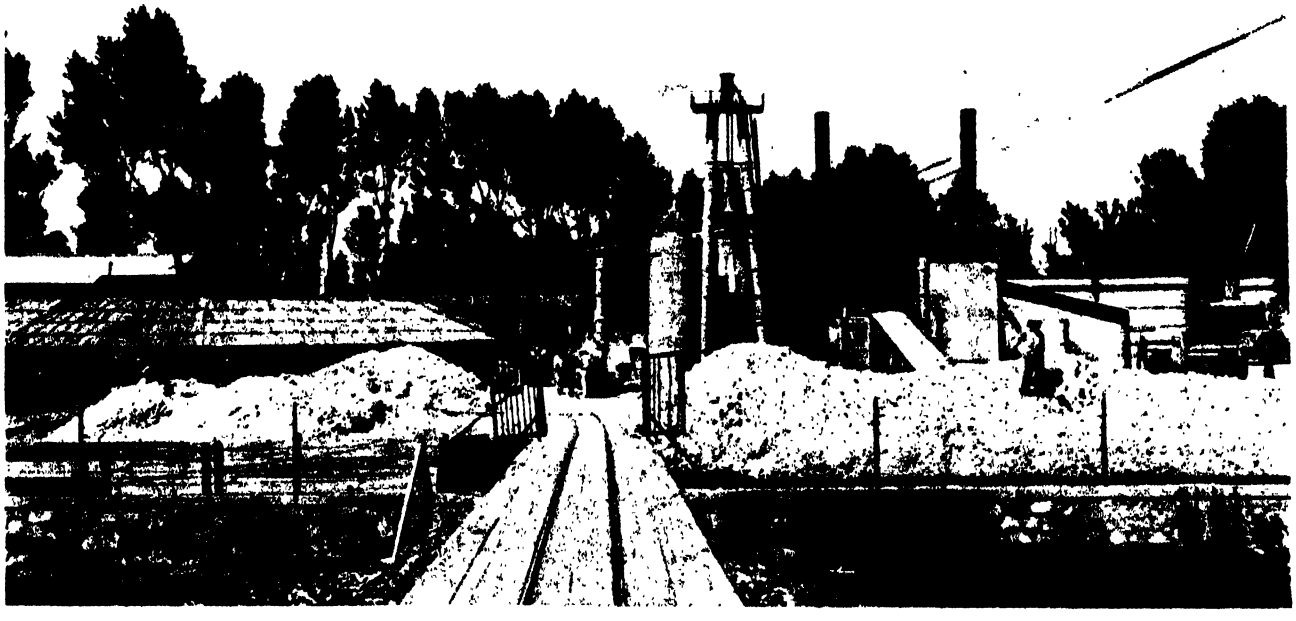


Corn (above) and Eucalyptus growing on land reclaimed from the highly alkaline Texcoco Lake

slabs separate the winding waters of the *Caracol* into various ponds, connected with one another by small subterranean outlets 24 inches in diameter. The water that comes into the *Caracol* from the main salt canal takes one year to reach the center of the basin. The difference of level between the outer spire and the center is 7.8 inches, and the water moves by gravity without need for pumping or siphoning. The difference in concentration, as well as the various kinds of organic matter settling on the bottom, gives the waters in the subsequent spirals different colors which vary from light gray and clear green to dark muddy brown in the center, where the viscosity is highest.

The amount of salts obtained by the solar evaporation system depends upon the initial concentration of the water entering the *Caracol*. Actually there are about 10 kg. (22 pounds) of salt per cubic meter of water in the outer spiral, and 300 kg. (660 pounds) per cubic meter when the water leaves the center and goes to the crystallizers. Thus the concentration achieved during the evaporation is thirty fold. The main canal first brings the water into a sump and thence it is fed into the first spiral of the *Caracol* by a pumping plant of 480 horsepower and 43,500 g. p. m. capacity.

In addition to the main canal that brings the brine to the *Caracol*, 47 wells also collect salt water; each has a depth of 66 feet. This will eventually increase the quantity of salts available. Once the reclamation of the remaining barren lands (about 27,000 acres) is completed, there will be, says Mr. Larios, salts for some 1500 hundred years still in the subsoil. As the subsoil solutions have a higher concentration, the production of salts by the *Caracol* system will also increase. The *Caracol* is continuous in operation and has an average capacity of 100,000 tons per year. It can hold many million tons of salts in case it is not run to capacity. In July 1942 the *Caracol* held about 100,000 tons of salts, representing approximately $5,000,000. The salts in the *Caracol* are concentrated to the saturation point, are pumped into a



Experimental plant Netzahualcóyotl on Lake Texcoco with piles of trona in the foreground

5,600-foot canal, and from there go to the 20 crystallizers with sun evaporation. These crystallizers cover a surface of 1356 square yards each. When crystallized, the salts are provisionally stored in huge tight cones in the open air; in the Mexican landscape among palms and eucalyptus trees these resemble incongruous heaps of snow.

From the crystallizers the salts are transported in wagons to the plant Netzahualcóyotl. This plant is small and primitive, and was not intended for commercial production but only for scientific experiment. Consequently the processing is not carried out with an eye to efficiency. Nevertheless the plant pays its own expenses by processing about 20 tons of salts per day. The salt is roasted, dissolved, filtered, recrystallized, and centrifuged, and is being sold as sodium decahydrate carbonate to various soap factories at about $50 per ton. The plant is mainly concerned with the methods of salt separation, and produces carbonate of 99 per cent purity and raw carbonate of 80–90 per cent purity; this latter is used as such or transformed into caustic soda elsewhere.

Future Capacity

Several projects for the exploitation of these enormous salt riches have been discussed. The *Caracol* contains sufficient salts to warrant great industrial development. The 100,000-ton salt capacity represents the entire consumption of Mexico. If other countries eventually became consumers, the *Caracol* could be amplified or another one built, and the higher initial concentration of the subsoil salts would also increase the capacity.

After the saturation of the brines, the separation of the salts can be performed by various systems: solar evaporation, carbonation, freezing, and steam evaporation (as used by the American Potash and Chemical Corporation). Official figures claim that the actual capacity of the *Caracol* is about 20,000 tons of caustic soda, 13,000 tons of sodium carbonate, 6,000 tons of potash, 2,000 tons of sodium sulfate, and 2,600 tons of borax, representing a total commercial value of about $3,500,000 per year, besides 50,000 tons of sodium chloride which actually has a market price of about $17 per ton.

The consumption of salts in Mexico is relatively high. The glass factory Vidriera Monterrey consumes about 13,000 tons of sodium carbonate a year. The entire country consumes 16,000 tons of caustic soda. Caustic soda is one of the items most needed. With the scarcity of this and similar chemicals and the growing industrialization of Mexico and Latin America as a whole, projects for exploitation of the *Caracol* seem commercially promising. So after hundreds of years, the popular belief may come true. The mysterious lake may finally surrender its treasure; however, it will not have the splendor of gold and diamonds but the cool sober gleam of salt crystals.

Rubber Substitute from Dairy By-Products

EXPERIMENTS in the development of a rubberlike substance from by-products of dairy processors have been carried out for some weeks by scientists of the National Dairy Products Corp. The B. F. Goodrich Co. has carried on developmental work looking toward practical utilization of the product. The work done to date has been examined in detail by officials of the War Production Board.

At present the process is still in the test-tube stage. Experiments carried out thus far give some reason to hope that material suitable for recapping tires might eventually be developed in this manner.

The War Production Board has expressed interest in the process. The National Dairy Products Corp. is building a pilot plant with its own funds. No estimate of the final uses of this project, or of the tonnage which might possibly be produced, can be made until these steps have been taken.

Antitrust Prosecutions Postponed

PROSECUTIONS of 21 chemical companies and 65 of their officials upon charges of violating the antitrust laws are to be postponed until after the war. The charges were contained in six separate indictments returned by a Federal Grand Jury sitting at South Bend on June 26, 1942, citing illegal restraints of trade in the manufacture and sale of formic acid, sulfuric acid, oxalic acid, chromic acid, muriatic acid, and bichromates of soda and potash. All these chemicals, the indictments stated, are essential in the war program, and the major part of the domestic output is controlled by the defendant companies.

The Acting Secretary of War and the Acting Secretary of the Navy stated in letters to the Attorney General that, in their opinions, the trial of these cases at this time would seriously impair the war effort. In accordance with the procedure established by the President on March 20, 1942, the Attorney General agreed to petition the court for a postponement of the trials until after the war.

New Transparent Plastic

THE development of an entirely new transparent plastic having many times the abrasion resistance of other clear plastics has been announced by the Columbia Chemical Division of the Pittsburgh Plate Glass Co., Pittsburgh, Penna. Because of priorities and other restrictions, however, this new plastic is not yet in commercial production, and is not expected to be available for any but experimental purposes for several months.

The new plastic, called C. R. 39, is one of a group of resins resulting from many years of research activity. It does not dissolve in acetone, benzene, toluene, alcohol, gasoline, or any of the common solvents. Its resistance to abrasion is 10 to 30 times greater than other clear plastics. It retains its shape even when exposed to high atmospheric temperatures and can be formed into large sheets, either clear or laminated, by the application of extremely low pressures. In transparent sheets its strength, weight, clarity, and impact resistance are comparable with other transparent resins.

In its primary form C. R. 39 is a clear, low viscosity liquid which, in the presence of a catalyst and heat, hardens into a crystal-clear solid. Layers of fabric, paper, and the like can be impregnated with the liquid material and cured under low pressure to form sheets or shaped objects with a minimum of expense for tooling.

Chemical Collections for New York Fund

J. J. LINCOLN., sales manager of the Air Reduction Co., and chairman of the chemical section of the Greater New York Fund's 1942 campaign reports that the section so far has collected $49,998, $44,995 of which was given by firms.

Data Published on Selective Service

BECAUSE of the wide interest in this subject and the need for obtaining trained men for our Production Army, we give below references to information we have published on occupational deferments, including those of men in training, and the need for technically trained persons. Future developments will be brought to the attention of our readers.

Chemical Engineering News

(NEWS EDITION previous to 1942)

Vol. 18 (1940), pages 890, 1127
Vol. 19 (1941), pages 129, 311, 457, 459, 489, 520, 587, 681, 797, 1164, 1412, 1464
Vol. 20 (1942), pages 110, 157, 472, 579–80, 788, 812, 837–39, 985, 1099, 1100, 1219

Current issue, page 1294

Industrial and Engineering Chemistry

Vol. 33 (1941), pages 1, 135, 283, 561
Vol. 34 (1942), pages 2, 131, 259, 648, 1134.

POTOMAC POSTSCRIPTS

Price Regulations

UNIFORM licensing and registration provisions for distributors of chemicals have been written into 14 maximum price regulations and schedules by the Office of Price Administration. Supplementary Order 11, issued August 6, made distributors of the products covered by these 14 schedules subject to licensing and registration provisions but excluded all retail sellers from its scope, leaving them subject to the licensing and registration provision of the General Maximum Price Regulation. The new amendments write these provisions into each of these schedules for informative purposes. The provisions automatically grant a license as a condition of doing business. Courts may suspend the license of a person who, after a warning from OPA, violates a price regulation.

The amendments apply to the following schedules and regulations:

Amendment 1 to Revised Price Schedule 21—Formaldehyde.

Amendment 1 to Revised Price Schedule 31—Acetic Acid.

Amendment 1 to Revised Price Schedule 34—Wood Alcohol.

Amendment 3 to Revised Price Schedule 38—Glycerine.

Amendment 3 to Revised Price Schedule 42—Paraffin Wax.

Amendment 2 to Revised Price Schedule 78—Oxalic Acid.

Amendment 3 to Revised Price Schedule 79—Carbon Tetrachloride.

Amendment 3 to Revised Price Schedule 80—Lithopone.

Amendment 2 to Revised Price Schedule 98—Titanium Pigments.

Amendment 1 to Revised Price Schedule 99—Acetyl Salicylic Acid.

Amendment 1 to Revised Price Schedule 103—Salicyclic Acid.

Amendment 1 to Maximum Price Regulation 179—Pine Oil.

Amendment 2 to Maximum Price Regulation 191—Cotton Linters and Hull Fibers.

Amendment 1 to Maximum Price Regulation 192—Imported Cresylic Acid.

Agricultural Insecticides and Fungicides. The OPA has acted to bring into appropriate relationship ceiling prices for agricultural insecticides and fungicides, which are governed by two regulations: The General Maximum Price Regulation, which covers sales by manufacturers and wholesalers to dealers, and Maximum Price Regulation 144, which covers retail prices including sales by manufacturers and wholesalers directly to consumers.

In the new amendment to Regulation 144, the Price Administrator readjusts the ceilings over manufacturers' and wholesalers' sales to consumers so that these prices, in keeping with customary trade practice, will be the same or slightly higher than the maximum prices that may be charged on sales to dealers. The method originally provided for persons, other than manufacturers, selling only at retail is retained.

The amendment provides that a manufacturer or wholesaler selling insecticides and fungicides to consumers shall establish his maximum price by adding his typical differential for this class of sales to his maximum price to dealers. This differential in dollars and cents between his price to dealers and consumers is the one the seller observed during the month in which he delivered to consumers of the same class the largest quantity of a particular insecticide in the 12-month period ending March 31, 1942.

Chemical Woods. To ensure an adequate supply of saw or veneer mill wood wastes in wood distillation plants producing methanol, acetic acid and charcoal, the Office of Price Administration has freed sales of these so-called "chemical woods" from price control. Approximately 75 per cent of chemical woods already are exempt from the General Maximum Price Regulation, while saw or veneer mill wood wastes have been temporarily excepted in Amendment 22 to Supplementary Regulation 1. The new action, contained in Amendment 31 to Supplementary Regulation 1, under the General Maximum Price Regulation, makes this exemption of veneer and saw wastes permanent and of general application. The amendment went into effect October 13.

The exemption will not have any effect on the general price structure as the mill wastes are such a small factor in the distillation plants' total cost of production that any increased costs for these materials can be absorbed easily.

Ethyl Alcohol. To aid WPB efforts to increase production of high proof ethyl alcohol, a special pricing formula has been issued for the relief of whisky distilleries which are converting their facilities to the production of industrial alcohol.

The pricing formula, contained in Amendment 2 to Revised Price Schedule 28, is intended to provide relief to whisky distilleries which have converted to the production of 188 proof or higher ethyl alcohol and whose costs of production during the initial stages of production may be abnormally high. This amendment, effective September 23, 1942, gives such converted distilleries the choice of selling industrial alcohol at the maximum prices prevailing or at the maximum prices computed pursuant to the formula contained in the amendment.

Sales of ethyl alcohol of 188 proof or higher, commonly known as industrial alcohol, by the Defense Supplies Corp. to the Government, its agencies, or any person using the alcohol to fulfill a government contract are exempt from the provisions of Revised Price Schedule 28, the specific regulation governing certain formulas of the product, and from the General Maximum Price Regulation.

All industrial alcohol under the control of the WPB is to be allocated to the Defense Supplies Corp. for purchase, and this agency either will sell the alcohol for war needs or store it as a stockpile.

Fats and Oils. Specific dollars-and-cents prices have been established on wool grease, raw soap stocks, recovered or acidulated soap stocks, distilled fatty acids and stearic and oleic acids. Previously, under Revised Price Schedule 53 (Fats and Oils), these articles had ceilings represented either by their October 1, 1941, price or 111 per cent of their November 26, 1941, price, whichever was higher. The new specific ceilings set in Amendment 11 on wool grease and Amendment 12 on the other products, reflect the *average* of such previous ceilings.

This latest OPA move follows the general policy of eventually replacing ceiling prices for some 125 major fats and oils, initially established by the freeze technique, with specific industry-wide maximums. This previously has been done in cottonseed oil, corn oil, peanut oil and many other important fats and oils. Specific ceiling on crude dry centrifugal wool grease, has been set at 20 cents per pound for carlots f. o. b. producer's plant in returnable drums. This reflects the average price on the freeze dates. There was a considerable disparity between individual ceilings on processed wool grease on those dates under the freeze technique, due to differences in inventory or raw material buying policies of the various wool grease merchandisers. This will be eliminated by the new amendment which sets a uniform price. Ceiling prices also are set on other grades and varieties of wool grease. The new maximums are established in Amendment 12 for such raw soap stocks as cottonseed foots, corn foots, and soybean foots. Ceiling on tallow fatty acids, delivered in tank cars in the east, is set at 12 cents per pound. Maximums on soybean fatty acids from foots, soybean fatty acids, from crude, corn fatty acids, and peanut fatty acids are based on studies made by OPA. In each case the produce has been allowed average actual costs, plus $^3/_4$-cent per pound margin. Ceiling price of $15^7/_8$ cents per pound for double pressed stearic

acid, delivered east of the Rockies in carloads in bags is approximately the average maximum under the previous ceilings. Oleic acid ceilings are set at approximately the average at which most sellers did business during the freeze dates.

Fertilizers. Amendment 3 to Maximum Price Regulation 135 by the OPA clarifies the method to be followed in establishing maximum prices for new grades of mixed fertilizers, superphosphate and potash, as well as certain changes in the requirements regarding terms of payment.

Ceiling prices for the fertilizers governed by the regulation are established on the basis of the seller's "average prices" or "schedule prices" in effect during the base period, February 16 to 20, 1942. Where a fertilizer cannot be priced by this method the published price of any manufacturer during the same period is applicable. In the case of a new product or grade not marketed during the base period, the measure provides that the seller submit to OPA a proposed maximum price in line with the level of the maximum prices established for comparable quantities, grades and kinds of fertilizers sold to consumers under the same terms and conditions.

Amendment 3 limits more specifically the maximum price which may be established for a new product by providing that this price must be in line with the prices the seller has set for comparable fertilizers according to the "average price" or "price schedule" methods. The amendment also requires seller to submit to OPA the basis on which his proposed price was determined.

Formaldehyde. Sales of formaldehyde in containers of the 45-pound size are subject to the maximum prices established by Revised Price Schedule 21 (Formaldehyde), effective August 20, 1941, irrespective of whether the containers are full. The regulation applies to all sales of this chemical "in containers of 45 pounds or more", with maximum prices for deliveries in smaller containers governed by the General Maximum Price Regulation.

Revised Price Schedule 21, established f. o. b. maximum prices for formaldehyde ranging from $0.0425 per pound for tank cars (70,000 to 72,000 lbs.) to $0.0950 per pound for 45 pound kegs shipped in less than carload lots.

Furfural. Agricultural components of furfural have been exempted from price control, OPA announces. Products affected include cottonseed hulls, cottonseed hull bran, oat hulls, and other agricultural commodities which may be used in production of furfural at a later date. Corn cobs, also used in making furfural, have not been under price control previously, but the other named items were under the General Maximum Price Regulation. This step, effected through Amendment 30 to Supplementary Regulation 1 under the General Maximum Price Regulation, is necessary because the synthetic rubber demand requires that present productive capacity of furfural be tripled. The amendment became effective October 3, 1942.

A new government plant is being erected in the South, where it is favorably located because the principal raw materials for furfural—cottonseed hulls and cottonseed hull bran—are produced nearby.

Solvents. Revision of the maximum prices for fermentation acetone, normal fermentation butyl alcohol and normal fermentation butyl acetate, to reflect recent changes in market conditions for these basic chemicals has been ordered by the Office of Price Administration. The revision, contained in Amendment 2 to Maximum Price Regulation 36 (Acetone) and Amendment 2 to Maximum Price Regulation 37 (Butyl Alcohol and Esters Thereof), establishes ceiling prices of 14.25 cents per pound for normal fermentation butyl alcohol and 7 cents per pound for fermentation acetone, delivered in tank cars in Eastern territory. In addition, the maximum price for normal fermentation butyl acetate is fixed at 14.75 cents per pound.

The adjusted prices for butyl alcohol and acetone produced by fermentation reflect the recent decline in the price of acetone, and they will allow manufacturers to obtain a yield sufficiently high to enable the necessary production of these important chemicals. Because of the joint product nature of butyl alcohol and acetone the prices of the two products are closely related, and a decrease in the market price for one increases the cost of production of the other.

The revision does not alter differentials for shipments to Western territory or those for shipments in drums in carload or l. c. l. lots.

Soybean Oil, Corn Oil, and Peanut Oil. Specific "dollars and cents" price ceilings have been established in Amendment 7 to Revised Price Schedule 53 (Fats and Oils), effective September 30, 1942, for various grades and qualities of soybean oil, corn oil and peanut oil. Except for certain refined oils where price spreads over the crude article were either abnormal or subnormal, these new ceiling prices, which will be uniform for every seller in the industry, generally approximate the individual maximums previously set under the freeze technique contained in Revised Price Schedules 53 and 92. In these schedules, the ceiling was each seller's October 1, 1941, sales price or 111 per cent of his November 26, 1941, figure.

Soybean oil and peanut oil under the new amendment are subject to the fats and oils regulation and removed from Revised Price Schedule 92. The latter schedule, therefore, has been revoked by an order issued simultaneously with this amendment.

WPB Activities

Chlorinated Hydrocarbon Solvents. The provision of Order M-41 which permits users of carbon tetrachloride for purposes assigned a B-2 rating to consume 100 per cent of the amount used in the base period has been restored. The 100 per cent provision, in effect from August 1 to September 30, is now restored until December 31. A rating of B-2 is assigned users for these purposes: degreasing machines other than those used for Army and Navy contracts; packaged spotting and cleaning preparations; dry cleaning establishments; and manual cleaning of other than metal parts of electrical equipment. Such users now may consume 100 per cent of their average monthly consumption for the year ending September 30, 1941.

Chromium. Restrictions on the use of chromium chemicals have been removed by the Director General for Operations. Order M-18-b, as amended June 27, restricted the amounts of chrome chemicals that could be used in the manufacture of pigments, chromic acid, roofing materials, or in tanning leather, and restricted all use in any month to one-twelfth the amount used in the base period. The new revision removes these restrictions. Inventory is limited to a 30-day supply, and regular reports are required on Form PD-54. The action will not result in making available any more chrome chemicals, nor will it permit the use of any additional chrome ore in the manufacture of chrome chemicals. The over-all amount of chrome that can be converted to chemicals is regulated by Order M-18-a.

Dyestuffs. Civilian quotas for all anthraquinone dyes for the fourth quarter will remain at 70 per cent of 1941 consumption, under provisions of Order M-103, as amended. The nine anthraquinone dyes previously set aside for military use will continue in this category.

Other changes effected by the amended order are the removal of restrictions on the use of blue and green dyes for coloring leaded gasoline and the prohibition of sale and use of *m*-toluylene diamine in the developing of diazotized dyes after November 1. *m*-Phenylene diamine can be used as a substitute. Sale and use of anthraquinone as a discharging and stripping agent in textile printing are also prohibited, and alpha-amino-anthraquinone is placed under the anthraquinone vat dye quota.. The change was made because consumers who use this dye restrict themselves generally to vat dyes in their operations.

Nickel. Use of nickel, except where specifically authorized by the Director General for Operations, has been restricted by the War Production Board

in a revision of Conservation Order M-6-b to implements of war and other products certified by the Army-Navy Munitions Board to be essential in the successful prosecution of the war. Previously, the order prohibited the use of nickel in a long list of products, and permitted the use of nickel in all other products only on specific allocations by WPB. This provision is retained in the revised order. However, the general exemption from these restrictions in favor of the armed services, A-1-k or better orders, and where necessary for compliance with safety regulations, is removed. Implements of war are defined as combat-end products, complete for tactical operations, including aircraft, ammunition, armament, ships, tanks, and other military vehicles, and parts to be incorporated in such implements. The term does not include facilities or equipment to be used in the manufacture of such items. The amended order also contains a rephrased provision relating to the use of nickel for products not appearing on the prohibited list. No substantial change in control is involved here, and the section is rewritten only for the purpose of clarity.

Oils. Tightened control over three imported oils—tung, oiticica, and rapeseed—has been ordered by the Director General for Operations. The order, amending M-57, requires specific authorization of the director to use tung oil after November 1, except for users of 35 pounds or less in a month. Until that date existing regulations will prevail. These permit use of tung oil on ratings of A-2 or higher, on orders placed by the Defense Supplies Corporation, for food can linings for human consumption, for outside can coatings necessary in food processing, and to comply with underwriters', health, sanitary, or safety regulations.

Control of oiticica oil, a substitute for tung oil imported entirely from Brazil, follows exactly that of tung oil, and is made necessary because of failure of the Brazilian crop. Tightened control of rapeseed oil, which also comes from South America, is the result of restricted shipping. Its principal uses are in the manufacture of heavy machine oils and synthetic rubber. Order M-77 is amended to set up the new controls, which follow the provisions of those over tung and oiticica oils. The standard chemical forms PD-600 and PD-601 are provided for requests for allocations for all three oils and for reports from distributors.

Scales, Balances, and Weights. Limitation Order L-190 limits the production of clinical, mailing, parcel post, and dietetic scales to 25 per cent of 1941 production, limits manufacture of industrial and scientific scales for inventory to 30 days' supply, and prohibits use of brass in major parts of industrial scales, and in all weights except small ones used for analytical balances. Restriction is also placed on the sale of industrial, scientific, clinical, mail, and parcel post scales to rated orders, and dietetic scales are limited to doctors' prescriptions. Production of commercial scales for retail trade and production of household scales are also prohibited.

The order prohibits the production of repair parts for household scales, but permits their manufacture for all other scales up to 150 per cent of the 1941 production, in order to reduce replacement requirements and facilitate the continued use of existing equipment. The order restricts production which consumed approximately 10,000 tons of materials in 1941.

Sulfamic acid has been placed under complete allocation control by the Director General for Operations. Allocations, under Order M-242, will take effect on on November 1. The regular chemical forms, PD-600 and PD-601, are to be used for requests for allocation and for reports by distributors.

Thermoplastics. The effective date of the scheduling provision of Order M-154, governing use of thermoplastics, previously postponed to October 1, has been again postponed to November 1. The order is being revised to provide proper control for all types of thermoplastics, due to the increased military demand, and the new amendment allows additional time for completion of the revision. Order M-154, which set up a ladder of uses for thermoplastics, was issued on June 27, and provided for scheduling of operations by manufacturers to begin on July 15. That later was postponed until August 15 to give manufacturers time to change operation schedules.

Supplementary Order M-154-a, which places polyvinyl butyral under allocation control, has been revoked by the Director General for Operations, since Order M-10 as amended October 10 includes all vinyl polymers in its allocation control, thus obviating the need for M-154-a.

Vinyl acetate, used in the manufacture of rubber substitutes and in the synthesis of sulfa drugs, has been placed under complete allocation control by the Director General for Operations. Allocation will take effect on November 1, according to the terms of the order, M-240, although the director may issue specific directions on use or deliveries. Form PD-600 is to be used for requests for deliveries and Form PD-601 for reports from distributors. Deliveries of 25 pounds or less in any one month may be made without regard to allocation.

Vinyl Polymers. Order M-10, which sets up an allocation system for polyvinyl chloride, has been amended to cover all vinyl polymers. All of these materials are used as rubber substitutes and many are interchangeable. Increasing demand due to the rubber shortage has made complete allocation necessary. No other substantive changes are made in the order. The same forms, PD-33 and PD-36, will be used as in the past.

Additional Advisory Committees Appointed by WPB

The War Production Board has announced the formation of the following new industry advisory committees:

Chromium Chemical Producers Industry, J. W. Wizeman, government presiding officer. George A. Benington, Mutual Chemical Company of America; Arthur F. Brown, Imperial Paper and Color Co.; Clyde Marlatt, Martin Dennis Co.; H. B. Prior, Prior Chemical Corp.; and H. A. Goman, Natural Products Refining Co.

Mercury Producers Industry, R. J. Lund, Government presiding officer. B. C. Austin, B. C. Austin & Co.; Worthen Bradley, Bradley Mining Co.; H. W. Gould, New Idria Quicksilver Co.; A. E. Humphreys, Humphreys Gold Corp.; W. W. Kelly, Texas Mercury Co.; F. Eugene Newbold, New Almaden Corp.; L. K. Requa, Idaho Almaden Mines Co.; H. D. Tudor, Mercury Mines; and S. H. Williston, House Heaven Mines, Inc.

Paper Industry Technical Development Industry, John G. Strange, government presiding officer. C. M. Connor, Glassine Paper Co.; Walter G. Hendrich, Byron Weston Co.; L. S. Johnson, Cornell Wood Products Co.; Harold R. Murdock, Champion Paper & Fibre Co.; H. A. Rothchild, Kimberly-Clark Corp.; M. O. Schur, Brown Co.; and W. R. Barber, Crown Willamette Paper Co.

Pyroxylin and Vinyl Resin Coated Paper and Fabric Industry, E. H. Bucy, government presiding officer. L. E.



Carpenter, L. E. Carpenter & Co.; Frank V. Friedlander, C. R. Whiting Co., Inc.; Robert A. Harper, Holliston Mills, Inc.; G. M. Jackson, Western Shade Cloth Co.; J. C. Lippmann, Textileather Corp.; John W. F. Young, Federal Leather Co.; F. J. McCormick, Permatex Fabrics Corp.; W. E. Masland, Masland Duraleather Co.; Walter V. Shearer, The Plastic Coating Corp.; F. F. Sommers, Chicago Rubber Clothing Co.; and J. K. Weidig, Zapon-Keratol Co.

THERMOSETTING PLASTICS PROCESSORS INDUSTRY, Frank H. Carman, government presiding officer. Donald H. Dew, Diemolding Corp.; George K. Scribner, Boonton Molding Co.; William H. Milton, Jr., General Electric Co.; Thomas J. McIntyre, Macklin Co.; Milton P. Higgins, Norton Co.; W. A. Blume, The American Brake Shoe & Foundry Co.; Dr. R. T. Halstead, Johns-Manville; D. J. O'Conor, The Formica Insulation Co.; Dr. G. E. Landt, Continental-Diamond Fibre Co.; M. A. Chapman, Mica Insulator Co.; John T. Ehleider, Insulating Tube Co., Inc.; and Leonard T. McCloskey, Taylor Fibre Co.

Referee Board Announces Operating Staff

THE operating staff for the Referee Board of the Chemicals Branch, WPB, has been announced by Donald B. Keyes, Chairman. Dr. Lawrence A. Monroe, of Philadelphia, will serve as executive secretary to the board, assisted by Dr. W. M. Langdon, of Elizabeth, N. J., both devoting full time to the work of the board. Cooperating with them on a part-time basis will be Carl Monrad, A. L. Elder, C. W. Lenth, E. M. Houts, and Walter Munster, all of whom are now officials of the Chemicals Branch in various capacities and will take on the work of the board in addition to their present duties.

These staff members will collect data on various problems for submission to the board and will make preliminary reports on problems submitted to them. The Referee Board is composed of 12 chemists and chemical engineers who report their findings as to the merits of competing chemical processes submitted to the War Production Board and who act in an advisory capacity in the assigning of chemical raw material research problems to various laboratories throughout the country.

WPB Urges Businessmen Not to Go to Washington

THE War Production Board again urges businessmen that whenever they wish to obtain information from WPB they should go to their regional or field offices before going to Washington. The announcement reported that there are 12 regional and 127 field offices scattered thoughout the country, which were established in order to save businessmen the trouble of coming to Washington, and also to prevent an overload of work in Washington.

Regional offices are located in Boston, Mass., New York, N. Y., Philadelphia, Penna., Atlanta, Ga., Cleveland, Ohio, Chicago, Ill., Kansas, Mo., Dallas, Tex., Denver, Colo., San Francisco, Calif., Detroit, Mich., and Minneapolis, Minn.

WPB Regulates Tank Car Uses

THE new priorities schedule of tank car uses issued by the WPB gives the Office of Defense Transportation a specific mandate to distribute the Nation's 143,000 tank cars on a basis of first-needs first. With the bulk of the country's tank cars transporting the petroleum which formerly moved in oil tankers, the need for cars to transport war-essential chemicals and vegetable fats and oils has become critical. WPB has ordered the ODT to give these latter items preferential treatment in the allocation of cars.

Certification of Necessity for Priority Action 1 issued by WPB set up five classes of materials and commodities transported in tank cars and directed the ODT to execute priorities in the following order: Class A, transportation of materials consigned to or for the Army or Navy, Maritime Commission, War Shipping Administration, or Lend-Lease; Class B, transportation of certain chemicals, edible and nonedible fats and oils, and other foods and commodities; Class C, transportation of petroleum and petroleum products into the Eastern district in quantities certified by the Office of Petroleum Coordinator subject to review by the Director General for Operations of WPB; Class D, transportation of petroleum and petroleum products, other than automotive gasoline, within the Eastern district and into or within the other four districts of the country in quantities certified by OPC; Class E, transportation of automotive gasoline within the Eastern district and into or within the other districts as certified by OPC, subject to review by the Director General for Operations of WPB.

Silver in Electrical Conductors

THE War Production Board has announced that substituting silver for copper in electrical conductors had saved in the last few months 24,000,000 pounds of copper. The silver is going into bus bars, windings for transformers, and similar electrical appliances. The Treasury has allotted 34,000 tons of silver to the Defense Plant Corp., which lends it to plants, which must return it to the Treasury after the war.



OPA Creates Standards Division

OPERATING sections of OPA's newly created Standards Division and their executive heads have been announced by Dexter M. Keezer, Deputy Administrator and acting director. The Standards Division was set up to provide OPA's operating divisions with the technical assistance necessary to incorporate quality definitions in price, rent, and rationing regulations.

Initially, the new division will have seven sections as follows: Food and Drugs (which also will handle paints and chemicals for the present); Textiles, Leather, and Apparel; Consumer Durable Goods; Home Furnishings; Lumber and Building Materials; Agricultural and Industrial Machinery; and Rubber and Rubber Products. Sections to handle fuel and petroleum products; chemicals and paints; transportation equipment; paper, paper products, and containers; and metals and metal products, as well as a commodity testing branch, are being organized.

Chemical Workers Union Scored by War Labor Board

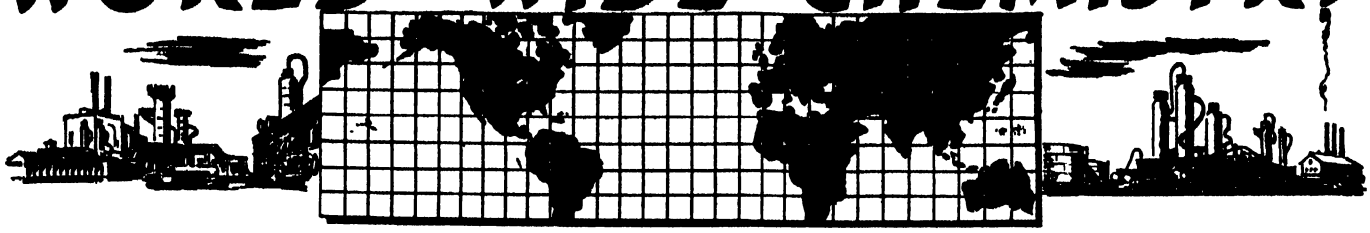
THE National War Labor Board unanimously decided to deny a maintenance of membership clause to the Chemical Workers Union, AFL, because the union had violated its no-strike pledge by calling a 5-day strike in July of the 700 employees at the two plants of the Monsanto Chemical Co. and the New England Alcohol Co., at Everett, Mass.

Economic Stabilization in Nonferrous Metals

PAUL V. MCNUTT, chairman of the War Manpower Commission, has announced that the War Manpower Commission's employment stabilization plan of 1942, covering nonferrous metals and lumbering activities in the 12 western states, includes all mines producing ores from which the following metals are produced, as well as all milling, smelting, and refining operations in connection with the production of the following metals:

Aluminum, including alunite and bauxite ores
Antimony
Arsenic
Beryllium
Chrome
Cobalt
Columbium
Copper
Magnesium
Manganese
Mercury
Molybdenum
Tantalum
Tin
Titanium
Tungsten
Uranium
Vanadium
Zinc
Zirconium

WORLD-WIDE CHEMISTRY



Control over the chemical industries in Great Britain has been tightened in various directions during the past month. Lactic casein and liquid paraffin have been subjected to control. Licenses are required for quinine and all other cinchona alkaloids, including totaquina and quinetum, cinchona itself, and any synthetic product which is used against malarial infections. The Ministry of Supply has become the sole importer of raw mica. The control of purchasing and shipment of palm kernels, hitherto vested in the Ministry of Food, has been transferred to the Colonial Office. Phosphates can no longer be used on grass land; this applies to basic slag, super and ground mineral phosphates, and bone and compound fertilizers containing phosphates. Rubber dentures will be replaced by products made of acrylic resins. The technical fat-producing and bone-using industry has been organized under a concentration scheme. The supply quota for cosmetics has been reduced further and now stands at 20 per cent of the standard period June 1939 to May 1940, though 50 per cent is permitted to firms in approved areas. Most important of all, the Ministry of Fuel and Power has begun a campaign for utmost economy in the use of coal and other fuels which is bound to affect important chemical works.

New Restrictions on Exports Are Imposed

All exports to Aden, Sudan, Cyprus, Egypt, Palestine, and Transjordan are now subject to license. Although exports to these countries, which must now be carried around the Cape instead of passing through the Mediterranean, have been limited to essential goods for some time, the change is likely to result in a further curtailment of shipments. A similar effect is expected from the decision of the Colonial Governments in East Africa (Kenya, Uganda, Tanganyika, and Zanzibar) to grade all imports in three priority classes. All import licenses for United Kingdom goods have been recalled for review in these territories. A move in the same direction took place earlier in British commerce with South Africa. All these territories make heavy calls on shipping space because of the long distances covered, and a curtailment of exports to these destinations is therefore important.

Export licenses are now required for ethyl cellulose and preparations thereof; manganese sulfate; mixtures of, or containing, potassium hydroxide; unexposed sensitized photographic film; insecticides, fungicides, and weed killers containing arsenic compounds; chlorinated naphthalenes, cyanides, fluorides, metaldehyde, nicotine or its salts, petroleum oils, pyrethrum or its extracts, or silicofluorides; iron oxides and pigments containing iron oxides, including ochres, siennas, and umbers; rotenone, roots containing rotenone whether ground or not; extracts containing rotenone and preparations of any of these; bacteriological products not of a kind used solely for veterinary purposes; antigens, including toxins, toxoids, and tuberculins, but not including vaccines, antiviruses, and bacteriophages; sera, including antitoxins and antitoxin globulins.

Alternative to Tung Oil Is Found in West Africa

A small source of a vegetable oil intermediate in properties between oiticica and tung oil has been located by the Imperial Institute in Sierra Leone, West Africa. It is produced from the kernels of the poyak tree, which is closely related to oiticica, and has a specific gravity at 15.5° C. of around 0.96, refractory index at 20° C. of 1.502 to 1.518, saponification value around 190. The oil was found to be compatible with natural and synthetic resins, and drying properties were inferior to tung oil but much better than for linseed oil. About 50 to 100 tons of kernels could be shipped annually at present, but as the residual meal left after the extraction of the oil is not suitable as a feeding material for animals, it would probably be preferable to carry out the extraction locally.

Seaweed Survey Is Organized at Ministry of Supply Request

A survey of seaweeds found around the British coasts has been organized by the Marine Biological Society and carried out by a number of scientists from Cambridge. It is hoped that seaweed will provide a useful material for feeding and fertilising and also for the production of certain chemical products of which there is now a shortage. Similar efforts have been made in Ireland where commercial utilization has made some progress.

British Pharmaceutical Manufacturers Work on New Antibacterial Product

Reference to a new antibacterial product, Penicillin, with exceptional properties was made in the daily press. According to a letter in the *Times* by F. H. Carr, chairman of the research panel of the Therapeutic Research Corporation of Great Britain, Ltd., five different research laboratories of leading pharmaceutical houses, working with two important university laboratories under the aegis of the corporation, have for some time past put their most intensive effort in the field of Penicillin. Similar collaborative work is being undertaken by the staffs of certain American firms, and arrangements have been made for a full interchange of information between the two research groups. The task confronting the investigators is formidable. Apart from other considerations, Penicillin is unstable under many conditions, and to make possible its large-scale manufacture it has been necessary to discover the means of rendering it stable during the isolation and purification stages. The work is still far from completed, but it is hoped to publish before long some of the scientific results. The original discovery, about 13 years ago, that the mold *Penicillium notatum* possessed strong bactericidal powers is due to Alexander Fleming, of the research department at St. Mary's Hospital, Paddington, London; and to him is due also the suggestion that the substance might be found to have important applications in medicine and surgery. Isolation of therapeutic Penicillin and its separation from the toxic substances, also produced by the mold, was first effected

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EDITOR'S NOTE. Those interested in further details should address the correspondent whose name and address appear for each country, and enclose sufficient international coupons to prepay the reply. United States stamps should not be sent.

by H. W. Florey, of the School of Pathology, University of Oxford, who investigated the subject on behalf of the Medical Research Council, and effectively paved the way for the more intensive attack now being made under the aegis of the Therapeutic Research Corporation. Clinical trials and *in vitro* tests have shown its antibacterial properties to be remarkable. It is said that Penicillin can completely inhibit bacterial growth in a dilution of 1 in 25,000,000 and that it can act as a partial inhibitor in a dilution six times as great, while it is apparently innocuous when given to human beings even in comparatively large doses.

Medical Research Council Advises on Insecticides

A committee of the Medical Research Council has studied insecticides against bedbug infestation. A detailed technique for the safe application of hydrogen cyanide as a fumigant has been worked out. Sulfur dioxide was found unsuitable as a general fumigant. Caution is advised with regard to *n*-butyl carbitol thiocyanate and dodecyl thiocyanate. The insecticidal power of heavy naphtha seemed to follow approximately the degree of unsaturation, indene and coumarone being the major unsaturated constituents. It is suggested that the naphtha should not be washed with sulfuric acid of more than 35 per cent strength. Addition of 2 per cent of liquid carbolic acid containing at least 90 per cent of cresols causes a marked increase in potency. Heavy naphtha is a useful contact insecticide and still more effective in its vapor action. It is recommended that the distillate, before final rectification, be washed with 5 to 10 per cent caustic soda solution and with sulfuric acid preferably of 25 per cent strength.

Scientific Advisers Appointed for the Ministry of Production

Captain Oliver Lyttelton, Minister of Production, has appointed I. M. Heilbron, professor of organic chemistry, Imperial College of Science and Technology, T. R. Merton, treasurer of the Royal Society, and W. A. Stanier, chief mechanical engineer of the London Midland and Scotland Railway, to act as full-time scientific advisers to his Ministry. The demand for a central scientific and technical board to assist the government in the utilization of modern scientific developments has been raised often in and outside Parliament, and the Lord Privy Seal, a member of the War Cabinet, was hitherto mainly responsible for the promotion of scientific methods and findings in government departments. Most of these have their own scientific advisers. There are also such general research bodies as the Department for Scientific and Industrial Research with its various affiliated organizations (the National Physical Laboratory, Building Research Station, etc.) and the Imperial Institute. The three scientific advisers appointed by the Minister of Production will keep in touch with the scientific advisers of the Service and Supply Departments. They will be responsible to the Minister of Production but work under the immediate supervision of the Lord Privy Seal. The organization chosen for this nucleus of a Central Scientific Board shows all the signs of a compromise, but it may serve as the basis of a Ministry of Science which is bound to become necessary at some future date.

Plant for Petroleum Detergents Is Erected

The Shell Refining and Marketing Co., Ltd., has erected a special plant for the large-scale manufacture of sodium secondary alkyl sulfates for use as detergents. The raw material is a by-product of British petroleum refineries which is cracked to produce a mixture of olefins. This is fractionated, and one of the carefully isolated fractions is sulfated, neutralized with soda alkali, and purified. The final product, marketed under the trade name "Teepol" by Technical Products Ltd., is a clear pale yellow liquid at temperatures down to 15° to 20° C.

Comparative Notes Issued in Fireproofing Chemicals

The Timber Development Association (London) has issued notes on the fireproofing of timber either by impregnating or by surface coating. They deal with the power of different chemicals to render timber fire resistant and the corrosive and rotting action of some of these products. Special attention is called to hygroscopicity and leaching out of water-soluble chemicals. Monammonium and diammonium phosphate are (following information supplied by I. C. I., Ltd.) described as good fireproofing agents for stopping flame, even at low concentration, and preventing afterglow or smoldering both in light and heavy concentration. In this respect triammonium phosphate is inferior. The ammonium phosphates have comparatively little corrosive effect on metal, though on mild steel and wrought iron some slight attack occurs during the initial stages which helps to form a thin resistant coating of iron phosphates on the surface of the metal. Although ammonium phosphates may be dissolved out to a great extent if exposed to water for some time, experiments have shown that ammonium phosphate is held very retentively by most woods. In atmospheres of lower humidity than 92 per cent no moisture will be deposited on wood treated with mon- or diammonium phosphates.

The effect of ammonium sulfate on flames is small in low concentration, but in very high concentrations (of the order of 20 per cent) its effect is marked. It has no appreciable effect on glow or smoldering, is more corrosive to metals than are the phosphates, and increases the hygroscopicity of the timber to a greater extent; it can be leached out of the wood by prolonged and continuous action of water.

Ammonium borate has a moderate effect on flame when present in large quantities and a very good effect in stopping afterglow whether in low or heavy concentrations, but it is not available in commercial quantities in England, and information on other aspects is limited.

Ammonium chloride has a noticeable effect in suppressing flame at low concentrations and a very marked effect at high concentrations which also suppress glow. It is highly corrosive to most metals, can be leached out of timber, and timber impregnated with it becomes damp above 79.5 per cent humidity.

Magnesium chloride has a similar effect on flame, but the glow is reduced and not stopped completely whatever the concentration may be. It is corrosive to iron and steel, though less so than ammonium chloride, has a mild action on copper, and timber treated with it becomes damp even in comparatively dry atmospheres; it is largely upon this dampness that magnesium chloride relies for its fireproofing effect.

Agricultural Salt Is Used as Potash Substitute

Agricultural salt has been used as an alternative to potash on mangolds, sugar beet, and cabbage, and it is claimed that, applied at the rate of 5 hundredweight per acre, it is a profitable and useful fertilizer. When used in conjunction with a good dressing of sulfate of ammonia, it is said to act as well as muriate of potash. On sandy soils which are often deficient in potash, salt has given very promising results. In sugar beet and mangolds sodium is said to act like potash. Agricultural salt proved most effective on light and medium soils.

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September 16, 1942

Uruguay soon expects to become independent of imports of fish oils with high vitamin A content, and may even have an exportable surplus. A plant to prepare fish liver oil on a commercial scale is now nearing completion near Montevideo.



Very interesting figures were recently disclosed by the Federal Council for Foreign Trade regarding the consumption and national production of cement. Considering the consumption of 281,447 metric tons as the index 100, the increase in the last ten years showed the following indexes: 110, 121, 160, 171, 200, 230, 237, 260, 269, and 276, the last corresponding to a consumption of 776,846 metric tons in 1941. Local production increased from 167,115 metric tons in 1931 to 767,506 in 1941, while imports decreased from 114,322 metric tons in 1931 to only 9,943 in 1941, when only special types of cement were imported. Brazil started to export cement to other South American countries in 1938, when 6 metric tons were sent abroad, to attain 603 metric tons in 1941. The picture will probably be changed, owing to the shortage of fuels; local production will decrease and importation increase without affecting the consumption, which will continue to increase, owing to the expansion in building activities.

Consumption of Coal Is Increasing

The consumption of coal during the last ten years showed a picture similar to that of cement. For a consumption of 1,780,000 metric tons in 1931, a little more than 490,000 metric tons were produced locally, the balance being imported from Europe and the United States. In that year one metric ton of coal was worth only 87$000 (about U.S. $4.35), the main consumer was the Central do Brasil Railway, and coal imports represented about 6 per cent of total Brazilian importation. Only a little less than 2 per cent of Brazilian coal was consumed by the Central do Brasil Railway. In 1932, consumption decreased about 3 per cent; but since 1933 both consumption and national production have presented increased figures. More than 1,000,000 metric tons were produced in 1938 and in 1941 Brazilian production of coal was 1,408,000 metric tons.

Importation of coal since 1933 has been very irregular, decreasing in 1934, to increase in 1935 and decrease again in 1936, attaining in 1937 the highest peak with 1,707,852 metric tons. Imports of coal into Brazil attained the lowest level in 1941, when only 1,057,946 metric tons were imported. Exports of Brazilian coal were very irregular up to 1940 when 6,900 metric tons of coal were exported, increasing in 1941 to 61,434 metric tons. The price of imported coal in 1941 was approximately three times that of 1931, and the principal consumer of coal in Brazil, the Central do Brasil Railway, consumed in 1941 more than 156,000 metric tons of national coal, representing about 30 per cent of its total consumption. The Federal Government is considering the utilization for fuel purposes of shales and bogheads existing in large quantities in Brazil.

Arsenic Is Produced by Three Companies

Consumption of arsenic in Brazil was about 1,820 metric tons in 1941, 1,203 metric tons of which were produced locally and the balance imported from United States and Japan, the first contributing more than 93 per cent of total importation. Local production of arsenic shows a very irregular picture up to 1937, when 717 metric tons were produced; however, in 1938 production was only 520 metric tons. Since 1939 the Brazilian production of arsenic appears to show signs of improvement and, starting with 713 metric tons in 1939, reached 1,088 metric tons in 1940 and 1,203 metric tons in 1941. Imports of arsenic have been steadily decreasing. In past years Brazil exported arsenic, but since 1925 when 68 metric tons were sent abroad, no export figures have appeared in Brazilian statistics.

At present, arsenic is produced by three companies which work the gold deposits in the State of Minas Geraes: the St. John del Rey Mining Co., in Nova Lima; the Cia. Minas da Passagem, in Passagem, near Mariana; and the Cia. Brasileira de Mineração, in Juca Vieira. However, the largest producer is the St. John del Rey Mining Co., that obtains arsenic as a by-product of gold, like the two other producers. After extraction of gold, the balance which contains arsenical pyrites is burned to produce white arsenic. Arsenic is used in Brazil mainly in the manufacture of insecticides and in the glass and pharmaceutical industries. Two more gold mines are planning to produce arsenic, both of them located in the State of Minas Geraes.

Vegetable Oils Are Important

Vegetable oils are of basic importance for many industries, and Brazil is contributing on a large scale in supplying them to the war efforts of the United Nations. Production of vegetable oils in Brazil is being increased from year to year, reaching in 1941 an estimated total of 500,000 metric tons, both from fruit and extracted oil. Brazil up to the outbreak of the first world war was an importer of vegetable oils. Since 1914 production of cottonseed and castor oils has been developed, linseed plantations made in several states of Southern Brazil, and tung and oiticica oils cultivated in São Paulo and in the northeast, respectively. In 1933, Brazil appeared as an exporter of vegetable oils, sending abroad 291 metric tons. Development has been rapid since the outbreak of the present war, and in the 3 years between 1939 and 1941 exports increased from 34,140 to 56,370 metric tons, represented by coconut oil, cumarú oil, ucuuba grease, linseed and oiticica oils, murumuru grease, andiroba, babassú, cottonseed, copaiba, and castor oils, and several others.

Considering the importance of the production of oiticica oil for the economy of Northeastern Brazil, the Federal Council for Foreign Trade adopted a resolution approved by the Federal Government, by which the following measures were settled: establishment of standardized types of oil demanded by foreign trade; supervision of exports and issuing of certificates of quality; extension of technical assistance to manufacturers in order to make oil of approved types; registration of oiticica factories and control through the Ministry of Agriculture; study of official specifications for the different types of oiticica oil within the limits preferred by importers. The resolutions decided against the compulsory use of oiticica oil in paints and varnishes produced in Brazil, which had been proposed. In spite of efforts towards the production of oils developed by the Federal Government, the exportation of vegetable fruits and seeds is still important in foreign trade. Export of fruits and seeds increased from 76,323 metric tons in 1931 to 281,316 metric tons in 1941. The Brazilian flora is recognized as one of the most opulent in the world and it is estimated that more than 50,000 different species of plants are found in Brazil.

Gasoline Substitutes Are Being Studied

Because of the lack of tankers, Brazil has had to restrict consumption of gasoline and other petroleum products which are imported mainly from other American countries, such as the United States, Venezuela, Dutch West Indies, Peru, and Ecuador. Since July 19 no private cars have been allowed to run, with exception of those used by Brazilian authorities and heads of foreign diplomatic missions. At the same time, the Federal Government stressed to the Comissão Nacional de Gasogênio the importance of developing and intensifying the production of gas producer equipment. A little more than 1,000 gas producers are in traffic throughout Brazil, the majority of them in busses, trucks, and lorries. Steps were taken by the Comissão to promote a program permitting the construction of about 10,000 producers throughout Brazil of which São Paulo will contribute 50 per cent.

Two different types of gas producers are being utilized in Brazil, one using wood as fuel and the other such forms of carbon as wood charcoal. The best known wood-burning gas producer plants existing in Brazil are the trade-named Metropolitana, Imbert, Ferta, and Imbraz. Char-

coal producers' equipment existing in Brazil is of the cross-draft type, and the trade-named Light, Mechanica, Gohin Poulenc, C. E. G., and Sully are among the better known producers. Charcoal made from almost any wood is being used as fuel for gas producers. The Ford Motor Co. and the General Motors Corp. are reported as producing trucks and busses equipped with gas producers. Only a few passenger motor car owners are using gas producers, owing mainly to the high prices charged by the gas producer manufacturers.

The Instituto do Açucar e do Alcohol, controlling the production of sugar and alcohol in Brazil, permitted the sugar mills to start milling 30 days before the date previously established, and efforts are being made to intensify the plantation of more sugar acreage. Rules governing production of anhydrous alcohol, prices for beverage and motor fuel alcohol, and elimination of the export quota for sugar were proposed by the institute and approved by the Federal Government. Wood, shale, bogheads, and other similar products are also being used in place of petroleum fuel oils.

Cottonseed and other vegetable oils are also being used not only as substitutes for lubricating oils but also for fuel purposes. Babassú oil is being used in motor boats and in tractors crossing rivers and roads in the northern states of Brazil. Studies are now being carried out by the Federal Government for the development of sewage gases for fuel and power purposes. A Diesel motor representative reported that good results will be obtained with the use of gas producers in Diesel motors, and tests will be carried out in the very near future in the presence of interested people. In an effort to intensify the use of substitutes for petroleum products, a national meeting will be held in October, under the sponsorship of the Touring Club of Brazil, in which technicians of all Brazilian states will discuss problems related to the development of such substitutes.

Chemists Will Meet at Santiago

American chemists will attend during January 1943 the Fourth South American Chemical Congress to be held in Santiago do Chile. The previous meetings were held in Argentina (1926), Uruguay (1930), and Brazil (1937), and the Chilean committee plans the fourth beginning January 7. During eight days the members of the congress will visit the most important manufacturing centers of Chile, and will discuss the papers to be presented by American chemists. A main theme of discussion will deal with the present mineral resources, and it is hoped that the papers will contribute to a better knowledge of present conditions of the mineral industry in all countries.

Trade with Canada Improves during 1942

In spite of difficulties in shortage of freight space, Brazilian trade with Canada showed a good improvement during the first six months of the current year. The trade balance this year shows a credit to Brazil of more than four million U. S. dollars. The most important products exported to Canada during that period were raw cotton, vegetable waxes, rubber, cotton linters, and coffee. Banana flakes and industrial diamonds appeared for the first time in the statistics as export products. Imports from Canada are of many different types, the principal ones being sewing machines and their accessories. The first six months of 1942 showed favorable trade for Brazil, while the same period of 1939 and 1940 showed an adverse trade balance for Brazil.

C. E. Nabuco de Araujo, Jr.

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Rio de Janeiro
September 29, 1942.



The situation on raw materials, chemicals, steel, and the like is becoming more difficult here day by day. Even vital industries do not get enough. Causes are scarcity of export licenses from the United States, which is still the main supplier, and lack of shipping space.

It is generally hoped that the coming journey of President Juan Antonio Rios to Washington, which probably means breaking off relations with the Axis, will ease matters. Because of that, Oscar Zárate, head of the Dirección General de Sanidad, is to go to the United States heading a cooperative purchasing commission, which will buy some $600,000 worth of drugs. Dr. Zárate's journey has been put off continually since May, but now it seems that conditions have improved enough to justify the expense.

Serious Gasoline Situation Has Arisen

One of the gravest problems is gasoline. During June and July the ration for private riders was 3 gallons a month. In August it was 10 gallons, not because of abundance but because of lack of storage space; in September it is still 10 gallons if you can get it, and from October 1 on private riders are forced off the street. The lent Argentine tanker *Los Pozos* will probably go back to the owners, so that everything will have to be carried from Talara, Peru, to Chilean ports in scarce drums aboard the two school ships of the navy and the regular coastal steamers.

The government is doing everything possible to avoid a catastrophe in the industrial life of the country. Months ago a commission was appointed to study possible substitutes for gasoline, composed of the following representatives of industry, army, navy, and government: Alberto Gómez Del Fierro, Eduardo Nef, Gustavo Vicuña, Felipe Altamirano, Ignacio Toro, General Froilán Arriagada, José Gielmi, Oscar Tenhamm, Rodolfo Mebus, and Mayor Carlos Guiraldes. The commission has made a report in two parts.

The only quick solution seems to be to employ generators of gas from charcoal or wood, as has been done for some years in some parts of Europe. That would be a solution only for trucks, in the opinion of the committee, because of the weight of the generators, but might eventually save valuable valuta, until now used to import gasoline and Diesel oils, in normal times also. Two kilograms of charcoal should replace one of gasoline or Diesel oil, which would allow trucks the same mileage but at lower speed, the latter circumstance saving tires, which are scarce also. (The government meanwhile has decided to try it out and, through the Corporación de Fomento, has offered to lend truck owners who wish to switch over to gas generators up to 70 per cent of the cost. For this 1,000,000 pesos have been made available. The generators can be made in Chile. No information is available, how many, if any, trucks have been converted.)

Solutions possible in a relatively short time involve the use of alcohol, bituminous slate, and bituminous coal. Mixing alcohol with gasoline is being done already with about 300,000 liters monthly of dehydrated alcohol, by-product of the sugar refineries. The quantity of alcohol from that source could possibly be increased by some 8,000 liters more, at the best. It should be possible to produce large quantities of alcohol from wine or by dry distillation of wood, and a mixture of gasoline with 30 to 35 per cent of alcohol has proved acceptable in several European countries. The possible production of industrially pure alcohol by enlarging existing factories is estimated by the commission at 17,800,000 liters annually.

Hydration of coal should be possible with the soft coals of the mines in the provinces of Bio-Bio, Cautin, and Valdivia, but would need much time to build plants, as the necessary equipment cannot be made in Chile right now. The most promising measure would be exploitation and distillation of bituminous slate. The most important deposits, known so far, are at Lonquimay and El Pular. The most practical would be the first, as it lies near the railroad being built from Manzanar to Malalcahullo, province of Cautín, which will be ready in about 16 months.

Meanwhile there has been a public laboratory demonstration in the Sociedad Científica de Chile, made by Jorge Ville-

gas, chemical engineer, and Victor Torrealba, mineralogist. In this laboratory trial, at a temperature of 250° to 300° C., 140 grams of kerosene were distilled from 1 kg. of pulverized slate. Although a laboratory trial does not prove very much, several chemical engineers have made calculations on the basis of working with sufficient capital, the result being that the cost price in industrial distillation should not be above 2.00 pesos per liter, without calculating any money made by by-products, such as heavy oils, paraffin, etc. The wholesale price of gasoline is now 2.00 pesos per liter, including duty and taxes. It is planned to form an exploitation company with low-priced shares with the help of the Corporación de Fomento. The studies are being continued under supervision of the Instituto de Ingenieros de Minas de Chile.

Mining Institute to Have Headquarters in Santiago

The central office of the Pan-American Institute of Mining and Geological Engineering will be settled permanently at Santiago de Chile, with branches in all American countries. The statutes of this newly formed institute were drawn up during the congress of mining engineers, held at Santiago last January, and have been approved meanwhile by all 17 countries represented.

Metal Prices Are Established

New price regulations have been settled between the Metal Reserve Co. and the Chilean Government. The new contract will be in effect for six months. The negotiations were presided over by the Minister of Economy and Trade, Pedro Alvarez.

The price of refined copper was increased 10 per cent to 5.00 pesos per kg. Until now the government has subsidized small refiners with 0.50 peso per kg., but from now on the Metal Reserve Co., will pay that in the price.

The price of copper concentrates increases 5 per cent over the value of short ton dry concentrate. Moreover, 60 grams of gold per ton are now allowed, instead of only 35. In future bags are not to be charged, which means a price increase to producers of 50.00 pesos per metric ton.

Copper in gold concentrates are to have only U. S. $0.01 discount per pound of copper, instead of $0.02.

Several expenses, charged until now to producers of gold ores and concentrates, will be paid by the Metal Reserve Co., which means a saving of 170.00 pesos per ton of concentrates to producers.

Tolerances for silica and copper, in manganese ore until now 12 per cent, have been upped to 16 per cent silica and 0.33 per cent copper.

The representatives of the Metal Reserve Co. manifested a big interest in the Chilean deposits of cobalt, lead, molybdenum, tungsten, and zinc, and promised good prices as soon as producers should be able to supply considerable lots.

Prices of mercury have not changed.

Government Studying the Rubber Situation

The undersecretary of the Corporación de Fomento, Mr. Del Pedregal, recently gave an interview to the press about the rubber situation. The tire factory, under construction near Santiago, about which I wrote in my last letter, is the Sociedad Nacional de Neumáticos S. A., joint undertaking of the General Tire and Rubber Co., of Akron, Ohio, and the Corporación de Fomento. The buildings are ready, and a small but sufficient supply of rubber from Brazil and Ecuador is guaranteed, but the U. S. Government has not yet given export licenses for the equipment.

All rubber goods have been declared products of vital necessity, export of which is prohibited.

The government is financing studies of the industrial possibilities of a plant named Hulla or Huyulla, which grows in parts of the provinces of Tarapacá and Atacama, and seems to have rubber-bearing possibilities. Although nothing is known generally about the Hulla plant, it is interesting in view of the coming visit to this country of O. D. Hargis of the U. S. Department of Agriculture. Mr. Hargis is said to be very much interested in experiments in planting guayule in Chile, because the climate of the northern provinces is very similar to that of Southern California and parts of Mexico.

Valeria Root Not Cultivated in Chile

In your issue of February 10 there was a short notice that valeria root is planted intensively in Chile and could be exported. That is entirely wrong. There are, if any, very small cultivations of valeria root here, and although I know that trade pretty well, I have never heard of its cultivation in Chile.

Copper and Brass Products Are Being Manufactured

The Maquimetal Ltda., Santiago, division of the Sociedad Manufacturera de Metales "Mademsa", S. A., Santiago, is now manufacturing on a large scale copper and brass plates, tubes, and wire. The army-owned Fábrica de Material del Ejército makes in its Santiago plant copper and brass products, on a smaller scale, as well as manganese steel armor plates. Copper and other wires are made by several smaller factories. This evolution of the Chilean metal industry is helped by government edicts, that the foreign-owned refiners of electrolytical copper are obliged to sell to Chilean industries at cost price, in fact, actually 4.80 pesos per kg. Maquimetal is preparing to produce zinc from Chilean ore.

Grants Made by the Corporación de Fomento

300,000 for exploring and starting mining of pyrites in the province of Atacama, department Copiapó

1,000,000 to the Sociedad Minera La Coruña, at La Coruña, province of Coquimbo, department Illapel, for increasing their capacity of 48 per cent manganese ore from 500 to 1,000 tons monthly

4,000,000 to the Cía. Carbonifera de Lirquén, at Lirquén, province and department of Concepción, for building a thermal centrale of 1,000 h. p. and enlarging its equipment, to be able to increase production from 109,000 tons in 1941 to 180,000 of bituminous coal in future

300,000 to the Cía. Azufrera Aguas Calientes, district Tacora, province and department of Arica for opening new sulfur deposit

1,228,000 to the Cía. Agrícola de Purranque Ltda. for building a wheat dehydrator

120,000 to the Cía. Minera Popete, province of Coquimbo, for prospecting for tin

3,000,000 to a company to be formed which will solve the shipping problem by towing barges on the Pacific coast, also for international traffic. The head office of this company will be at San Antonio, province of Santiago, department Melipilla.

Use of tin plate for anything but canning foodstuffs and pharmaceuticals has been strictly prohibited. The quota for Chile, settled by the U. S. Government, is 9,000 metric tons for 1942, but until now less than half of it has come in.

The Junta Nacional de Abastecimientos, the Chile office which subdivides Chile's quota of allocated materials, will open a branch office in the United States, to be able to coordinate better with the Export Control Office of the Board of Economic Warfare.

The Sociedad Astilleros y Maestranza Valdivia Ltda., at Valdivia, province and department Valdivia, is starting to build a big Bessemer steel foundry.

The Fábrica Nacional de Vidrios Planos S. A. at Lirquén has doubled its capital to 30,000,000 pesos and tripled output of window glass. This factory is exporting to all South American countries, and is the most modern factory of its kind south of the United States.

It is said, although I could not get confirmation of it, that the Sociedad Nacional Industrial de Alcoholes "Indalcona" is preparing production of acetic acid and acetone at a plant at Requinoa.

RODOLFO ZOELLNER I.

CASILLA 3593
SANTIAGO
September 7, 1942

Continental Europe

Germany

An order has been issued by the German Price Commissioner for the reduction of cartel prices, and the chemical industry is one of those which are likely to be affected by the new order and feel some concern about its possible effects. Before the order was issued the cartels had been asked for proposals about price reductions, but this voluntary action does not seem to have given satisfactory results, and the price commissioner has therefore decided to fix prices himself. The position in the chemical industry is rather more complicated than in others, as the same products may be obtained by different processes. They may be principal objects of production in one factory and merely by-products in another plant. Nevertheless the price commissioner intends to fix binding prices in accordance with costs as established by him in a typical efficient plant. In general, the costs allowed will be those of the most efficient producer; other firms have either to adjust their production methods or to bear a loss.

This intention seems to have aroused a great deal of opposition even from official representatives of the chemical industry, who point out that low costs, though undoubtedly important, are not the only factor to be taken into consideration. In the choice of the material availability at home and possibility of substitution are regarded as no less important, and substitution may in many cases result in higher prices. It is argued that if low costs are the only determining factor, the utilization of many waste products from other processes will become impossible, with the result that the demand for essential raw materials in short supply will increase. It is said that the examination of all these questions in detail will take considerable time. In the meantime negotiations with the price commissioner have begun.

French Chemical Workmen Are Transferred to Germany

The chemical factories belong to one of the six industrial groups in which direct negotiations between German and French organizations have taken place with a view to the transfer of skilled workmen from France to the Reich. It is reported that the I. G. Farbenindustrie alone wishes to employ 7,000 French workmen, probably largely in its plants at Mannheim, Ludwigshafen, and Oppau which have been visited on various occasions by the Royal Air Force. The willingness of French industrial firms to cooperate with German companies in the transfer of workmen will depend somewhat upon the present form of the placement of German orders with French firms, comments a neutral paper, the *Neue Züricher Zeitung*. In recent months it has been noticed in France that German contracts have been cancelled or allowed to expire, with the result that substantial numbers of workers in French factories had to be paid off. It is intended to transfer these unemployed workers in *Betriebszellen*—i. e., groups of workers who have been employed together in one factory—to German industrial centers where, it is hoped, they will acclimatize easier if they have all their colleagues with them. The recruiting of labor for German chemical factories has been extended to the unoccupied zone and enjoys the full support of the Vichy authorities, while French chemical manufacturers are reluctant to dismiss their skilled workers and thus deprive themselves of the possibility of resuming operations speedily when conditions change. Several firms, for instance, in the oil refining business, which have had to close down their plants entirely, retain their staffs of specialized workers with that in mind, and the German authorities seem to make special efforts to release these workmen for employment in Germany.

Vegetable Caoutchouc to Be Cultivated in Eastern Europe

The Ost-Gesellschaft für Pflanzenhautschuk und Guttapercha m. b. H. has been formed with the small capital of 30,000 marks as one of the so-called trust companies which have been created by the German authorities for the special purpose of encouraging the production of certain important commodities in occupied territories of eastern Europe. The company is to assist in the cultivation and processing of vegetable caoutchouc and gutta-percha.

Another company formed in eastern Europe is the Pankreas-Verwertungs-Gesellschaft m. b. H., which is to collect pancreas glands from slaughter yards in Latvia, Lithuania, Estonia, and Ukraine. Owing to the shortage of insulin, which has led to the introduction of an insulin ration card for diabetics, a large organization for the collection of glands from German slaughter yards was drawn up a long time ago, but this has not apparently solved its task in a satisfactory manner.

Leather Fibers Treated with Synthetic Resins

A leather substitute was made before the war from leather fibers (derived from waste leather) and latex, but the latter material is now replaced by emulsions of synthetic polymerization products, usually on the basis of polyvinyl or polyacrylic acid compounds. It is stated that waste leather tanned with chromium products has better strength, wear, and suppleness than leather treated with vegetable tanning materials, but must be detanned with a slightly alkaline solution before use. Products made with polyvinyl acetate are said to be stronger, while polyacrylic acid esters seem to give a greater degree of flexibility, but both are inferior to latex in wear resistance, partly because of their greater moisture absorption. Fats, softeners, and repellents are normally included in the material to give special properties. The sheets in which the material is eventually obtained require careful drying.

I. G. Farbenindustrie Subsidiary for High-Molecular Paraffins

The Gesellschaft für Synthese-Produkte m. b. H. has been formed in Frankfort (Main) by the I. G. Farbenindustrie A.-G. for the processing and treatment of high-molecular paraffins. The company has the right to establish branch works abroad and to take over existing equipment of a suitable type.

Removal of Hemi-Celluloses from Textile Cellulose Studied

The removal of hemi-celluloses from pulp intended for use in the manufacture of artificial rayon and staple fiber has attracted considerable attention from German chemists, also in connection with the use of new raw materials such as straw and reed. Beside alkaline processes, the possibility of treating celluloses with a pentosan content with 58 to 60 per cent sulfuric acid has recently been investigated. It is claimed that theoretically cellulose with α-cellulose content of 95 per cent can be obtained in this way, which, however, is not easily applicable on an industrial scale. "Prehydrolysis" has been tried out by several producers with apparently satisfactory results. If carried out at high pressure an excellent textile cellulose with 1.8 per cent pentosan only may be obtained by use of a solution containing 0.57 per cent hydrochloric acid, 0.66 per cent hydrobromic acid, or 2.54 per cent sulfuric acid. Work with hydrobromic acid seems to have given the highest cellulose production with the highest α-cellulose content. Use of a mixture containing 0.5 per cent of sulfuric acid and 0.5 per cent of hydrobromic acid gave 31.28 per cent of a very good cellulose with an α-cellulose content of 98.43 per cent from rye straw. The type and strength of acid to be used depend in part upon the temperatures at which the work is carried out. Entirely different results have been obtained with acids, in varying strengths, at different temperatures and pressures.

Tincture of Iodine Replaced by Indigenous Substitution Product

A new substitute for tincture of iodine, called Kodan tincture, has appeared on the German market. It is a brown liquid

with a slight smell of thymol and contains in alcoholic solution chlorobenzylates of the alkyl amides of dimethylaminoacetic acid, chlorodimethylphenol, and chloroxydiphenylmethane. The phenols, which are not soluble in water but soluble in lipoids, have a deep effect on the skin. It is claimed that the tincture wets the skin well without irritating it. It does not corrode metal instruments and the brown dyestuff can be easily removed from linen.

Iodine Recovered from Flue Dust

Flue dust as obtained in German blast furnaces by electrical gas purification contains between 0.001 and 0.2 per cent of iodine, and experiments for the recovery of the iodine have been carried out at the Heinrich Bierwes plant of the Mannesmann tube works. The flue dust, 19 tons of which are obtained every 24 hours with 0.025 to 0.035 per cent of iodine, is first concentrated by thorough boiling with water, resulting in a dry substance which contains largely sodium and potassium chloride and carbonate, organic compounds, fluorine, ferric oxide, and iodine. The organic compounds are removed by calcination at about 700° C. The remaining salts are dissolved, leaving the ferric oxide as a residue which is separated. Next the material is precipitated with calcium chloride in order to eliminate the fluorine as far as possible. The remaining clear solution is slightly acidified with hydrochloric acid and distilled, when it yields between 80 and 90 per cent of the original iodine content. The potash salts in the flue dust can be recovered in the form of potassium chloride of 98.5 per cent purity and may contribute towards the costs of the process. The economic side of the recovery process seems not to have been examined yet.

Concentration Ordered in the Cosmetics Industry

An order issued by the government limits the manufacture of cosmetic products to firms which made them in 1938 and have continued production ever since. No less than 1,600 firms were engaged in the manufacture of cosmetics before the war, but most of these have been compelled to close down, owing to shortage of raw materials, and the number of firms which have been officially entrusted with the manufacture of toilet preparations by the Reich Office for Chemistry is below 100. In recent years, however, outsiders believed to number several hundreds have entered the market, with the result that, as the *Frankfurter Zeitung* reports, the market has been inundated with doubtful products. The new concentration measure is directed against these firms.

New Motor Car Engines Designed for Liquid Gases

The use of gases in motor engines has made considerable progress in various countries of Europe, particularly in Italy where natural deposits of methane gas are available, but also in smaller countries like Hungary, Holland, and Denmark. In Denmark gas engines using natural gas have been introduced into small sea-going vessels like fishing boats. In Germany no natural gas deposits are available, but greatly increased use has been made of liquid gases obtained by compression of butane and propane from Fischer-Tropsch plants for synthetic gasoline. In 1936 about 4,000 road vehicles were running on liquid gases in Germany, by 1939 the number had risen to 33,000, and the present circulation is said to be several times larger. The use of liquid gases has been encouraged by the fact that at times their use was virtually unrestricted because the Fischer-Tropsch plants had to dispose of the growing output obtained automatically in the course of their normal operations. At other times restrictions were imposed in order to safeguard supplies of butane for industrial purposes, but in general owners of liquid gas vehicles have fared better than others.

Lately there has been a tendency to encourage the use of liquid gases by technical adjustments in engine design. It is claimed that the motor itself need not be altered for liquid gases if Otto motors are used, while for Diesel engines conversion to the Diesel-gas process, which is characterized by the use of small quantities of Diesel oil for starting, etc., is recommended. The high antiknock value of the liquid gases would permit the use of engines with a higher compression ratio than is usual in gasoline or Diesel engines, but users are reluctant to order these specialized engines because they cannot be converted back to the use of liquid motor fuels. although it is stated that these special gas engines consume about 15 per cent less gas than ordinary converted motors. There are now about 700 gas filling stations in various parts of Germany exclusively for liquid gases, and distribution is also helped by mobile distributing stations—i. e., tank cars which are sent wherever they may be needed. Distribution is still a major problem in the utilization of liquid gases.

Sweden

Synthetic rubber is now produced from sulfite alcohol in a pilot plant at the rate of 100 kg. a day by Mo and Domsjö, an important firm in the cellulose industry. A larger plant is under construction and will, when completed, have a capacity of 200 tons of synthetic rubber which will be marketed under the trade name Modo. The Industrial Commission assists Allmänna Svenska Elektriska A.B., a firm of electrical manufacturers, which is experimenting with synthetic rubber in its plant at Västeras. Meanwhile the rubber-yielding plant Taraxacum Kok-Sagys has been cultivated on trial plots in Sweden, and laboratory experiments are also carried out with several local types of dandelion.

Less Cellulose for Paper and Rayon

The output of fodder cellulose, which according to official plans is to reach 550,000 metric tons in the year ending June next, has assumed considerable proportions, with the result that supplies of wood pulp for the paper industry and of cellulose for rayon manufacture are meeting with some difficulty. Between 40 and 50 per cent more wood will be required to meet all demands, and cellulose manufacturers complain that the prices for fodder cellulose compare unfavorably with those received from rayon producers. Swedish cellulose plants seem to have concluded large contracts for the export of textile cellulose to rayon factories in Continental Europe, and these may not be fulfilled.

New Pharmaceutical Factories to Be Built

Two new pharmaceutical factories are to be built in Sweden by Astra A. B. Apotekarnas Kemisker Fabriker and by Apoteksvarucentralen Vitrum. The plant to be built by the former firm at Södertälje will be the largest pharmaceutical factory in the Scandinavian countries. The latter firm hitherto specialized in the manufacture of insulin, a shortage of which is reported from several European countries.

Zinc Paints to Be Made in Closed Cyanide Plant

A. B. Glücksmans Metallaffär has bought from the Swedish Government the cyanide plant now lying idle at Trollhättan. The company intends to treat zinc scrap in the plant and later to use zinc concentrates. The products of the plant will comprise ammonium chloride, zinc white, and zinc gray in addition to metallic zinc. Hitherto about 5,000 tons of scrap zinc have been exported annually from Sweden, so that the company should find no difficulty in securing the raw material for its plant.

Shale Oil Producer Applies for Permit

The Company for the Lime and Stone Industry has asked the Swedish Government for a permit for the erection of a shale oil plant at Skoellersta near Tarsta in the district of Naerke, where oil shale

has been exploited industrially for some time. It is intended to build a plant at an expenditure of 300,000 kronor and to treat 20,000 tons of shale and 12,500 tons of limestone annually for the production of 550 tons of shale oil and 7,500 tons of burnt lime. It was announced only a short while ago that another plant which commenced production during last spring will produce 25,000 to 30,000 tons of shale oil and 10,000 to 15,000 tons of sulfur annually.

Denmark

Dansk Sojakagefabrik has been compelled by shortage of imported raw materials to reduce its production of oil cakes for Danish farmers. It is now announced that the firm has been experimenting during recent months with a new synthetic rubber product which will be marketed under the trade name Aetylan. It is produced from alcohol, and chlorine, kaolin, sodium sulfate, and sulfur are mentioned as materials used in the production. While the new product does not compare with other synthetic rubbers in all properties, it is said to be suitable for shoe soles and driving belts. Its use for bicycle tires is under development.

Quartz Sand Found In Jutland

Large deposits of quarts sand suitable for the manufacture of high-class optical glass have been discovered in Jutland. A process has been worked out by S. A. Andersen for the reduction of the iron content of the sand to 0.2 per cent, so that it can be used for the manufacture of optical glasses for which formerly 24,000 tons of quarts sand had to be imported. These imports are in future to become superfluous. The only window glass factory in Denmark, which has been closed for the past two years because of the lack of coal, has now been reopened.

Dry Blood Plasma to Be Produced

Dansk Albumin Fabrik A.S., a firm which has been producing technical blood albumin for use in the plywood industry for a number of years, has now formed a new department for the manufacture of dry blood powder and plasma for use in the food industries.

Medicinal Herbs to Be Cultivated

A survey of medicinal herbs growing wild in Denmark has been undertaken, and their systematic collection is to be organised. Det Danske Medicinal- og Kemikalie-Kompagni reports that the cultivation of medicinal plants and collection of herbs have made good progress. The cultivation of poppy for the production of opium preparations was especially satisfactory. Vitamin products are being made from halibut, carrots, and spinach. The production of cod liver oil increased, but that of tunny liver oil was insufficient.

France

In contrast to other European countries, France pursued before the war a policy of importing crude mineral oils and refining them in large plants in the four import ports of Marseilles, Bordeaux, Nantes, and Rouen. Three of these are now in the occupied zone, and Marseilles alone is left to Vichy France. Owing to the interruption of oil imports, however, all the French refineries have had to curtail operations drastically, and war damage has also caused great difficulties, with the result that none of the importing refining companies has been able to show a profit in recent years. Typical of the conditions prevailing in the French oil-refining industry is the position of the Raffinerie de Berre, which reports that the plant was closed down almost completely until the second half of 1941, when some sections were reopened for the treatment of substitutes which, however, do not permit anything like complete use of the plant facilities. The company endeavors to hold its technical staff together, so as to be able to resume operations later on.

Grande Paroisse to Distill Lignite

The Société Chimique de la Grande Paroisse has commenced construction work on a plant for the treatment of lignite and production of liquid fuels at St. Hilaire on the Allier river in Central France. It was only recently that the company acquired a concession for the exploitation of lignite deposits in that district, and the new plant is being built under an agreement with the Vichy Ministry for Industrial Production. Apparently the company intends to use its own process for the distillation of lignite.

Three-Year Plan for Cellulose Factories

The Société Française de la Cellulose is to spend 100 million francs on the erection of several factories for the production of cellulose from *Arundo donax* in Provence. During the next three years a plant with a capacity of 120,000 tons per annum is to be built. It is stated that *Arundo donax* (reed) has a very high α-cellulose content. The company will operate its own lignite and sulfur mines and will also produce enough chlorine and sodium sulfate for its purposes. German interests are reported to participate in the enterprise.

French Rubber Supplies Insufficient

The total French rubber supplies consist at present of 1,500 tons of reclaim a month, a quantity which covers only a fraction of the demand which in peace time was estimated at 60,000 tons per annum. Normally France used to rely on the production of plantation rubber in Indo China, and since this source has been lost to Japan, schemes have been prepared for the encouragement of rubber cultivation in French possessions in West Africa. The production of synthetic rubber has also been studied, but since France does not possess a surplus of coal, oil, or alcohol at present, the plans have been dropped for the time being, as construction materials are also difficult to obtain.

Italy

The Azienda Generale Italiana Petroli (AGIP) has increased its capital from 500,000,000 to 1,000,000,000 lire. The new funds are to be used mainly for financial transactions in connection with the nationalization of foreign oil companies operating in Italy. Twenty-one companies, mostly belonging to the combines of Shell, Standard, and Vacuum, are affected by the transaction. Some of these own large refining and storage plants. A recent law provides for the appointment of an expert commission to assess the value of the properties handed over to the AGIP. As the AGIP is a semiofficial company financed by the state and the sums fixed by the commission as representing the value of the foreign oil interests will presumably be paid into blocked accounts, the transaction causes no financial difficulty. The "nationalization" will probably be followed by a "rationalization", since the oil supplies available in Italy do not permit the maintenance of the large distributing organization built up by importers before the war.

Forty Barytes Deposits Exploited

About forty deposits of barytes are at present exploited in Italy, and the annual production is stated to exceed 50,000 tons. The principal deposits are found near Trent, on the island of Sardinia, in the Val d'Aosta, in Valassina, and in Tuscany. It is reported that the output of lithopone is now sufficient to meet local demands, but the supply of other paints is far below requirements.

Synthetic Rubber Industry Plants Are Amalgamated

The Società Italiana per la Produzione della Gomma Sintetica and Società Italiana Gomma Sintetica, the two companies

formed jointly by the official Istituto per la Riconstrucione Industriale and the rubber company Pirelli, have decided to merge. The former company had a capital of 6,000,000 lire, but this has been reduced to 3,600,000 lire in order to cancel the loss of 2,440,000 lire incurred during operations so far. No information about plans for commercial production are available yet, nor is it easy to see how a substantial output of synthetic rubber is to be accomplished, considering the lack of suitable raw materials and metals for equipment. Mineral turpentine oil is to be used in the manufacture of synthetic rubber.

Gasworks Increase Output of Liquid Hydrocarbons

Although the provision of coal meets with considerable difficulties, the Italian gasworks, it was officially stated, are now producing 50 per cent more gas than in 1936 and three times as much as in 1929. The output of benzene, toluene, and xylene for war purposes is eight times the quantity provided during 1914 to 1918 when, of course, it was very small indeed. Some gasworks have experimented with wood and lignite as a raw material, but careful neutralization with ammonia is necessary, especially in the case of lignite, and the quantity used is limited.

Spain

The Union Resinera S. A. has raised its capital from 75 to 125 million pesetas, and will use new funds for plant extensions. The company has acquired further pine forests and intends to build a new factory in the Sierra de Cazorla. Plant for the use of waste products is to be extended. The production of celluloid is to be started under patents from the French chemical producer, St. Gobain. Export licenses for resin and turpentine oil are granted in rare cases only, it is reported from Spain.

Oil Refinery Moved from Canary Islands

Compania Española de Petroleos S.A. has dismantled part of its refinery at Santa Cruz de Tenerife (Canary Islands) and transferred it to Cartagena (Spain), where it is to be rebuilt and to be extended by addition of modern equipment. The Compania de Investigación y Explotaciones Petrolíferos S. A. reports that the exploration and prospecting work was continued throughout 1941 and new oil concessions were taken up, but the results so far obtained do not yet permit any conclusions as to whether profitable oil production is possible in Spain. The Spanish Government has encouraged the development of substitute fuels, but in this field also little progress has yet been made. The distillation plant at Puertollano is still the only one of its kind in the country.

Aluminum and Magnesium Production to Be Increased

Aluminio Español S.A., hitherto the only light metal producer in Spain, has decided to increase the annual output from 1,300 to 2,000 metric tons at a cost of 4,500,000 pesetas. Another Spanish company, Empresa Electro-Mecánica de Cordoba, intends to build an aluminum plant with a capacity of 8,000 tons per annum. The establishment of a magnesium industry is also intended. Investments of 20 million pesetas would be required, and the erection of suitable plant would take two years, but no definite decision has yet been taken.

Southeastern Europe

New Fertilizer Factory Formed in Yugoslavia

The Chemical Factory, Ltd., which was formed in March by the Prager Chemischer Verein, successor to the Aussig chemical combine and now under German control, and a group of Croatian industrialists will shortly commence the production of sulfuric acid, copper sulfate, superphosphates, and other chemical fertilizers. The capital of the company is 50 million kuna, 20 million of which have been paid in.

New Process to Use Asphalt Oils in Hungary

A new process for the extraction and utilization of asphalt oil from the bituminous deposits at Derna-Tataros and Bodnos in the district of Bihar has been developed by Julius Nyula. These deposits contain between 10 and 20 per cent of asphalt oil which has penetrated the stone. A heavy crude lubricating oil is produced by treatment with benzene, benzol, or other solvents, and this may be processed further to yield equal parts of a lubricating oil and an asphalt suitable for road construction. It is claimed that the lubricating oil can be blended to advantage with that obtained from the Hungarian mineral oils at Lispe. A commercial plant is to be ready for production within twelve months.

Shale Oil Plant to Be Built in Bulgaria

Two 600-foot wells have been drilled near Bresnik, 25 miles west of Sofia, where oil shale deposits are known to exist. Plans have been prepared for the erection of a plant capable of an output of 20,000 tons per annum of liquid fuels from either shale or lignite, large deposits of which are also available in the country. A sulfuric acid plant is to be erected in the vicinity of the state coal mines at Pernik.

Aluminum Production Planned in Yugoslavia

Croatian Aluminum, Ltd., has been formed in Agram with a capital of 20,000,000 kuna by the Vereinigte Aluminium-Werke A. G., the German aluminum trust, and the Croatian Government for the exploitation of local bauxite deposits and the erection of alumina and aluminum plants.

Magnesium to Be Produced in Hungary

The Hungarian State Iron, Steel, and Engineering Works have obtained a license from I. G. Farbenindustrie for the production of metallic magnesium (Elektron) in Hungary. A new company, the Hungarian Magnesium and Elektron Co., has been formed for the utilization of the I. G. Farbenindustrie process.

Quinine Production in Western Hemisphere

A CONTRACT has recently been signed, designed to increase cinchona bark output in Guatemala and Ecuador, between the Defense Supplies Corp. and the American Quinine Co. Plans for developing cinchona plantations, laboratories, and methods of grading and testing the bark are also included. Charles Cosse, president of the company, has gone to Guatemala with a production staff, to establish cinchona plantations that are expected to yield 1,500,000 pounds of bark in 5 to 10 years.

Magnesium Plant Begins Operation

A NEW plant for the manufacture of magnesium was put into operation in New South Wales, Australia, in July. The process being used in the plant includes the treatment in a heated vacuum of finely ground calcium carbide with calcined magnesite. The metal thus obtained is remelted and refined under special fluxes.

Critical Chemicals from Argentina

ARGENTINA may prove to be a source of some of the critical chemicals needed by America's war effort, according to a report from the Armour Research Foundation's field party now making an industrial survey of the South American nation.

Chief among the critical products found in Argentina are beryllium in the oxide form, butyl alcohol, acetone, acetic acid and methanol, and asbestos.

Mexican Rubber Program Expanded

More than 1,500,000 Hevea rubber seedlings are ready for cultivation on demonstration plantations in southern Mexico, as a part of the broad inter-American program for expansion of rubber growing in the western hemisphere, according to a report from the Office of the Coordinator of Inter-American Affairs. The site of the first Mexican plantation has been selected at Las Palmas, State of Chiapas. Four additional demonstration plantations are planned in time for seeding this season, in the States of Chiapas, Tabasco, and Vera Cruz.

Each plantation, averaging about 1,000 acres, with 750 acres planted to rubber, will be planted with high-yielding, bud-grafted Hevea trees a year or two old.

Bauxite Output Declines in Dalmatia

According to figures credited to the German press, output of bauxite in Dalmatia has declined from 404,418 metric tons in 1938 to 274,195 tons in 1940 and to 211,111 tons in 1941. This decline is attributed to the absence of sea transport facilities and to the failure of the railways to handle greater quantities of the mineral. The mines are located in territory now forming part of Croatia.

New Chemicals Made in Britain

New British-made chemicals, states a recent report from the United Kingdom, include acid calcium ammonium phosphate and the salicylacetates of sodium, potassium, and calcium. The phosphate is to be used as a substitute for cream of tartar in baking powder; its raising power is claimed to equal that of calcium acid phosphate. The salts of salicylacetic acid possess greater solubility, are more easily absorbed, and have more anti-rheumatic value than aspirin, it is stated.

Canadian demands for emergency metals and minerals has spurred an aggressive search for new sources of base metals. New aluminum-producing units have been placed in production as a part of the Canadian effort, and that country now furnishes about 40 per cent of the United States' requirements.

Recent experiments in Eire have shown that laminarin, a seaweed product, is a source of glucose and alcohol and that it might be used as a basis for adhesives, according to an industrial report of the Department of Commerce. Yields of 13 to 16.9 gallons of ethyl alcohol per ton of air-dried weed were obtained.

NECROLOGY

Alfred N. Finn

Alfred N. Finn, chief of the Glass Section, National Bureau of Standards, died September 21, 1942, at Lincoln, Nebr. He had been in ill health for the past year and had retired from active work about six months ago.

Mr. Finn was born in Denver, Colo., in 1882. He received his A.B. in 1906 and M.A. in 1909 from the University of Denver. After several years as an instructor at the University of Denver he was appointed in 1911 as an assistant chemist at the National Bureau of Standards. His work dealt with cements, paints and oils, boiler waters and boiler compounds, protective coatings for metals, and corrosion of ferrous and nonferrous alloys. In 1919 he accepted a position as chief chemist and metallurgist for the Hydraulic Steel Co., Cleveland, Ohio, but later returned to the Bureau as chief of the Glass Section.

Mr. Finn was an authority in glass technology and had charge of the bureau's production of optical glass. He also directed the making of a glass disk 70 inches in diameter and 11 inches thick for use as a reflector in an astronomical telescope now in use at the Ohio Wesleyan University.

Mr. Finn had been a member of the American Chemical Society since 1911 and was also a member of the American Ceramic Society, American Society for Testing Materials, the Washington Academy of Sciences, Optical Society of America, and the American Institute of Chemists.

Ross Aiken Gortner

Ross Aiken Gortner, chief in the Division of Biochemistry, University of Minnesota, died September 30. Dr. Gortner was born at O'Neill, Nebr., March 20, 1885. After graduation from Nebraska Wesleyan University in 1907 he earned his M.S. degree from the University of Toronto in 1908 and his Ph.D. degree from Columbia University in 1909. An honorary Sc.D. was conferred on him in 1932 by Lawrence College.

Dr. Gortner went to the University of Minnesota in 1914 as associate professor in the Division of Soils from the Station for Experimental Evolution at Cold Springs Harbor, N. Y., where he formed his close personal and scientific association with J. Arthur Harris, who probably exerted more influence on Dr. Gortner's scientific thinking than any other one person. Dr. Gortner transferred to the Division of Biochemistry of the University of Minnesota in 1916 as associate professor and was made full professor and chief of that division in 1917, which position he held at his death.

Dr. Gortner's contributions to scientific journals number more than 300. The chief fields covered are the black animal pigments, the melanins; proteins, especially the cereal proteins and their relation to the properties of flour and dough; colloids, especially their physicochemical properties and the role of water in living processes.

His major contributions to scientific thought include "Outlines of Biochemistry", "Selected Topics in Colloid Chemistry", which contained the lectures given at Cornell University in 1935–36 in connection with the George Fisher Baker lectureship, and a third volume prepared by Dr. Gortner and colleagues in 1936 entitled "J. Arthur Harris, Botanist and Biometrician".

His intense enthusiasm for science and especially for the field of biochemistry, his exceptional fund of scientific knowledge in many fields, and his easy, familiar delivery made him an inspiring teacher. He gave freely and liberally of his time and thought to the research problems of his own graduate students as well as to those of his colleagues both in the Division of Biochemistry and in other divisions of the University, and in the early days of the development of graduate work in the Division of Biochemistry spent many hours in the laboratory working with his students. Dr. Gortner was active in many graduate student activities outside scholastic work.

Dr. Gortner was honored with appointment to many positions of responsibility in scientific research and education. In the National Research Council he was serving at his death on committees on the chemistry of colloids, chemistry of proteins, and organic chemical nomenclature for the American Society of Biological Chemists and the American Chemical Society. For three years he served on the executive committee of Sigma Xi, and on December 31, 1941, was made president of the society. Last May he was awarded the Osborne Medal by the American Association of Cereal Chemists. He had been a member of the American Chemical Society since 1909.

Arthur D. Hirschfelder

Arthur D. Hirschfelder, professor of pharmacology at the University of Minnesota, died October 11 at the age of 63.

After being graduated from the University of California, Dr. Hirschfelder studied at Stanford University, Heidelberg, and the Pasteur Institute. He received the M.D. degree in 1903 from Johns Hopkins University, where he spent his

internship and later held a staff position. He went to the University of Minnesota in 1913, and was head of the pharmacological section of the Medical School.

Dr. Hirschfelder had been a member of the AMERICAN CHEMICAL SOCIETY since 1914 and was Chairman of its Minnesota Section in 1917. He belonged to the American Association for the Advancement of Science, Society of Pharmacology, Society of Experimental Biology, Society for Clinical Investigation, and American Medical Association (chairman of the section on pharmacology and therapeutics, 1917). His interests included internal medicine, lead poisoning, antiseptics, mosquito repellents, and the determination and clinical variations of magnesium.

Edward G. Lunn

EDWARD G. LUNN, research chemist with the Bureau of Engraving and Printing, Washington, D. C., died September 19 at Niagara Falls, N. Y., at the age of 45.

Dr. Lunn was a native of New York City and a graduate of the University of California. For the past five years he had been employed as research chemist with the Bureau of Engraving and Printing, and prior to this worked for nine years as a chemist with the Naval Research Laboratory. He had been a member of the AMERICAN CHEMICAL SOCIETY since 1921.

Richard A. Moll

RICHARD A. MOLL of the Esso Laboratories-Chemical Division died suddenly on September 1.

Mr. Moll, who was graduated from Syracuse University in 1932, was with the Hewitt Rubber Corp., Buffalo, N. Y., between 1932 and 1940. He joined the Standard Oil Development Co. in April 1940 and at the time of his death was Group Leader in charge of the Rubber Service Laboratory of the Esso Laboratories-Chemical Division. A paper by Mr. Moll and his associates, R. M. Howlett and D. J. Buckley, dealing with Perbunan properties and compounding was presented before the Division of Rubber Chemistry, at the Buffalo meeting of the AMERICAN CHEMICAL SOCIETY.

Mr. Moll had been a member of the SOCIETY since 1940.

Orrin W. Pineo

ORRIN W. PINEO, physicist, died September 5, 1942, in Milo, Maine. He was born at Katahden Iron Works, Maine, September 28, 1908, and was graduated from Massachusetts Institute of Technology with a B.S. degree in 1929. From 1929 to 1933 he worked with A. C. Hardy at M. I. T. on the development of an automatic recording visual range spectrophotometer which was later commercialized by the General Electric Co. During 1932-33 he held the Textile Foundation's senior fellowship. From 1933 to 1934 he worked independently on the development of automatic spectrophotometers with Adam Hilger, Ltd., in London and contributed to a book published by this company on the subject of "The Practice of Absorption Spectrophotometry".

From 1935 to 1940 he was employed by the Calco Chemical Division, American Cyanamid Co., at Bound Brook, N. J., where he did further work on the development of spectrophotometers, taking out many patents. During the past two years Mr. Pineo had been engaged in work for the war effort, being located in Washington, D. C., and Princeton, N. J.

Morris A. Pozen

MORRIS A. POZEN, consulting chemist and specialist in food chemistry, died September 29 in Brooklyn, N. Y., at the age of 55. Born in Russia, Mr. Pozen came to this country at an early age and received his doctor of pharmacy degree from George Washington University. In 1909 he was awarded the American Pharmaceutical Association Prize. While serving as assistant chemist and then chemist in the Department of Health, Washington, D. C., he was also collaborating chemist in the Bureau of Chemistry of the Department of Agriculture from 1909 to 1920. He then joined the Schwarz Laboratories as chief chemist, where he remained until 1930.

Mr. Pozen was at one time editor of Brewery Age and author of "Successful Brewing", published in 1935.

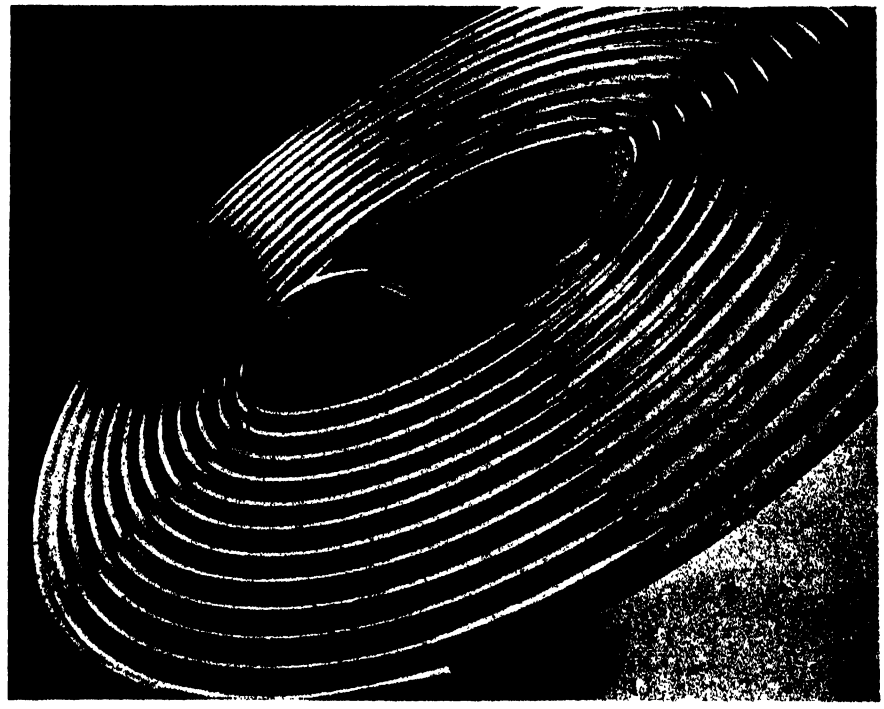
Carbon Black by Gas Explosion

A METHOD of making carbon black by a gas explosion has been developed at the University of Kansas by George W. Stratton and Delos E. Winkler, and is said to produce 30 pounds of carbon black from 1,000 cubic feet of a mixture of natural gas and chlorine. Present industrial methods recover only from 0.5 to 2 pounds from the same amount of gas. Dr. Stratton proposes to secure the chlorine from the salt deposits of central Kansas, using petroleum wastes from nearby oil fields to furnish cheap power for steam generators.

Arc Welding Movie

GENERAL ELECTRIC'S film, "The Inside of Arc Welding", is being used extensively in speeding and facilitating the training of arc-welding operators.

Over 2000 reels of this 16-mm. film are in regular use throughout the United States alone, while numerous reels are being used in England, Canada, Brazil, and South Africa. Of these, 30 complete sets are being used by the U. S. Navy in its training programs, and 25 sets by the War Department.



Plastic Replaces Tin Pipe

Flat coils of transparent Tenite pipe are now used in cooling systems for the beverage-dispensing industry. This pipe, manufactured by Tennessee Eastman Corp., Kingsport, Tenn., may be readily coiled, bent, formed, or curved to fit almost any condition. Inquiries should be addressed to North Penn Co., 72 Fifth Ave., New York, N. Y.

Air Raid Precautions for Chemical Works

R. WALTERS, National A. R. P. Co-ordinating Committee, British Information Services, London, England

AIR raid precautions for the chemical industry present many special problems, but before any of these can be tackled the general measures for the protection of industrial premises must be applied. The objects of these measures may be briefly summarized as: the protection of personnel, the protection of plant, and the establishment of a system which will involve the least disturbance to production.

Only then is it possible to consider the particular difficulties of the chemical industry. With chemical undertakings, the nature of the products means that in most cases A. R. P. organizations have to give special attention to antigas measures. The corrosive or poisonous nature of many chemicals will be equivalent to, or worse than, those of the familiar war gases, and it is fortunate that equipment designed to protect against the latter will, if available in sufficient quantity and handled with expert knowledge, afford a means of dealing with the former.

Acids and Alkalies in Tanks

In works where large tanks of strong acids or alkalies, or pipe lines carrying these substances are used, special attention should be paid to the following points:

An immediate inspection should be carried out of such plant, following an air raid in the district, as there may be cracks caused by distant explosions.

Adequate supplies of a neutralizant should be stored near by.

Drains should be adequate, near to the particular hazard, and dams should be built to direct the escaping fluid into sumps or drains, and keep it away from other plants.

Good supplies of water for flushing down are needed.

It will obviously be better to build a blast wall around tanks, rather than to cover with sandbags or similar obstacles that would make inspection difficult. For protection of underground pipe lines, trenches should be dug on either side to break the effect of the shock wave; such trenches would also serve to trap escaping fluids. It may be necessary to provide extra shut-off or non-return valves. The first aid parties in such works should fully understand the properties of the materials likely to be splashed about if the plant were hit, and the appropriate treatment. A good decontamination center, with changes of clothing ready, will be needed.

Chlorine Stored in Railroad Tanks

A serious hazard in paper and dye works, both to the workers and the nearby district, is liquid chlorine in railroad tanks. The siding into which these are shunted should be protected with blast walls and a sump and hose should be provided. The ordinary gas mask is designed for only small concentrations of gas, and in such a situation special masks or breathing apparatus should be available. This warning applies equally to refrigeration plants using liquid ammonia. The special masks should be kept in the open as near as possible to the hazard, in a glass-windowed case, so that rescue operations can be speedily carried out by those first on the spot.

Apparatus and Plant

The question of inspection after a works has been hit is most important. Apparatus such as autoclaves, steam economizers, high-pressure air and steam plant, which may suffer only minor damage at the time, can cause serious casualties and dislocation if explosions occur subsequently. Representatives of the workers should join in the inspection in order to maintain confidence, and if there is any doubt, tests should be carried out before restarting. In most cases, an adequate system of recording pressures, temperatures, etc., will serve to warn of any abnormality, but sometimes it may be more convenient to install automatic devices to give an alarm signal.

Where quantities of organic solvents of an asphyxiating nature are used, breathing apparatus will normally be supplied, and probably the most serious risk is of fire and subsequent explosion. A special measure of protection against incendiaries would be worth while under these circumstances, consisting of a layer of shingle or sandbags, supported if necessary by timber supports which could be made of salvaged wood. Stores of inflammable or dangerous materials should be dispersed if at all possible. In any event inflammable material should be kept away from main structural steel members, as the load-bearing capacity is destroyed at comparatively low temperatures.

Check Fire Extinguisher

A checkup should be made on the type of fire extinguisher available and, if necessary, its effectiveness against the particular inflammable fluid should be tested by the fire party. The conditions under which a fire may turn into an explosion should be fully understood by the firemen, and timely evacuation should be provided for.

Perhaps the one thing which stands out clearly in dealing with the special question of A. R. P. in chemical undertakings is the necessity for the fullest training of the personnel. Owing to ignorance of the properties of chemicals, there exists the possibility of panic developing, or alternatively a lack of appreciation of dangers. All members of fire parties and first aid personnel should be given simple instruction in the nature and properties of the substances used in the works, so that they may readily understand the reason for counter measures, and thus promote individual sense of responsibility with consequent increase in initiative.

Given a well-trained A. R. P. personnel of this type, the chemical industry should reach as high a level of safety in air raids as any other.

Ethylene Oxide Hazard

CONSIDERABLE hazard may be present in working with certain high-pressure reactions involving ethylene oxide. There were two instances in the past year when this substance, in combination with other organic chemicals, inexplicably entered into reactions which went out of control, and the resultant explosions were in each case exceedingly violent. In one case the ethylene oxide was reacting with certain mercaptans, and in the other with an alcohol. Circumstances alone prevented disastrous consequences.

A number of war research projects today are using or contemplating the use of ethylene oxide in reactions of this general nature.

The two explosions mentioned were both of a treacherous nature, since in each instance the reaction had been conducted successfully a number of times before it got out of control. The work can be done with safety if the proper precautions are taken, and it is recommended that the initial investigations be carried out in small quantities, using special bombs designed for pressures of 100,000 pounds per square inch and upward, in order to learn the safe limits of operating technique.

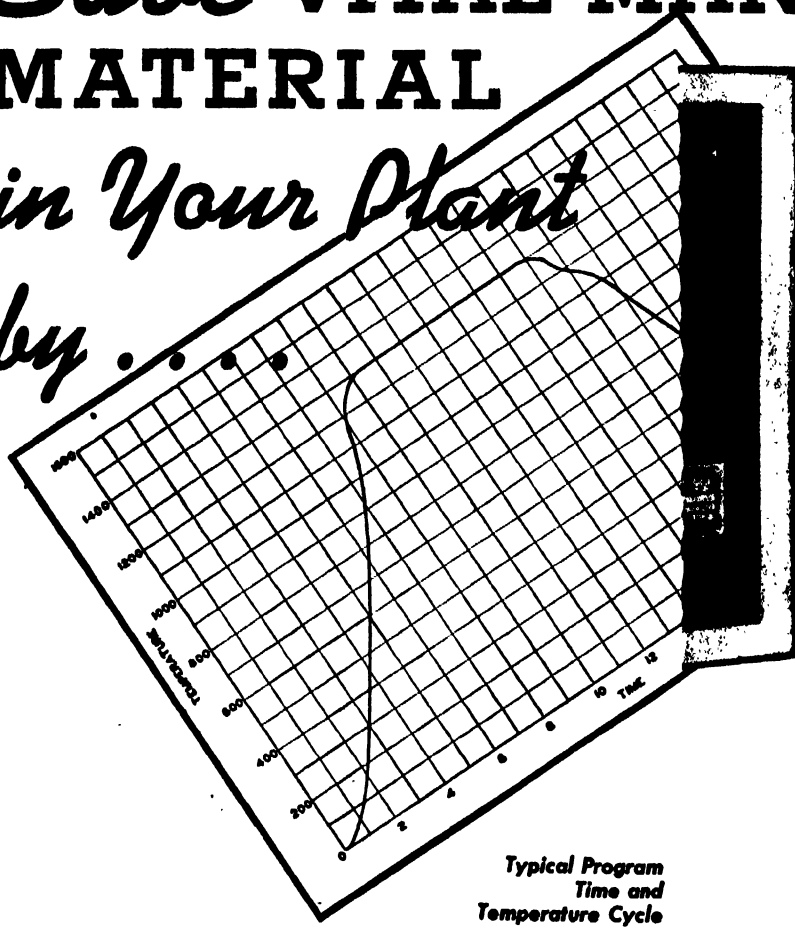
DOUGLAS P. MEIGS
AMERICAN INSTRUMENT CO.
SILVER SPRING, MD.
September 29, 1942

Electrolytic Tinplating to Save Tin

THE desperate necessity of conserving our tin has resulted in great dependence on the comparatively new electrolytic tinplating industry, which is now being expanded to take care of a large portion of the United Nations' tinplate needs, according to J. H. Hopper, General Electric Co., in a paper presented before the annual convention of the Association of Iron and Steel Engineers at Pittsburgh.

A year ago, there were only two continuous tinplating lines capable of handling strip 30 inches wide at speeds above 300 feet per minute. By the end of the year fourteen new lines will be in operation; by the middle of 1943 there will be 26, most of them designed to handle 36-inch strips at speeds above 600 feet per minute.

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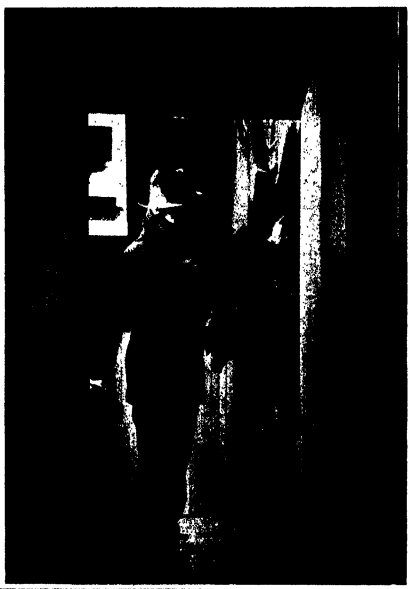
THE CHEMICAL NEWS PARADE



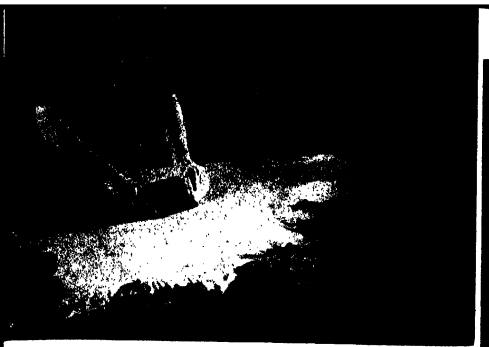
PHOTOS BY WILLIAM M. RITTASE

Shown here are various stages in processing leather at laboratories of Röhm & Haas Co., Philadelphia, Penna., manufacturer of leather-treating chemicals. *Above.* Hair is stripped after skin is immersed in milk of lime for several days. *Right.* Resistance of hides at 0° F. is tested in cold room. *Below.* Hides are subjected to enzyme action to cleanse skin of undesirable detritus from liming operation.









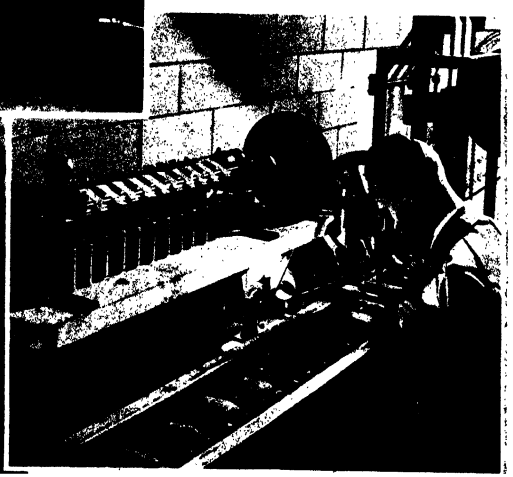
Above. Operator smooths out leather to eliminate wrinkles after tanning in drum. *Right.* Leather is rolled under pressure to flatten grain and improve gloss. *Below.* At left resistance to sunlight is tested in Fadeometer. At right skins are ironed.





Below left. Skins, tanned by tumbling in tanning liquors in revolving drums, are then inspected. *Below center.* Polishing on a plush-covered wheel gives final silky luster. *Below right.* Leather strips get same bending action as would the vamp of shoe. This flexing test indicates how long leather finish will last.







American Chemical Society[1]

105TH MEETING. Indianapolis, Ind., April 12 to 16, 1943.

106TH MEETING. Minneapolis, Minn., September 6 to 10, 1943.

AKRON RUBBER GROUP. Akron City Club, Akron, Ohio, November 6, 1942. Fall meeting.

CHEMICAL ENGINEERING SYMPOSIUM. Palmer House, Chicago, Ill., December 28 and 29, 1942. "The Application of Kinetics to Design and Operation of Chemical Engineering Equipment". Ninth Annual Symposium.

NATIONAL CHEMICAL EXPOSITION AND NATIONAL INDUSTRIAL CHEMICAL CONFERENCE. Sherman Hotel, Chicago, Ill., November 24 to 29, 1942.

ORGANIC CHEMISTRY SYMPOSIUM. Boston, Mass., December 28 to 30, 1943. Tenth National Symposium.

Other Scientific Societies

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Netherland Plaza Hotel, Cincinnati, Ohio, November 16 to 18.

AMERICAN PETROLEUM INSTITUTE. Palmer House, Chicago, Ill., November 9 to 13. Annual meeting.

AMERICAN SCIENCE TEACHERS ASSOCIATION. Hotel Pennsylvania, New York, N. Y., December 29 and 30.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA. William Penn Hotel, Pittsburgh, Penna., November 9 and 10. Third annual water conference.

INDUSTRIAL HYGIENE FOUNDATION. Mellon Institute, Pittsburgh, Penna., November 10 and 11. Annual meeting.

OPTICAL SOCIETY OF AMERICA. Hotel Pennsylvania, New York, N. Y., October 30 and 31. Annual meeting.

NATIONAL LUBRICATING GREASE INSTITUTE. New Orleans, La., October 26 to 28.

NATIONAL SAFETY CONGRESS AND EXPOSITION. Sherman Hotel, Chicago, Ill., October 27 to 29.

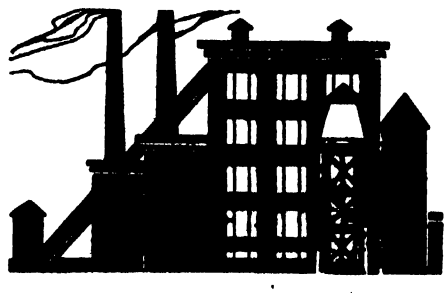
[1] The list of the SOCIETY's National Officers and Directors, Editors, members of Council, Divisional and Local Section Officers, Committees, and Chapters of Student Affiliates appears in CHEMICAL AND ENGINEERING NEWS three times a year—usually February 10, May 10, and October 10. The latest list is printed on page 1239 of the October 10 issue.

Local Sections

SECTION AND PLACE	NOV.	SPEAKER	SUBJECT
Alabama, Tutwiler Hotel, Birmingham	12	Laurence L. Quill	
California, Claremont Hotel, Berkeley	14		Social Meeting
Cincinnati, Ohio	11	G. B. Bachman	Synthetic Rubber
Connecticut Valley, Springfield, Mass.	14	Maurice L. Huggins	Structure and Properties of Synthetic Polymers
Dayton, Engineer's Club	10	G. B. Bachman	Synthetic Rubber
Detroit, E. S. D. Auditorium, Rackham Memorial Building	13	L. T. Hallett	The Industrial Application of Microanalysis
Florida, Tallahassee	14	Laurence L. Quill	
Indiana, Indianapolis	6	G. B. Bachman	Synthetic Rubber
Kalamazoo, Room 313, Science Building, Western Michigan College	14	L. T. Hallett	The Industrial Application of Microanalysis
Kanawha Valley, Charleston, W. Va.	12	G. B. Bachman	Synthetic Rubber
Lexington, Room 201, Kastle Hall, University of Kentucky	5	G. B. Bachman	Synthetic Rubber
Louisville, Ky., Auditorium, Public Library	4	G. B. Bachman	Synthetic Rubber
Memphis, Tenn.	10	Laurence L. Quill	
Michigan State College, Kedzie Chemical Laboratory, East Lansing	10	L. T. Hallett	
Midland, Mich., Auditorium, Dow Chemical Company	9	L. T. Hallett	The Industrial Application of Microanalysis
Minnesota, Minneapolis	2	F. F. Blicke	Synthetic Local Anesthetics
Montana, Bozeman	4	F. F. Blicke	Synthetic Local Anesthetics
Nashville, Furman Hall, Vanderbilt University	9	Laurence L. Quill	Nuclear Fission and the Transuranium Elements
North Jersey, Newark Athletic Club, Newark	9	C. P. Rhoads	Chemical Mechanisms in Cancer
Northeastern, Huntington Hall, M. I. T., Cambridge, Mass.	12	Maurice L. Huggins	Structure and Properties of Synthetic Polymers
Northwestern Utah, Chemistry Building, University of Utah, Salt Lake City	13	F. F. Blicke	Development of Synthetic Local Anesthetics
Oregon, Reed College, Portland	10	F. F. Blicke	Development of Synthetic Local Anesthetics
Puget Sound, Seattle, Wash.	9	F. F. Blicke	Synthetic Local Anesthetics
Purdue, Lafayette, Ind.	9	G. B. Bachman	Synthetic Rubber
Rhode Island, Metcalf Auditorium, Brown University, Providence	13	Maurice L. Huggins	Structure and Properties of Synthetic Polymers
Rochester, Cutler Union, Prince Street Campus, University of Rochester	2	Carl R. Addinall	Vitamins and Their Industrial Development
Sacramento, Calif.	11	F. F. Blicke	Synthetic Local Anesthetics
Toledo, Room 1, University of Toledo	12	L. T. Hallett	Industrial Application of Microanalysis
University of Illinois, Urbana	13	Kasimir Fajans	Molecular Structure
University of Michigan, Ann Arbor	11	L. T. Hallett	
Washington, D. C., Cosmos Club	12	Max Bergmann	Specificity of Proteolytic Enzymes
Washington-Idaho Border, Pullman, Wash.	6	F. F. Blicke	Development of Synthetic Local Anesthetics
Western Vermont, Burlington	11	Maurice L. Huggins	Synthetic Polymers
Wilson Dam, Sheffield, Ala.	11	Laurence L. Quill	Rare Earths

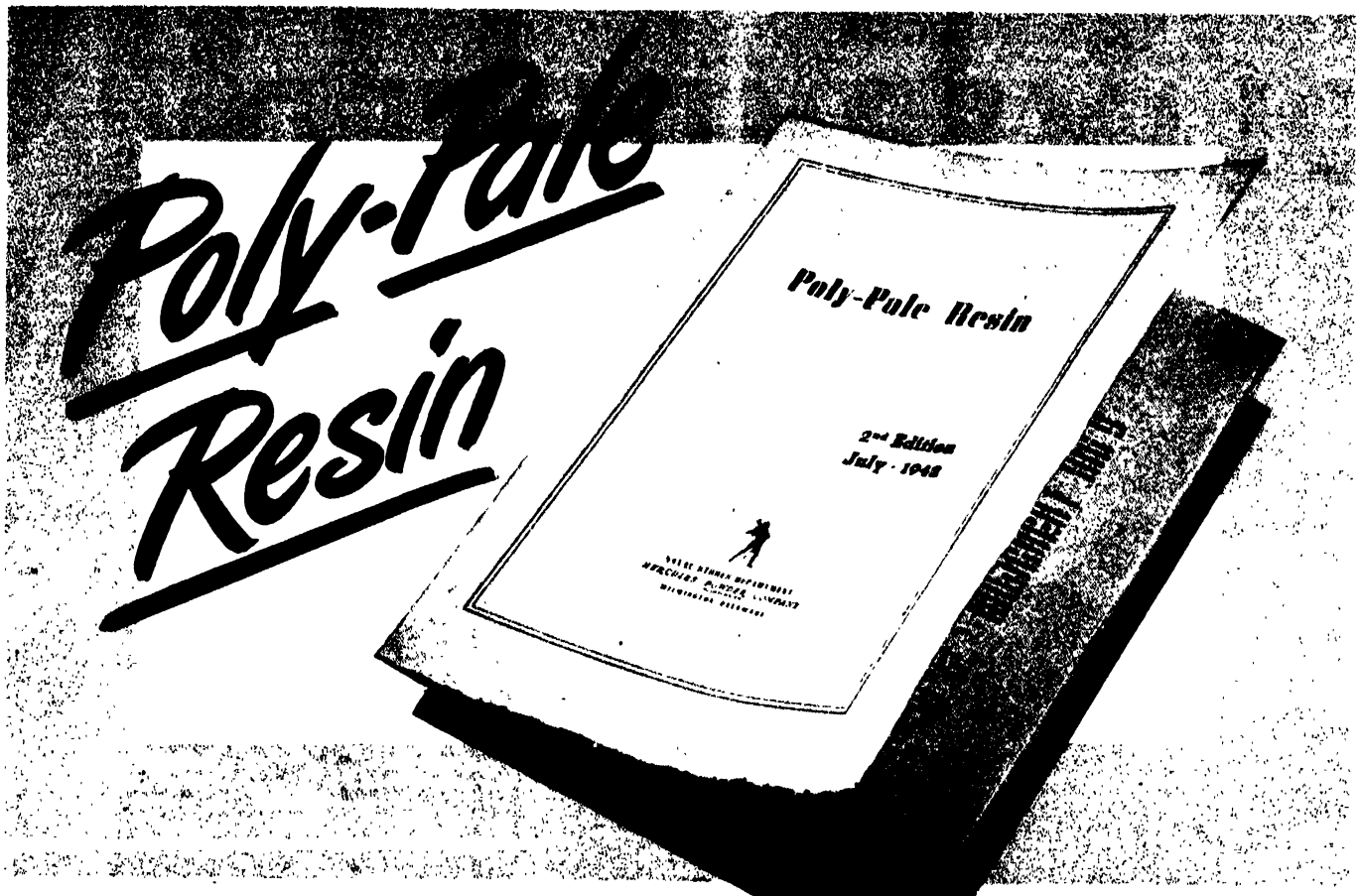
SOCIETY OF CHEMICAL INDUSTRY, Montreal Section, Rubber and Plastics Division. McGill Faculty Club, Montreal, Que., November 13.

SOCIETY OF RHEOLOGY. Hotel Pennsylvania, New York, N. Y., October 30 and 31. Annual meeting.



National Power Show

ALREADY more than 150 exhibitors have taken space at the 15th National Exposition of Power and Mechanical Engineering, to be held at Madison Square Garden, New York, N. Y., November 30 to December 4. As heretofore, the power theme will dominate the exposition. The range of exhibits includes refractories, coal and ash-handling equipment, dust collectors, insulation, combustion controls, indicating and recording instruments for the power house, boiler tubes, pumping, piping, all types of valves, steam traps, steam specialties of many kinds, and a variety of power plant supplies.



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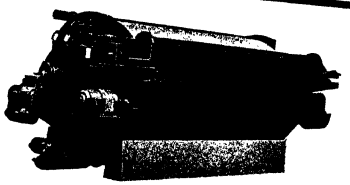
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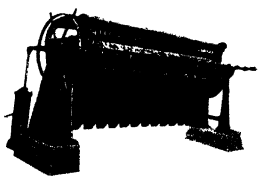
OLIVER UNITED FILTERS



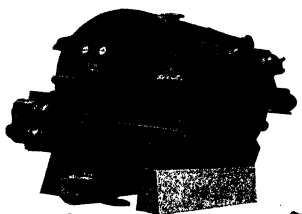
Oliver Continuous Vacuum Filter—Chemical Type



Oliver Continuous Precoat Filter Open Type—Vacuum



Sweetland Pressure Filter



Oliver Continuous Precoat Filter Hooded Type—Vacuum



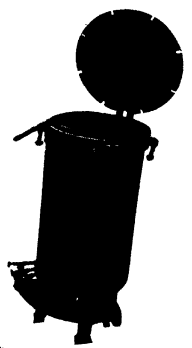
Oliver Continuous Pressure Filter



Oliver Top-feed Continuous Vacuum Filter—Crystal Type



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Isn't it significant, then, that companies with vital war projects decided that Oliver United was the best place to contact for filters? Isn't it logical that you can find Oliver United filters today handling such vital war materials as Alumina and Aluminum—Copper—Magnesium—Chemicals such as Explosives and Arsenal Products—Steel—Catalysts and numerous other strategic products?

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Heat Transmission. *William H. McAdams.* 2nd ed. xiv + 459 pages. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York, N. Y., 1942. Price, $4.50.

DURING the past 10 years the first edition of this book has been the standard reference and text for practicing and student engineers in all fields concerned with the transfer of heat. The stated purpose of this second edition is to make readily available to such engineers the many relatively inaccessible developments in heat transmission which have occurred since the first edition appeared. The result has been a complete, well-integrated digest of the entire literature with essential data presented clearly and in usable form. A quantitative idea of the extent of the literature in the last decade and the thoroughness with which it has been covered may be had from the excellent bibliography which has been increased from 414 to 789 references.

In the second edition the subject matter has been treated under the same chapter headings as before, but a new chapter entitled "Applications of Design" has been added which covers compactly the various factors influencing heat exchanger design, with special attention to optimum operating conditions. The section, "Heat Transfer to Boiling Liquids", is almost entirely new, and the chapter on "Radiant Heat Transmission" by Hoyt C. Hottel has been extensively revised. The other chapters have been thoroughly amended by the inclusion of new data which, in general, confirm previous correlations; new correlations cover, among other things, heating and cooling liquids in the streamline and transition regions, gravity flow of liquids in layer form, and flow past finned surfaces. New methods of calculation are given for net radiation between bodies within enclosures, unsteady conduction in special shapes, and two-dimensional heat flow. Under this last heading, reference might well have been made to the methods of Function Theory, a branch of mathematics which has been so much associated with the electrical field that its applications to other potential problems have not been widely recognized.

Worthwhile innovations are the addition of abstracts at the beginning and practice problems at the end of each chapter. The nomenclature has been revised to conform to accepted standards, but some inconsistencies occur—e. g., Y is used for the MTD correction factor in Chapter VI and F in Chapter XI. The tables of physical properties, etc., have been revised and expanded; it is unfortunate, however, that these include data on the viscosity of steam and the thermal conductivity of water which are now considered unreliable (Tables XXIV and XXVI in part). However, the reviewer has been advised by Professor McAdams of a proposed footnote to Table XXVI which will correct the data given therein.

In its revised form, this book should become increasingly useful as a text and as an authoritative source of information and reference in the field of heat transmission, and it should be the nucleus of any library in that field.

KARL A. GARDNER

Organic Reactions. Vol. I. Edited by *Roger Adams.* vi + 391 pages. John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y., 1942. Price, $4.00.

THIS book, the first in a projected series, will be welcomed by organic chemists. Twelve type reactions have been selected for critical presentation, following this general pattern: historical introduction and mechanism, scope and limitations of the synthesis, tabular presentation of substances synthesized, experimental procedure for selected members. These reactions were presented: Reformatsky (by R. L. Shriner), Arndt-Eistert (W. E. Bachmann and W. S. Struve), Chloromethylation of Aromatic Compounds (R. C. Fuson and C. H. McKeever), Amination of Heterocyclic Bases by Alkali Amides (M. T. Leffler), Bucherer (N. L. Drake), Elbs (L. F. Fieser), Clemmensen (E. L. Martin), Perkin

CONTINUED ON PAGE 1328

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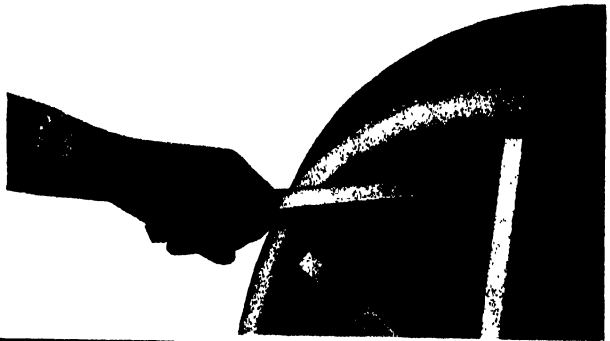
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Beyond the Flyleaf

CONTINUED FROM PAGE 1326

(J. R. Johnson), Acetoacetic Ester Condensation (C. R. Hauser and B. E. Hudson, Jr.), Mannich (F. F. Blicke), Fries (A. H. Blatt), and Jacobsen (L. I. Smith).

Most of the chapters are 25 to 40 pages long, with extremes at 14 and 56 pages. Clear expository writing, excellent covering of subject matter, and uniform editorial supervision stand out as features in each chapter. The commendable practice is retained of placing references at the bottom of each page. The physical make-up of the book is all that could be desired. Subsequent volumes in the series will be awaited with interest.

CHARLES D. HURD

Physical Chemistry. *Frank Thomson Gucker, Jr.*, and *William Buell Meldrum.* 1st ed. 683 pages. American Book Co., 88 Lexington Ave., New York, N. Y., 1942. Price, $4.00.

THIS is an introductory text for a two-semester course in physical chemistry. By selecting appropriate portions it may be adapted to a one-semester course. The topics covered are those found in most elementary texts on physical chemistry, with somewhat more attention given to subjects of particular interest to premedical students. An entire chapter is devoted to osmosis and osmotic pressure, another to indicators, and a third to enzymes. The discussion of photochemistry is confined to a single reaction, and except for the parachor there is no reference to any relationship between physical properties and molecular constitution.

In the reviewer's opinion the segregation of some of the mathematical derivations will convince the student either that the mathematics is too difficult for him, or that it is not essential to an adequate understanding of physical chemistry. Most students will benefit by having struggled with these derivations, even if they never comprehend them fully. That they are essential is confirmed by the presence in the remainder of the text of frequent references to the derivations in the last chapter.

The book is characterized by exceptional clearness and appears to anticipate many of the difficulties which the beginning student might have. The results of recent research are included where significant and are well blended with the older work. Occasionally one regrets the simplifications. For example, on pages 91–3, the discussion on the heat capacity of gases would have been more realistic had it considered both the contribution of the vibrational degrees of freedom to the residual energy and the application of the quantum theory.

There are not many errors. On page 162 the figure is a plot of C_v, although one would infer from the text that C_p is plotted. On the following page it appears that the θ of Debye is identical with the θ of Lewis and Gibson, which is not the case. On pages 593 and 596 the temperature of the triple point for water should be +0.0098°. In calculating the figure given in the text the effect of dissolved air in the water at the freezing point was neglected. The formulas for N_2, N_2O, and NO on pages 68 and 69 are not consistent with the best physical data.

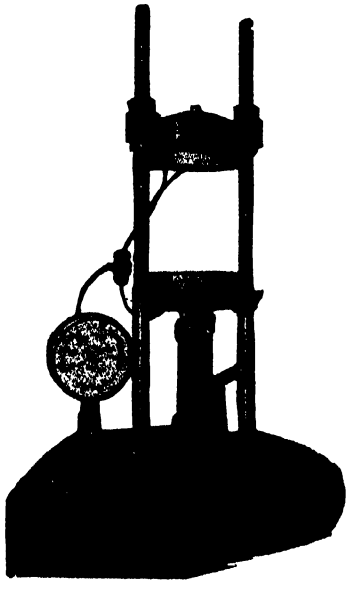
The text is amply supplemented by graphs and tables of experimental data and the laboratory methods by which such data are obtained are adequately described. The problems and exercises, included at the end of nearly every chapter, are simple. Each chapter closes with a reading list, accompanied by brief statements of the scope or difficulty of the book or journal article referred to. A table of atomic weights gives the names of the investigators who determined the most recent values, with the date and the method by which each atomic weight was determined. Throughout the book are attractive photographs and brief, informative footnote biographies of eminent

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Beyond the Flyleaf

CONTINUED FROM PAGE 1328

chemists. More than ordinary effort has gone into the mechanical features, such as the index, detailed table of contents, list of symbols used, and typography. The book represents an interesting and welcome addition to the already large number of texts in the field of physical chemistry.

WALTER B. KEIGHTON

Elements of Heat Transfer & Insulation. *Max Jakob* and *George A. Hawkins.* 1st ed. John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y., 1942. Price, $2.50.

THIS book represents a definite contribution to the literature on heat transfer and is especially valuable to students as an introduction to the subject. The work seems to cover the entire field in a general way and includes several chapters on phases of the subject which are not generally covered in other texts. The engineering designer looking for a satisfactory reference book will perhaps be somewhat disappointed in this work. As such it appears to devote too much attention to the derivation of formulas and might well include more charts and design curves.

The authors have included numerous examples and have gone to unusual detail in outlining the method of solution. The chapter on thermal conductivity appears to cover the subject particularly well. It includes many useful tables on thermal conductivity of vapors, liquids, and insulating and refractory materials, together with conductivity of metals and alloys. The chapter on conduction of heat in the unsteady state describes in great detail the derivation of formulas covering this phase of the subject. Much of the information in this chapter is not generally found in most other texts on heat transmission. The subject of steady state heat conduction in bodies with heat sources is treated briefly in this book.

I found the chapter on introduction to the dimensional analysis of convection extremely interesting and instructive reading and recommend it highly for anyone interested in the fundamental basis of heat transfer and fluid flow relations.

Some readers may be disappointed in the manner in which the chapter on heat transfer by forced convection is presented. The authors might have devoted considerably more space to this important phase of heat transfer. It has been fairly well established that the rates of heat transfer for fluids in turbulent flow of pipes cannot be represented accurately by a single formula as was attempted by the authors. This, of course, does not apply when dealing with liquids in streamlined flow through pipes and a single formula as shown by the authors has been found to correlate experimental data in a satisfactory manner. Transfer rates for heating of fluids flowing normal to banks of staggered tubes is again presented by the authors in a single formula. Such a formula definitely will not cover this type of flow from the turbulent region through the viscous region and a curve might better have been used. This chapter might well have included reference to methods of calculating heat transfer rates for flow normal to banks of tubes in line and on the outside of tubes in baffled heat exchangers.

The chapter on heat transfer by the combined effect of conduction and convection presents information which is not generally found in older texts on heat transmission. This chapter derives the formula for log mean temperature difference for the simple cases of parallel and contraflow but does not introduce the very useful and generally accepted correction curves for mixed flow.

The authors devote little space to heat transfer in condensing and boiling. They might well have presented a portion of the most up-to-date data on these two interesting subjects. The knowledge of these subjects is in a rapid state of flux and recent formulas for calculating heat transfer rates in these phases of the subject are very empirical and do not lend themselves readily to mathematical analyses. This might have led the authors to devote such a small amount of attention to this chapter.

A good general introduction on the subject of heat transfer by radiation is included. The final chapter of the book entitled "Heat Transfer and Pressure Drop" presents interesting sidelights to the subject, including the basic idea of Reynolds analogy, but includes no really useful fluid flow relations.

The book is interesting and instructive and should constitute a worthwhile addition to anyone's library on the subject of heat transmission.

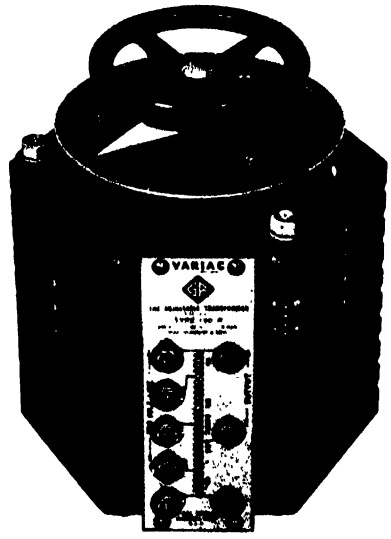
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Combustion Efficiencies in Domestic Heating Plants

CIRCULAR 44, "Combustion Efficiencies as Related to Performance of Domestic Heating Plants", by Krats, Konzo, and Thomson, is a 30-page booklet available at 40 cents a copy from the University of Illinois, Urbana, Ill.

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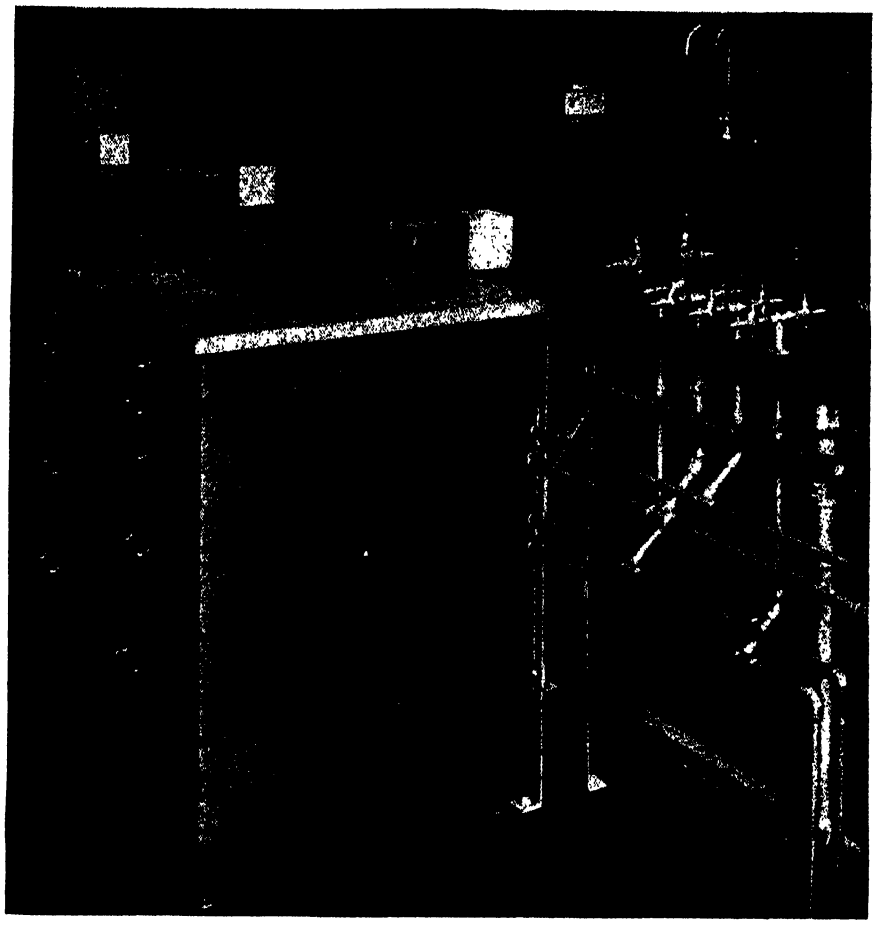
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Polarimetry, Saccharimetry, and the Sugars

THE increasing applications of polarized light, especially in carbohydrate chemistry, has led to many requests for information. In Circular 440, National Bureau of Standards, by Frederick J. Bates and associates, an attempt is made to answer such inquiries. Emphasis has been placed on the applications of polarimetry in carbohydrate chemistry.

The subject matter presented is divided into five parts. The first, consisting of 115 pages, covers an original mathematical treatment of the physical phenomena and a description and discussion of the physical equipment, such as polarimeters, saccharimeters, and accessory apparatus utilized in the study and applications of polarized light.

Part II, 275 pages, relates to the analysis and properties of sugar products such as raw and refined sugars, honey, and sirups. It includes an extensive discussion of the polarimetric and chemical methods utilized for the determination of sucrose, invert sugar, reducing sugars, pentosans, dextrose, levulose, and other sugars. Sections are devoted to the important physical properties of the sugars and their solutions, notably density, refractive index, color, turbidity, viscosity, acidity, electrical conductivity, solubility, and boiling point.

Part III, 140 pages, is devoted to the preparation and properties of the sugars and their derivatives. It includes discussions of the optical activity of organic compounds and of the structures, configurations, and reactions of the sugars. Methods are given in detail for the preparation of 24 important sugars and for numerous sugar derivatives. The text is supplemented by an extensive table which lists the important sugar derivatives and gives physical constants and literature references.

Part IV, 9 pages, gives general information concerning the standard samples of sucrose and dextrose issued by the bureau and concerning tests of equipment which the bureau is prepared to conduct.

Part V, 235 pages, contains 78 reference tables of numerical data and a résumé of the work of the International Commission for Uniform Methods of Sugar Analysis and the United States Customs regulations governing the weighing, taring, sampling, classification, and polarization of imported sugars and molasses.

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Surface Area of Colloidal Carbons

VOLUME III in the series on Columbian colloidal carbons has recently been issued by the Columbian Carbon Co. Research Laboratories, New York, N. Y., as a 96-page booklet entitled "The Surface Area of Colloidal Carbons". This is very well illustrated by photomicrographs and charts, and includes a bibliography of 69 items. It is the first important research to be completed in the field of the electron microscope.

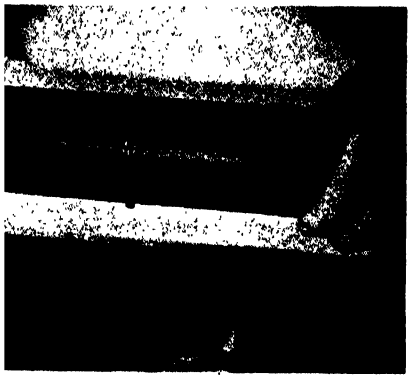
The discussion is divided into two parts, the measurement of surface area by the electron microscope, and the role of surface area in rubber reinforcement. Studies conducted during the past six months have shown that the role played by surface area is even more essential in synthetic rubbers than in natural rubber, and the importance of carbon structure has been confirmed.

Achievements in Chemistry

A BIBLIOGRAPHY of achievements in chemistry from 1930 to 1941, by Lloyd McKinley, head of the Department of Chemistry, University of Wichita, Kansas, has been issued as Bulletin 11 of the University of Wichita. This is a 60-page booklet, available at 15 cents a copy, which lists achievements in chemistry under 48 headings, from abrasives to x-rays, in addition to 55 periodicals, and 73 book publishers.

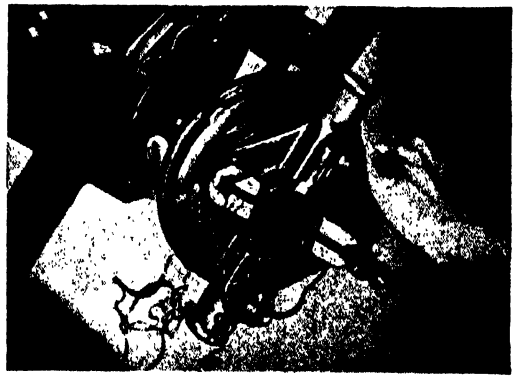


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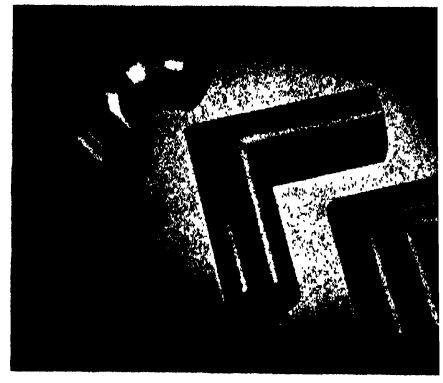
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War Control Handbooks

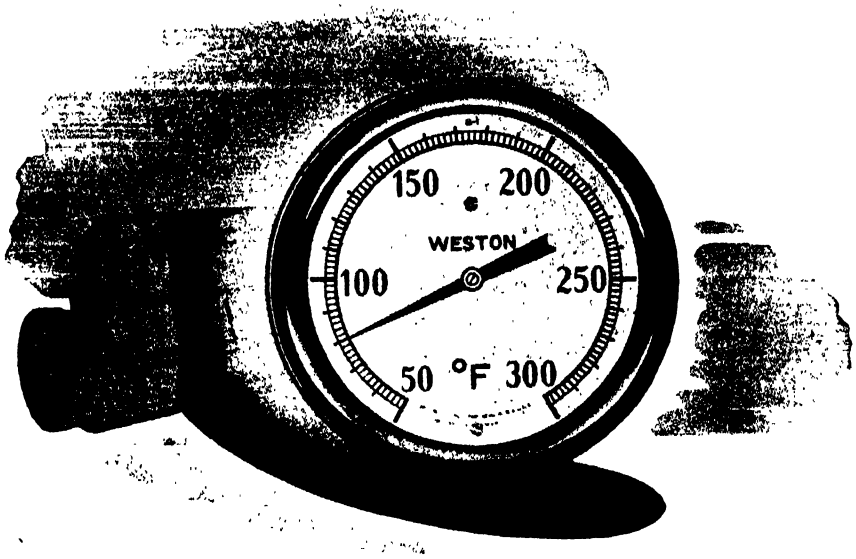
Two new war control handbooks, one digesting price and priority regulations and the other summarizing controls on imports and exports, have just been published by the *N. Y. Journal of Commerce.*

Every OPA price ceiling or rationing order and every WPB L, M, and P regulation is covered in the 32-page "War Controls Guide". Industries and commodities are listed alphabetically along with a brief digest of the various OPA and WPB regulations and amendments affecting each item. Over 2,100 individual rulings have been edited, weeded out, and indexed.

The "Import-Export Control Index" lists all existing controls in imports and exports along with the shipping priority rating and licensing symbols assigned to the various commodities. The import section includes a complete breakdown of WPB Order M-63 and an outline of the forms and information importers are required to furnish. Commodity numbers, general license ranges, and shipping priority ratings are presented in the export section.

Copies of either handbook may be had at 25 cents each from the *N. Y. Journal of Commerce*, 63 Park Row, New York, N. Y.

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Storage of 1,3-Butadiene

Because of the importance of synthetic rubber to the war program and the lack of experience in the storage of the raw materials used in its manufacture, the Pittsburgh–Des Moines Steel Co., through its Chemical Storage Fellowship at the Mellon Institute, Pittsburgh, Penna., has prepared Research Bulletin 7.381-B, which reports work on 1,3-butadiene. This is a 36-page publication, illustrated with tables and charts. The research indicates that 1,3-butadiene should be stored at about 32° F.

Bulletins on the storage of styrene, isobutylene, and acrylonitrile are in preparation.

Identification of Fibers and Fabrics

The Research Bureau for Retail Training, University of Pittsburgh, and the Fisher Scientific Co. have published a little 56-page booklet on "Identification of Fibers and Fabrics", which was produced with the cooperation of the Multiple Industrial Fellowship on Commodity Standards of Mellon Institute. The booklet gives the procedure of testing, with appendixes of the fabric families, classification of fabrics according to fabric families, and man-made fibers. Copies may be purchased for 80 cents each from the university or from the Fisher Scientific Co., 717 Forbes St., Pittsburgh, Penna.

Standards on Coal and Coke

The American Society for Testing Materials has issued its 1942 edition of the compilation covering 27 methods, specifications, and definitions of terms developed through its Committee D-5. Changes include modifications in standard methods of laboratory sampling and analysis of coal and coke (D271-42). The compilation includes specifications for classification of coals by rank and by grade, requirements for gas and coking coals, and specifications for sieves for testing purposes.

Copies of this 130-page publication may be obtained from the A. S. T. M. Headquarters, 260 South Broad St., Philadelphia, Penna., at $1.35 per copy.

Manual Sheet TC-4 of the Manufacturing Chemists' Association is a 9-page leaflet, which forms the first comprehensive instruction sheet of a general nature to be issued covering the unloading of tank cars containing inflammable liquids. Copies may be obtained from the association, 608 Woodward Bldg., Washington, D. C., at 12 cents each.

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Chemistry has gone to war! Research directors, chemists, plant managers, engineers and executives who attend the Exposition, will find a vast store of knowledge available concerning new methods and materials. Men high in their respective fields will impart interesting data vital to both America's war effort and to civilian economy.

INDUSTRIAL MOVIES

A continuous showing will provide a liberal education in chemical processing. Subjects covered will include plastics, rayon, chemical stoneware, glass, bread, coke, white lead, glass insulators, gelatin capsules, steel, aluminum and many others important to the American way of life.

COMMERCIAL EXHIBITS

An imposing list of leaders in every field will display and introduce many new items to the profession. These remarkable exhibits, in themselves, will completely justify attendance.

SCIENTIFIC EXHIBIT

The "Electronic Microscope" will be exhibited by RCA Manufacturing Company. See actual micrographs from this Electronic Microscope.

SPECIAL EXHIBITS

The War Production Board (W.P.B.) exhibit demonstrates reclamation and recovery of vital chemical products.

"Successful alternates and substitutes"—the extensive exhibit prepared by Dr. Harrison E. Howe.

"New Chemicals"—a significant exhibit by W. J. Murphy.

For details concerning available exhibit space, consult

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Robert E. Wilson to Receive Perkin Medal

ROBERT E. WILSON has been selected to receive the Perkin Medal of the Society of Chemical Industry for 1943. This medal is awarded annually for outstanding work in applied chemistry and the medalist is selected by a committee representing the five chemical societies in the United States. The medal will be presented on January 8, 1943, at a meeting to be held at The Chemists' Club, New York.



In 1922 Dr. Wilson became assistant director of research of the Standard Oil Co. of Indiana, where he did outstanding work in pioneering the application of chemical engineering principles in the oil industry. In 1929 he was placed in charge of the newly formed Development and Patent Department, and in 1931 became a director and in 1933 a vice president of the company. In January 1935 he became vice chairman of the Pan American Petroleum & Transport Co. Outstanding achievements have been made in the development of refining processes under his direction. Since February 1937 he has been president of the Pan American Petroleum & Transport Co., The American Oil Co., and other subsidiaries.

Dr. Wilson is a Director of the AMERICAN CHEMICAL SOCIETY and a member of eight scientific organisations.

Perry R. Cassidy, former executive assistant, The Babcock & Wilcox Co., is now lieutenant colonel in the Engineer Corps, U. S. Army.

Bradley Dewey, president of the Dewey and Almy Chemical Co., Cambridge, Mass., has been appointed deputy rubber administrator by William M. Jeffers, and is on leave of absence from his company for the duration. This company, one of the pioneers in synthetic rubber research in the United States, was the second in this country to use rubber latex on a commercial scale and one of the first to substitute synthetic rubber for the natural product. In 1938 Colonel Dewey visited many of the leading European rubber factories



Bradley Dewey

and laboratories and returned to the United States to start intensive research in Buna S rubber. Materials to erect a synthetic rubber plant with its own funds were granted the company in December 1941 and the plant went into operation in August.

Esther A. Engle has accepted a position with the Technical Service Division of the Commercial Solvents Corp., Terre Haute, Ind. The duties of this division include the introduction of the company's new products and the preparation of technical literature and advertising. Miss Engle was formerly of the Chemistry Department of Cedar Crest College, Allentown, Penna., and Chairman of the Lehigh Valley Section of the AMERICAN CHEMICAL SOCIETY.

Ernest R. Epperson has been named research instructor in the Department of Chemistry and Chemical Engineering at the Michigan College of Mining and Technology, Houghton, Mich. Mr. Epperson was formerly with the Missouri State Highway Department, Bureau of Materials and Tests.

I. **Fankuchen,** formerly of Cambridge University, England, has been added to the graduate teaching staff of the Polytechnic Institute of Brooklyn. He will present a lecture and laboratory course in "Chemical Analysis by X-ray and Electron Diffraction Methods".

Dean Cobleigh Becomes Acting President of Montana State College

THE Montana State Board of Education announced September 16 the appointment of Dean William M. Cobleigh as acting president of Montana State College to succeed President A. L. Strand, who resigned October 15. Dean Cobleigh has been active in chemistry and engineering since he was first appointed to the faculty of Montana State College in 1894 as assistant in chemistry. In 1907 he became head of the Department of Chemistry and held that position until 1929 when he was made dean of engineering and professor of chemical engineering.

Margaret Garver has been appointed assistant biochemist at the Armour Research Foundation, as the first woman on the research staff. Miss Garver was on the administrative staff of the foundation before her new appointment, in charge of the National Registry of Rare Chemicals.

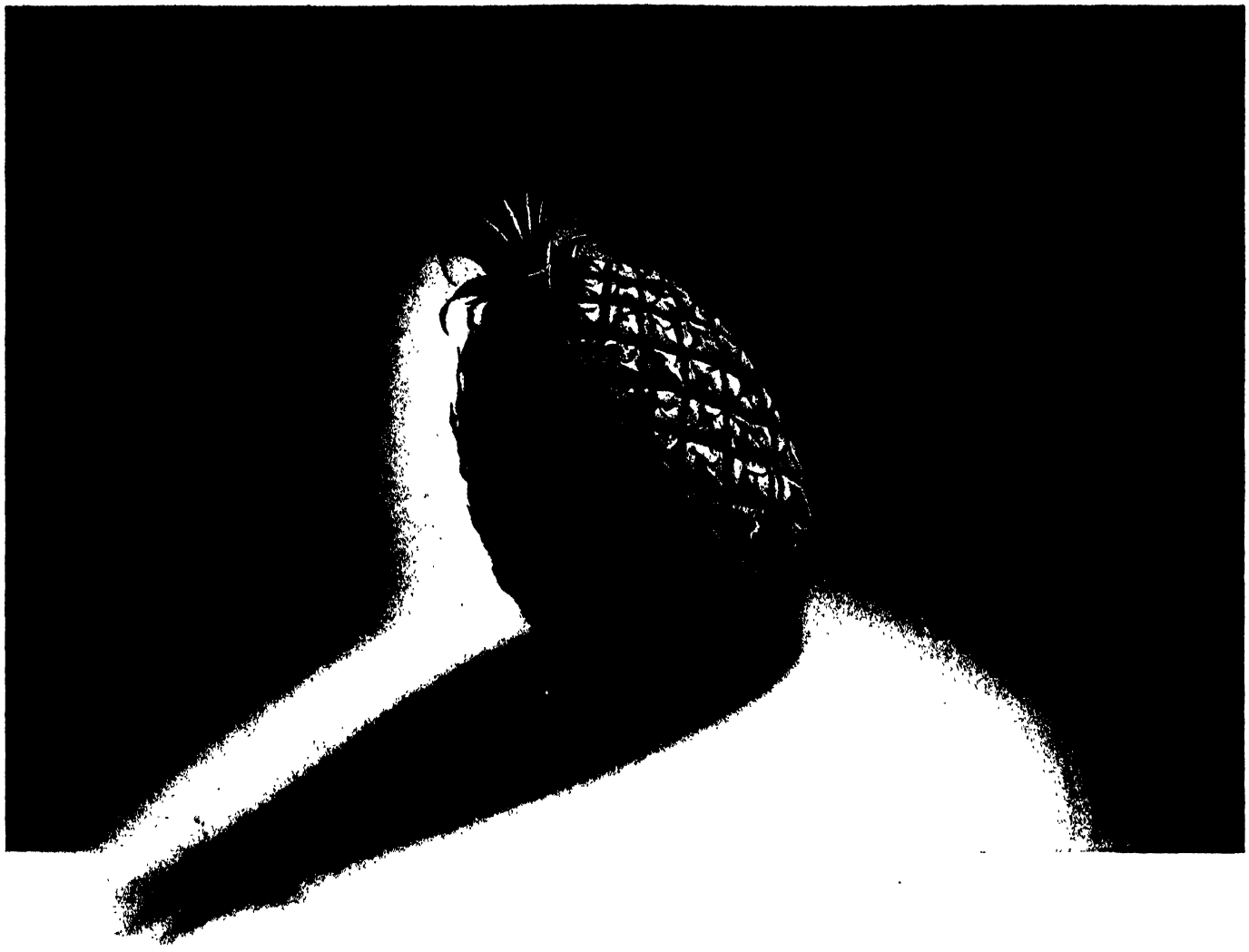
Henry J. Guzewicz and **Joseph E. Moran,** formerly associated with The Dicalite Co., are now serving in the armed forces of the United States.

Anson R. Kendall has accepted a position as assistant professor of chemistry at the Michigan College of Mining and Technology. He was formerly professor of chemistry at Dakota Wesleyan University.

William S. Kennedy has left the War Department, Elwood Ordnance Plant, and has accepted a position as associate engineer in the Engineering and Operations Division, Pantex Ordnance Plant, Amarillo, Texas.

C. G. Kirkbride has been placed in charge of all chemical engineering development being conducted by the Field Research Laboratory of the Magnolia Petroleum Co., Dallas, Tex. He was employed previously by the Pan American Refining Corp., Texas City, Texas.

Gordon M. Kline, chief of the Organic Plastics Section, National Bureau of Standards, recently returned from Great Britain, where he spent a month observing developments in war applications of plastics. During his visit he was guest speaker at luncheon meetings of the British Plastics Federation, the Plastics Group of the Society of Chemical Industry, and the annual meeting of the Institute of the Plastics Industry in London. Dr. Kline made the trip as a representative of the U. S. Government in response to an invitation from the British Ministry of Supply.



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Fifteen years ago this statement could not have been made. A pineapple *was* a pretty tough customer. Armored shell disposed of, the crushed pulp contains fibres, grit and foreign matter . . . all of these filtration removed but left an almost colorless liquid of inferior nutritive value . . . and far from the pineapple juice we drink today. Centrifugal force scientifically applied gave the desired answer.

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E D W A L

The EDWAL Manufacturing Division
Laboratories, Inc.
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Colonel H. A. Kuhn, Commanding Officer of the New York Chemical Warfare Procurement District for the past four years, has been assigned to duty in the



Colonel H. A. Kuhn

Office of the Chief, Chemical Warfare Service, Washington, D. C. His position as Commanding Officer of the New York District has been assumed by **Colonel Patrick F. Powers.**

Josiah K. Lilly, chairman of Eli Lilly and Co., has been named the 21st recipient of the Remington Medal, in recognition of his distinguished services to pharmacy.

Members of the AMERICAN CHEMICAL SOCIETY receiving awards in the $200,000 progress program of the James F. Lincoln Arc Welding Foundation are **Carlton G. Lutts**, Boston Navy Yard, who received a $500 award, and **L. P. Skinner, Jr.**, Southern Acid & Sulphur Co., Inc., Port Arthur, Texas, who received a $100 award.

Lieutenant Colonel Willard Machle is now with the Armored Force Medical Research Laboratory, Fort Knox, Ky., where he is serving as director of research. The laboratory is to concern itself with physiological and medical problems arising in the operation of armored vehicles.

George M. Machwart has left the University of Maryland to join the chemical engineering faculty of the Michigan College of Mining and Technology as associate professor. He will aid in the installation of the new chemical engineering laboratory now being completed.

E. T. Mitchell has resigned his position as a member of the faculty of the College of the Holy Cross, where he taught for the past four years, and has joined the research staff of the B. B. Chemical Co., Cambridge, Mass.

Thomas H. Miller has been named chief of the Metals Economics Division, Bureau of Mines, U. S. Department of the Interior, Washington, D. C.

Harry S. Owens is now employed as an assistant chemist at the Western Regional Research Laboratory, Albany, Calif. He was previously assistant professor of chemistry at the University of Idaho.

The following received Ph.D. degrees in agricultural and biological chemistry at The Pennsylvania State College in August 1942 and have accepted appointments as listed: **James Russell Oyler**, Nutrition Foundation Research Fellow at Columbia University; **Isadore Zipkin**, first lieutenant, Sanitary Corps, U. S. Army; **Laurence L. Layton**, Research Department, Distillation Products, Inc., Rochester, N. Y.; **Gertrude H. Spremulli**, Ranger Aircraft Engines, Farmingdale, L. I., N. Y.; **Seymour S. Block**, Joseph E. Seagram & Sons, Lawrenceburg, Ind.

Henry A. Roemer, Jr., formerly manager of sales of steel and wire products, has been made assistant general manager of sales of the Pittsburgh Steel Co., Pittsburgh, Penna., and **Norman F. Melville** has succeeded him as manager of sales.

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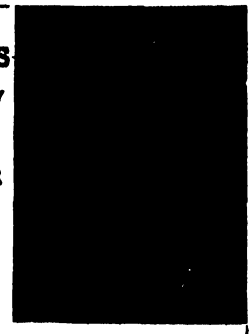


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The L. S. O. G. Exchange

Edited by A. A. Ashdown, Ed. F. Degering, J. E. Hawkins, and S. L. Redman

Send items to Ed. F. Degering, Department of Chemistry, Purdue University, Lafayette, Ind.

THE Montana Section of the A. C. S. was chartered April 30, 1928, after a campaign of some two years to obtain a membership large enough to petition for a section. The section endeavors to band together the chemists in the state so that they can become acquainted with each other and work harmoniously to further the profession of chemistry in a territory where individual chemists are separated by great distances. It is thought that affiliation with the A. C. S. facilitates bringing these scattered chemists together, for this affiliation makes it possible to have more outside speakers.

With the nearest section about 500 miles away, the travel expense to Bozeman has been great. The problem has been to finance outside-speaker expenses, although section members cheerfully pay additional assessments for this purpose. In the early days of the section's existence its small $50 yearly budget did not even permit one outside speaker except through cooperation with other sections in the Northwest. This very unfortunate condition was somewhat relieved through the persistent efforts of Edward Lyons of Parke, Davis and Co., and others. It is now possible to have a larger number of outside speakers through cooperation with the national office. It is felt, however, that there is still a need for more speakers for the smaller sections.

Acquiring new members outside the state educational institutions has been difficult because most of the industrial chemists of the state are connected with mining, smelting, or the production of such things as sugar, petroleum products, cement, fertilizer, and sulfuric acid. Since these people have rather specific interests, it is difficult to get them to come to meetings that are held 100 to 200 miles away. To try to overcome this condition two of the meetings each year have been held in Butte, Helena, Missoula, or Anaconda nearer these people in industry and with programs of interest to them.

The programs are usually kept fairly general in order to interest as large a percentage of the membership as possible as well as nonmembers in related lines. Reports of members who have attended national meetings also help to maintain interest.

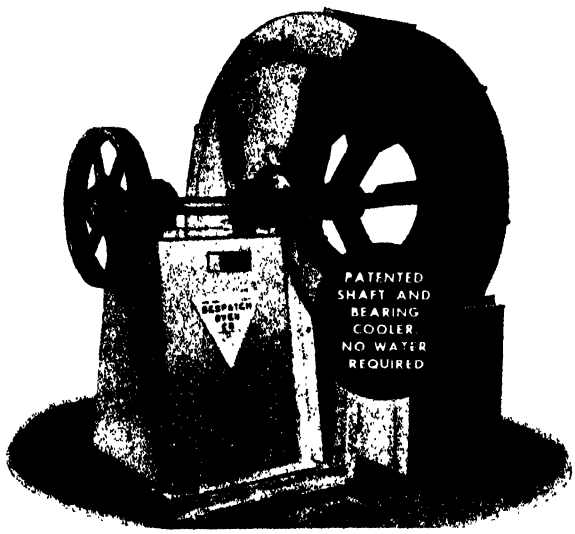
Members of the Montana Section are loyal boosters, and it is seldom that some do not drive from 100 to 200 miles to attend monthly meetings.—RAY WOODRIFF, *Montana Section.*

Washington Section Claims Oldest Officer

ON SEPTEMBER 12 Christian Heurich, one of the members of the board of managers of the Chemical Society of Washington, celebrated his 100th birthday anniversary. Mr. Heurich is president of the Christian Heurich Brewing Co. of Washington, D. C., and has been a member of the AMERICAN CHEMICAL SOCIETY for 35 years.

THE daily papers a few days ago carried a dispatch from Alabama to the effect that Private Theodore E. Borst of Clinton, N. Y., had sold a patent in the field of agricultural chemistry to the du Pont organization. Private Borst is a member of the 54th Chemical Company, entering the army from Middletown, Conn. Further inquiry reveals that some error was made, inasmuch as du Pont has never purchased a patent from Private Borst and never has had any patent negotiations with him.

NEW 1600°F. FANS



Despatch announces a complete line of all welded heavy duty acid resistant fans having capacities ranging from 1000 to 20,000 C.F.M. These fans have been thoroughly tested on Despatch ovens and dryers over a period of seven years. They are now offered to the trade for the first time.

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New Containers

CREATION of new types of containers to meet the conditions of war is one of the more important packaging developments which have taken place in the last year and a half, the WPB reports. The containers industries are highly specialized, and, as a result, have not been able to convert their facilities to the production of a large volume of direct war items. "Conversion" in the containers industries has meant instead, the invention of new types and adaptations of old types to meet the peculiar requirements of war.

The steel shipping container industry, for instance, has turned out an American version of the "blitz" can, a multi-purpose 5-gallon can which is used by the armed forces for carrying all sorts of liquids. This container can be used for water, oil, or gas, and can be carried by one or two soldiers. Although made of heavy steel, the cans are designed to float even when full. Another new type of container is a heavy paper-board carton which has been designed for overseas shipments. Not long ago, it was thought impossible to ship commodities abroad in anything less than wood or wire-bound boxes.

Jars and bottles, replacing metal cans for distribution in civilian channels, and for the Army in some instances, are being furnished by the glass container producers. The collapsible tube industry is producing tin and lead tubes for burn ointments, medicinal products, and of course, shaving cream and toothpaste.

Butadiene from Grain

AUTHORIZATION to build a pilot plant for making butadiene from grain by first fermenting the grain to produce butanediol has been received from the Rubber Reserve Co. by Joseph E. Seagram & Sons, Inc., and work on the plant in Louisville already has begun.

The Rubber Reserve Co. is to assist "in having a priority rating assigned which will make it possible to obtain early completion of the pilot plant, and in obtaining delivery of the materials".

Preliminary estimates indicate that a commercial sized plant, capable of producing 20,000 tons of butadiene a year, could be built in from 6 to 8 months from when materials were available, and that the butadiene could be made from between 15 and 20 cents a pound.

The pilot plant that has been authorized will be capable of handling 250 bushels of grain a day. Initial operation of parts of the process is expected by December 15; the plant will be entirely completed by January 15. While construction of the pilot plant is going on, experiments with the butanediol process are being conducted in various parts of the Seagram plant not needed for war alcohol production.

Design and Material Equally Important in Coke "Breeze" Pumps

"Water-ends" of Amsco-Nagle centrifugal pumps are always made of metals best suited to withstand the corrosive or abrasive conditions under which each specific pump must operate. Three pumps recently made for a petroleum refinery were fitted with water-end parts of manganese steel.

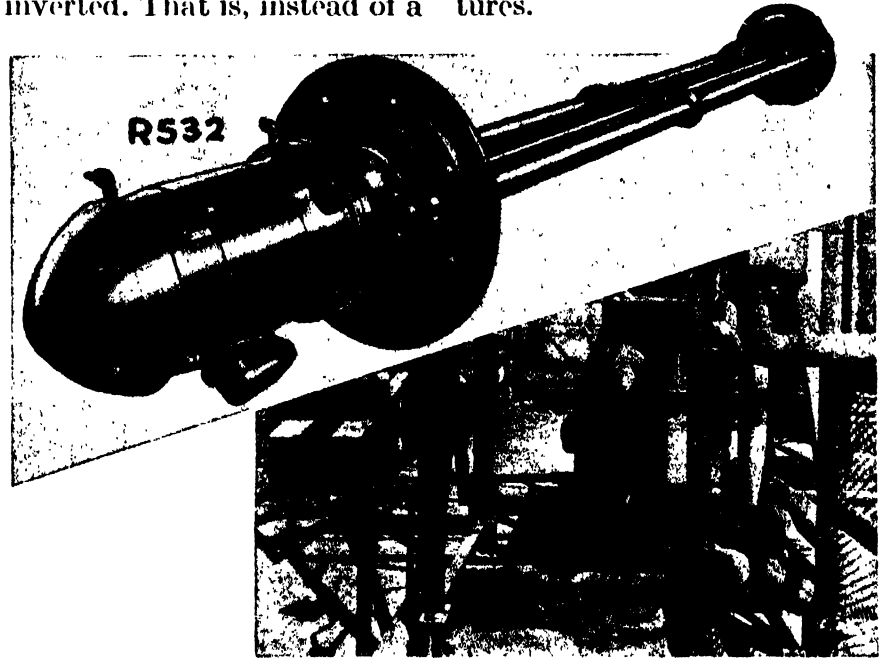
These pumps, one of which is pictured before and after installation, are Amsco-Nagle 3" type "SW" units with 11" impellers. They handle, in a coking unit quenching system, water containing petroleum coke "breeze" which, being excessively abrasive, has a severe scouring action that is satisfactorily resisted by the 13% manganese steel.

The design plays an equally important part in the successful operation of these pumps, which have been on the job over a year and a half. Notably, the water-end inlet is inverted. That is, instead of a side or bottom inlet, the liquid enters from the top of the casing. This eliminates air or gas binding. Simple, liberal slippage seal adjustment is provided.

In addition, intermediate and steadying sleeve bearings, in split yoke retainers, are lubricated from above the floor plate. The tubular structural members serve a dual purpose, one as an outlet pipe and the other as a duct for lubricant to the submerged bearings.

This is only one of many cases where Amsco-Nagle Pumps are economically serving the process industries. Amsco-Nagle Pumps are available in horizontal and vertical shaft types, from ¾" to 12" pipe, with impellers up to 28½" diameter and for capacities as great as 8,000 g.p.m. and heads as high as 200 ft.

Bulletin 940 thoroughly covers the many design features.

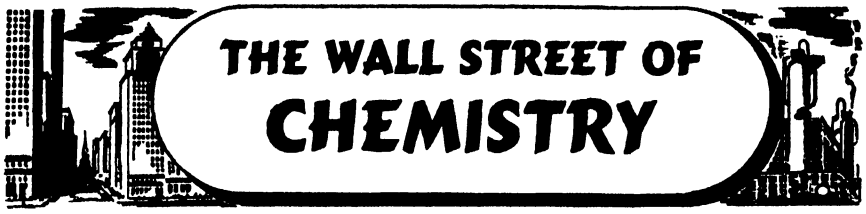


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OFFICES IN PRINCIPAL CITIES



Net sales of the **Masonite Corp.** for the fiscal year ended August 31 amounted to $17,044,152, a new high record and an increase of $4,111,176 over the previous year. Operations of the company are continuing on a 4-shift, 24-hour day, with the major portion of output going into the war program. Between January and September there was a 50 per cent turnover in its personnel. The company is now paying local wood producers approximately 100 per cent more than in 1938, and its hourly wage rate is 50 per cent above what it was in 1938.

The Pennsylvania Salt Manufacturing Co., for its fiscal year ended June 30, 1942, reports net earnings of $1,421,170 after deducting taxes and setting aside $200,000 for reserve for contingencies and unknown taxes. These net earnings amount to $9.47 a share, a decrease of 13.8 per cent compared with the previous year. Dividends amounting to $7.25 per share were paid during the year.

Directly or indirectly more than three quarters of the company's total production goes into the war effort, and the increasing demand for its products resulted in sales of $19,552,300, 19.7 per cent above the preceding year and the highest in the company's history. The company has undertaken the erection of three plants for the production of essential chemicals, and in addition approximately $3,500,000 has been expended for new plants and improvements and extensions to present facilities.

Procter & Gamble Co. in the September quarter reports sales on about the same level as a year ago. The second quarter sales were adversely affected by anticipatory buying in the initial months of the war.

Overly Biochemical Research Foundation

On September 14, the semiannual directors' meeting of the Overly Biochemical Research Foundation was held at its recently completed laboratories, 254 West 31st St., New York, N. Y. The foundation is a nonprofit organization incorporated under the laws of the State of New York.

The research staff includes James S. Wallerstein, chemist, who is also the president of the foundation; Arthur L. Schade, microbiologist; and Kurt G. Stern, biological chemist, formerly of Yale University, assisted by a number of qualified technicians. The board of directors is made up of Dean Burk, Archibald Sinclair, Leo Edelman, Leo Stieglitz, O. Alan Rose, Leonard M. Wallstein, and others. The foundation has received a grant from the Max Wallerstein Memorial Foundation towards the costs involved in the construction of the laboratories and the operating expenses during 1942–1944.

The two main lines of investigation concern the development, in concentrated and stable form, of polyvalent bacteriophage preparations active against bacillary dysentery, and the improvement of methods to produce certain strategic materials, such as glycerol, by fermentation processes.

F. J. Stock, formerly deputy chief of the Health Supplies Branch, War Production Board, has been appointed chief of the new Drugs and Cosmetics Section, Chemicals Branch, War Production Board. Deputy chief is **C. A. Willard**, and consultants are **Floyd Thayer**, **A. B. Pacini**, **John Williams**, and **Dan Dahle**. Unit chiefs are: Biologicals and medicinal chemicals, **J. T. Batson**; botanicals and imports, **T. F. Currens**; vitamins and agar, **Mark Merrell**, and cosmetics, **Robert Blair**.

Chester M. Suter, professor of organic chemistry and chairman of the Department of Chemistry, Northwestern University, has been appointed director of chemical research of the Winthrop Chemical Co., Inc., Rensselaer, N. Y.

Procter Thomson, Chemical Division, Procter & Gamble Co., Ivorydale, Ohio, is the representative of the Cincinnati Section of the American Chemical Society on the War Products Advisory Committee of Cincinnati.

R. G. Verdieck, Ph.D. in chemistry, St. Louis University, and **Wm. C. Eastin**, B.S. in chemistry, University of California, have joined the staff of the research and development department, Westvaco Chlorine Products Corp., New York, N. Y.

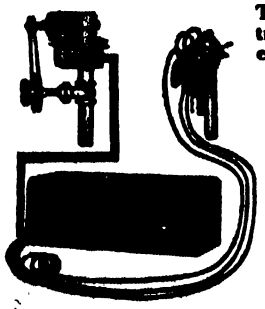
Herbert A. Winkelmann, technical director, Dryden Rubber Co., was the speaker at the first meeting of the season of the Midwest Section, American Association of Cereal Chemists. On October 5 he addressed the section on "Facts About Synthetic Rubber".

Who Makes It?

The following chemicals are wanted by The National Registry of Rare Chemicals, Armour Research Foundation, 35 West 33rd St., Chicago, Ill.:

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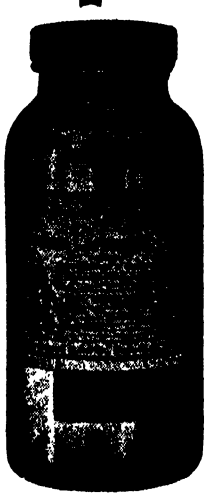
Ammonia
Argon
Boron Trifluoride
Butadiene
Butane
Butene 1
Butene 2
Carbon Dioxide
Carbon Monoxide
Chlorine
Dimethylamine
Dimethyl Ether
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Oxygen
Phosgene
Propane
Propylene
Sulphur Dioxide
Trimethylamine



ANALYTICAL REAGENTS

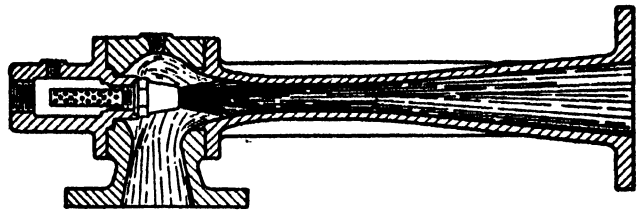
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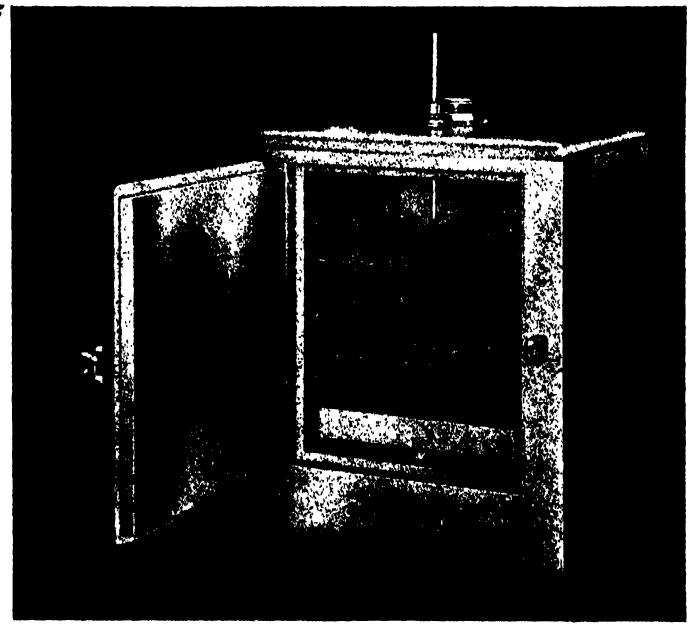
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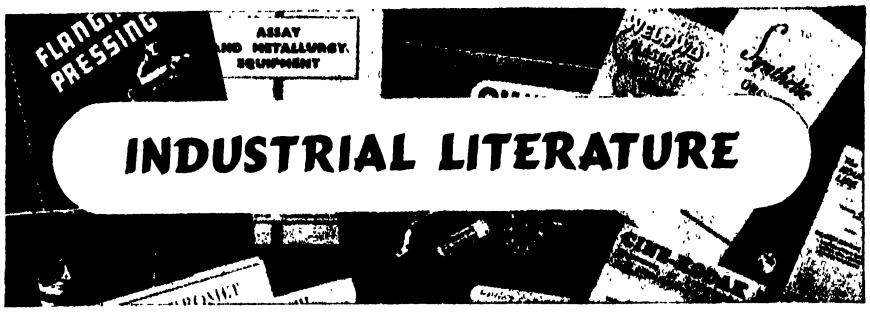
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Listed publications should be requested directly from the company concerned. Use business stationery, mention bulletin numbers, and refer to this journal. Publications will be sent free unless otherwise noted.

Accident Prevention. This card-case size booklet gives details of off-the-job accidents, and how to prevent them. Concise enough to be read in 10 minutes, yet complete enough to convince every American worker that his presence in mine, factory, or office every working day is essential to victory. Copies may be obtained at $2.50 per hundred. *Booklet CEN.* National Conservation Bureau, 60 John St., New York, N. Y.

Arc-Welding Accessories. An illustrated 32-page bulletin presents a complete line of General Electric accessories. *Bulletin GEA-2704B CEN.* General Electric Co., Schenectady, N. Y.

Centrifugal Separation. A new technical bulletin on the theory and practice of applying centrifugal force to chemical and industrial operations. This authoritative bulletin is divided into four parts: theoretical discussion, functioning of centrifugal bowls, centrifugal design, and installation and operation, and is being used as a textbook in one of the maritime academies. *Bulletin CEN.* The Sharples Corp., 2356 Westmoreland St., Philadelphia, Penna.

Cleaning Compound. A new folder describes the properties and uses of "Quiksil". It claims that this oil-absorbent material is better than wood shavings, can be re-used, eliminates sawdust, sand, and sweeping compounds, keeps floors dry, will dry up kerosene, gasoline, and various solvents and eliminates slip hazards on all types of floors. *Folder CEN.* Trojan Products & Mfg. Co., 3130 South Wabash Ave., Chicago, Ill.

Control Instruments. This bulletin contains detailed information on a compensated control for zone temperature control work. Heat anticipation is provided only when needed and in the amount required by a particular weather condition. These controls eliminate overheating and drafts, may be used in old or new buildings, and are adaptable to one- or two-pipe systems, and any type of heating system. *Bulletin F-1756 CEN.* Barber-Colman Co., Rockford, Ill.

Conveyors. A new, 4-page pamphlet on all types of conveyor systems, adaptable to the chemical process industries and to the war plants, to keep material rolling at a high pace. Illustrations show units at work in chemical, paper, textile, oil, glass, metal working, and other vital industries. *Pamphlet CEN.* Standard Conveyor Co., North Saint Paul, Minn.

Glassware. A new 16-page catalog describes new lines, such as blood bank bottles, lamp sulfur determination apparatus, fritted disks, distilling receivers with standard-taper ground joints, etc. An alkali-resistant (boron-fired) glassware, and 43 new items in Lifetime Red actinic glassware are described and illustrated. *Catalog, Supplement 1, CEN.* Corning Glass Works, Corning, N. Y.

Health and Safety Manual. Probably one of the first publications of its kind, this manual is devoted exclusively to the problems of women in industry. A section is devoted to the proper attire for women in the shop. Maintenance of good physical condition and hazards to be avoided in various occupations are also taken up. *Manual CEN.* Allis Chalmers Mfg. Co., Milwaukee, Wis.

Material Handling. An attractive, new, 16-page bulletin on manganese steel chain for conveying and elevating. Specifications and illustrations are included. *Bulletin 742-C N CEN.* American Manganese Steel Division, American Brake Shoe and Foundry Co., Chicago Heights, Ill.

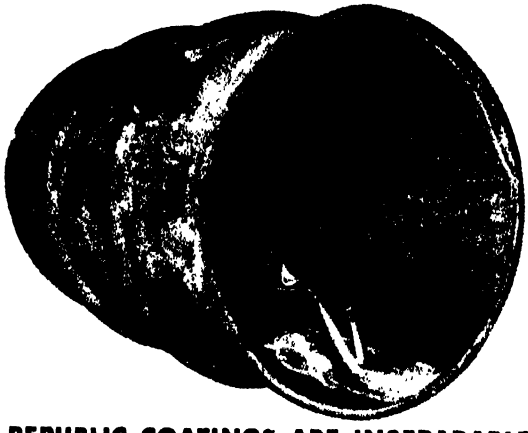
Micromax Thermocouple Pyrometers. In 56 illustrated pages this book gives first-hand information on indicators, recorders, and controllers, and the thermocouples and accessories used with them. *Catalog N-33A-CEN.* Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Penna.

Motor Fitness Manual. An illustrated 40-page bulletin discusses how to get the most service out of old and new motors, selection and application of motors, types of motor enclosures, etc. *Bulletin GED-1017 CEN.* General Electric Co., Schenectady, N. Y.

Pipe-Line Tracyfier. This bulletin describes a superseparator for separating any liquid and solid particles from any gas or vapor: water from air; water from steam; drops of oil from vapor, etc. The unit is applicable in steam lines to stills, dryers, processes, dye vats, cookers, on small engines, pumps, turbines, etc., tar and oil burners, and so on. Illustrations and line drawings, specifications and dimensions are also included. *Bulletin 1565 CEN.* Blaw-Knox Co., Pittsburgh, Penna.

Pumps. A new, 4-page bulletin on paper stock pumps of the centrifugal type. Specifications and construction features are given. These pumps will handle stock up to 6.5 per cent consistency and can be used for higher consistencies in special cases. They can be driven by motor, belt, or pulley. *Bulletin W-360-B1A CEN.* Worthington Pump and Machinery Corp., Harrison, N. J.

CONTINUED ON PAGE 1346



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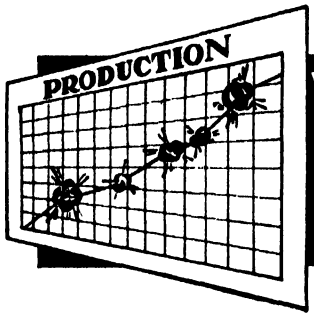
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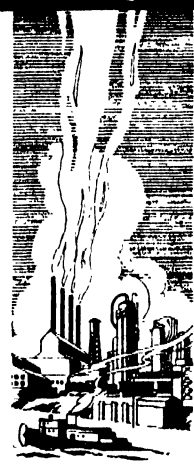
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Industrial Literature

CONTINUED FROM PAGE 1344

Rubber Conservation. A timely booklet on the conservation of conveyor belting in industrial plants. Contains a step-by-step, illustrated procedure, with interesting examples of savings made and rubber conserved. Headings include the saving of rubber by making vulcanized repairs promptly, salvaging belts for smaller drives, and special splicing. *Booklet CEN.* B. F. GOODRICH Co., Akron, Ohio.

Spectrophotometer. This new, 8-page bulletin describes uses of the Coleman Universal spectrophotometer. Test tubes for samples and instantaneous readings give high speed. Turning one knob permits selection of any color or light band required. Information on many tests is given, such as molybdenum, manganese, chromium, and other metals, copper in foods, determinations of vitamins, quinine, chlorophyll, chlorine, and other materials. Many curves and references are also included. *Bulletin CEN.* WILKENS-ANDERSON Co., 111 North Canal St., Chicago, Ill.

Stainless Steels. This 12-page booklet is divided into two parts. The first deals with the selection of stainless steels for chemical process equipment, mentioning metallurgical developments that have facilitated construction of such equipment. The second part discusses solutions to fabrication problems and the functions of alloying elements used in stainless steels. *Booklet Form 5201 CEN.* ELECTRO-METALLURGICAL Co., 30 East 42nd St., New York, N. Y.

Starting Switches. This new bulletin describes a line of manual starting switches for motors rated up to 1 h. p., 110 to 200-volt a. c. and ¼ h. p., 115 to 230 volt d. c., for starting and overload protection of small motors used on unit heaters, refrigerating machines, pumps, compressors, etc. In addition to illustrations and descriptions, this bulletin includes dimensions, diagrams, and prices. *Bulletin CEN.* ALLEN-BRADLEY Co., 1311 South First St., Milwaukee, Wis.

Staybelite Resin. This hydrogenated rosin is discussed in a new 8-page booklet. Physical and chemical properties are given, along with graphs showing the rate of oxygen absorption and other characteristics. Many applications are discussed, such as use in adhesives, rubber compounding and reclaiming, and paper, ceramics, and soap industries, special solder fluxes, linoleum waxes, cordage, rock wool, etc. *Booklet CEN.* HERCULES POWDER Co., Wilmington, Del.

Steel Tubing. This new pamphlet describes a variety of seamless steel tubing for the industries. Standard shapes are illustrated, as well as special shapes and parts, including round, square, rectangular, oval, streamlined, and hexagonal units. *Pamphlet CEN.* SUMMERILL TUBING Co., Bridgeport, Montgomery Co., Penna.

Testing Apparatus. A new, very complete, 96-page catalog gives comprehensive information on testing apparatus for the petroleum industries and on equipment

for standard methods of testing asphalt, bituminous materials, automotive and aviation fuels, and lubricants, conforming to specifications of the A. S. T. M., Federal Specifications Board, and other governing bodies. This catalog is profusely illustrated, and has a complete cross index. Also included are many laboratory utilities, an up-to-date compilation of data on thermometers used for petroleum inspections; dimensions, sizes, and prices on each type of apparatus. *Catalog 700 CEN.* PRECISION SCIENTIFIC CO., 1736 North Springfield Ave., Chicago, Ill.

Valves. A timely bulletin on the repair and upkeep of various types of valves. The steps taken to repair leaky gate and globe valves are explained and illustrated, with hints on how to reclaim discarded valves and on keeping these units in good operating condition. This is the fifth of a series on piping pointers for peak production. *Bulletin CEN.* THE CRANE CO., 836 South Michigan Ave., Chicago, Ill.

Vibrating Screens. A new pamphlet describing two types of high-speed vibrating screens designed for high capacity and efficiency at low operating costs. Also included are specifications, dimensions, and typical installations. *Pamphlet 128 CEN.* ROBINS CONVEYING BELT CO., Passaic, N. J.

Waxes. A 4-page pamphlet describes two special waxes for use in paper, rubber, coating, cosmetic, dental, adhesive, and other industries. These waxes are made from mid-continent crude oils and are microcrystalline rather than amorphous in character. Properties and specifications are also included. *Pamphlet CEN.* BARECO OIL CO., Box 2009, Tulsa, Okla.

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A.C.S. Monograph No. 30
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In addition to increased use in the paper, leather and glue industries, three spectacular developments have tremendously enlarged the demand for casein, namely, plastics; casein paste paint; and casein fibre, which may soon rival rayon in commercial importance. These recent developments are described in detail and critically evaluated.

On the theoretical side great progress has been made toward a better understanding of this complex protein. The organic and physical chemistry of casein are discussed at length, and avenues for further research are opened up.

CHAPTERS

Introduction.
Casein in Milk and Its Isolation, Frederick L. Browne.
The Organic Chemistry of Casein, Ross Aiken Gortner.
The Physical Chemistry of Casein, Frederick L. Browne.
The Manufacture of Casein, Arnold O. Dahlberg.
Testing and Analysis of Caseins, Edwin Sutermeister.
Storage of Casein, Albin H. Warth.
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Casein Glues, Frederick L. Browne and Don Brouse.
Casein in Paper Making, Edwin Sutermeister.
Casein Paints, Albin H. Warth and Frederick L. Browne.
Casein in the Leather Industry, Edwin S. Cavett.
Alimentary and Medicinal Uses of Casein, Henry A. Schuette.
Miscellaneous Uses of Casein and Statistics, Edwin Sutermeister and Louis A. Olney. Index.

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Box 24-NP-10, Ind. & Eng. Chem., Easton, Pa.

CHEMIST ABLE to conduct research work with minimum supervision wanted primarily for development of synthetic drying oils. Man with draft deferment because of physical impairment preferred. Send inexpensive photograph and give complete personal, professional and academic data in first letter. All letters acknowledged. Address P.O. Box 377, Dayton, Ohio.

EXPERIENCED CHEMICAL engineer. Excellent opportunity for man of outstanding qualifications in research laboratories located in the East, occupied with essential activities. Please submit college record, experience, accomplishments, and small photo.
Box 55-NP-10, Ind. & Eng. Chem., Easton, Pa.

CHEMISTS WITH Bachelor or Master degrees for positions in laboratories of Analytical Chemistry, Biochemistry, Organic Chemistry and Physical Chemistry in eastern organization engaged in essential activities. Opportunities for qualified men. Submit details concerning training, experience, personal history, and small photo.

Box 56-NP-10, Ind. & Eng. Chem., Easton, Pa.

PHARMACEUTICAL CHEMIST acquainted with analytical and control procedure for established pharmaceutical house in the New York area. State full details.
Box 12-TP-10, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER—Recent graduate or few years' experience; for pilot plant research; location small town 25 miles from Philadelphia. Apply by letter outlining training and experience, slary desired.
Box 14-TP-10, Ind. & Eng. Chem., Easton, Pa.

WANTED: Instructor in General Chemistry and Qualitative Analysis. B.S. required. Immediate employment. $1720-$2220 per year. George Walker, Principal, New Bedford Textile School, 1191 Purchase St., New Bedford, Mass.

WANTED: competent chemist—Ph.D. or D.Sc. Must be graduate of acknowledged school. Must possess sound scientific background, some industrial experience desirable. Wanted for research work with nationally known manufacturer of photographic material. Photographic hobbyist preferred. Adequate compensation and excellent future opportunities assured.
Box 17-TP-10, Ind. & Eng. Chem., Easton, Pa.

A MIDDLE Western industrial organization is seeking one or two men, preferably under 35 for adhesive research. Actual industrial experience in this field is desirable but not essential. Excellent opportunity for one familiar with adhesives, starch conversion and raw materials, such as starch, dextrins, glues, gums, resins, etc.
Box 20-TP-10, Ind. & Eng. Chem., Easton, Pa.

CHEMIST or CHEMICAL Engineer for midwest producer of corn products. Position calls for laboratory used in connection with plant problems, operation of pilot plant equipment, and sales service work. Prefer applicant under 30 years of age. State age, experience, draft status, and salary expected.
Box 21-T-10, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST Ph.D.—wanted for Newark, N. J., industry. Recent graduate or with a few years' experience preferred. For individual research involving synthetic resins. Sound training in synthetic organic, physical organic, and physical chemistry essential. Give experience, education, and salary expected.
Box 23-TP-10, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER—Recent Ph.D. from accredited university to handle development research in synthetic resins. Permanent responsible position in Newark, N. J., industry. Give experience, education, and salary expected.
Box 24-TP-10, Ind. & Eng. Chem., Easton, Pa.

RESEARCH ASSISTANTSHIP in Biochemistry. Must be a woman or have draft deferment. B.S. in Chemistry or Biochemistry. For work on proteins and enzymes. Limited time for graduate work. Salary $1500. University of Southern California School of Medicine, Department of Biochemistry, Los Angeles, California.

WANTED: Organic Chemist for research work on grinding wheels. Intimate knowledge of synthetic resins desirable. Bay State Abrasive Products Company, Westboro, Mass.

LOS ANGELES manufacturer has opening for chemist as laboratory assistant to conduct research and development work in field of industrial cleaners and related products. Position offers excellent opportunity and permanency for qualified applicant. Reply stating education, experience, age, draft classification and record of previous employment.
Box 26-T-10, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST A.B., for literature searching, abstracting, and report writing in research department of drug company. Chemistry major. Knowledge of German and typing desirable, also some acquaintance with literature of organic chemistry and medicine, including references, salary desired. Send photo. New York State.
Box 27-T-10, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST with good basic training in organic and analytical chemistry for laboratory and literature research and technical secretary in pharmaceutical and vitamin company. Location New York City. Give details of education and experience with salary desired.
Box 29-T-10, Ind. & Eng. Chem., Easton, Pa.

PROGRESSIVE MIDWEST concern desires a research man to conduct organic syntheses. Ph.D. preferred; 3-A draft status. Give details of training and experience; references. State salary expected. Good connection for right man.
Box 30-T-10, Ind. & Eng. Chem., Easton, Pa.

WANTED—BIOCHEMIST or organic chemist with some biochemical training with a B.S. or M.S. degree for work in a biochemical laboratory in a middle-western university town. Arrangements for part time graduate work may be made if desired. Supply details of training, experience, draft status, personal history, religious preference, and a small recent photograph.
Box 32-TP-10, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, Man or Woman, with A.M. or Ph.D. for research fellowship in New England University to work in the field of synthetic organic chemistry. Practically full time for research. Stipend up to $2000, depending on experience, for eleven months. Send transcript of record, names of references and small photograph.
Box 33-TP-10, Ind. & Eng. Chem., Easton, Pa.

WOMEN CHEMISTS: Applications invited from women chemists for positions in a growing industry where few technically trained women have been employed. Openings in analytical, research and development, with probability of continuation after war. Location East.
Box 44-TP-10, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST—Graduate within past 5-10 years. Background organic chemistry, synthetic resins. Wanted for technical sales correspondence, preparing technical bulletins, library work, reports, etc. Excellent and unusual opportunity for right person. Location small New York State town. Give complete information, salary expected, recent photograph.
Box 49-TP-10, Ind. & Eng. Chem., Easton, Pa.

CHEMIST with Ph.D. or S.D. degree, not older than 30 years, needed by research institute in Western Pennsylvania for study of war problems.
Box 50-TP-10, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Ph.D. and assistant professor in Southern medical school. Thorough training in biochemistry with background in clinical application preferred. Man with initiative and imagination desired. Excellent opportunity for research. Wanted immediately. Give full details in first letter including minimum salary and photograph.
Box 51-T-10, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST, excellent opportunity with a research laboratory close to New York City. Please state education, experience, draft status, salary expected, and send recent small photograph.
Box 54-TP-10, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 1350)

Address communications to the box number indicated and Mail to Easton, Penna.

The American Chemical Society has no information concerning the position advertised, or in regard to those seeking employment.

(Situations Open Continued)

WANTED: INSTRUCTOR in inorganic chemistry by college located in the East. Department on approved list of A.C.S. Salary dependent on qualifications.
Box 61–T–10, Ind. & Eng. Chem., Easton, Pa.

LACQUER CHEMIST, Independent formulator wanted by long established manufacturer located 15 miles from New York City. Man with deferred draft status desired. Give complete details relating to products which you have made. Position is permanent. Plant is 85% on defense.
Box 67–T–10, Ind. & Eng. Chem., Easton, Pa.

RESEARCH and PLANT Chemist with Ph.D. degree desired by progressive Tobacco Company. Training and experience in Plant Biochemistry necessary. Must be qualified to plan and conduct research. Give training, experience, draft status, personal data, salary expected and recent photo in first letter.
Box 68–T–10, Ind. & Eng. Chem., Easton, Pa.

CHEMIST for research and development who has had varied practical experience in coatings such as lacquers, synthetics and enamels. One having had experience with paper products preferred but not essential. Splendid opportunity and permanent position with a company now engaged in war work. State technical education, experience, age, and draft status. Correspondence strictly confidential.
Box 71–TP–10, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(A.C.S. MEMBERS)

FOOD CHEMIST with over twenty years' wide experience in the Food Industry, in direction, research, process development, quality control, and factory problems. Desires a responsible position.
Box 69–N–8. Ind. & Eng Chem., Easton, Pa.

CHEMICAL ENGINEER, Ph.D., industrial organic chemist, 25 years industrial and research experience, process developments, production problems, among others rayon, cellulose and derivatives. Patents, publications, new projects, languages, business knowledge. Married, one child. Available on short notice.
Box 31–T–9, Ind. & Eng. Chem., Easton, Pa.

PHARMACIST-CHEMIST (Ph.D.). Would like to change position. Great experience in deodorization and selective Hydrogenation of fish oils, all control tests, developing of new methods, new pharmaceutical products, emulsions, cosmetics. No draft status, Catholic, first class references. New York or Philadelphia area preferred.
Box 23–N–10, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST: M.S. in chemistry 1939, University of Pennsylvania. Organic major, analytical minor. Desires preferably research position with company having war contracts. 3 years' college teaching experience. Available immediately for position in Philadelphia and vicinity. Protestant. Married.
Box 26–N–10, Ind. & Eng. Chem., Easton, Pa.

PHARMACEUTICAL CHEMIST, B.S., Phar.D., Columbia University. Three years of graduate research, one year of product development work. Age 28, draft deferred, member Sigma Xi. Desires position to do research, product development, testing or other.
Box 29–N–10, Ind. & Eng. Chem., Easton, Pa.

YOUNG WOMAN chemist, several years' responsible experience in industrial research organisation. Desires editorial or market research position. Expert stenographer; knowledge of French and Spanish. Would consider A-1 secretarial position. Location immaterial.
Box 33–N–10, Ind. & Eng. Chem., Easton, Pa.

SYNTHETIC ORGANIC chemist. M.S. research and development experience in plastics. Desires organic research position (plastics or other industry) contributing directly to war effort. Young, married, responsible. Presently employed. Metropolitan location preferred.
Box 36–N–10, Ind. & Eng. Chem., Easton, Pa.

EXPERIENCED CHEMICAL Engineer; available for work in defense industry. 18 years' experience in plant and research work. Oils and fats, metallurgy, petroleum, textiles.
Box 46–N–10, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, available for spare time work. Broad training and experience, including catalysis, petroleum and fuels technology, explosion processing, pharmaceutical synthesis, metallurgical chemistry. Specialist in new process development and plant design. Currently employed, with contract permitting outside work of practically unlimited scope. Central eastern U. S. war work only.
Box 63–N–10, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, Ph.D., now in class 2-A, in charge of small laboratory for pharmaceutical manufacturer, seeks position in closer connection with defense work. Experience in drug analysis and research.
Box 66–N–10, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. Five years' industrial research and development experience in synthetic organic chemistry. Prefer position in charge of a small group with a company doing defense work preferably in the field of organic chemicals, or drugs, plastics and rubber.
Box 73–N–10, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER: B.S. 1937, desires chemical engineering development work in field essential to the war effort. 5 years' experience in industrial application of, and research relating to, resins and plastics. Extra training in plastics, colloidal and organic chemistry, and chemical engineering. Good character and personality, progressive, practical, has ideas and sense of responsibility. American, white, single, age 27, draft, 2-B.
Box 79–N–10, Ind. & Eng. Chem., Easton, Pa.

EXECUTIVE CHEMIST. Over twenty years' experience in manufacture of mechanical rubber goods, latex, synthetic rubber. At present head of own company. Unable to raise capital necessary to convert to war work. Desires executive or technical position where unusual talents and ability can be used to fullest extent. Able to handle men. Familiar with labor problems.
Box 13–T–10, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST—Ph.D. February 1943 from an eastern university. Well grounded in organic synthesis. Single, 24, 2-A in draft. Physical chemistry minor. Eastern location preferred.
Box 15–T–10, Ind. & Eng. Chem., Easton, Pa.

RESEARCH DIRECTOR, Ph.D., assistant at two world renowned universities. 12 years' research experience in organic synthesis and biochemistry (hypnotics, analeptics, vasoconstrictors, antiseptics, vitamins, hormones). 5 years' research director of French industrial laboratory, one year research director of American industrial laboratory. Desires similar position in large industrial research laboratory or university. Age 36, first citizenship papers, draft status 2-B.
Box 31–T–10, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. Strong on synthesis. Unusual academic record. Four years' industrial experience. Work on diolefines, unsaturated alcohols, aldehydes, acids and derivatives, aldol condensations. Imaginative, responsible. Draft 3-B. Employed, available short notice.
Box 34–T–10, Ind. & Eng. Chem., Easton, Pa.

PROJECT LEADER with company wishing to inaugurate concentrated research program in the field of synthetic antimalarials, sulfonamides and new types of therapeutic agents. Ph.D. 1941 with one year industrial experience. Good professional contacts. Original ideas. Married, age 28. Draft 2-B.
Box 35–T–10, Ind. & Eng. Chem., Easton, Pa.

PLASTICS CHEMIST, 8 years' experience in research, development, and production of synthetic resins as applied to molding compounds, laminating and impregnating solutions. Thoroughly experienced in molding, shop practice and supervision. Age 29, married, children. Graduate study, patents, publications.
Box 37–T–10, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST. M.S. from leading eastern university. Excellent organic background. 6 years' experience in research and analysis. Research or development desired but will consider any exceptional opportunity. East or Midwest. Age 30, single, 3-A, Christian, employed, available short notice.
Box 38–T–10, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, B.S. (1942) in Chemistry. Also had training in Accounting. Would like position in either field. Location immaterial. Single, 22. Employed at present.
Box 39–T–10, Ind. & Eng. Chem., Easton, Pa.

ASSOCIATE PROFESSOR of analytical chemistry in a medium-sized university desires change. Author of successful textbook and numerous papers. Also experienced in teaching general and organic chemistry. Will consider industrial research.
Box 40–T–10, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, M.S., 1939. Year of synthetic organic research; 2½ years' industrial experience, mainly control and research on explosives and related materials; also experience testing petroleum products, and in general commercial analysis. Now employed, desires more opportunity for advancement, in any applied organic field, as fine chemicals, pharmaceuticals, synthetic rubber, explosives, etc. Age 28, single, draft deferred. Location unimportant. Available on reasonable notice.
Box 41–T–10, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST: 16 years' broad experience in research, development, production and consultation; technical director of research for western division of large chemical industry; special research on magnesium products, slats and refractories; patents; publication; good background in mathematics, physics, engineering, bacteriology and crystallography; M.S. degree University of California; desires position on West Coast; age 39; married; one child; available immediately.
Box 42–T–10, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST, Ph.D. 27 years' experience general analysis. Desires position as senior analyst. Employed at present. Married.
Box 43–T–10, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, M.A. 1939. Two years with major petroleum corporation and one with well-known research institute. Most of course work for doctorate at large mid-western university. Thermodynamics, colloid chemistry, electrochemistry, advanced organic, physics, mathematics. Research. Sigma Pi Sigma. Read German, French, Russian. Age 28, married, draft deferred.
Box 45–T–10, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. 1942. Large Eastern University. Minor, physical chemistry. 6 years' teaching, 4 years' research. Extensive training in organic synthesis. Intelligent, conscientious, adaptable. Five languages. Publication in preparation. Aged 29, single, unemployed. Draft 2-A. Desires organic research in war industry preferably in the East. Available November.
Box 47–T–10, Ind. & Eng. Chem., Easton, Pa.

CHEMIST GRADUATE executive. Twenty-five years' varied experience including research and production on foods, food packaging, latex, plastics, and explosives. Seeks contact with essential industry.
Box 48–T–10, Ind. & Eng. Chem., Easton, Pa.

BIO-ORGANIC CHEMIST Ph.D. May, 1942. Research experience in organic enzyme vitamin (pyridoxine and pantothenic acid chemistry). Formerly employed on vast industrial vitamin project. Papers being published. Member Phi Beta Kappa, Phi Lambda Upsilon, Sigma Xi. Interested in research vital to war effort in above fields. East only.
Box 53–T–10, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST—M.S.—preparing for Ph.D. during evenings. Have 3½ years' industrial experience in synthetic organic research including pharmaceuticals, wetting agents, aromatics, esters. Employed—Draft 2-B. Desire position of more responsibility and advancement in research and development field, preferably with company doing at least part war work. Salary commensurate with responsibility and duties. Available on adequate notice. Location—preferably Metropolitan area but other areas will be considered.
Box 55–T–10, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL CHEMIST, Eastern University graduate. Grad. work. Single, Protestant, American. Six years' experience analytical and development. Superv. control—lab. Foods, fats and oils; soaps; solvent extraction, alkaloids; Biological examination milk and water supply. Some teaching. Must relocate defense work. Immediately available.
Box 56–T–10, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER (1929) seeks research, development or engineering in East, Midwest or South. Experience proteins, adhesives, resins, coatings, impregnation, emulsions, process and production. Patents. Draft 3-A. Desire permanent connection of responsibility in defense or essential civilian industry.
Box 57–T–10, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST: M.S. 1940 with two years' experience in analytical research. Single, 25, draft classification 2-B. Would prefer vital work but must have postwar possibilities. Location immaterial.
Box 58–T–10, Ind. & Eng. Chem., Easton, Pa.

YOUNG PH.D., 1941, analytical-inorganic, chemical engineering minor, 2-B. Protestant, American born, interested in available research and development positions.
Box 59–T–10, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL-ENGINEER, Highpolymers, 8 years' plant and research experience in viscose rayon and cellophane plants, 5 years' experience in polymerisation processes, styrene, acrylic and other highpolymers, first citizenship papers. Age 39, owner of pilot plant laboratory. Desires position to serve Nation more effectively.
Box 70–T–10, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. Rensselaer Polytechnic Institute, 1941. Employed. Experience in cellulose and synthetic resins. Desire synthetic organic chemical research with responsibility. Age 26, excellent health, American, unmarried, draft 4-F. Read French and German. Sigma Xi. Available on two weeks notice. Prefer New York City area.
Box 72–T–10, Ind. & Eng. Chem., Easton, Pa.

COLLOID CHEMIST. Woman. M.S., Mass. Tech. Outstanding research and development, plant, and sales service experience. Adhesives, coating, emulsions, impregnating, inks, paper, tanning, grease and waterproofing, wetting agents, detergents. Capable associate for busy executive. Can direct research, analyse reports, write, speak, get things done. Mentally flexible; good natured. Prefer New York area; would act as New York representative, for outside concern.
Box 73–T–10, Ind. & Eng. Chem., Easton, Pa.

CHEMIST: B.S. Chemistry, M.S. Agr. & Biological Chem. Three years' graduate research on sulfite waste utilization, 21 months as analyst in Experiment Station and soil mechanics. Past two years in pulp mill laboratory on research and pollution. Employed but available on short notice. Desires position in research or development. Age 29. Draft 3-A. West or Midwest preferred.
Box 78–T–10, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 1351)

(Situations Wanted Continued)

ORGANIC CHEMIST, Ph.D. 10 years' experience pharmaceutical research and development abroad and in U. S. A. Four languages, 34 years of age, 3-A, married, one child. Friendly alien, first papers. Desires change into more essential industry.
Box 77-T-10, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER—B.Ch.E. Age 26, 3½ years' experience in supervision of production, chemical plant design and pilot plant research in heavy chemicals, research drugs and foods. Also 4½ years' chemical plant experience as research chemist, control chemist and chemical plant operator. Seeking 100% war work in production supervision or chemical plant design. Draft status 2-B.
Box 81-T-10, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED (NONMEMBERS)

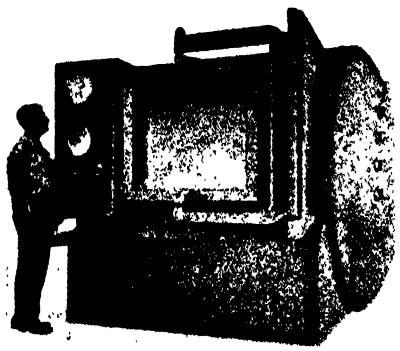
ORGANIC CHEMIST, Ph.D. 10 years' experience research and production aromatics and pharmaceuticals. Desires position research and development laboratories where abilities and resourcefulness will be recognized. Patents and publications. Age 35, Married. Draft 3-A.
Box 52-T-10, Ind. & Eng. Chem., Easton, Pa.

PH.D. age 47, experience in organic chemistry, big successes in research, owner of inventions and patents, synthetics, textile chemicals, emulsions, plastics and fibres. Desires suitable position.
Box 69-T-10, Ind. & Eng. Chem., Easton, Pa.

RESEARCH LIBRARIAN. College woman; experienced in literature and patent searches in organic chemistry and synthetics; languages. Library administrator; can assume responsibility. Not interested in abstracting or typing. Location immaterial.
Box 82-T-10, Ind. & Eng. Chem., Easton, Pa.

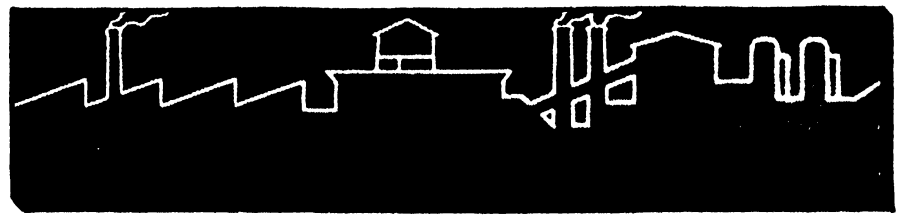
Stratosphere Chamber for Parts Testing

TO TEST the mechanical parts of aircraft, as well as radio used in high altitude work, the Kold-Hold Manufacturing Co., Lansing, Mich., has developed and built a stratosphere chamber that operates between the temperatures of +200° and −75° F. with an internal pressure variation from ambient at the location of the unit to 3 inches of mercury absolute. Both the pressure and temperature variations are controllable throughout their ranges. The first such unit was designed and built for the Philco Corp. of Philadelphia, for testing radio parts for bombers. Work is now under way on similar chambers for Ford and other large manufacturers of similar types of equipment.



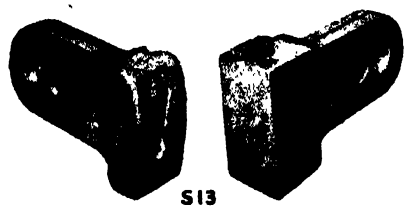
This stratosphere unit, which has an interior chamber volume of approximately 186 cubic feet, uses Freon-12 as a refrigerant. Humidity control is from 25 to 95 per cent, relative to all temperatures above +40° F., or at a fixed bottom temperature of +32° F. Below this level, absolute humidity will correspond to the air saturation at the coil temperature, which will average 15° to 20° lower than the chamber temperature.

A NEW metal-enclosed assembly of gang-operated oil fuse cutouts for economical short-circuit protection and switching has been announced by the General Electric Co., Schenectady, N. Y.

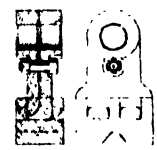


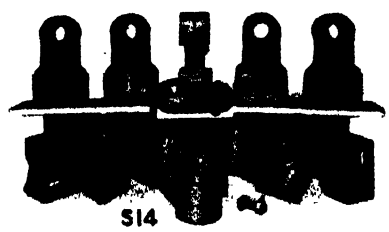
Three-Part Pulverizer Hammer

THE Clark renewable tip pulverizer hammer (patent applied for), announced by the American Manganese Steel Division of The American Brake Shoe & Foundry Co., Chicago Heights, Ill., is a child of the times, for metal conservation is its design feature. The hammer consists of a weighted manganese steel head connected to the rotor by two matching arms or bars of manganese steel. On the lower end of each bar are hooks which engage internal pockets in the head. The bars are bolted together under the eye so that they form a one-piece arm, yet they are easily disengaged from the service-worn head by unbolting.



S13





S14

S-13 shows a closed type hammer as made and as worn in service. New complete hammer weighed 110 pounds; arms 57½ pounds; head 52½ pounds. Worn complete hammer weighed 74 pounds; arms, still completely serviceable, 57 pounds; head, scrapped, 16½ pounds. Over two thirds of the metal in the head was consumed in use before it was necessary to discard it. The line drawing shows the method of securing the head on bar hooks and bolting bars to form a one-piece arm. S-14 is a set of new Clark hammers of slightly different design, having the advantage of more bearing on the supporting shaft and visible hooks on shanks when assembled. These smaller size open type hammers have a complete weight of 48 pounds; bars 28 pounds; and head 20 pounds.

Thumb-Spray Attachment for Extinguishers

SOME fires are fought with a spray as well as a solid stream, but most standard fire extinguishers discharge only a solid stream. Consequently, a thumb-spray nozzle attachment has been developed by the Pyrene Manufacturing Co., Newark, N. J., for converting present extinguisher equipment to wartime needs. It simply clamps over the ⅜-inch hose and nozzle of any standard soda-acid, foam, gas cartridge, or pump tank fire extinguisher

Filter Cartridge

THE new Mersorb filter cartridge, recently introduced by the Mine Safety Appliances Co., Braddock, Thomas, and Meade Streets, Pittsburgh, Penna., for use with any of the company's standard M. S. A. cartridge respirators, provides protection for 70 hours against light concentrations of metallic mercury vapors, as compared with the 10-minute service life of activated charcoal cartridges, largely used in the past.

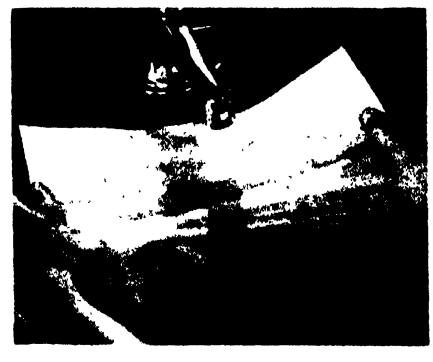
The chemical cartridge respirator, for which the Mersorb cartridge is designed, is a low resistance, twin-cartridge-type respirator used for protection against light concentrations of organic vapors and acid gases, whether occurring separately or in combinations.

Instantaneous Fluorescent Lighting

FLUORESCENT lighting fixtures employing a new method of ballasting to give positive, instantaneous starting are available for industrial plant lighting applications. With this method, the lamps come on fully at the turn of the switch just as in the case of incandescent lighting. The fixtures are made by R. & W. Wiley, Inc., 777 Hertel Ave., Buffalo, N. Y.

Aqualized Paper Fabric

A SIGNIFICANT aspect of the wartime search for substitutes is the use of paper to replace priority materials. Aqualized paper, a product of the Brown Co., New York, N. Y., is a substitute for cloth and burlap.



The individual cellulose fibers in the paper are effectively interlocked and fastened, giving an inherent wet strength all the way through the sheet independent of any coating or sizing on the surface. Some types are highly absorbent, while other types repel water.

MISCELLANEOUS

BUSINESS OPPORTUNITIES • FOR SALE • WANTED • ETC.

Five cents a word, minimum charge $2.00; display available at $7.50 per inch; in advance. No discounts or allowances

MICRO-ELEMENTARY ANALYSES: C, H, N, S, P, Halogens, Methoxyl, Mol. wt., etc., U.S.P. and other official tests, Purity tests, Microinorganic assays, Spot tests, Micro-distillations, Toxicological investigations, and typical micro-chemical research work. Dr. Carl Tiedcke, 366 Fifth Avenue, New York, N. Y.

SPECTROGRAPHIC ANALYSES: Petroleum derivatives, styrene, toluene, xylenes, and other organic chemicals. Metals in alloys, ores, foods, pharmaceuticals, plastics, inorganic chemicals. Photometric control of production. Research. Hubbard Laboratories, 125 West Hubbard Street, Chicago, Illinois

WANTED: Die Neuere Harnsaurechemie, H. Blits, one copy.
Box 10-T-10, Ind. & Eng Chem , Easton, Pa

WANTED: Industrial & Engineering Chemistry; Analytical Edition only; Vol. 1-12 incl. unbound; or Vol. 1-13 incl. bound; good condition; state terms in letter.
Box 11-T-10, Ind. & Eng. Chem , Easton, Pa.

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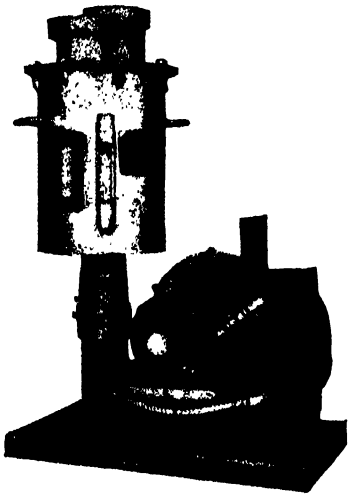
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Lectrobreathers

LECTROBREATHERS, developed by the Pittsburgh Lectrodryer Corp., 1047 32nd St., Pittsburgh, Penna., are used to prevent the entrance of atmospheric moisture into oil and chemical tanks. They permit only dry air to enter the tank when it



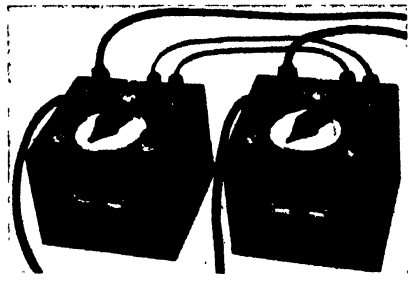
is emptied or when air enters owing to temperature drops.

Glass Bottles for Petroleum Products

SUBSTITUTION of glass bottles for tin cans in packaging certain petroleum specialty products and lubricants, which will divert to the current nationwide tin conservation drive 255 tons of tin plate a year for the war effort, has been announced by Standard Oil Co. of Indiana. Tin plate thus saved will make approximately 2,000,000 tin cans of the standard No. 2 size for military rations.

Electronic Timer

A NEW electronic timer designed for single actuation as well as for sequence timing and recycling in continuous operation has been announced by the Photovolt Corp., 95 Madison Ave., New York, N. Y.



The function of the timer is to close or open an electrical circuit for a preset time interval. When the timer is actuated, a charged condenser begins to discharge, the rate of discharge being controlled by adjustable resistors. Simultaneously with the actuation, amplifier tubes energize the relay. When the discharge of the condenser is completed, the amplifier tubes become inoperative and the relay is de-energized. The timer thus operates without clockwork or motor, in fact without any mechanically moving part except for the relay.

The range of the timer is from 0.05 to 20 seconds but other ranges may be obtained if desired.

Bubbles of Cellophane in War Uses

CHEMISTS have accomplished the feat of trapping air in a continuous stream of cellophane bubbles. The resiliency and buoyancy of the resulting product open up a large field of interesting possibilities for its application.

The material, known as "Bubblfil", has been developed by E. I. du Pont de Nemours & Co., whose Rayon Division is now manufacturing it in its Tennessee plant. The Office of Price Administration has set a price ceiling of $1.25 per pound, which applies so long as the production is under 1,000 pounds per day. Commercial sale must wait on war necessities, chiefly those in which it could take the place of kapok or sponge rubber.

Tests already made show that the cellulose bubbles are fully as buoyant as the imported kapok, which comes from the seed pod of a Javanese tree. Bubblfil has also been tried in the air compartments of lifeboats and life rafts, where kapok is no longer being used because of the limited supply, and for bridge pontoons, formerly filled with sponge rubber.

Surface Conditioner for Brightening Steel

THE Hanson-Van Winkle-Munning Co., Matawan, N. J., has developed a new type product called "Surbrite", a steel surface conditioner.

Surbrite is a free-running powder prepared in two types for addition to hydrochloric acid and sulfuric acid pickles. Its use in small quantities as additions to regular acid pickles produces bright, smut-free surfaces when iron and steel are pickled.

CHEMICAL AND ENGINEERING NEWS
HARRISON E. HOWE, Editor
PUBLISHED BY THE AMERICAN CHEMICAL SOCIETY
VOLUME 20 NOVEMBER 10, 1942 NUMBER 21

A. C. S. Candidates for 1943

MEMBERS of the AMERICAN CHEMICAL SOCIETY whose brief biographies follow have been proposed by the Local Sections for nomination for President-Elect and for Councilors-at-Large in accordance with the Constitution and Bylaws governing elections to these positions.

President-Elect



Thomas A. Boyd was born at Fairview, Ohio, October 10, 1886, received his B.Ch.E. degree from Ohio State in 1918, and then became a member of the research division of the Dayton Metal Products Co. where he remained until 1919. At that time he joined the General Motors Corp. where he has since done much work in the chemistry of motor fuels and the mechanics of their combustion. Since 1923 he has been head of the fuel department at General Motors Research Laboratories. A member of the AMERICAN CHEMICAL SOCIETY since 1919, he has been active both in Local Section and national Society affairs, serving as Divisional Chairman as well as Local Section Chairman and Local Section Councilor. Other affiliations of Mr. Boyd include membership in the A. A. A. S., the A. S. T. M., the Society of Automotive Engineers, American Petroleum Institute, and the Michigan Academy.

Mr. Boyd has written many articles on subjects related to his field, and his books include one on "Gasoline. What Everyone Should Know about It" published in 1918, and another on "Research, Pathfinder of Science and Industry" published in 1935.

Carl Shipp Marvel was born near Waynesville, Ill., September 11, 1894. He received his A.B. from Illinois Wesleyan in 1915, and his Ph.D from the University of Illinois in 1920. An instructor at that university during 1920–21 he advanced



to full professorship in 1930, which post he still holds. During these years and since his interests have been in the field of organic chemistry with special reference to identification of compounds, polyynes, organo-metallic compounds, free radicals, rearrangements, polymerization, and natural products. He has been a member of the AMERICAN CHEMICAL SOCIETY since 1915, during which time he has served as Divisional and as Local Section Chairman and as Local Section Councilor. Other activities have included membership on the editorial board of "Organic Syntheses" 1923–31, and in the American Association for the Advancement of Science.



Thomas Midgley, Jr., was born at Beaver Falls, Penna., May 18, 1889. He received the M.E. degree from Cornell in 1911. After employment with the National Cash Register Co. that year he began research work on automobile tires which he carried on during 1912–14, thereafter becoming superintendent of the Midgley Tire and Rubber Co. for two years. Then followed work with Charles F. Kettering and later with the General Motors Research Corp. where he became chief of the fuel section. Since 1924 he has been vice president of the Ethyl Gasoline Corp. (now the Ethyl Corp.) and of Kinetic Chemicals, Inc., since 1930, as well as director of the Ethyl-Dow Chemical Co. since 1923. Among many honors received for his achievements in chemistry (which include use of tetraethyllead as an antiknock compound and synthesis of certain organic fluoride compounds for antifreeze reagents as the best known) are the Nichols Medal of the AMERICAN CHEMICAL SOCIETY, the Willard Gibbs Medal of the Chicago Section of the A. C. S., and the Priestley Medal, also of the SOCIETY. Other awards have also been made for his work, including the honorary degree of doctor of science from the College of Wooster in 1936. A member of the SOCIETY since 1921, Dr. Midgley has contributed much to its progress and has served as a Director since 1930, and as chairman of the board since 1934. He is also a member of the American Association for the Advancement of Science, the Society of Automotive Engineers, and other scientific organizations.



Linus Carl Pauling was born at Portland, Oreg., February 28, 1901, and received his B.S. degree from Oregon State College in 1925. A fellow at the California Institute of Technology from 1922 to 1925 he received his Ph.D. in 1925, and became director of the Gates and Crellin Chemistry laboratories in 1937. During the intervening years he was a Guggenheim Memorial Foundation Fellow, a lecturer at California, and a visiting professor at M. I. T., and progressed from the position of assistant professor in theoretical chemistry at the institute to the directorship he now holds. In 1937–38 he was the George Fisher Baker lecturer at Cornell.

Dr. Pauling's work on determination of structure of crystals and molecules, application of quantum mechanics to chemistry, the chemical bond, line spectra, etc., has won him wide recognition. Honors bestowed upon him include the AMERICAN CHEMICAL SOCIETY Award in Pure Chemistry of which he was the first recipient. He is a member of the National Academy, the Philosophical Society, and a fellow of the Physical Society. As a member of the AMERICAN CHEMICAL SOCIETY since 1920 he has contributed much to the organization, and has served as a Local Section Councilor.



W. T. Read, dean of the School of Chemistry, Rutgers University, N. J., was born at College Station, Tex., March 8, 1886. He received his A.B. degree from Austin College, an A.M. in 1908, and an A.M. from the University of Texas in 1915. Thereafter he was an instructor in chemistry at the University of Texas, an assistant at Harvard University, chemist at the Bureau of Economic Geology of Texas, instructor and then assistant professor at Yale University where he received the Ph.D. degree in 1921. From 1925 to 1930 he was professor at the Texas Technological College, from which post he went to his present one.

During World War I, Dr. Read served as 1st Lieutenant in the Chemical Warfare Service, and since 1923 he has acted as director of the students' course of the Exposition of Chemical Industries. A member of the A. C. S. since 1907, Dr. Read has been interested in its progress, and has held offices as Councilor and as Chairman of the North Jersey Section. He is also a member of the American Instititute of Chemical Engineers and of the American Institute of Chemists, as well as of the Society of Chemical Industry (London). His work has been in organic and industrial chemistry with reference to semicarbazide, hydrazine, hydantoin derivatives, and boiler feed waters. As the author of several publications he is perhaps best known for his book on "Industrial Chemistry" published in a second edition in 1938.



Ernest H. Volwiler, vice president in charge of research and development at the Abbott Laboratories since 1933, was born in Hamilton, Ohio, in 1893. A graduate of Miami University, he received his Ph.D. from the University of Illinois in 1918. He became assistant in chemistry at Miami, then at the University of Illinois, and later was a fellow at the same institution, leaving to become research chemist at Abbott Laboratories in 1918. Chief chemist since 1920, he became a member of the board of directors and the director of research in 1930.

Dr. Volwiler has been a member of the AMERICAN CHEMICAL SOCIETY since 1916, and has held many offices in the organization including that of Divisional Chairman, Councilor-at-Large, Divisional Secretary, and Local Section Chairman as well as Councilor. During 1922–24 he edited the *Chemical Bulletin* of the Chicago Section. He has also served as president of the Association of Illinois Chemists and of the Chicago Chemists Club.

Holder of many patents for medicinal compounds, Dr. Volwiler is also a contributor to chemical and medical journals, and among his writings is a chapter on "Synthetic Drugs" published in a book on "Fighting Disease with Drugs".

Dr. Volwiler has been a major in the Chemical Warfare Service since 1925.



Hobart H. Willard, professor at the University of Michigan since 1923, was born in Erie, Penna., in 1881. He received his A.B. and A.M. degrees from the University of Michigan, was a fellow at Harvard University thereafter, and received his Ph.D. from the latter in 1909. At Michigan he served successively as instructor in chemistry, assistant professor, and associate professor until he attained full professorship in 1923.

During World War I he directed the Chemical and Metallurgical Laboratory, Bureau of Aircraft Production, of the Detroit District. He served on the National Research Council Division of Chemistry and Chemical Technology from 1934 to 1937, and was a Director of the AMERICAN CHEMICAL SOCIETY (which he joined in 1902) from 1934 to 1940. He is now serving as a member of the Advisory Board of the *Analytical Edition* of *Industrial and Engineering Chemistry*, and was Associate Editor of the *Journal of the American Chemical Society* from 1922 to 1931.

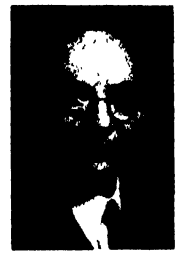
In addition to A. C. S. membership, Dr. Willard is affiliated with the A. A. A. S., the Electrochemical Society, and the National Research Council. He is the author of numerous papers on analytical and inorganic chemistry and has been co-author of several textbooks in his field.

Robert R. Williams was born in Nellore, India, February 16, 1886, but came to this country to graduate from the University of Chicago in 1908, with an M.S. degree. Thereafter, until 1915, he was a research chemist in the Philippine Islands where he began work which was to lead later to the successful synthesis of vitamin B_1. He was in the U.S. Department of Agriculture 1915–18, a chemist with Western Electric Co. 1919–24, and has been a chemical director at the Bell Telephone Laboratories since 1925. He also served as a research associate at Teachers College, Columbia University, from 1925 to 1935. In addition to the work for which he is best known, Dr. Williams has also done much on submarine and on textile insulation, and is an expert on industrial research management. He has been granted numerous patents, has written many papers, and is co-author of an authoritative book on "Vitamin B_1 and Its Use in Medicine".



A member of several scientific societies, including the American Association for the Advancement of Science, Society of Experimental Biology, and Society of Biological Chemists, Dr. Williams has been a member of the A. C. S. since 1913, during which time he has contributed his services in many ways, his offices including that of Local Section Councilor.

Councilors-at-Large



M. L. Crossley, director of research of the Calco Chemical Division, American Cyanamid Co., Bound Brook, N. J., was born at Saba Island, D. W. I., July 3, 1884. He was educated at Brown University where he received the Ph.B. degree in 1909, M.S. in 1910, and Ph.D. in 1911. From 1909 to 1911 he was instructor in chemistry at Brown University, associate professor at William Jewell College from 1911 to 1913, lecturer in organic chemistry at Wesleyan University in 1913–14, and associate professor of chemistry and acting head of the department from 1914 to 1918. From 1918 to 1936 he was chief chemist of the Calco Chemical Co., and since 1936 has been director of research. From 1916 to 1918 he was consulting chemist of the Barrett Co.

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From 1915 to 1917 he was Chairman of the Connecticut Valley Section of the AMERICAN CHEMICAL SOCIETY, and in 1924 and 1934 was president of the American Institute of Chemists. He is also a member of the Society of Chemical Industry, Faraday Society, Chemical Society (London), and the American Association for the Advancement of Science. He is particularly interested in work in dyes and pharmaceuticals, and has done much pioneer work in the study of the sulfa drugs.



George Glockler was born in Munich, Germany, September 7, 1890, received his B.S. and M.S. degrees from the University of Washington at Seattle, and his Ph.D. from California in 1923. From 1916 to 1921 he was an analytical chemist in Japan. He was national research fellow at the California Institute of Technology for three years, then American Petroleum Institute research associate at the University of Minnesota for a similar period. From associate professorship in inorganic chemistry, Dr. Glockler advanced to professorship in physical chemistry in 1936, which position he held until 1940 when he left Minnesota to become head of the department of chemistry and chemical engineering at the University of Iowa.

In the field of physical chemistry Dr. Glockler's work has concerned itself with resonance and ionization potentials, chemical activation by electrical discharge and by controlled electrons, light scattering by solids, liquids, and gases. He is co-author with S. C. Lind of a book on "Electrochemistry of Gases and Other Dielectrics" and has contributed many papers to A. C. S. journals and other scientific publications. He is a fellow of the American Physical Society, a member of the A. A. A. S., and a research associate of the Naval Research Laboratory. A member of the AMERICAN CHEMICAL SOCIETY since 1921, Dr. Glockler has given much time to its affairs, his offices in the Local Section having included service as Chairman, Secretary, and Councilor.



Webster Newton Jones was born in Rich Hill, Mo., on July 29, 1887, and received his A.B. from Missouri in 1908, his A.M. in 1909. Thereafter he taught chemistry at Missouri, Harvard, Purdue, Maine, and Montana before becoming research chemist at the B. F. Goodrich Co. in 1919. In 1920 he received the Ph.D. degree from Harvard, but continued at the Goodrich company until 1932, at which time he was general superintendent of the processing division. In 1932 he became director of the college of engineering at Carnegie Institute of Technology, Pittsburgh, a position he now holds. Dr. Jones has been chiefly concerned with rubber chemistry and products, but has also devoted his attention to the selection of technical personnel and to chemical prices, serving as a chemical expert on the War Trade Board in 1919.

Dr. Jones is a member of the National Inventors Council, the A. A. A. S., the American Institute of Chemical Engineers (of which he was president in 1939–40), the Society for the Promotion of Engineering Education, and the AMERICAN CHEMICAL SOCIETY since 1908, as well as a number of other professional and fraternal organizations.



O. E. May was born at New Albin, Iowa, on August 22, 1901. He received his A.B. from Columbia College, Iowa, in 1924, his M.S. from Minnesota in 1926, and his Ph.D. from George Washington University in 1929. From 1923 to 1936 he was in the U. S. Department of Agriculture in Washington, leaving to become director of the Regional Soybean Industrial Products Laboratory of the department at Urbana, Ill. In the summer of 1942 he was appointed director of the Northern Regional Research Laboratories at Peoria, but returned recently to engage in administrative work in the Bureau of Agricultural Chemistry and Engineering in Washington.

In addition to his work on the industrial utilization of soybeans and soybean products, Dr. May has been concerned with vapor pressures of industrial organic intermediates, mold metabolism, acid formation by molds, mold fermentation mechanisms, and the effect of air pressure increases on oxidative mold fermentations. He has contributed numerous papers to the scientific literature, and has been active in the affairs of the AMERICAN CHEMICAL SOCIETY which he joined in 1927. He has served as Treasurer of the Washington Section, also as Secretary.

W. Albert Noyes, Jr., professor of physical chemistry, University of Rochester, was born in Terre Haute, Ind., April 18, 1898, and received his A.B. from Grinnell College in 1919 and his D.Sc. from the University of Paris in 1920. He was teaching fellow at the University of California in 1920–21, instructor in chemistry in 1920–22; assistant professor at the University of Chicago, 1923–29; associate professor at Brown University



1929–35 and professor 1935–38; professor of physical chemistry at the University of Rochester since 1938. In 1918–19 he was 2nd Lieutenant in the Signal Corps, and since 1936 has been Lieutenant Commander in the U. S. Naval Reserve Corps. At present he is a consultant for the Chemical Warfare Service and engaged in special work for the National Defense Research Committee. He has been Councilor of the AMERICAN CHEMICAL SOCIETY, Assistant Editor of *Chemical Abstracts*, and Chairman of the Division of Physical and Inorganic Chemistry. His principal interests lie in the fields of electrochemistry, discharge through gases, vapor pressures, thermal reactions, and photochemistry. He is a member of the American Association for the Advancement of Science, Physical Society, American Academy, and the Illinois Academy.



George Scatchard was born at Onconta, N. Y., on March 19, 1892, received his A.B. from Amherst College in 1913, and his Ph.D. degree from Columbia in 1917. He served as assistant in chemistry at Columbia 1914–17, was associate professor at Amherst during 1919–23, and National Research Fellow at M. I. T. during 1923–24. He advanced from assistant professorship at M. I. T. in 1924 to full professorship in 1937, a position he now holds.

Dr. Scatchard's chief interests lie in the fields of organic and physical chemistry, his work dealing with war gases, physical properties of optically active components, reaction rate in solutions, mixtures of nonelectrolytes, electrolytes in solution, and liquid junction potentials. He has contributed much to the scientific literature on these subjects.

A member of the AMERICAN CHEMICAL SOCIETY since 1913, Dr. Scatchard is also a member of a number of other scientific organizations, including the American Academy of Arts and Sciences. In World War I he served as a 1st Lieutenant in the Sanitary Corps.

R. L. Shriner was born in St. Louis, Mo., on October 9, 1899, received his B.S. from Washington University there, his M.S. and Ph.D. from the University of Illinois, the latter in 1925. He was an instructor in chemistry at Washington University during 1921–22, associate research and assistant professor at the New York Experiment Station 1925–27, and then became assistant professor at the Uni-



versity of Illinois. He advanced to a professorship there in 1935, leaving to become professor of chemistry and chairman of the department at Indiana University, Bloomington, Ind., in 1941.

Dr. Shriner's work has concerned itself with identification of organic compounds, salts of nitro compounds, waxes, catalysis, drugs, alkaloids, sulfoxides and sulfonanilides, mutarotation, etc., and he has contributed considerably to the literature on these subjects. He has published numerous articles and a number of books as well, among the latter "Systematic Identification of Organic Compounds" of which R. C. Fuson is co-author.

A member of the A. A. A. S., of the Editorial Board of the *Journal of Organic Chemistry*, and of the AMERICAN CHEMICAL SOCIETY since 1919, Dr. Shriner has been identified with both Divisional and Local Section activities of the A. C. S. He has served in turn as Divisional Chairman, as Local Section Secretary, and as Local Section Councilor.



Robert B. Sosman was born in Chillicothe, Ohio, March 17, 1881, received his B.S. degree from Ohio State in 1903, S.B. from M. I. T. in 1904, and Ph.D. from the same institution in 1907. From 1906 to 1908 he worked in the laboratory of Arthur D. Little, became an assistant director at the Carnegie Institution of Washington's Geophysical Laboratory where he remained from 1908 to 1928, and then took up his present work as research chemist with the U. S. Steel Corp., Kearny, N. J.

Dr. Sosman served also as consulting chemist to the Ordnance Department of the U. S. Army in 1918, was lecturer on geophysics at M. I. T. during 1925–26, and has been a national councilor of the Ohio State University Research Foundation since 1937.

Subjects of interest to Dr. Sosman include aqueous solutions at 0° to 300°, gas thermometry to 1600°, specific volume of minerals at fusion, refractory oxides, iron-oxygen system, silica and silicates, geophysics, and industrial pyrometry. He has been the author of many papers on these topics, as well as of books dealing with the properties of silica and with the pyrometry of solids and surfaces.

A member of several scientific societies, including the A. A. A. S., the Ceramic Society, Physical Society, the Washington Academy, and the AMERICAN CHEMICAL SOCIETY, Dr. Sosman has been active in A. C. S. circles. A member since 1904, he has held the offices of Chairman, Secretary, and Councilor for his Local Section.



Vincent du Vigneaud was born in Chicago, Ill., on May 18, 1901, received his B.S. degree at Illinois in 1923, his M.S. in 1924, and his Ph.D. degree from Rochester in 1927. Since that time he has served as assistant biochemist at the Philadelphia General Hospital and at the Pennsylvania Graduate School of Medicine. He was at the Kaiser Wilhelm Institut and at the medical school of Edinburgh during 1928 and 1929. Returning to this country he became professor and head of the department of biochemistry at the George Washington School of Medicine in 1932 after two years spent as associate at the University of Illinois. In 1938 he became professor and head of the department of chemistry at Cornell Medical School, which position he still holds.

Dr. du Vigneaud's work includes studies on the chemistry of insulin and posterior pituitary hormones, intermediary metabolism, amino acid, peptide, and protein chemistry. His researches on vitamins have culminated recently in the announcement of the discovery of the structure of biotin, the empirical formula of the molecule having been established two years ago.

In recognition of his contributions to science the Hillebrand Prize of the Chemical Society of Washington was awarded to Dr. du Vigneaud in 1936. A member of many scientific societies, including the A. A. A. S., New York Academy, Society of Biological Chemistry, Chemical Society (London), Dr. du Vigneaud has belonged to the A. C. S. since 1930, and has been a committee member as well as a Local Section Councilor.

Report of Committee on Economic Status

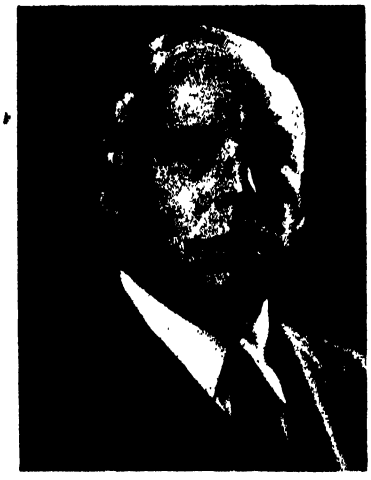
THE survey of the economic status of the membership of the AMERICAN CHEMICAL SOCIETY it is hoped will appear in three sections, the first of which was published on page 1289 of the October 25 issue of CHEMICAL AND ENGINEERING NEWS. Because of space limitations it was decided not to use the issue of November 10, as this is a special number devoted largely to the National Chemical Exposition. Remaining sections of the report will probably appear on November 25 and December 10.

Many members will probably wish to purchase copies of the report bound under a single cover. The committee is therefore arranging to have a supply of reprints prepared immediately following publication of the last section.

Nomenclature in Quantitative Analysis

THE Division of Analytical and Micro Chemistry, AMERICAN CHEMICAL SOCIETY, has appointed a committee to take up the problem of nomenclature for analytical methods. M. G. Mellon, Purdue University, is chairman, and the other members of the committee are H. V. Churchill, Aluminum Co. of America, N. H. Furman, Princeton University, and S. E. Q. Ashley, General Electric Co.

Nichols Medal Award to Arthur B. Lamb



THE Nichols Medal Jury of Award for 1943 has announced that the Nichols medalist for 1943 is Arthur B. Lamb, professor of chemistry, Harvard University, and Editor of the *Journal of the American Chemical Society*. The award will be made at a joint meeting of the New York Section of the AMERICAN CHEMICAL SOCIETY and the Society of Chemical Industry at The Chemists' Club, New York, N. Y., March 5, 1943.

Dr. Lamb has published numerous papers for over 20 years dealing with the aquo- and ammonio-metal salts, more recently on the rate of attainment of equilibrium in aquo-ferric, rhodium aquopentammine, and cobalt carbonateo-pentammine salt solutions, as well as on the adsorption of gases by solids, and other topics. He is a recognized authority on inorganic chemistry.

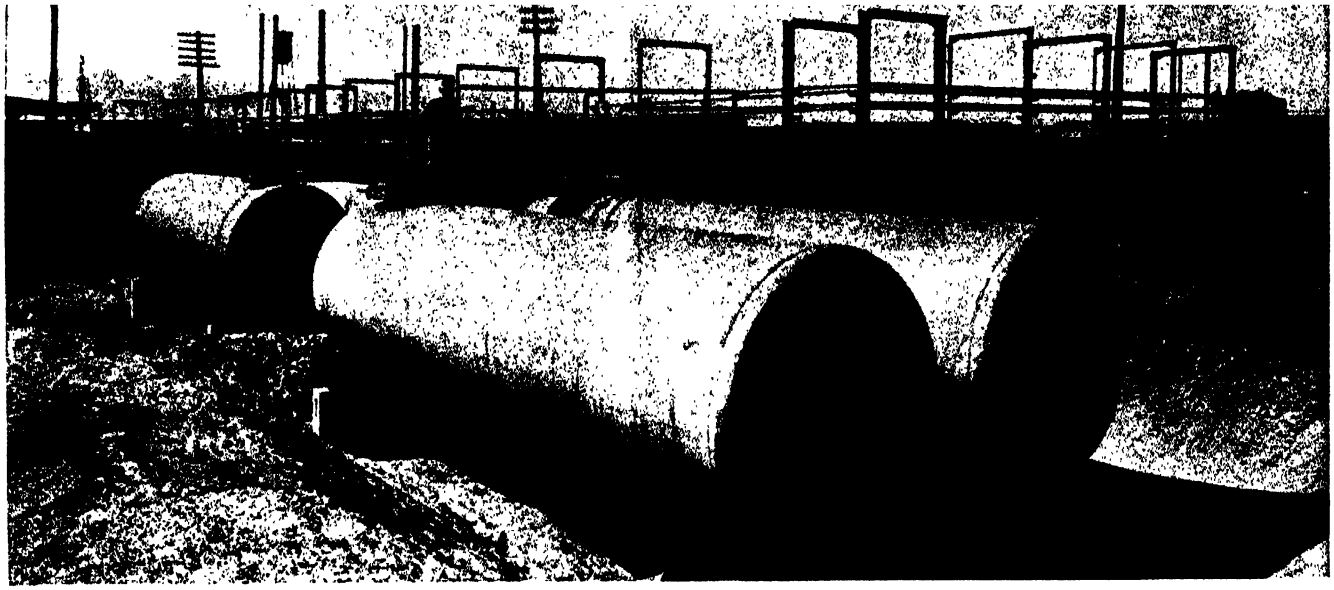
This award comes to Dr. Lamb in his 25th year as Editor of the *Journal of the American Chemical Society*.

Ellis Blade, formerly chief engineer of the Spring Division, John Chatillon & Sons, is now a production engineer with the Signal Corps, with headquarters in Washington, D. C.



ACTION ON THE AMERICAN CHEMICAL FRONT

Here and in issues to follow we give facts about some origins which show that in America genius continues to flourish.



The basic ingredient of Ameripol, the synthetic rubber developed by the B. F. Goodrich Co. in a 16-year research program, is butadiene. Here butadiene is stored at a plant in cylinders under pressure. All materials used in Ameripol are found in America.

Introduction

AMERICANS act swiftly and effectively when need appears. Our chemical industry evidences that. World War I revealed great gaps in our chemical economy; and plants to practice the intricate, and then strange, syntheses of drugs, dyes, and a thousand other chemical products appeared miraculously. Cornfields gave way, producing units between plant and harvest. The miracle was hidden then by the grief and travail—the blood, sweat, and tears—of creating totally new enterprises to meet unexpected needs quickly.

Now, again, the exigencies of war have created new and unforeseen shortages that must and will be met. Now, as before, the urgency of the need has made performance seem slow, has encouraged carping criticism of earnest effort. Even the ingenuity and inventiveness of Americans are questioned. But only foresight has failed. Diplomatic and military defeats created a shortage of rubber so complete and so sudden that we as a nation were set back on our heels. In the ensuing turmoil fruitless argument and faultfinding consumed precious time. That lag shook confidence in the acumen of our scientists and the ability of our industry. These misgivings suggested to the uninformed that American science is an alien borrowed art and that American scientists are parasites thriving only on the inventions and discoveries of others.

That is patently false. No one can view American accomplishments in science without being deeply impressed. Our vaunted Yankee ingenuity has merely assumed a new garb. The pioneering spirit, which carved a great nation out of a wilderness, today animates the research workers of the country, thrives in advancing science, engineering, and industry.

Obviously, the answer to critics lies in knowledge. Only lack of facts can foster misunderstanding. Consequently it will be worth while to review some of the fields in which Americans have pioneered in industries based on science. That is done in the following pages.

Rubber Technology

WILLIAM C. GEER[1], 624 Highland Road, Ithaca, N. Y.

BECAUSE of its history, the word "rubber" carries several implications, and in any except the most highly technical writings one all-important conception should be explained and emphasized. Raw or crude rubber cannot, without the aid of other substances, be made into articles which would perform a fraction of the service rendered by the merchandise with which we are familiar. There are but few exceptions and they are products which, strictly and chemically speaking, should not be classified under the heading of "rubber".

Automobile tires, for instance, if made only of raw rubber, whether from a plantation in the Far East, a wild tree in the Amazon Valley, or out of the chemist's kettle, might carry a car around the block without a breakdown but certainly not much farther. Other substances must be mixed with raw rubber and in different proportions for each of the thousands of well-known articles. Thus, the rubber mixture, or "compound" as it is colloquially expressed, involves a considerable science and constitutes the foundation of the rubber industry.

[1] Formerly vice president in charge of research and development of The B. F. Goodrich Co.

During the early years of the past century, efforts were made to use raw rubber directly in the form of various articles. The qualities were low and the little rubber industry had practically collapsed when the American, Charles Goodyear, in 1839 made the first of that series of four discoveries each of which today is necessary to rubber compounds. Goodyear discovered that sulfur, when mixed with crude rubber and heated, produced a profound change. This method shortly thereafter became known as vulcanization and is still so designated. From then until now sulfur has become as necessary to rubber articles as rubber itself. The crude rubber is weak and thermoplastic, whereas vulcanized rubber is much stronger and not thermoplastic. However, the time then required for the vulcanization process was measured in hours and still the finished article did not exhibit many desirable characteristics.

In 1906 Oenslager, in Akron, Ohio, found certain organic chemicals which, when used in small quantity (1 per cent or less) with rubber and sulfur, not only shortened this time but greatly improved the strength and other physical properties. As a class these substances were termed

"organic accelerators" and many different ones are in current use. Modern vulcanization is measured in minutes rather than hours, and the tensile strength, as well as other properties of equivalent compositions, has been more than doubled, with corresponding increase in service value to the consumer.

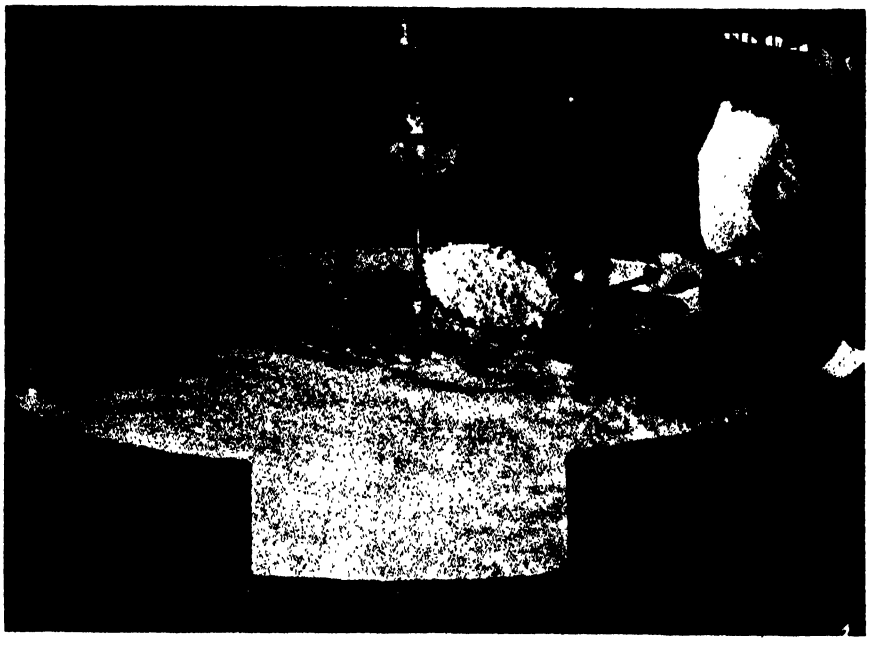
For many years vulcanized rubber did not age well. It "perished" too easily. It was conceived that this perishing was due to oxidation. Several American investigators, working independently about 1910 to 1915, found how small amounts (about 1 per cent) of certain organic compounds which were not accelerators of vulcanization preserved the physical properties of rubber products during long periods of time.

Methods and apparatus were devised which permit the rubber chemist, after a few days of testing, to estimate the number of years which a given rubber compound will last. At least one of these numerous "antioxidants" is included in tires, shoes, and other largely used articles, with the result that rubber goods may be stored from 5 to 10 years with but little alteration of service value.

A fourth group of materials are essential in rubber mixtures which must withstand abrasive effects, such as the treads of automobile tires, the outer cover of conveyor belts, and the soles of rubber shoes. These substances are called "reinforcing agents". The one most valuable and that upon which rubber technologists depend to give maximum abrasive wear is a finely divided carbon made from the incomplete combustion of natural gas. Although the first use of this substance, known to the industry as carbon black, probably was in England, its development and utilization for the treads of automobile tires began in this country about 1915. A rubber mixture which contains the right amount of carbon black will outwear steel or any other known material by a ratio of 10 to 1.



To prepare Ameripol, the B. F. Goodrich "liberty rubber" compounded from oil, soap, and natural gas for use in tires and other rubber products, the raw product, fresh from the coagulating vats, is broken up and sheeted on a wash mill. Here lumpy material is squeezed into thin sheets which are then cut to a standard size and thoroughly dried.



From the polymerizers there comes a thick milky white liquid which is similar in appearance and form to the virgin latex of the rubber tree. The synthetic latex is stirred in large vats where it is stabilized in order to give the finished rubber resistance to heat and oxygen. Then the rubber content is solidified in another vat by coagulating it with dilute acid. This milklike curd is then washed by agitating it, as shown above, in the vat.

Place these chemical achievements together and add to them two contributions made by the American engineers—namely, the multi-ply cord tires and the large section tires (formerly known as balloon tires)—and the sum is modern transportation. Without them the volume of crude rubber used during 1940 for tires alone would have been fivefold that consumed and at a cost of some one billion dollars more than was actually paid.

Quite naturally, at the moment, the attention of the people of this country is centered upon synthetic rubber. There are some six varieties of synthetic rubber which exist in the form of many types and grades. Well over a thousand different synthetic rubbers are known to those who specialize in this field, and no one of them is a chemical duplicate of natural crude rubber or possesses all the physical properties of that material. Of these six varieties, four of them—namely, neoprene, Thiokol, Koroseal, and butyl originated in this country. Wholly satisfactory tires can be made from neoprene, but for large-scale, rapid, and economical production, preference has been given to a fifth which is a copolymer of butadiene with styrene, called "Buna S".

Even though butadiene was first polymerized in Russia in 1910, American chemists prefer the copolymers (Ameripol, Chemigum, Hycar, and Amprene) which are the products of their own exhaustive research. The author has dropped the

name "Buna S" and has adopted the term "Amprene" which was suggested to him by a group of American rubber chemists because it is distinctly an American product.

The grades and types of this variety of synthetic rubber are quite different. American rubber chemists must, and do, understand what other substances and how much are to be used with each, for they have a wide and thorough scientific and practical knowledge of the numerous grades and of the many essential compounding ingredients—accelerators, antioxidants, plasticizers, and reinforcing agents.

The methods of mixing the compounds are not the same as for natural rubber. Thus, new techniques and somewhat complicated ones have been worked out in our factories. All this information and experience are of vital consequence to the users of the vulcanized article (tires) for, let me repeat, the raw material must be associated with other substances if high quality is to be realized in the finished product.



The synthetic rubber comes from the wash mill in flesh-colored sheets. By drying, the color becomes a light amber. A workman holds a sheet of dried synthetic rubber, at left, and dried natural rubber. The rubber is crude No. 1 Smoked Sheet and like the synthetic is raw or unvulcanized at this stage, with corrugated surface.

The reclaiming of vulcanized rubber was taken up early after the discovery of vulcanization and has had a large and successful development in this country. Marks, about 1899, in Boston, invented the reclaiming method which has become the most practical and which yields the product of the highest quality. In principle it is still employed, although the reclaimers have improved it in detail and the use of reclaimed rubber has advanced steadily over the years.

Boiled down to its simplest terms, reclaimed rubber is a plasticized vulcanized rubber derived from rubber articles which, during the process of reclaiming, have been freed from cotton or other fabric. Therefore a certain point should be made clear: Reclaimed rubber does not possess the same physical properties as crude rubber. It has specific and valuable uses in many compounds. But in tires and articles subject to abrasion and heat, the service rendered is less than in articles made only with natural crude rubber.

Then again, it is general practice to mix some crude rubber with reclaimed rubber in practically all articles in which reclaimed rubber is specified. But there is no method known by which this new rubber can be separated from the reclaimed rubber after vulcanization. We cannot unscramble eggs and we cannot unscramble vulcanized rubber articles and obtain the original ingredients, whatever they may have been. This means that scrap articles such as tires, tubes, shoes, belting, packing, hose, matting, and so on, must be sorted, reclaimed separately, and the reclaimed rubber from each of these grades used in similar articles, or in those of lower service requirements.

A logical question is: How familiar is the rubber industry in this country with the several grades, varieties, and types of crude rubber other than those which have come from the plantations? Literally thousands of species of trees, shrubs, vines, and plants contain some rubber. The standard quality is that from the *Hevea brasiliensis* tree, native in the Amason Valley and cultivated in the Far East. For many years rubber from the Castillos, Ceara, Manihot, and other natural trees has been used. The qualities are various and require specialized techniques for different articles, but we are well able to handle them all. Guayule rubber, the shrub rubber native in Mexico and obtained from plantations in California, has been in steady use in the rubber industry for the past 30 years. The industry can absorb all that can be produced economically.

Studies have been made from time to time upon native American plants which contain low percentages of rubber, but these are not so well known to the rubber industry because the quantities available have been small and the high cost of collection has discouraged their thorough study. When and if large amounts of rubber from Cryptostegia, Asclepsis, Chrysothamus, and others become available, I am sure that the issue will be met and that these grades will be employed in any quantity in which they may be produced.

If those who are technically minded wish support of the foregoing assertions, reference is suggested to "The Chemistry and Technology of Rubber", edited by C. C. Davis and J. T. Blake, (A. C. S. Monograph No. 74, 1937) in which is listed a large number of citations to original literature.

Summing it all up, American chemists have discovered and developed new and superior varieties and types of synthetic and reclaimed rubber. The technicians of the rubber industry lead the world in knowledge of all grades of rubber and of those substances necessary for use with raw rubber in order to give high quality to the vulcanised product. They must be supplied with the raw material—whether natural crude or synthetic rubber, whether guayule or Cryptostegia. They must be



After 14 days' immersion in oil at 160° F., a miniature tire of natural rubber swelled 40 per cent in diameter and 180 per cent in volume. A miniature tire of synthetic rubber, known as Hycar OR, showed no effects of its oil bath, retaining its original dimensions. W. L. Semon holds the two tested tires, while an untested tire in the foreground indicates original size.

allowed freedom in their research and not be hampered by orders and directions from officials who do not understand the technology of rubber.

Under such conditions, the American rubber chemists and the American rubber industry can maintain their leadership and can be depended upon to produce for the military services, and for the country, continued high service values in articles made of that truly remarkable substance—rubber.

Accelerators and Antioxidants in the Rubber Industry

PAUL I. MURRILL, R. T. Vanderbilt Co., Inc., 230 Park Ave., New York, N. Y.

THE centennial of the discovery of the vulcanization of rubber by Charles Goodyear was appropriately celebrated in 1939 by the chemists of America and the world generally. For two thirds of the century since that discovery the rubber industry was an art, but during the last third of a century it became a science in which American chemists were leaders. The change-over coincides approximately with the work of George Oenslager on organic accelerators and his discovery in 1907 of the advantages of aniline for that purpose. The discovery was not patented but was kept a secret within the B. F. Goodrich Co.'s organization as long as possible. However, the knowledge gradually reached other rubber chemists and started them on a search for other and better accelerators. The first U. S. patents on accelerators were issued in 1915 to Hofmann and Gottlob, and on this basis the claim was made (and accepted for a time) that the Germans were entitled to all the honors. However, in 1933, after weighing the claims of various workers in the field, the Perkin Medal of the Society of Chemical Industry was awarded to Oenslager for his priority and achievements.

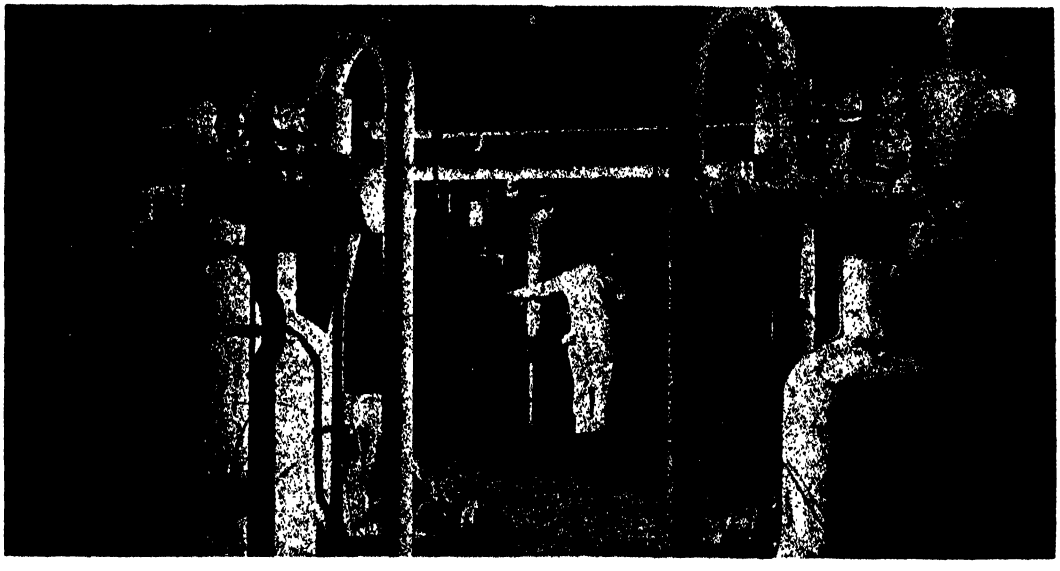
During the period 1915 to 1925 the names of Boggs, Price, DeMeeus, Murrill, Bedford, Sibley, Scott, Moloney, Nikaido, Lorents, Cadwell, Bradley, Ricard, Naylor, Weiss, Ostromislensky, Sebrell, Chute, Russell, Morton, Young, North, Shepard, Fisher, Trumbull, and Winkelmann appear prominently among those who were granted U. S. patents relating to accelerators and give a good indication of what chemists in the United States were doing, though the list is incomplete.

The advantages accruing to the rubber industry and to all users of rubber products, which means the entire Nation, may be briefly summarized as follows:

Temperature of vulcanization was lowered, saving steam.
Time of vulcanization was shortened, saving labor and equipment and increasing output.
Quality of the product was improved, giving greatly increased useful life.

The use of antioxidants in rubber articles was a direct outgrowth of the work on accelerators, since it was soon observed that the presence of certain accelerators, together with the less severe conditions of cure, gave products which had a longer life when subjected to the action of light, heat, and oxygen, either separately or together. This led to a study of other chemicals more or less related to the known accelerators and to the discovery that certain chemicals were effective in retarding oxidation, although they had no effect on time or temperature of vulcanization. One of the earliest patents in this field was issued to Gray and Winkelmann in 1924, and in succeeding years the names of many of the chemists already mentioned reappear in the literature.

Although chemists in foreign countries have not been idle and their contributions to the rubber industry cannot be ignored, it may be said truthfully that the industry has never been dependent on foreign sources of information for the knowledge and the materials needed for the highest quality of rubber articles. The automobilist needs only to compare the mileage obtained on his tires in 1915 with what he got in 1935, especially if this is done on the basis of miles per dollar, to get a clear picture of what the rubber chemists of the United States have done for him. With the present shortage of rubber and the necessity of getting the greatest possible life from what we have, it is clear that wartime economy owes much to American rubber chemists.



The first step in making nylon at Delaware du Pont plant is evaporation of water from the chemicals shipped from the du Pont plant in West Virginia. Nylon intermediates are pumped into large tanks to begin processing that turns them into strong, elastic, truly synthetic fibers and other materials.

Thiokol

BEVIS LONGSTRETH, Thiokol Corp., 780 North Clinton Ave., Trenton, N. J.

THE several types of synthetic rubber being marketed under the brand name "Thiokol"[1] are the result of research initiated in the early 1920's and carried on uninterruptedly since then by Thiokol Corp. For the past 12 years, the company has maintained a staff of rubber chemists and itinerant engineers who have worked closely with the entire rubber industry and industries outside the rubber field whose interest in synthetic rubber dates back several years. This practical experience and acquaintanceship with production problems have proved particularly valuable in gearing the company's work to war production.

As many chemists know, the basic chemical reaction involved in the manufacture of Thiokol synthetic rubber is that between sodium polysulfide and ethylene dichloride. Investigation and variations of this basic reaction have resulted in the development of literally hundreds of different types of Thiokol synthetic rubber. These products differ from each other not only in properties but also in form. Today crude Thiokol synthetic rubber and Thiokol latices, emulsions, and dispersions are being marketed. The potential number of different Thiokol materials is infinite; in fact, many rubber chemists consider the basic Thiokol reaction the beginning of an entirely new field of sulfur chemistry. If this is so, credit for development of the field belongs to J. C. Patrick, the inventor of the polysulfide reaction products.



Drawing off latex in plant of Thiokol Corp.

By incorporating one or another form of Thiokol synthetic rubber into their manufacturing processes, the rubber industry and others have developed an impressive list of products. Well up on this list are industrial hose of all types, stamped and molded goods, airplane self-sealing fuel tanks, barrage balloon cloth, inflated rubber equipment, packings and gaskets, and coatings for concrete and metal. The primary reason for Thiokol synthetic rubber being used in these products is its freedom from attack of petroleum products, resistance to aromatics, and high impermeability.

No statement about Thiokol synthetic rubber would be complete without mention of a recent development which in importance may well transcend the combined importance of all previous developments in which the material has played a part—the use of Thiokol synthetic rubber for tire retreads and possibly completely new all-synthetic tires and tubes. In the opinion of both the automotive and rubber industries, Thiokol offers the fastest and most economical means of producing enough synthetic rubber to retread the millions of tires needed to run the automobiles of war workers.

Recently, the Tire Committee of the Automotive and Rubber Industries recommended a program which would put 1,000,000 Thiokol retreaded tires on the road every month, starting before the close of 1942.

Thiokol retreaded tires, extensive tests show, deliver an average of 7,500 miles of wear. Tires completely made of the material have run 8,000 to 10,000 miles in the Arizona desert. On the production side of the picture, plants similar to that which would be required to produce the new type of retreading material have in the past been put into operation in considerably less than six months.

Lastly, the raw materials required to make Thiokol are available in Continental United States.

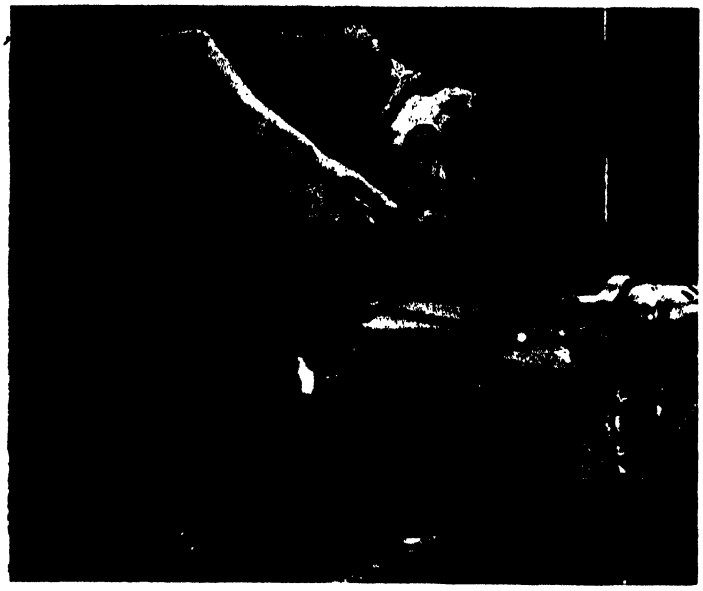
[1] Thiokol Corp. Trade Mark, Reg. U. S. Patent Office.



Solid Thiokol crude rubber remaining in bottom of vat after the liquid has been drained off is cut out in large chunks

Neoprene

This story is based upon information furnished by E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.



Neoprene lining in air hose resists the effects of hot oil through air line

THE infant synthetic rubber industry is being called upon to provide hundreds of thousands of tons of resilient material for our planes, our tanks and trucks, our ordnance, and our industrial machinery. This industry, working at top speed, is going to produce this material as rapidly as possible and as soon as possible. Unfortunately, the current newspaper controversy on synthetic rubber has tended to confuse the background of this industry, a background on which our Nation is building for future success.

Materials produced synthetically and having rubberlike properties are not new to American industry. The rubber industry has been using such materials for over 10 years. Rubber manufacturers know how to compound synthetic rubber, they know how to make products from it, and they have the experience to utilize any type of synthetic that is produced in this country.

Most of this experience was gained through working with neoprene, a synthetic rubber in quantity production in this country since 1932. Neoprene was not developed as a mere "rubber substitute". It was planned as a new material that the rubber industry could use for those applications where rubber could not be employed because of the severe conditions of service.

Neoprene had its beginnings at a time when the search for synthetic rubber appeared so hopeless that a leading scientist in this field said: "Regarded from the technical standpoint, synthetic rubber is today no longer a practicable proposition". Fortunately, such a pessimistic attitude did not permeate the chemical industry. At the very moment those words were written, chemists of E. I. du Pont de Nemours & Co., Inc. were actively prosecuting a search for a method of making butadiene rubber from acetylene.

The solution of this problem was vastly accelerated by a chance meeting of a young chemist and a college scientist at a meeting of the AMERICAN CHEMICAL SOCIETY. The scientist was reporting merely on some research on acetylene gas. He told of producing from acetylene a yellow oil called "divinylacetylene" and of a strange odor that had persisted in the reaction, an odor which led him to suspect the presence of monovinylacetylene gas. The young chemist was vitally interested in this latter statement; it was a definite clue to the problem of producing synthetic rubber.

Synthetic rubber never was made from divinylacetylene, although the chemical was found useful in the preparation of a valuable type of corrosion-resistant finish. When finally produced on a pilot-scale basis in a du Pont laboratory in 1929, it was found to contain a contaminant. And, note carefully, that contaminant turned out to be the elusive monovinylacetylene, a colorless liquid with a sweetish odor.

At last the chemists found they could have this material in substantial quantities. Combined with hydrochloric acid and left standing, it turned to a jellylike substance with some of the properties of rubber. This ultimately was developed into the long-sought commercial product.

What the chemists actually had done was not to synthesize rubber but to synthesize a material containing rubber's desirable qualities and, in addition, superior properties of its own. These properties include superior resistance to the effects of oils, chemicals, sunlight, ozone, and oxidation, forces which had previously limited the usability of natural rubber.

Since this development, over 10 years ago, the synthetic rubber industry has been growing steadily. Without fanfare, this new material found its way into literally thousands of different products where it proved of inestimable value. It was used despite the ready



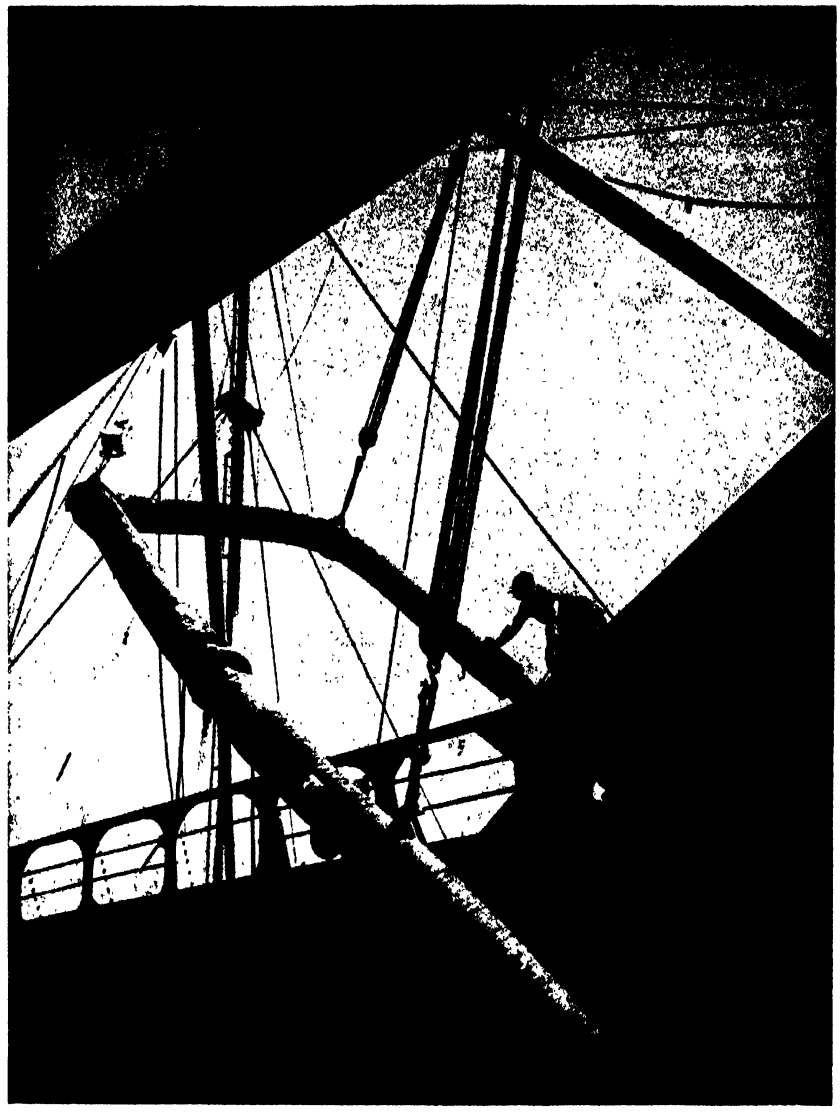
This belt conveying oil-treated coal has a neoprene cover used because of its abrasion resistance when soaked with oil.

availability of natural rubber and despite a substantial difference in price. It was used because it paid its way in simplified design, in lowered maintenance, in increased production.

Thus engineers and designers knew neoprene. They knew its abilities and its limitations. They had seen and had taken part in the steady improvement in the crude material, in compounding practices, in application methods. They were ready to put the material to work wherever its properties might be required.

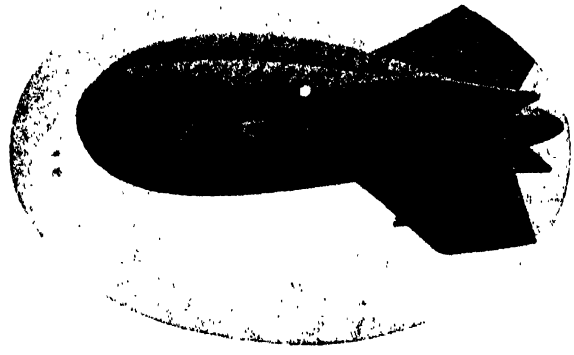
For all of these reasons, neoprene, the "noble rubber", developed to meet the need for a new material, was found to be, early in 1941, a material so much in demand that it was necessary to put it under mandatory priority control. Production had essentially doubled in each year since the introduction of the material, but this was not enough. Engineers who had tested neoprene in their own plants and in their products as molded goods, diaphragms, hose, belting, tubing, rollers, gloves, packing, and thousands of other products were calling upon this material to do the same jobs in the vastly expanded production program. And the products which had been proved in automobiles were called upon to do similar jobs in aircraft, in tanks, and in trucks. Today, neoprene production has been tremendously expanded, yet the continued demands for the material still make it necessary to allocate it to the war effort in the order of uses of importance, whether they be an aircraft part, a machine tool packing, a ship's power cable, or a protective coating for a metal tank.

In this way the chemical industry, with particular contributions from the rubber sections, has built up an industry which is of extreme importance to the future of the



ROBERT YARNALL RICHIE PHOTO

Smooth neoprene lining resists the effects of oil and gasoline and speeds the flow of oil



Because of the sunlight resistance of neoprene, it is now employed in the construction of barrage balloons.



← The flexibility and abrasion resistance of this neoprene part are used advantageously to seal over the oil-well tubing where oil resistance is a major factor.



Neoprene-faced asbestos gloves combat deteriorating effect of hot metal flux

country. Quietly, and without fanfare, chemists continued to seek a material which was called "impractical". Thinking only of better products for industry, for the professions, and for the home, they achieved their goal and industry put the material to work. Today this material has an even more vital job. And, behind the scenes, removed from the publicity, the chemical industry is striving to improve the materials it already has, is working to increase production, and is seeking every compounding improvement that will ensure the products made from these materials being better than they have ever been, with longer life, and with a greater field of usefulness.

American Process Zinc Oxide

AMERICAN process zinc oxide has been made available by the New Jersey Zinc Co., 160 Front St., New York, N. Y. Although in 1941 both zinc oxide made from metal (French process) and zinc oxide made from ore (American process) were on the list of critical materials, American process zinc oxides are now readily available.

Examination for Water Chemists

THE Board of Civil Service Commissioners of the City of Los Angeles, Calif., is seeking qualified chemists for the Los Angeles Water and Health Departments, at salaries from $150 to $250 per month. Applications must be on file by November 20, 1942.

Nylon

E. K. BOLTON, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

IN 1928 a long-range variety of chemical exploration was initiated in the laboratories of the Chemical Department of the du Pont company. This research has had far-reaching implications, both scientific and commercial, since out of it came nylon—source of the first truly synthetic textile fiber—destined to exert a profound influence on international trade.

The immediate objective of this work was to gain a better understanding of the little-known field of polymerization—that is, the union of small molecules to form large molecules such as those found in rubber, resins, and cotton. There was, however, the definite hope that this chemical exploration would lead to the creation of a distinctly new textile fiber.

Early in this work Wallace H. Carothers and his associates undertook to develop a background of scientific work on "linear" polymers—that is, materials whose molecules form long chains, similar to the long-chain molecules of silk. He chose first to study polyesters, the condensation products arising from the reaction between dibasic acids and glycols.

But fibers spun from these polyesters were of theoretical interest only. The melting points were too low for general textile purposes and they were too much weakened by water. Nevertheless, these fibers suggested that some related type of polymer might produce filaments which would possess the characteristics desired for textile purposes.

Further investigation was accordingly undertaken in an effort to create a superpolymer from which strong, elastic, and water-resistant fibers could be drawn or spun, but many difficulties were encountered. Numerous new superpolymers were synthesized, but each was deficient in one or more vital textile properties. At one stage of the work the outlook was so dark that investigations along this line were actually halted for a time.

Fortunately, however, the work was not permanently abandoned and finally a new type of fiber-forming material, known as a polyamide, was prepared. The first polyamide synthesized, although by no means ideal, appeared so promising that extraordinary efforts were made to bring the development to commercial success. Finally, after several more years of painstaking research, Carothers and his staff developed what they called "66" polymer, made by the reaction between hexamethylenediamine and adipic acid, and it is of interest that, although many different types of nylon are possible and many polyamides were synthesized and evaluated in the course of this work, the "66" variety is still the type most widely used for textile purposes.

On October 27, 1938, du Pont announced to the world the development of this family of new synthetic polyamides—christened "nylon"—from which, among other possible applications, could be spun textile fibers surpassing in strength and elasticity any previously known textile fiber, either natural or synthetic. In addition, bristles better than any pig bristles from the Orient could be made from the same nylon used in the manufacture of textile fibers.

But as yet the battle was only well under way. Next came research directed to the development on a laboratory scale of manufacturing processes for the intermediates, the polymer, and nylon yarn, and the development on a semiworks scale of the chemical and engineering data needed for the erection and operation of a large-scale plant. Space does not permit recounting all the difficulties encountered in working out the details of these operations on laboratory and semiworks scale, but the task was enormous.

The development of manufacturing processes for the intermediates, polymer, and yarn represents one of the largest cooperative projects within the experience of the du Pont company. From the time laboratory work was started until designs could be turned over to the construction engineers, some 230 chemists and engineers were at one time or another engaged.

Nylon polymer was an entirely new material with properties different from those of any previous synthetic product, and spinning nylon yarn from the molten polymer was entirely different from the spinning of either acetate or viscose process rayon. No complete picture can here be given of the numerous and peculiar chemical and engineering problems which had to be solved. Many types of spinning-cell melting grids, for example, were designed and tried before a satisfactory type was worked out. Special pumps also had to be designed for the molten polymer—pumps that could be operated at the high temperature of 285° C. with small clearances and no lubrication other than the polymer itself.

Each and every step of the process and the equipment for it, however, were worked out on a semiworks scale with such nicety that except for size the first commercial plant which went into operation early in 1940 was practically a



Nylon's first bath. Molten polymer, extruded on a huge casting wheel, at the du Pont nylon plant in Delaware, is quickly sprayed with water, to help solidify it into a strip resembling ivory. Later it is chopped, melted, and extruded again as filaments.

duplicate of the semiworks plant in all details. And the second plant, which went into production late in 1941, was virtually a duplicate of the first—a tribute to the thoroughness with which details of the various operations had been worked out.

With nylon in commercial production it might appear to some that the job was completed. But such was not the case. Before nylon could reach the Nation's counters, many problems associated with the conversion of this yarn into finished fabrics had to be ironed out—problems of which the average chemist has little knowledge.

For example, it was necessary to develop yarns of different diameters and twists for a variety of uses, and the good qualities of this new yarn had to be confirmed by actual wear tests. In 1939 and the early months of 1940 more than 150,000 pairs of nylon stockings in various weights, colors, and constructions were subjected to the most rigorous testing. Sizes for this new type of yarn had to be developed, similar to the sericin which coats and protects the silk fiber during knitting and weaving operations.

Technical service men, versed in every phase of textile technology, had to go into the field and show the mills how to use nylon yarn, particularly the methods employed for "pre-boarding" hosiery—a special process for setting the shape of stockings by means of heat treatment on a form to ensure that hosiery will maintain its original shape.

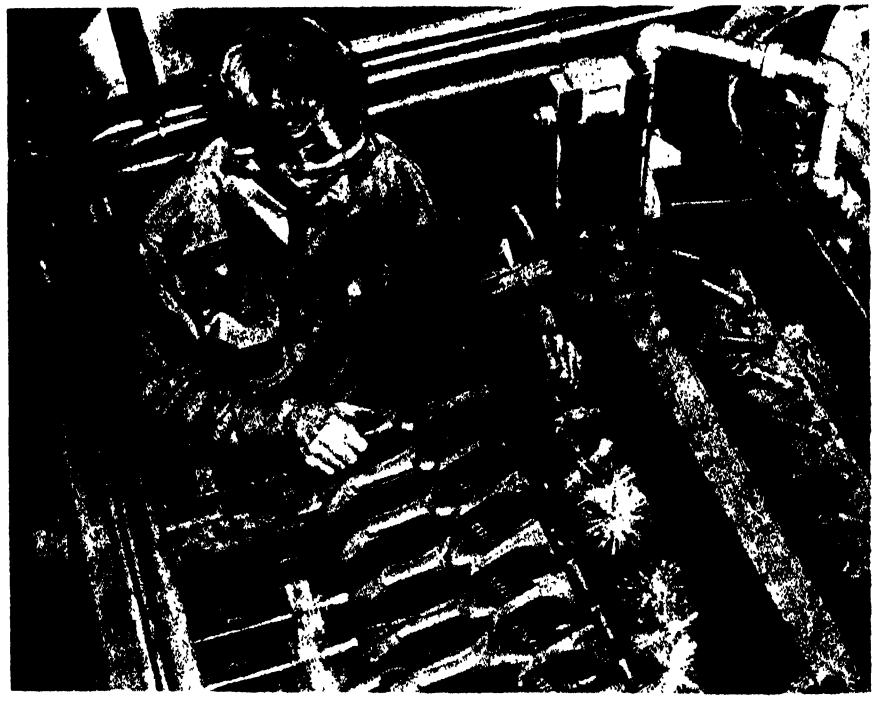
Later, as the market for nylon yarn began to broaden beyond hosiery, further field work was done in cooperation with textile mills directed to the development of a variety of knitted and woven fabrics designed for every conceivable purpose. Before this work had progressed very far, however, Pearl Harbor was bombed. As a result, commercial developments were largely suspended, and today the entire production facilities of du Pont's two nylon plants are being devoted to the manufacture of products for use in connection with the war effort.

Such, in brief, is the saga of nylon—an all-American development, conceived and brought to fruition during peacetime, but now playing a vital part in winning the war.

1943 Spring Meeting, A. C. S.

War activities have preempted so much hotel space in Indianapolis that the local committee feels it cannot care adequately for registrants at the 105th national meeting of the American Chemical Society. The Board of Directors, therefore, has voted to postpone the Indianapolis meeting until such time as the committee feels that meeting attendants can be housed.

The Detroit Section, recognizing the emergency that exists, has stepped into the breach and invited the Society to meet with it in April 1943. Hotels are less crowded in Detroit than in most major cities. The Board of Directors has accepted the invitation. The Society is deeply grateful to the Detroit Section for its willingness again to be host so soon after the successful meeting held in that city in September 1940. Further particulars will be published in the near future.



Brushes made of nylon bristles are a great aid in cleansing bottles, a rapidly expanding use for these new brushes. Bristles of nylon, the new material developed in the laboratories of the du Pont company, are exceptionally durable and sanitary.

Aviation Gasoline

By Polymerization and Alkylation of Cracking Gases

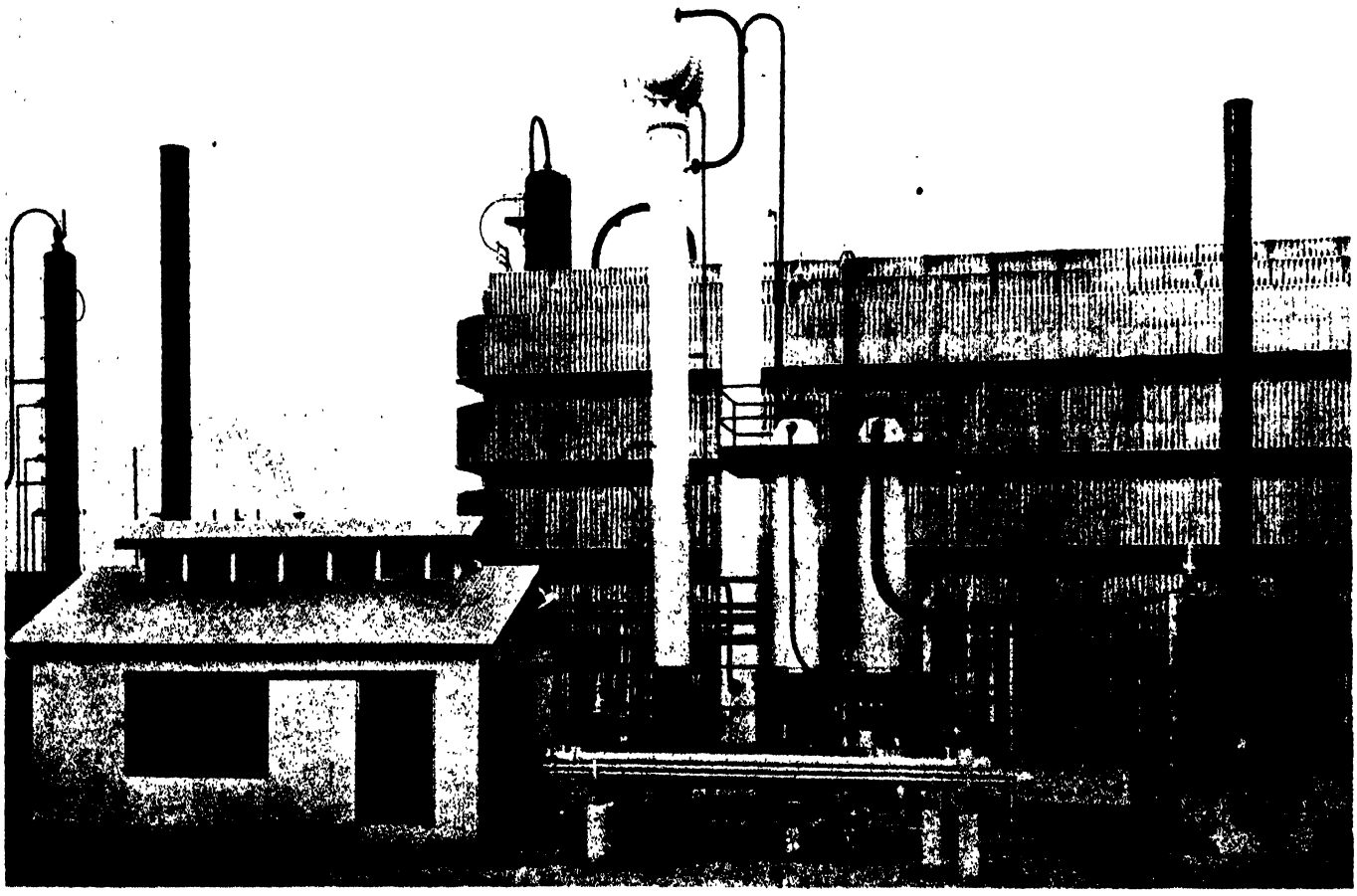
V. N. IPATIEFF, Universal Oil Products Co., Chicago, Ill.

No one will dispute that today the potential strength of an army depends basically on two factors: its supply of explosives and its supply of gasoline. The number of tanks, guns, and airplanes which an army could accumulate would have little significance if it did not have enough explosives or gasoline. The offensive ability of an army lacking either would be greatly curtailed. However, it is not alone the quantity of gasoline which is important; the quality of gasoline also plays a very important role. Aviation, the new and most important branch of the army today, requires gasoline of high quality, and to be effective, must have it in great quantities. The higher the quality of the gasoline—i. e., the higher the octane number—the greater will be the speed the airplanes can develop and the greater the air advantage.

Unfortunately, high octane gasoline cannot be obtained directly from either natural crude oil or its thermal cracking, and obtaining it in large quantities was a tremendous problem which faced the chemist a decade ago. It is to the credit of the United States that her chemists solved the problem first, and most brilliantly. And it was done by a magic little thing called a "catalyst".

The problem confronting the chemist a decade ago, when "70" was considered a "high" octane number, was to convert the straight-chain hydrocarbons (which have low octane numbers) found in petroleum to the so-called side-chain hydrocarbons which have much higher octane numbers. Several answers were found almost simultaneously. Gasoline from gases was one and it consisted of polymerizing or combining two or more simple hydrocarbon molecules into a more complicated one. Thus, for example, when two molecules of some unsaturated hydrocarbon—an olefin such as gaseous butylene—combine, they form dibutylene which is still an olefin but now a liquid. A similar process, called "alkylation", refers to the uniting of an olefin and a saturated hydrocarbon—a paraffin—or a cyclic hydrocarbon—a naphthene. What makes these processes so important is that in every case these molecules unite in side-chain arrangements, and the resulting synthetic gasoline has an octane number between 80 and 100 depending on the original hydrocarbons used. Thus in one stroke a high-quality gasoline is developed and a use found for billions of cubic feet of waste gases formed yearly by the cracking process of petroleum.

These new syntheses of hydrocarbons



A catalytic polymerization unit. Some units are being converted to the production of special components for 100-octane aviation gasoline.

became possible through the action of a catalyst—a substance which will greatly accelerate a reaction without itself changing. Although a catalyst can be anything, each reaction can be stimulated only by a specific substance, and most of the time of the chemists who tried to solve the aviation gasoline problem was spent searching for the substances which cause hydrocarbons to condense.

Hundreds of catalysts and their actions on various hydrocarbons were studied in the laboratories, and out of this work came the simultaneous discoveries of polymerization and alkylation. A short time later another important reaction was discovered—isomerization—in which any straight-chain hydrocarbon could be changed into its isomeric form. This has become an extremely important reaction in the production of aviation gasoline.

Each of these reactions uses different catalysts; some reactions can be stimulated by several catalysts. One of the most important of these, that used in polymerization, is the solid phosphoric acid catalyst developed by the Universal Oil Products Co. Its importance can be best judged by the following facts:

In the United States the thermal cracking process produces 300 billion cubic feet of waste gas yearly containing up to 20 per cent unsaturated hydrocarbons which, by the help of catalytic polymerization, can be converted into polymer gasoline of octane number 82. Several scores of petroleum refineries in the United States are producing polymer gasoline in quantities of several million barrels a year from these waste gases. This is not only a tremendous economy over the old practice of burning the gas to get rid of it, but a great step forward in the motor fuel problem. At the present time methods are being developed whereby the gasoline produced by polymerization may be converted into high aviation gasoline of octane numbers over 100.

As mentioned before, aviation gasoline is also obtained by the alkylation of paraffins and olefins in the presence of various catalysts. The discovery of this reaction in the United States had a great scientific as well as practical significance and amazed the entire chemical world. Previously it had always been assumed that paraffins, the most inert of all organic substances, could not react with other hydrocarbons, and it was not until certain catalysts were found that the "impossible" was performed and paraffins were combined with olefins. Now tens of thousands of barrels of gasoline of octane numbers between 90 and 100 are produced daily by this method.

In such a short article the development of catalytic reactions in the petroleum industry cannot be outlined. Those who wish to acquaint themselves with the subject should refer to the article on "The Problem of Rational Utilization of Petroleum and of Petroleum Distillates" (*1*).

The speed with which American industry has been able to take these reactions and almost overnight put them to work on a large scale is indeed amazing. These feats owe as much of their success to America's highly developed engineering technique—the best in the world—as to her creative inventiveness; and in the history of the petroleum industry, America's contribution will stand out as one of the greatest and most important. The fact that we are at war multiplies the value of these processes a hundredfold for it will be on *our* aviation gasoline that the Allies will fight—and win—this war.

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Cracking

J. BENNETT HILL, Sun Oil Co., 1608 Walnut St., Philadelphia, Penna.

CRACKING, in the petroleum industry, may be defined as the breaking down of the hydrocarbon molecules into smaller ones, with attendant polymerization and other side reactions. The science of cracking is distinctly an American development and its commercial application an American achievement.

When cracking by heat was first recognized, its only commercial significance was as a possibility of producing more kerosene from crude oil. Cracking was stimulated by the advent of the automobile and a consequent commercial demand for gasoline, but it was not until World War I that it acquired any considerable commercial importance.

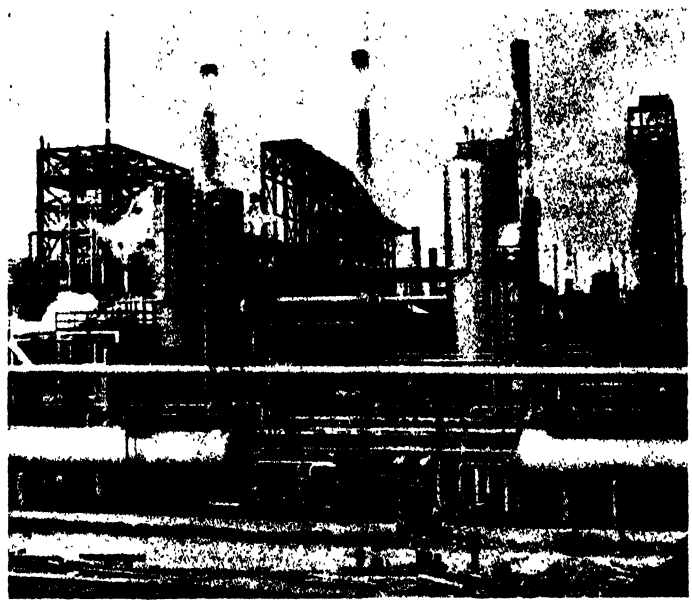
The first commercially successful cracking stills, operated by W. M. Burton at Whiting, Ind., were simply batch stills, throttled so that they could be operated under pressure. Cracking was therefore a thermal reaction taking place in the liquid phase. As petroleum distillation became a continuous instead of a batch process in the early 1920's, cracking followed the same course and cracking stills became a combination of pipe still, pressure reaction chamber, and fractionating tower. The Cross, Dubbs, Holmes-Manley, tube and tank, and other processes developed during this time were all combinations of the same essential elements but differed widely in engineering design. The success of these processes established cracking as a practical and essential procedure for making gasoline and marked the first major period of the development—a period of liquid phase thermal cracking.

During this first period the production of cracked gasoline increased from 1,500,000 barrels during 1914, or 5 per cent of the total gasoline produced, to 122,000,000 barrels in 1928, or 32 per cent of the total gasoline. But it was only during the latter part of this period that it was realized cracked gasoline was something more than an additional quantity of an inferior product, that it had in fact the advantage over straight-run gasoline of what we call today higher "octane number". This realization brought cracked gasoline out of the red-headed stepchild class, washed its face, and sent it to school to learn to be an even better boy. Out of this realization of the possibility of better octane numbers through cracking came the side-by-side development of the high-compression, high-economy automobile engines and the high-octane gasoline to operate them. There was ushered in the second phase of cracking development, a development for quality and not for quantity alone.

Although the first phase of cracking development was largely engineering, the quest for quality in the second phase has been largely a matter of chemical research, followed by engineering. Since research showed that high temperature favored the production of better octane fuels, the first steps were to raise the temperature of the liquid phase processes or to go beyond them and crack at high temperature in the vapor phase as had been done during World War I to produce aromatics. The most important commercial processes resulting from the vapor phase idea are the deFlorez and Gyro processes, the latter being an outgrowth of the earlier Ramage process. While the vapor phase processes produced a higher octane product they also gave a product rich in unsaturated hydrocarbons and suffering thereby in stability.

Most of the development in recent years has been along the line of catalytic cracking. By means of suitable catalysts the desired reactions have been made to progress at lower temperature and the effect of the undesirable high-temperature reactions has been minimized. Using an alumina-silica catalyst made either by activation of a natural clay or synthetically, a cracked product is produced which is low in normal paraffins, high in isoparaffins and aromatics, and low in olefins. Such a product has excellent octane num-

bers. The first such commercial process of catalytic cracking is the Houdry process in which the heavy hydrocarbon vapors are passed through a fixed bed of the catalyst, beds being alternately regenerated by blowing with air. Although Houdry is himself French-born, the process has been developed in this country. It is being used extensively at the present time.



More recently new processes of catalytic cracking have been developed which make the operation entirely continuous. The fluid catalyst process suspends the finely divided solid catalyst in the vapor stream and later separates it, regenerates it, and returns it. The Thermofor catalytic process uses a catalyst bed which moves downward through a tower, the catalyst being continuously removed from the bottom for regeneration. Although no substantial commercial experience on these processes is yet available, extensive commercial installations are being made.

The gasoline from all of the catalytic processes may be retreated with catalyst, resulting in virtual elimination of the olefins and increase in the aromatics.

For many years cracking, by one method or another, has been used on a comparatively small scale to make certain special products other than gasoline, as, for example, ethylene or aromatics. Recently the demand for isobutane, butenes, and butadiene has focused attention on these other materials. The wide cracking knowledge and experience possessed by technical men in this country are making the solution of these problems immeasurably easier.

Nitroparaffins

H. B. HASS, Purdue University, Lafayette, Ind.

THE first nitroparaffin was reported in 1872 by Meyer and Stüber who reacted amyl iodide with silver nitrite. Eight years later Beilstein and Kurbatov treated a heptane fraction with nitric acid in liquid phase and obtained a mixture of isomeric nitroheptanes. In the half century between 1880 and 1930 numerous investigations were carried out in Russia, Germany, and the United States to discover a method of utilizing this reaction for the commercial production of nitroparaffins, but in spite of approximately six thousand literature references on the aliphatic nitro compounds, none had reached commercial production.

In 1930 work was started at Purdue on the assumption that isobutane, the nitration of which had not been reported, might, because of its unique structure—nine relatively unreactive primary hydrogen atoms and one easily substituted tertiary hydrogen—make it possible to obtain better yields of mononitroparaffin than had resulted from the other alkanes. Reaction was slow until the critical temperature of isobutane had been exceeded.





Then it was rapid, and the expected product, tertiary nitrobutane, was obtained in fair yield. Other alkanes, however, reacted similarly under these conditions.

The advantages of the flow method in studying vapor-phase reactions had been apparent for some time in our chlorination researches and this technique was then applied to the nitration. Shorter exposure times and lower pressures in the flow method, as compared with operations in bombs, required higher temperatures for reasonably rapid reaction. Under these conditions an entirely new nitration reaction occurred with a fission of carbon-carbon linkages.

$$RR' + N_2O_4 \longrightarrow RNO_2 + R'NO_2$$

Thus isobutane yields, in addition to the tertiary nitro derivative, 1-nitro-2-methylbutane, 2-nitropropane, and nitromethane.

Soon after preliminary work had indicated the advantages of the new technique in nitrating paraffins, a prominent manufacturer of natural gas gasoline sponsored a fellowship with the Purdue Research Foundation to study the process and the properties and uses of the nitroparaffins. After definitely encouraging laboratory results had been obtained, this company decided not to go into the manufacture of chemicals and discontinued support of the research.

The Commercial Solvents Corp. and one of the important explosive companies thereupon displayed an interest in the nitroparaffins, but after a careful study of nibglycerol trinitrate, $O_2NC(CH_2ONO_2)_3$, and nibglycol dinitrate, $CH_3C(NO_2)(CH_2ONO_2)_2$, they decided not to engage in such manufacture. Commercial Solvents, however, soon erected a pilot plant for the nitration of propane, butane, and isobutane so that quantities of nitroparaffins could be manufactured for research on applications and for market exploration.

The courage and vision displayed by Commercial Solvents Corp. in embarking upon a wholly new technique and in opening up a field of chemistry in which there was no previous record of commercial success can hardly be overestimated. Costly delays were inevitable as problems arose and had to be solved. The pioneering nature of the development was well expressed by the Patent Office which stated, in response to a second patent application from the Purdue Research Foundation, that its original patent (U. S. 1,967,667) "represents the complete state of the art so far as known".

The first pilot plant was destroyed by fire. The second one, however, operated even more successfully than the laboratory experiments had promised. It is still in 24-hour daily operation because the large plant is unable to meet the market demand for nitroparaffins. Commercial operation began in May 1940 after a few birth pangs characteristic of a radically new process.

The only major disappointment of the entire development is the disparity between the size of the present unit and the demand for nitroparaffins and their derivatives. At present the process is operating with propane as the starting material and yields nitromethane, nitroethane, 1-nitropropane, 2-nitropropane, five nitroalcohols and nitroglycols obtained by formaldehyde condensations with these nitroparaffins, the five corresponding reduction products, the aminohydroxy compounds, and salts of hydroxylamine. Potential sales are at least 10 times the present plant capacity.

New and Rare Instruments

THE Committee on Location of New and Rare Instruments has the following offers and requests:

Instruments Offered

Curie electrometer (Paris make)
Loewe-Zeiss liquid interferometer
L. & N. portable potentiometer (No. 7655) with 2 quinhydrone and 1 calomel electrodes
Microammeter, D'Arsonval Type (model S of Sensitive Research Instrument Corp). Rental only
Quartz microscope
Siemens & Halske optical pyrometer
Two-circle reflecting goniometer (several)
Welch d. c. volt-ammeter (0–150 volt, 0–15 ampere)
Westinghouse 4-unit moving coil Type PA oscillograph with three galvanometers
Weston galvanometer (No. 375)
Weston galvanometer (No. 440)
Weston voltmeter (No. 280)

Instruments Needed

Coleman spectrophotometer (10 requests)
Grating spectrograph (9 requests)
Leitz Ultrapak or equivalent
Quartz spectrograph
Zeiss Optimeter
Zeiss-Pulfrich refractometer (8 requests)

If you have rare instruments you would be willing to sell, lend, or lease for essential war research or if you need such instruments, write to D. H. Killeffer, 60 East 42nd St., New York, N. Y., chairman of the committee, who has particulars on the offers and requests mentioned above.

Data Published on Selective Service

BECAUSE of the wide interest in this subject and the need for obtaining trained men for our Production Army, we give below references to information we have published on occupational deferments, including those of men in training, and the need for technically trained persons. Future developments will be brought to the attention of our readers.

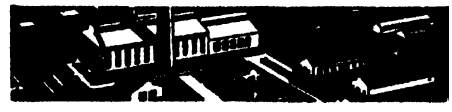
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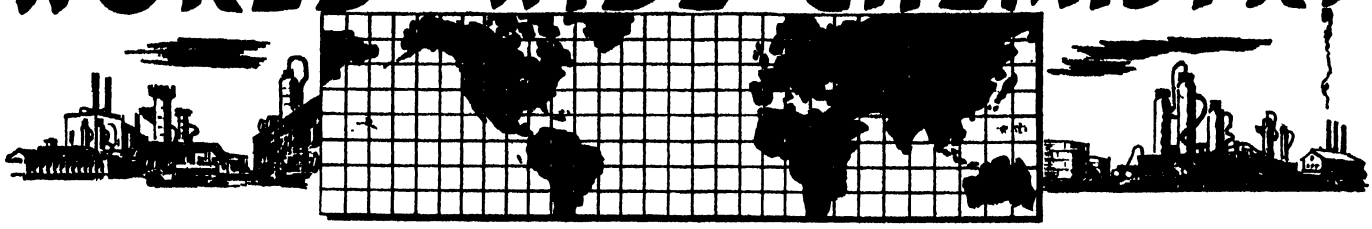
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WORLD-WIDE CHEMISTRY





The export license requirements for certain synthetic resins have been extended to a wider field. Export licenses are now required for adhesives and cements made wholly or mainly of synthetic resin, and synthetic resin and plastic materials derived from synthetic resins, or from cellulose or casein, in the form of granules, powders, blocks, rods, tubes, sheets, or strip, whether shaped or reinforced with other materials. Export licenses are also required for thermite, diacetin, dichlorodifluoromethane, selenium and its compounds, and triacetin. In order to save lead, the authorities have made suggestions for the substitution of alternative materials for chemical lead. Acid-resisting tiles or concrete can be used in many cases for tanks and containers; where lead is needed, the use of lead alloys is recommended; and the consumption of lead may be reduced also by use of thinner sheets and pipes. Such savings will be made easier if lead with a small addition of tellurium and copper (to give higher fatigue resistance and to increase ductility) is employed. No cereals may be used during the coming season for grain or malt whisky distillation. In the export field the freight registration system has been extended to shipments to West Africa, an important market for certain chemical products; while essential deliveries will not be held up, shipments of less essential materials will be adversely affected.

Pooling of Scientific Research Will Eliminate Waste

Two problems have been prominent in the wartime organization of chemical and other scientific research. One is coordination of research activity with a view to elimination of parallel efforts for the solution of one and the same task; the other is bridging the gap which has been found to exist in many cases between pure science and research and the application of its findings in industry. Both these problems have been brought nearer to a solution by the work of the official research organizations, especially the Department of Scientific and Industrial Research, but it is claimed by the fine chemical group of the Association of Scientific Workers that there is still insufficient pooling of research, development, and production, owing to the number of small production units employed. Among special faults now met in research are unnecessary waste of such items as solvents and failure to examine waste products for possible use and to search for alternative raw materials. A proposal has been made to set up a committee with executive powers for the control of the work of all laboratories and production equipment in general. Such a committee should be drawn from the government, the Association of British Chemical Manufacturers, the Department of Scientific and Industrial Research or another representative research body, and laboratory staffs. "Telescoping" of industry and concentration of production have made considerable progress in Britain, and this proposal aims at the extension of the policy to industrial research.

Coke Proposed for Postwar Fuel

Since the war has brought the importance of fuel problems home to British industry as a whole, much thought has been given to the most suitable arrangements for fuel supplies after the war. The problem is made more difficult, but in a way also eased, by the fact that coal is the only fuel raw material in abundant supply in the British Isles and that all plans must therefore be based on coal or manufactured coal products. It is believed that larger quantities of coke will be needed as producer fuel and for domestic purposes, and it has been proposed that coke may with advantage be treated chemically to make it fit for burning in existing appliances. G. E. Foxwell, discussing the subject in the journal of the National Smoke Abatement Society, states that a great deal of rebuilding will be necessary at the coke ovens after the war. This view is generally shared, and it is also recognized that the carbonizing industries will have to meet largely the demand for smokeless fuels. The coke ovens to be rebuilt after the war could be built on the combination principle and heated by producer gas, says Dr. Foxwell. Clean coal could be produced for coke manufacture and the higher ash intermediate product of the washeries could be carbonized in special ovens to provide coke for the producers. In this way, from 20,000,000 tons of coal, some 1,400 million therms (1 therm = 100,000 B. t. u.; 1 B. t. u. = the amount of heat required to raise the temperature of 1 pound of water from 60° to 61° F.) could be liberated for external use. Allowing 600 million therms for use in steelworks, at least 800 million therms gross providing 400 million therms of useful heat could be obtained annually, to which some 100 million therms in the form of coke could be added from existing or rebuilt coke ovens, making a total of 500 million therms towards an estimated total demand for 1,350 million therms. To take advantage of the coke-oven gas, regional gas grids would have to be built. Additional carbonizing and purification plants will be required in districts remote from the coal fields.

New Emulsifying Agent Recommended for Medicinal and Cosmetical Products

A new emulsifying, suspending, and stabilizing agent, described as a polyose derivative, is offered in the English market. It is soluble in water, is recommended especially for creams of the water-in-oil type, and is said to give a highly viscous solution which sets on standing into thick, stable, colloidal gels free from undissolved, suspended particles and not easily attacked by bacteria. Two varieties are on the market, one yellowish white for emulsions of low oil contents, the other yellower for those of high oil content. The preparation is supplied as a wax or powder, flakes or liquid.

Cellulose Esters Considered Alternatives for Cellulose Acetate

Several esters of cellulose suitable as alternatives to cellulose acetate and

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EDITOR'S NOTE. Those interested in further details should address the correspondent whose name and address appear for each country, and enclose sufficient international coupons to prepay the reply. United States stamps should not be sent.

cellulose nitrate (the basic cellulose ester for celluloid) are mentioned by *Chemical Age*. Ethyl cellulose and cellulose acetobutyrate are reported to find favor in the plastics industry.

Bacteriological Peptone and Anesthetic Trichlorethylene Offered in Great Britain

Bacteriological peptone is offered by a British chemical manufacturer to "meet the urgent demand from bacteriologists for a reliable British-made Peptone"; it is free from contaminating organisms, toxic by-products, and fermentable carbohydrate. Trichlorethylene offered in a purified form has recently found increased application as an anesthetic.

Economies Advised In Paint Extenders

British paint manufacturers have from time to time been advised about changes in the supply of important paint materials in order to enable them to change over from one material to another. This system has been working well on the whole and has naturally given a stimulus to the use of such indigenous materials as Cornish china clay and chalk. Recently a British Standard Specification has been issued for distempers, but this is essentially a performance standard, the only stipulation regarding composition being that the distemper must not contain more than 30 per cent of water. For washable oil-free distempers paints based on alkaline silicates or cements sold in dry form are recommended instead of casein. For nonwashable oil-free distempers the compositions are usually based on protein or starch.

Oil Recovered from Waste Rags

Adequate arrangements are in operation for recovering and treating oily rags, cotton waste, and wipers from government factories, services, and railway companies. A considerable number of processing firms are engaged in treating such material from commercial sources, but it is stated that further measures may be necessary to make full use of recoverable oil.

Dehydration Work Progresses

The large-scale process for the dehydration of vegetables developed by the Department of Scientific and Industrial Research at the Low-Temperature Research Station at Cambridge has been tried out in several experimental drying plants in different factories all over the country under the auspices of the Dehydration Branch of the Ministry of Food. Three big plants will be in operation before the end of the year, and one will specialize in the dehydration of potatoes; another will concentrate on soup powders containing dehydrated potatoes, vegetables, and meat. The process is similar to that employed in the semi-industrial plants. The potatoes go to automatic washing machines filled with carborundum rollers, are peeled and trimmed, stored in large wooden vats containing water with a small amount of sulfite, cut by machines into shreds 2.5 by 0.5 inches, freed of some of the starch in the outer layers by means of powerful water sprays, blanched by immersion in boiling liquor or by steam treatment in order to adjust the pH value and to destroy enzymes without softening, and finally dried. The final product contains 5 per cent of moisture and is of uniform color and texture.

G. Abrahamson

150 Halfway St.
Sidcup, Kent, England
October 6, 1942

Continental Europe

Eire

Wartime difficulties in import trade have given a great stimulus to staple industries necessary for the well-being of the country. Two cement factories at Limerick and Drogheda in Eire employ about 700 men. Their output is sufficient to meet the normal demand, although production commenced only a few years ago. Lately, however, difficulties have been experienced in the supply of fuel. A highly volatile coal is required in order to maintain the necessary temperature, and this is normally obtained from Britain. Experiments have been made with peat and Irish coal, but these fuel materials were found to be unsatisfactory. British coal exports to Eire may have to be further reduced owing to the shortage in the British home market.

The production of newsprint is limited to one factory which is also making cardboard and would normally cover about one fifth of the local demand. The shortage of imported newsprint has compelled some weekly papers to use a dark brown paper made from straw. Another straw paper said to be suitable only for a flat printing press is a dull yellow.

Drug Market Shows Slight Improvement

The position in the drug and chemical market has somewhat improved during the past 12 months as a result of adjustments in consumption and increases in production. Calcium carbide, carbon dioxide, formaldehyde, and glue are among chemical products which have been produced for the first time during this war or are produced in increased quantities. The stocks of important drugs are said to be nearly double what they were in the autumn of 1941. Powdered glucose arrived recently from the United States, and supplies of cod liver oil and liquid paraffin were said to be on their way. Certain brands of proprietary products are rapidly disappearing from the market, with a return to doctors' prescriptions and wider use of the British Pharmacopeia.

Reliance Placed on Local Fertilizer Sources

Several unused quarries and mines in Eire have been reopened since the beginning of the war, and it is hoped that some of them may be kept in operation when peace returns. Baryte deposits in county Sligo have been opened, and ochre which is worked in Eire and was sent to England for further treatment is now to be processed on the spot; soon an output of 5 tons of a purified material is expected daily. Great progress has been made in the pyrite mines in the Vale of Avoca, county Wicklow, which have been closed since the 1870's and are to yield 150 tons of ore weekly. Work is also proceeding on the phosphate deposits in county Clare, and both these materials are used to make superphosphates in Eire. The Irish Mineral Development Co. intends to install additional machinery in the pyrite mines in order to make ore with a sulfur content of less than 35 per cent available and to permit use of the copper, lead, iron, and zinc found in the mineral. A manure material which has aroused increased interest in Eire is seaweed. Supplies of copper sulfate are now sufficient to meet the country's needs.

France

France has several important asphalt deposits of which that of Gard is the largest. At present only the northern zone of this deposit is worked, at Saint-Jean-de-Maruéjols, and the entire output is used for road construction purposes. Investigations have now been made with a view to the development of this deposit as a source of liquid hydrocarbons for use as a motor fuel and lubricant. The possibilities of asphalt as a source of motor fuel have been ignored in France because of the ease of importing petroleum in peacetime and of the fact that in wartime there is another indigenous source available in the bituminous shale of Vagnas which contains twice the amount of bitumen. Nevertheless it is believed that the asphalt deposits of Gard could be made available as a source of motor fuel. The composition of the limestone—9.8 per cent bitumen, 81.7 per cent calcium carbonate, 3.8 per cent magnesium carbonate, 1.3 per cent alumina, 2.1 per cent iron oxide, and 1.35

per cent sulfur—is similar to that of Ragusa (Sicily) which is worked under the directions of the Italian Government. It is claimed that the asphalt of Gard could be treated easily by simple distillation at low temperature and that the resulting product would be similar to ordinary crude oil from oil wells. Besides, the region of Gard is known to contain important deposits of lignite which could be used as a fuel.

Propane Gas Results Open Prospect of Postwar Development

The existence of a large oil refining industry enabled France before the war to make more extensive use of petroleum products for other purposes than motor traffic than was the case in other European countries. Now that the French oil refineries either have been closed down or are working at a greatly reduced scale on domestic substitutes, industrial and domestic users of petroleum products have had to revert to other fuel sources. On the other hand, only now have complete results of the experience gained with some oil products been collected. Thus it is stated that use of propane gas as an alternative for coal gas has been very satisfactory. Propane gas can be carried in a liquid form under slight pressures and has been used on a comparatively large scale in rural districts where consumption was not large enough to justify establishment of gasworks. Distribution was in steel tubes of small diameter at 1.5 atmospheres, and the companies engaged in this business have shown favorable financial results although propane gas was sold at prices no higher in terms of calorific value than coal gas in medium-sized towns. This satisfactory result was due in the first place to the higher calorific value of propane gas which reduced the cost of installations for distribution and transport. It is hoped that the use of propane gas for lighting and cooking in rural districts will increase after the war. Some progress with propane gas has also been made in Germany, but the economic conditions there are rather different from those prevailing in France. The German output is obtained from Fischer-Tropsch plants situated in the principal coal-mining regions, so that the propane gas has no transport advantage as compared with coal gas. The financial results seem therefore to have been rather less satisfactory in Germany, the more so as distribution is still being hindered by lack of containers and steel materials.

French Chemists Sent to Germany

Collaboration between the Vichy Government and the German authorities has become more noticeable of late. A list of French chemists available for employment has been collected, and 200 chemists, it is reported, have been ordered to go to Germany. This follows a similar move for workmen employed in French chemical factories. Several thousands of these are to be transferred to Germany in complete groups. It is also reported that arrangements are being made for the bodily transfer of small and medium-sized plants from France to the eastern provinces of Germany.

Denmark

As the oil mills have been cut off from their overseas sources of raw material supplies, Danish manufacturers have experimented with several domestic materials. Oil-yielding plants have been grown by Danish farmers and are expected to contribute to the solution of the problem. Herring oil is said to have been found quite satisfactory as a medium in paint manufacture, but to give good results it must be purified, and the costs are rather higher than in the case of comparable vegetable materials. Oil produced from small herrings is to be used in tanneries. It is planned to process the entire output of herring oil so as to make it suitable for industrial application.

Feeding Stuffs Obtained by New Conservation Methods

The Danish sugar factories have received an order for 10,000 tons of molasses feeding stuffs. The product is a new material which is obtained from the juice of sugar beets and treated with ammonium sulfate, superphosphates, and a yeast material.

Natural Gas Becomes Fuel for Sea-Going Vessels

The supply of fuels has met with considerable difficulties in Denmark, the more so since deliveries of imported coal have been held up by transport conditions and great damage has been done to the peat production by heavy rains. Natural gas has been investigated as a possible source of energy for local cement and brickworks and for cooking and lighting, and now it is reported that a fishing vessel has completed successful trials with natural gas as a motor fuel. It is reported that 20 fishing vessels are to be equipped to use natural gas; a larger number would have been fitted but for a shortage of steel containers.

Peat Coke and Tar Oil Output to Be Increased

The Danish Government will spend 9,000,000 kroner in order to encourage the peat industry, which provides important fuel for gas producer plants. Special attention has been paid to the production of a better-quality fuel which is free of the disadvantages in filtering experienced with earlier peat fuels, and large amounts of peat coke—possibly 10,000 tons per annum—are to be used in this connection. The by-product output of tar and tar oil is also to be used to replace formerly imported oil products, and peat ash, which contains certain quantities of phosphorus, potassium, and lime, has been tried out as a fertilizer. It is a promising material for soils deficient in lime, but its large-scale use is hindered by the great variations in the contents of minerals between peat ash from different sources.

Hungary

Power Station to Operate on Natural Gas

Construction has commenced on an electric power station in Transylvania which will operate on natural gas. The plant is situated at Marosvarhely, and the cost of erection will be 20,000,000 pengö. Natural gas has been proposed as a source of energy for several industrial purposes, and long-distance pipelines are under construction to facilitate its distribution. Meanwhile the production of crude oil continues with the help of German petroleum companies.

Staple Fiber Factory Begins Operations

The Hungarian Viscose Co. which has a capital of 9,000,000 pengö announces that it will begin production of artificial silk and staple fiber in the near future. A Swiss process is employed and the number of workers will be 1,500 when the plant is in full operation. For the time being, however, only one third of this number will be employed as the supply of raw materials is not sufficiently large to permit full use of plant facilities.

German-Hungarian Chemical Cooperation Established

A special chemical commission has been attached to the committee formed by the German Industrial Federation for negotiations with industrial organizations in Hungary, and on the Hungarian side also a special commission to deal with chemical products has been formed. These two chemical commissions have held joint meetings and elected a joint chairman, who is a director of I. G. Farbenindustrie. From the German point of view Hungary is particularly interesting as a supplier of chemical products because the country is situated more favorably in relation to German industrial districts than other satellite states and, furthermore, produces

certain raw materials which are not available within Germany, such as bauxite, natural gas, oilseeds, poppy, and other drugs. German firms have therefore shown particular interest in chemical enterprises in Hungary, and the new move is no doubt calculated to encourage joint industrial undertakings in the chemical field.

Rumania

Oil Prospected in Undeveloped Districts

D. Breda, chief of the Directorate for Mineral Oils, has been entrusted with the drafting of executive orders for the new Petroleum Bill, one of the principal objects of which is the encouragement of oil prospecting in undeveloped regions. Twelve areas have been selected in various parts of the country and offered for exploration and development to private interests. The 12 trial areas are each approximately 75,000 acres in size. The prospecting rights were offered to private firms by public tender, and eight areas were taken up at once, whereas further negotiations were necessary for the remaining four areas. In the eight areas disposed of by tender, investments totaling 200,000,000 lei are to be made.

The 12 oil-prospecting areas are: Balteni-Pojogeni (in the district of Gorj), Roesti-Cermegesti (in the district of Valcea), Bals-Ganeasa (in the district of Romanati), Pitesti-Slativarele (in the districts of Arges and Olt), Topoloveni-Glambocelul (in the districts of Arges, Muscel, and Dambovita), Cislau-Tega (in the districts of Prahova and Buzau), Robesti-Trestia (in the district of Buzau), Barsesti-Campuri (in the district of Putna), Tg. Ocna-Harja (in the district of Bacau), Moinesti-Sambureni (in the district of Bacau), Taslau-Campeni (in the district of Bacau), Seletin-Dichtinet (in the districts of Radanti and Storonijet).

Negotiations Begun for Utilization of Danube Reed Banks

I. G. Farbenindustrie A.-G., the German chemical combine which is known to be interested in the utilization of the reed banks in the Danube delta for the production of cellulose, is understood to be negotiating with two Rumanian companies—Letea and Zarnesti—for the erection of one or more cellulose factories in the country. It is believed that these would meet the entire cellulose requirements of southeastern Europe.

New Mines to Be Developed

Steaua Romana, one of the leading oil companies, intends to undertake the mining of aluminum silicate. S. R. P. has obtained a prospecting license for bismuth, lead, and zinc. Intreprinderile Cero-Chimice-Farmaceutice is interested in asbestos deposits. Breaza-Zlatna is investigating asbestos and kaolin deposits. The mercury factory on which construction work has been under way for some time is to be opened shortly; the output will be 130 pounds from 44 tons of ore.

Chile Plans Increase In Digitalis Production

A species of digitalis (*Digitalis purpurea*), which grows wild in Chile, is believed to compare favorably with that formerly imported from European sources. In fact, its strength has never been less than 10 units per grain, according to the Instituto de Fisiologia, which controls the drug. The uncultivated herb flourishes in the favorable climate of southern Chile.

About a year ago digitalis, among other medicinal herbs and plants, was cultivated experimentally on farms under the supervision of the Caja de Colonización (Agricultural Colonization Bank). There appears, however, to be little need for cultivating the herb, since the wild plant has met all tests satisfactorily and grows in sufficient quantity to meet requirements for an indefinite period.

A drying plant has been installed near Osorno under the supervision of the Instituto de Fisiologia but is now operated by the Instituto Bacteriologico. This center now dries about 10 kg. of leaves a day although not operating on a daily schedule, and could produce as much as 100 kg. per day, provided sufficient stocks were regularly available.

While Chile's consumption of digitalis varies between 200 and 300 kg. per year, it is believed that as much as 3 or 4 metric tons could be produced annually.

Drug Manufacture Increases in Eire

The war has given a new impetus to the manufacture of drugs in Eire, according to a recent report to the government. Formerly just an exporter of native medicinal herbs and plants, Eire now has to shift for herself in the matter of finished drug products. Two firms, one in Kilkenny and the other in Limerick, have been experimenting with distilling and processing plants.

Further encouragement has come from the National Agricultural and Industrial Development Association in Dublin, which has prepared a list of some 200 varieties of medicinal herbs and leaves available in Eire with instructions as to how and when to collect them. Centers are being established for storing herbs before they are processed.

New Source of Perfume Oil Reported

United States buyers of perfume oils will probably welcome the news, currently reported in this country, that Mexico is producing a new kind of oil from *lima chicona*. This experiment may disclose a substitute for now scarce Italian bergamot.

During the latter part of 1941 and the first months of 1942 a lime oil factory in Colima processed about 1,500 pounds of what is known as Mexican bergamot cold pressed oil from *lima chicona*, grown principally in the states of Jalisco and Michoacan. A ton of *lima chicona* yields about 5 pounds of oil. Only small plantings of the tree have been made, however, and no immediate increase is anticipated.

Iodine Substitutes Appear in Germany

With the extreme scarcity of iodine in wartime Germany, numerous substitutes for this antiseptic have appeared on the market, according to an unofficial report to the Government. Some are compounds of bromine, which is plentiful in the Reich, but none contains even small amounts of iodine.

In spite of claims to the contrary, the germicidal value of these substances has not been convincingly shown. Actual tests have proved at least two of the substitutes are greatly inferior to iodine in potency. This was particularly true in the treatment of fungus infections of the skin, which are now greatly on the increase in Germany.

Power Alcohol Made from Cereals

The Argentine Congress is now considering a bill providing for the construction, at an estimated cost of 24,000,000 pesos, of alcohol-distilling plants to make power alcohol from corn, wheat, barley, other cereals, and potatoes.

The banks of the Parana River have been selected as the probable location of the proposed plants, presumably because Santa Fe is the center of the cereal zone. However, in view of recent discoveries and developments in other countries in the production of power alcohol from wood waste, sawdust, and wood pulp refuse, consideration may be given to the establishment of a distilling plant in the vicinity of Argentina's chief saw-milling industry.

Because of the increased demand for hydrochloric and sulfuric acids by textile and other factories in India, the Delhi Cloth and General Mills Company, Ltd., will erect a plant for the manufacture of these acids. The company also plans to produce the necessary raw materials, according to information received by the Commerce Department.

POTOMAC POSTSCRIPTS

WPB Activities

Acetic Anhydride. Because demand for acetic anhydride exceeds current production, it has been placed under a system of allocations, the Director General for Operations has announced. General Preference Order M-243, effective October 30, prohibits delivery or use of the chemical except as directed by WPB. The standard chemical allocations forms, PD-600 and PD-601, will be used by persons seeking authorization to make and accept deliveries.

Arsenic. Control over the use of arsenic (arsenious acid) has been tightened by the War Production Board in a revision of General Preference Order M-152 which prohibits the use of arsenic except as authorized by the Director General for Operations and requires all those holding 650 pounds or more to report their inventories to WPB. The original order made deliveries of arsenic subject to WPB approval but did not control end use. The revised order, in addition to controlling end use on future allocations, will control the use of existing inventories. Deliveries and use of 650 pounds or less in any calendar quarter for the manufacture of medicinal chemicals or preparations, or in research, testing, analytical, or educational laboratories are exempted from the restrictions of the order.

Chemical Cotton Pulp. Military exemption from the restrictions on deliveries of chemical cotton pulp has been eliminated by amendment of Conservation Order M-157. The Army and Navy must now apply for specific authorization to accept deliveries of cotton chemical pulp in order that their requirements will be made known to the administrators of the order. The order also was revised so that application for authorization may be made on Forms PD-600 and PD-601, standard chemical forms now being used. Forms for the December allocation had to be filed on or before November 5. Under the order, issued July 1, 1942, no producer may deliver and no buyer may accept any chemical cotton pulp without specific authorization by the Director General for Operations. The amended order still provides exception on deliveries by a producer of 2,000 pounds or less of chemical cotton pulp in any one month in lots of not more than 500 pounds to any one consumer in any month.

Ethyl Alcohol. Amendment 1 to General Preference Order M-30 states that holders of A-1-j ratings no longer are excepted from the restrictions on the use and delivery of ethyl alcohol. When the order originally was drawn, the A-1-j rating was intended to make delivery possible under exceptional circumstances only, but the change in priority rating levels served to liberalise deliveries beyond the extent contemplated. The provision allowing for delivery of ethyl alcohol on A-1-j ratings has been stricken from the order by the new amendment, issued by the Director General for Operations, since the rating of A-1-j is no longer high enough to obtain substantial deliveries, and this amendment simply brings the order into accord with current practice.

Fats and Oils. Corn oil, cottonseed oil, peanut oil, and sunflower seed oil have been added to the list of fats, oils, and oil-bearing materials which the Commodity Credit Corporation will consider for purchase under provisions of WPB General Imports Order M-63. This announcement, made jointly by the Board of Economic Warfare, the Commodity Credit Corporation, and the War Production Board, supplements the list announced September 18, 1942. The revised list includes babassu oil, babassu kernels, cashew nut shell oil, castor oil, castor seed, coconut oil, copra, corn oil, cottonseed oil, muru muru oil, neat's-foot oil, ouricury oil, oiticica oil, palm kernels, palm kernel oil, palm oil, peanut oil, rapeseed oil, sunflower seed oil, and tucum oil.

Tinplate. Use of tinplate in packing pyrethrum and rotenone base insecticides is prohibited by Amendment 4 to the Tin Conservation Order M-81. Packers of these products, which are the more expensive type of insecticide, can substitute blackplate or glass for the previously used tinplate containers. A provision for disposition of used cans to detinning plants is deleted from the order to bring it into conformity with M-72-a, which covers disposition of used tin cans.

Toiletries and Cosmetics. Because cosmetic output is controllable through allocation orders covering chemicals used, the Director General for Operations has revoked Order L-171, which set up a percentage production control over toiletries and cosmetics. Since the revocation removes all restriction on the manufacture of cosmetics, the effect will not be felt by the consuming public because limitations on materials entering into cosmetic manufacture will result in approximately the same output as at present. At the same time certain specific difficulties and inequalities will be removed and the industry will have more leeway in the use of available materials. It was emphasised by the Chemicals Branch, however, that fairly rigid restrictions could be expected on cosmetics packaging and luxury toiletries that use critical materials, particularly cosmetics containing alcohol, glycerol, imported oils, waxes, and higher grades of talc.

Price Regulations

Containers. In order to encourage the substitution of cheaper containers to replace steel and other critical materials no longer available for packaging numerous chemicals, the Office of Price Administration has informed the chemical industry that upward adjustment of ceiling prices, to permit producers to pass on to purchasers increases in container costs, will not be authorized except in special and unusual cases.

OPA will adjust the maximum prices of individual chemical manufacturers suffering substantial hardship owing to increases in packaging costs if the concern conclusively shows that it is unable to effect economies in container costs by use of cheaper materials. The WPB has prohibited by Limitation Order No. L-197 the use of steel drums in the packaging of approximately 90 important chemicals, but many manufacturers will be able to pack certain of their products in cheaper containers made of fiber or paper, thus reducing their container costs under levels of March 1942, the base pricing period of the General Maximum Price Regulation.

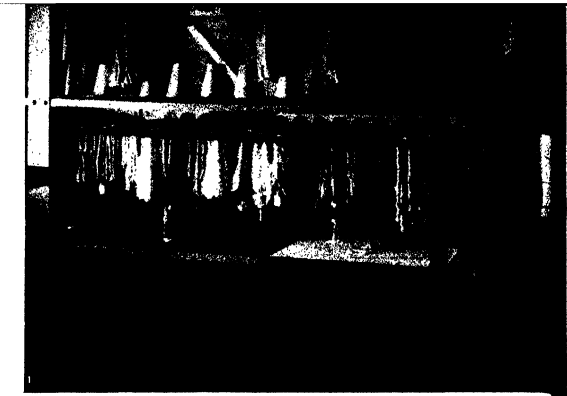
Fertilizers. Elimination of the uneven price structure prevailing for the Florida and Tennessee phosphate rock industry, as well as provision for more adequate production of the higher grades of this important fertilizer material, are provided in Maximum Price Regulation 240, effective October 19, 1942, issued by the Office of Price Administration. The measure, which applies only to phosphate rock produced in Florida and Tennessee establishes specific dollars and cents maximum prices about 20 cents per ton under current levels for the lower grades and at approximately the same level as those now prevailing for the higher grades.

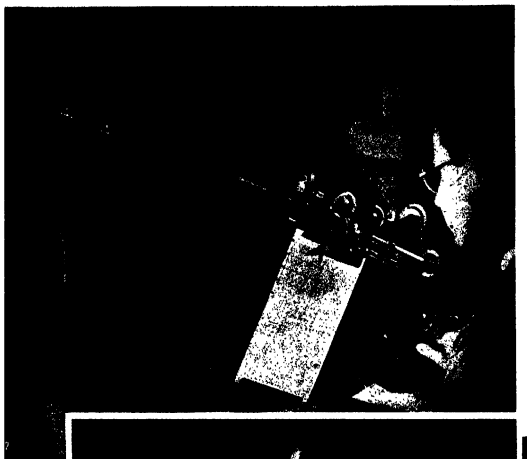
The new measure establishes maximum prices for various grades in a more consistent relationship than was possible under the General Maximum Price Regulation, thus removing the main factor hindering greater output of the higher grades.

Manganese Ores. A maximum price regulation for manganese ores, designed to stabilise the major cost element for manganese alloys, has been announced by OPA in Maximum Price Regulation 248, effective November 9. The new regulation provides maximum prices for all do-

CONTINUED ON PAGE 1379

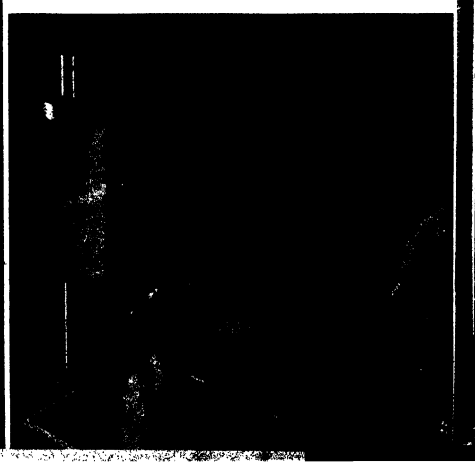
THE CHEMICAL NEWS PARADE



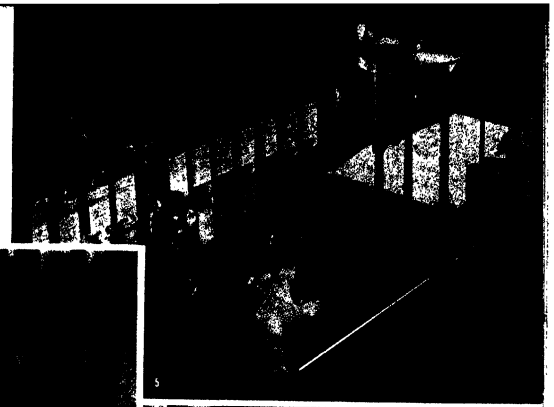


The modern textile laboratory of Röhm & Haas Co., Philadelphia, Penna., has been especially designed to carry on three major activities, namely, research, evaluation of existing products compared to new developments, and sales service. For these purposes specialized equipment designed to make this laboratory unique in its scope has been installed. A specialized piece of apparatus has been set up for testing and checking every plant operation. Machines have been designed for use in the laboratory which duplicate as closely as possible actual textile mill equipment in use. Through a precise control of time, tension, temperature, and drying rate, mill results can be obtained under laboratory conditions. One of the outstanding features of this tri-purpose laboratory is the conditioning room where every fabric or yarn to be tested is first conditioned for at least 24 hours at 70° F. and 65 per cent relative humidity. This measure is of the utmost importance as emphasized and exemplified in the case of tensile strength determinations on certain rayon fabrics, where tensile strength may vary as much as 40 per cent from day to day if such conditioning is not employed. Other pieces of equipment include a Scott tester to determine the efficacy of various textile finishes, a compressometer to measure crush resistance of velvet, and a Brookfield viscometer to test viscosity of textile finish.





(1) Fabrics and yarns to be tested are placed in conditioning room in order to secure necessary uniformity in moisture content to allow for accurate testing comparisons. (2) A Scott tester used to determine efficacy of textile finishes is shown here in action. (3) The stiffness tester is used for testing the stiffness of fabrics after the finishing operation. (4) The latest precision instrument set up by the AATCC to evaluate the hand or drape of fabrics is the drapemeter, outstanding in its simplicity and accuracy. (5) A Stormer viscometer checks on the textile sizings. (6) Since the wash is frequently the test of a good finish, the laboratories are equipped to evaluate finishes from the standpoint of commercial or home laundering. New detergents are evaluated in the Launderometer, right, then used in practical applications in rotary and dasher type washers.

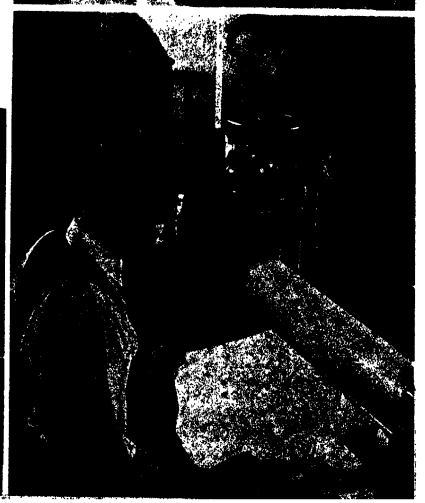






(7) As the conversion of starches with enzymes becomes of increasing importance, the Brabender viscometer is now used to determine with accuracy their enzymatic products, the diastases. This machine, pictured here, automatically determines and records the viscosity of the starch-enzyme mix as it is being subjected to temperature changes. (8) Basic research as it is carried on here is essential in the rapidly changing textile industry. (9) Padding and calendering, shown here, are two of the most difficult plant operations to reproduce in the laboratory. In order to ensure similar results in laboratory tests and plant results special pads and calenders have been developed.





NEUTRAL ALKYL PHOSPHATES

A Group of Organic Phosphorus Compounds That Offer Interesting Possibilities for Further Chemical Research

The organic phosphorus compounds are much less familiar in the industrial field than the inorganic phosphorus compounds. The last few years, however, have witnessed a marked increase in research on the former . . . on the alkyl esters of phosphoric acid in particular. The result has been that many interesting applications have already been suggested. Among them are the following:

Plasticizer in cellulose acetate, in organic acid derivatives of cellulose, and in synthetic resins of the phenol-aldehyde type.

Waterproofing textiles with cellulose acetate.

Accelerators for curing urea-formaldehyde resins.

Polymerizing agents for unsaturated hydrocarbons, drying oils, resins, etc.

Catalysts for the dehydration of glycols and olefinic alcohols to diolefins such as butadiene.

Absorbing fluids in refrigeration systems.

Leveling liquids in printing compositions for vat dyestuffs.

Corrosion inhibitors for gun barrels, bearings of meters and compressors, etc.

Properties of the Neutral Alkyl Phosphates . . . the subject of exhaustive study in the Victor Research Laboratories . . . are summarized in the table below. From the latter it is apparent that a combination of the proper alkyl and phosphate groups will produce compounds which possess, within indicated limits, properties to meet widely varying requirements. Some of these compounds are already in commercial production; others are available only in laboratory quantities. Additional information, as well as samples intended for further research, will gladly be sent upon request.

PROPERTIES OF NEUTRAL ALKYL PHOSPHATES

COMPOUND	Mol. Wt.	Sp. Gr. at x°/4° C.	B.P. °C.	Ref. Index ND	SOLUBILITY						
					Water	Alcohol	Acetone	Ether	Toluene	CCl_4	Naphtha
Orthophosphates, R_3PO_4											
Trimethyl phosphate	140	1.2052(25)	196	1.3950							
Triethyl phosphate	182	1.0637(25)	215	1.4039							
Tri n-propyl phosphate	224	1.0023(25)	252	1.4136							
Tri n-butyl phosphate	266	0.9727(25)	289	1.4203							
Tri i-butyl phosphate	266	0.9617(25)	264	1.4173							
Tri n-amyl phosphate	308	0.9497(25)	225(50mm)	1.4283							
Trimethallyl phosphate	263	0.988 (26)	135 (5mm)	1.445							
Trioctyl phosphate	434	0.921 (25)	210 (8mm)	1.442	I	S	S	S	S	S	S
Tricapryl phosphate	434	0.907 (25)	Decomp.	1.437	I	S	S	S	S	S	S
Pyrophosphates, $R_4P_2O_7$											
Tetramethyl pyrophosphate	234	1.357 (25)	Decomp.	1.410	SR	SR	S	SS	PS	I	I
Tetraethyl pyrophosphate	290	1.200 (25)	Decomp.	1.417	SR	SR	S	S	S	S	I
Tetrabutyl pyrophosphate	402	1.050 (25)	Decomp.	1.429	R	SR	S	S	S	S	S
Tetraoctyl pyrophosphate	626	0.977 (25)	Decomp.	1.443	R	SR	S	S	S	S	S
Tripolyphosphates, $R_5P_3O_{10}$											
Pentamethyl tripolyphosphate	328	1.430 (25)	Decomp.	1.420	SR	SR	S	I	I	I	I
Pentaethyl tripolyphosphate	398	1.245 (25)	Decomp.	1.424	SR	SR	S	I	SS	SS	I
Pentabutyl tripolyphosphate	538	1.095 (25)	Decomp.	1.435	I	SR	S	S	S	S	S
Tetrapolyphosphates, $R_6P_4O_{13}$											
Hexamethyl tetrapolyphosphate	422	1.474 (25)	Decomp.	1.423	SR	SR	S	I	SS	I	I
Hexaethyl tetrapolyphosphate	506	1.280 (25)	Decomp.	1.425	SR	SR	S	SS	S	S	I
Hexabutyl tetrapolyphosphate	674	1.119 (25)	Decomp.	1.435	R	SR	S	S	S	S	S
Hexaoctyl tetrapolyphosphate	1010	1.053 (25)	Decomp.	1.447	R	SR	S	S	S	S	S
Metaphosphates, RPO_3											
Methyl metaphosphate	94	1.620 (25)	Decomp.	1.439	SR	SR	S	I	I	I	I
Ethyl metaphosphate	108	1.420 (25)	Decomp.	1.438	SR	SR	S	I	SS	SS	I
Butyl metaphosphate (unstable)	136	1.227 (25)	Decomp.	1.445	SR	SR	S	S	S	S	I
Octyl metaphosphate (unstable)	192	1.151 (25)	Decomp.	1.450	SR	SR	S	S	S	S	S

Key to Symbols

S = Soluble
PS = Partially soluble
SS = sparingly soluble
I = Insoluble
R = Reacts
SR = Soluble and reacts



VICTOR *Chemical Works*

HEADQUARTERS FOR PHOSPHATES • FORMATES • OXALATES

141 W. JACKSON BLVD., CHICAGO, ILL., NEW YORK, N. Y., KANSAS CITY, MO., ST. LOUIS, MO., NASHVILLE, TENN., GREENSBORO, N. C. PLANTS: NASHVILLE, TENN., MT. PLEASANT, TENN., CHICAGO HEIGHTS, ILL.

Potomac Postscripts

CONTINUED FROM PAGE 1375

mestic sales of manganese ore of every kind, other than domestic battery or chemical ores, to any private buyer.

WPB Chemicals Branch Announces Allocations

OCTOBER allocations for other than direct military uses have been released by the Chemicals Branch, War Production Board. The Branch explained that allocations are made on the basis of specific end use where possible rather than on priority ratings. Although the program will change from month to month, the pattern will serve as a guide to areas in which chemicals are most likely to be available. The allocation requests in most instances do not indicate actual requirements for a given material, as industry has reduced its requests in fields where a known shortage exists.

The purpose of the release is to provide industry with a pattern for which October requests were granted in full, granted in part, or denied. Copies may be obtained direct from the WPB Office of War Information, Washington, D. C.

WPB Wants Report of Critical Chemicals

ACTING on evidence of slow-downs in the production of urgently needed munitions and other war materials on account of the scarcity of critical chemicals, H. M. Brundage, regional deputy director, WPB, in charge of priorities and materials, has asked all chemical manufacturers, suppliers, and users in the New York–Northern New Jersey area to report their holdings of idle, excess, or frozen stocks of critical chemicals to WPB regional headquarters. Aid will be given to war plants in obtaining the chemicals they need through regional representatives of WPB's Materials Redistribution Branch, and holders of idle, excess, or frozen stocks of critical chemicals will be aided in disposing of such stocks.

Full details are requested as to specifications, quantities, and location of some 150 chemicals listed in Schedule A to Priorities Regulation 13, which authorizes the sale of idle, excess, or frozen stocks to specified purchasers. Copies of Priorities Regulation 13 with the complete list of critical chemicals are obtainable at all WPB offices in this area.

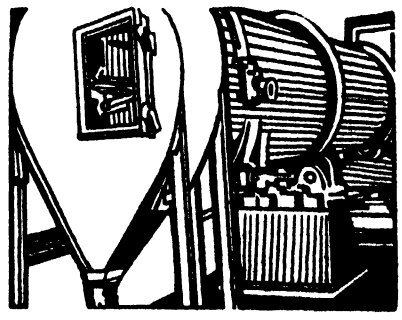
Mr. Brundage explained that although frozen stocks of many materials are moving rapidly into war production under the regulation, the problem in the case of chemicals is complicated, owing to the many specialized uses of chemicals. He pointed out that this program was intended to augment, not supersede, the machinery set up for the sale of frozen stocks under Priorities Regulation 13 and urged holders of frozen chemical stocks to make sales to purchasers specified by the regulation on their own initiative where possible.

No special forms are required and ordinary inventory sheets may be used for making the reports. Details as to the specifications, quantities, and location of the stocks should be forwarded by letter at once to the Materials Redistribution Branch, WPB, 122 East 42nd Street, New York, N. Y.

Food Price Division Set Up by OPA

PRICE Administrator Leon Henderson has announced creation of the Food Price Division in the Office of Price Administration and named as director A. C. Hoffman, who has been price executive of the Food and Food Products Branch now included in the new division. The new division is charged with the formulation, initiation, and administration of food price regulations. Its responsibilities also will include price research and analysis, the conduct of industry relations necessary to the formulation and administration of commodity price regulations assigned to the division, the processing of petitions for amendment, applications for adjustments, and protests, as well as the examination and evaluation of complaints and proposals relative to such food commodities.

The Food Price Division will have six branches: an economic analysis branch, an administrative services branch, and four commodity branches. Each commodity branch, in turn, will be divided into sections under which the various food commodities will be grouped. The four Commodity Branches and the commodities included in each are: Grocery Products Branch, including canned and frozen fruits and vegetables, fresh and dried fruits and vegetables, packaged specialties, imported foods, and beverage products; Meats, Fish, Fats and Oils Branch; Sugar, Tobacco and Dairy Products Branch; and Cereals, Feeds, and Agricultural Chemicals Branch.



Company Reports Simplified by OPA

SIMPLIFICATION in the reporting forms by which 25,000 companies voluntarily file financial reports quarterly with the Office of Price Administration has been announced. An outline of the changes in the program, which provides basic financial data for studies of price control, was presented to the Washington Chapter of the National Association of Cost Accountants by Robert W. King, head of the examination section of OPA's Financial Reporting Branch.

The most important change eliminates the requirement that a company report individual salaries for its officers and for employees receiving $20,000 a year or over. Instead there are substituted simple tabulation of these salaries, showing the range and number of persons in this class but omitting reports on salaries of particular individuals. Another change in the financial report forms, which will take effect on January 1, 1943, will be a provision in the profit and loss schedule for reporting separately charges which are set up to provide wartime reserves. The financial reporting forms give OPA continuing and basic information on price control problems in industries subject to OPA regulation. At present reports are being obtained from virtually all companies with assets of $250,000 or more engaged in manufacturing, mining, construction, and selected companies in wholesale trade and related fields.

Use of Inland Waterways Is Urged by Eastman

JOSEPH B. EASTMAN, Director of the Office of Defense Transportation, has urged shippers and all government agencies to utilize water carriers where possible. Declaring that everything possible must be done to prepare for the increased load which is coming upon the railroads, Mr. Eastman said in a circular to all government agencies that the railroads are carrying a freight traffic load which is running about 30 per cent ahead of 1941 as measured by ton miles. The government looks forward to a continuing increase in rail tonnage through 1943 as a result of the war production program and changes in the character of the movement of traffic.

Emphasising the difficulties of obtaining materials for expansion of railroad facilities to handle the heavier load, Mr. Eastman expressed the opinion that any allocation of material for new freight cars and locomotives will be based on the premise that other available means of transportation will be fully utilized. He said the Nation's inland barge lines and a number of inland water carriers operating along the Atlantic and Gulf intracoastal waterways are not being fully utilized at pres-

ent, and it is therefore necessary to urge not only shippers, but also governmental agencies, to instruct full utilization of water carriers where possible, thereby relieving the railroads and the truck lines of their burden.

New Advisory Committees Set Up by WPB

THREE new advisory committees have been announced by WPB. They are:

FERROMANGANESE INDUSTRY ADVISORY COMMITTEE, Andrew Leith, government presiding officer. J. H. Critchett, Electro Metallurgical Co.; A. M. Harper, Carnegie Illinois Steel Corp.; Charles R. Holton, Bethlehem Steel Co.; Carl McFarlin, Tennessee Products Corp.; Barbour Mitchell, H. J. Lavine & Co.; and Hugh Morrow, Sloss Sheffield Steel & Iron Co.

INEDIBLE ANIMAL FAT PRODUCERS INDUSTRY, E. W. Wilson, government presiding officer. James H. C. Allan, Western California Products Co.; W. C. Butler, Darling & Co.; A. D. Connell, Rath Packing Co.; G. D. Fitch, Wilson & Co.; D. M. Flick, Armour & Co.; A. M. Hayes, The Van Iderstine Co.; Kenneth McKinney, E. Kahn's Co.; Roger E. Morse, Jas. F. Morse & Co.; E. A. Moss, Swift & Co.; Chris Offenhauser, Consolidated Beef Co.; D. M. Pfeiffer, Akron Soap Co.; G. H. Schoen, Schoen Brothers, Inc.; Hugo Slotkin, Hygrade Food Products Corp.; and Rae H. Walters, The Harlan Rendering Co.

LIQUOR CARBON DIOXIDE DISTRIBUTORS ADVISORY COMMITTEE, Donald C. Knapp, government presiding officer. O. A. Brightwell, Jr., Parker-Browne Co.; George O. Cusack, Pure Carbonic, Inc.; Paul Drosto, National Cylinder Gas Co.; John E. Fowler, Fowler Carbonic Co.; Allyn Harris, Cardox Corp.; F. F. Lavedan, The Liquid Carbonic Corp.; R. B. Swope, Southern Oxygen Co., Inc.; J. B. Witt, Witt Ice & Gas Co.; and George W. Dolan, The Mathieson Alkali Works, Inc.

Movies on Fuel Conservation Available

FOUR motion pictures on subjects related to the Government's fuel oil rationing and fuel conservation programs are now available for release to schools, industries, defense organizations, consumer committees, and other groups, the Office of Price Administration has announced. These films, produced under the direction of the Department of the Interior's Bureau of Mines and the U. S. Bituminous Coal Consumers' Counsel for public distribution, include "Heat and Its Control", "The Story of Rock Wool Home Insulation", "The Story of Petroleum", and "Coal for Victory". All are available in 16-millimeter size, free of charge. Applications for the first three should be addressed to the Bureau of Mines Experiment Station, 4800 Forbes Street, Pittsburgh, Penna. Address requests for "Coal for Victory" to The U. S. Bituminous Coal Consumers' Counsel, Box 483, Washington, D. C.

Container Industry Urged to Develop Substitutes

BECAUSE of the increasing scarcity of critical materials for the manufacture of containers, the Containers Branch of the War Production Board has issued an urgent appeal to the industry to concentrate all its research facilities on the development of usable substitutes. Although many substitutes have been developed and are in use, the proportion of containers still made of critical materials is considerably in excess of what it should be in the light of present military demands. It was emphasized that responsibility for developing substitutes rests largely with the individual manufacturers, although the War Production Board is prepared to offer whatever assistance and guidance its facilities permit.

Substitutes should be designed to use a minimum of raw materials, even though the materials required are not at present in the critical category. Manufacturers and packers now using containers made of critical materials are asked not to rely on a continued supply of such containers.

Export of Fats and Oils Restricted by Government

FURTHER limitations on export shipments of certain fats and oils have been established by the Office of Exports, Board of Economic Warfare. General export licenses for a prescribed list of fats to all destinations except Newfoundland have been canceled. The commodities may be exported to Canada and that part of Labrador under Canadian control without regard to export licenses, since, as announced in OWI release 519, October 8, 1942, all license requirements for exports to Canada have been removed. Exporters desiring to ship fats and oils in the commodity group affected by this action to any other foreign destination must apply to the Office of Exports for individual export licenses to cover each proposed shipment.

Wineries May Convert to Alcohol Production

THE Chemicals Branch of the War Production Board is making studies looking toward possible utilization of California wineries for alcohol in the synthetic rubber program, Rubber Director William M. Jeffers has announced. Findings will be reported after distillation engineers have completed their research, and if favorable, it is possible a plant for making butadiene from alcohol will be set up on the Pacific Coast. Conversion of wineries to the production of 190 proof alcohol is described as "do-able but tricky".

Defense Plant Corporation Contracts for New Plants

JESSE JONES, Secretary of Commerce, has announced that the Defense Plant Corp., subsidiary of RFC, has authorized execution of a contract with the Dow Chemical Co., Midland, Mich., for machinery and equipment to be placed in a plant in Michigan. It is estimated that the cost will be in excess of $1,500,000. These facilities will be operated by Dow Chemical Company, and title will be retained by the Defense Plant Corp. Also authorized is the execution of a contract with U. S. Industrial Chemicals, Inc., New York, N. Y., to provide plant facilities in Maryland. It is estimated that this will cost in excess of $1,000,000. U. S. Industrial Chemicals, Inc., will operate these facilities and title will remain in Defense Plant Corp.

Storage of Coal

TO ASSIST commercial coal users in minimizing storage losses, the Division of Solid Fuels Utilization for War of the Bureau of Mines is organizing a group of experts to advise industries on best methods of stockpiling coal to avoid spontaneous heating and degradation of the stored product. Experts who will assist in this survey include W. D. Langtry, H. C. Carroll, W. W. Anderson, G. E. Keller, and R. W. Langtry, Commercial Testing and Engineering Co., 307 North Michigan Ave., Chicago, Ill.; and Douglas Henderson and C. T. Engvaldsen, Gould, Henderson and Brunhes, 215 Fourth Ave., New York, N. Y.

Persons encountering difficulties in the storage of coal in commercial quantities are asked to inform the Division of Solid Fuels Utilization for War, Bureau of Mines, Washington, D. C., or the nearest of the two consulting firms.

Chemical Manufacturers' Indexes

THE July index of value of chemical manufacturers' inventories was 162.8 compared with 162.7 in June, and 122.1 for July of 1941 taking the average month of 1939 for the index of 100, according to the survey of the Department of Commerce.

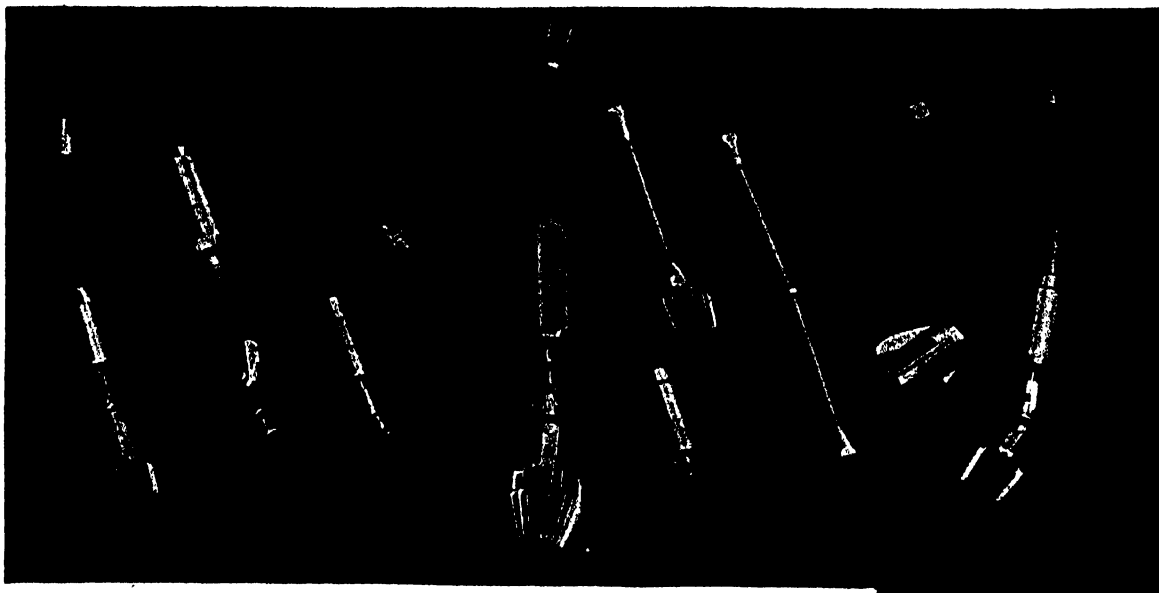
July index of value of chemical manufacturers' shipments was 172 compared with 168 for June, and 155 for last July, using the 1939 average month at 100.

Indexes of value of chemical manufacturers' inventories were 163.6 in August, and 163.3 in July, as compared with 125.2 in August 1941, using 1939 average month as 100, according to a report by the Bureau of Foreign and Domestic Commerce.

Chemical producers' shipments indexes were reported at 172 in August, and 169 in

CONTINUED ON PAGE 1382

Small tubes to clean?



Cleaners for small tubes, curved or straight. Although small, these cleaners are exceptionally powerful.

Speed the job with

ELLIOTT-LAGONDA EQUIPMENT



Two-speed geared motor, steam or air driven, for cleaning straight tubes in condensers and heat exchange apparatus. One of four types available.

KEEP TUBULAR APPARATUS UP TO HIGHEST EFFICIENCY. Remove deposits or fouling of any kind, in tubes straight or curved, from ½-in. diameter up, with Elliott-Lagonda tube cleaners.

On this page are some of the cleaners, cutters, drills and brushes supplied for small tubes, as in heaters, evaporators, heat exchangers, and other tubular apparatus for processing. Also available, cleaners for boiler tubes, still tubes, pipes up to 20 in.

If you have an out-of-the-ordinary tube cleaning problem, call upon the expert aid of Elliott-Lagonda specialists. For detailed data on equipment, write for Bulletin Y-10.

Various drills, brushes and cutter heads for removing different types of incrustation or fouling in small tubes.

ELLIOTT COMPANY

LAGONDA-LIBERTY *Tube Cleaner Dept.*

SPRINGFIELD, OHIO

Y-181 ***District Offices in Principal Cities***

Potomac Postscripts

CONTINUED FROM PAGE 1380

July, as compared with 155 in the previous August, using the same 1939 average month as 100.

Alien Property Custodian Seizes Additional Patents

LEO T. CROWLEY, alien property custodian, has announced the seizure of an additional 2,600 enemy patents, principally German-owned, among them many chemical patents. Including the announced seizures, more than 13,000 enemy-owned patents and patent applications have been taken over by the Office of Alien Property Custodian. Many of these patents already have been licensed to American companies, while research upon the feasibility of devices and processes covered by the patent applications is continuing.

APPOINTMENT of a staff of technical consultants on the Nation's rubber program has been announced by Rubber Director William M. Jeffers. They will serve under Bradley Dewey, deputy director, upon whom Mr. Jeffers has placed responsibility for the technical aspects of the program.

Those named are E. B. Babcock, Firestone Tire and Rubber Co.; L. D. Tompkins, U. S. Rubber Co.; E. R. Gilliland, M. I. T.; W. L. Campbell, Kroger Grocery Co.; Morehead Patterson, American Machine Foundry Co.; and Ray P. Dinsmore, Goodyear Tire & Rubber Co.

Treatment of Coal with Calcium Chloride

AN EXTENSIVE program of research on the treatment of coal with calcium chloride to reduce dust in handling and to avoid difficulty with the freezing of wet coal has been initiated at the Battelle Memorial Institute under the joint sponsorship of the Calcium Chloride Association and Bituminous Coal Research, Inc.

The new program of research will supplement and be correlated with a program that the Calcium Chloride Association has carried on for four years and is continuing at West Virginia University under the direction of W. A. Staab.

FERTILIZERS and chemicals in large quantities are now being sent to Finland by Germany, it is unofficially reported. Wood products comprise the major part of Finland's deliveries to Germany.

Staff Changes at Kansas State College

THE following men have recently left the Chemistry Department, Kansas State College, for other positions:

Capt. H. W. Marlow	Sanitary Corps, War Department
A. L. Olsen	Ordnance Plant, Pryor, Okla.
A. C. Andrews	Ordnance Plant, Pryor, Okla.
Donald Olson	Ordnance Plant, Pryor, Okla.
Erwin Olson	Ordnance Plant, Pryor, Okla.
Carl Latschar	Ordnance Plant, Pryor, Okla.
W. J. Peterson	North Carolina State College, Raleigh, N. C.
B. W. Beadle	American Meat Institute, Chicago, Ill.
A. E. Hostetter	Department of Shop Practice, Kansas State College
D. G. Kundiger	Röhm & Haas, Philadelphia, Penna.
E. P. Meibohm	National Defense Research Committee, Pittsburgh, Penna.
Raymond Olson	Texas Co., New York, N. Y.
Edward Stickley	Washburn Municipal College, Topeka, Kan.
C. R. Friede	E. I. du Pont de Nemours & Co., Inc., Woodbury, N. Y.
Donald Edgar	Hercules Powder Co., Christianburg, Penna.
L. Warren Brandt	Trojan Powder Co., Allentown, Penna.
Ernal P. Galbraith	Remington Arms, Salt Lake City, Utah
James K. Woods	Joseph E. Seagram & Sons, Louisville, Ky.

New additions to the staff include:

F. C. Lanning	University of Minnesota
Marvin Schreiber	University of Kansas
Don McCoy	McPherson College, McPherson, Kans.
Thomas Thomson	Seattle, Wash.
Mina Goehring Hall	University of Iowa
Elizabeth LaRue Conrad	University of Iowa
Charles Wagoner	McPherson College and Kansas State College
Joseph Weybrew	University of Wisconsin
Henry Lau	Kansas State College

Rubber Scrap Collection

THE rubber scrap pile of the Nation is considerably larger than it is generally thought to be if figures compiled by the Standard Oil Co. of Indiana may be taken as an index.

Immediately following the scrap rubber drive Standard announced that 41,798 tons had been collected in the 14 states in which it operates. About the same time an announcement was made from Washington that 454,155 tons had been collected in the country as a whole.

The latest figures available show that Standard and its subsidiaries together collected 61,271 tons of scrap rubber or about 13.5 per cent of the nationwide total as originally reported. The oil industry is shipping scrap rubber to central receiving depots and rubber reclaiming plants at the rate of about 4,000 tons a day.



Training of Chemical Engineering Aides

PRATT INSTITUTE, Brooklyn, N. Y., under the sponsorship of the Engineering, Science, and Management War Training Program, in cooperation with the United States Office of Education, is conducting a tuition-free course for the training of chemical engineering aides.

This course is under the educational charge of Tod G. Dixon, head of the Department of Chemical Engineering, and H. Russell Beatty, institutional representative of the ESMWT. It is planned to meet the needs of the chemical industry for young men and women to take positions as laboratory technicians. It will be a full-time day school course meeting 30 hours a week for 20 weeks beginning November 9.

Who Makes It?

THE following chemicals are wanted by The National Registry of Rare Chemicals, Armour Research Foundation, 35 West 33rd St., Chicago, Ill.:

Phospho-erythronic acid, oxalacetic acid, cuprous benzene sulfonate, glucose-6-phosphoric acid, phosphopyruvic acid, phosphoglyceric acid, dihydroxyacetone phosphate, creatine phosphate, acetoacetic acid, α-ketoglutarate.



AVAILABLE NOW-

in reasonable quantities, those who require an anhydrous alcohol, resin reactant or specialty solvent, would do well to consider and investigate the possibilities offered by

Furfuryl ALCOHOL

Most uses of Furfuryl Alcohol depend on the fact that it will resinify in the presence of dilute mineral acids or acidic salts. This is an advantage in the manufacture of heat setting binders, coating compositions, and molding materials. Our Bulletin 58 describes the application of such a resin to wood and other porous surfaces and a copy will gladly be sent upon request.

Other uses are as a dye solvent, acid resisting cement, and impregnating agent. If you have a problem embodying any of the possibilities of Furfuryl Alcohol, let us know and we shall be glad to supply all available information.

The Furans

FURFURAL
FURFURYL ALCOHOL
TETRAHYDROFURFURYL ALCOHOL
HYDROFURAMIDE

TYPICAL PROPERTIES

Specific gravity	1.131
Freezing point	−20°C
Boiling point	167–177°C. (95%)
Flash point (open cup)	75°C.
Refractive index (25/D)	1.4868

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TECHNICAL DIVISION 1-11

141 W. JACKSON BOULEVARD .. CHICAGO, ILLINOIS

FURFURAL - FURFURYL ALCOHOL - HYDROFURAMIDE
... TETRAHYDROFURFURYL ALCOHOL ...

The Chemist vs. the Chemical Engineer

Mr. S. D. Kirkpatrick, Editor,
Chemical and Metallurgical Engineering,
330 West 42nd St.,
New York, N. Y.

Dear Sid:

I HAVE just finished reading James H. McGraw, Jr.'s editorial which appeared in all McGraw-Hill publications [see *Chem. & Met. Eng.*, 49, 75 (1942)] for October. I am troubled, really troubled, and I think the situation is one that can be remedied only by frank appeal to you for your help. I think it is a matter of seriousness, equally to both branches of the chemical profession—Chemistry and Chemical Engineering. As I have said to you before, more or less publicly, you have given more honorary degrees in chemical engineering than have been conferred by all of the Chemical Engineering Departments in our colleges and universities. I believe that the situation is running away from us, both you and me, even if our ideas differ little except for your quite natural desire to aggrandize the term "chemical engineer".

This editorial by Mr. McGraw is well written. It will be read with interest by many. Its basic theme is right, but you know and I know, even if he does not, that it is both the chemist and the chemical engineer who have brought about the wonderful progress in our industries. To claim the development of everything, even to the sulfa drugs, vitamins, etc., etc., by implication or otherwise, as the work of "the chemical engineer" is going to hurt the chemical engineer more than it hurts the chemist. If this editorial is true, the AMERICAN CHEMICAL SOCIETY is made up entirely of chemical engineers. To have all chemical research and development ascribed to the chemical engineer will make it necessary to change the name "Chemical Profession" to "Chemical Engineering Profession", and instead of 21.9 per cent of our members being chemical engineers, 100 per cent become chemical engineers by courtesy. If "chemical engineer" is to become the standard cognomen for "chemist", the Institute of Chemical Engineers, to which both you and I belong and which we honor, will lose the specific place it now occupies. For some time, in order that such accomplishments as Mr. McGraw mentions might be accredited to the chemical profession and justly accredited, I have used the term "chemists *and* chemical engineers" when referring to the profession. I think you will admit that to be a good chemical engineer one must first be a good chemist.

What can we do about it? Are you ready to help in the aggrandizement of the "chemical profession", or do you prefer to continue to claim all the accomplishments of the chemist as the accomplishments only of "the chemical engineer"? I am quite sure you do not claim that a chemical engineer does not belong to the chemical profession.

Mr. McGraw assigns the future of the synthetic rubber industry to "the chemical engineer". Only yesterday I had a request from one of our largest rubber companies for six Ph.D. chemists. Please do not get the idea that I am in any way minimizing the accomplishments of chemical engineers as such. I am not. To me, the chemist and chemical engineer are one breed of cat. One may be a tomcat and the other a tabby, but we will cease to have a high breed of kittens unless they appreciate each other.

I am wondering how others feel about this matter. I am *thinking* of asking Doctor Howe to publish this as an open letter in CHEMICAL AND ENGINEERING NEWS so that I can find out. Have you any objection?

Cordially yours,
CHARLES L. PARSONS, *Secretary*

AMERICAN CHEMICAL SOCIETY
1155 SIXTEENTH ST., N. W.
WASHINGTON, D. C.
October 15, 1942

Dr. Charles L. Parsons, Secretary,
American Chemical Society,
1155—16th St., N.W.,
Washington, D. C.

Dear Charlie:

YOUR interesting letter of October 15 gets priority over the pile that is on my desk as a result of about three weeks' absence on work for WPB. Before I had left for Washington, however, I had read Mr. McGraw's statement several times and had seen nothing in it that seemed to me to be at all derogatory to the work of the chemist. Certainly, that was far from Mr. McGraw's purpose in this series of editorial advertisements running through all McGraw-Hill publications and reviewing the contributions to the war effort being made by the industries and professions served by these magazines. That this series should be concerned more with engineers than with chemists, physicists, bacteriologists, and other scientists is only natural because the advertisements parallel the fields of our papers.

A careful rereading of the current statement failed to reveal any claim that the chemical engineer was solely responsible for the war developments and other striking progress made by the chemical industries. That there were important contributions from others goes without saying. Had it been the purpose of the statement to pay tribute to the work of the chemist an even more striking story might have been told of the achievements of the research laboratories and the developments that have resulted from chemical control of practically all manufacturing operations. There is also a story, much less important to be sure, to be told about the contributions of physicists, mechanical, civil, and electrical engineers who have done a lot to advance the chemical process industries.

Frankly, I don't think that either you or I can afford to spend very much time these days arguing over the old chemist *vs.* chemical engineer controversy. That belongs back in the dark ages when *Industrial and Engineering Chemistry* ran the word "Engineering" in very small type and would never have thought of calling its NEWS EDITION "CHEMICAL AND ENGINEERING NEWS". Nor can I see anything very constructive to be gained by my admitting that the chemical profession may include chemical engineers as well as chemists.

Perhaps Mr. McGraw was wrong in assigning the future of the synthetic rubber industry to the chemical engineer. He had fairly good precedent, however, in the technical suggestions from the Baruch report, which in Paragraph 9 of Section 12 reads as follows:

> 9. The committee suggests the institution of a prompt survey to determine the number of *chemical engineers* and other technically trained men who will be required to operate the synthetic rubber plants now under construction: and if this survey indicates a serious shortage of such technical talent, the Manpower Commission be called upon for assistance in devising a policy for meeting this situation.

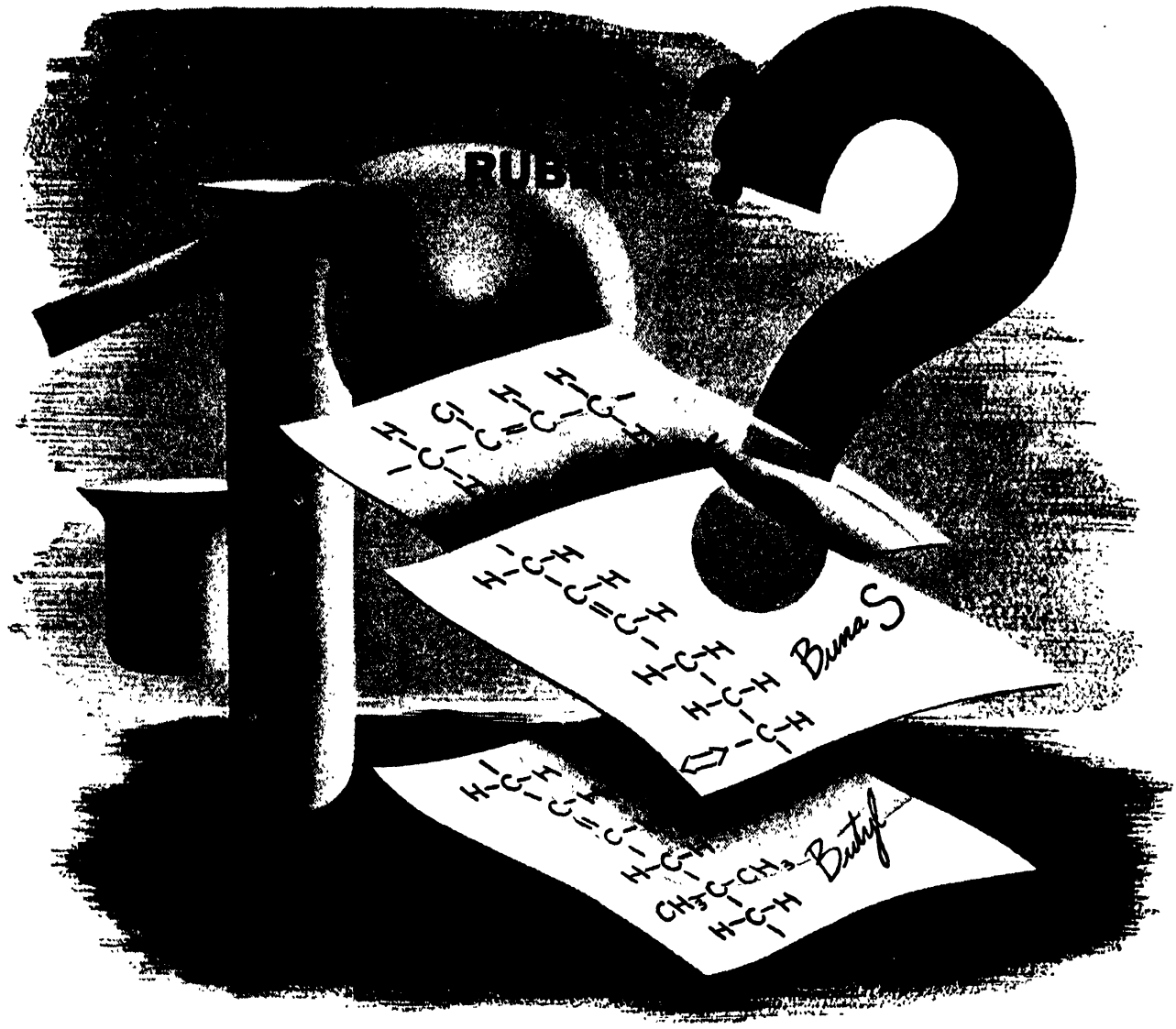
There is also an earlier reference in Section 6 on "The Synthetic Program", in which the following statement is made:

> It is fortunate that the program for the needed plants is generally in the hands of as competent *engineers* as there are in the country.

I got a great deal of merriment out of your Tom Cat and Tabby reference, and if you will let me publish a slightly less personalized version of your letter, I am sure it would bring forth some very interesting comments from *Chem. & Met.* readers. And, of course, there would be no objection on my part to any publication Doctor Howe wishes to make in CHEMICAL AND ENGINEERING NEWS.

With kindest personal regards,
Sincerely yours,
S. D. KIRKPATRICK, *Editor*

CHEMICAL AND METALLURGICAL ENGINEERING
330 WEST 42ND ST.
NEW YORK, N. Y.
October 20, 1942



MANY people will be surprised to hear that what we call synthetic rubber is not rubber at all but a new group of chemical compounds, basically different from the latex from trees, and similar only in certain properties, such as elasticity.

To the rubber chemist and manufacturer of rubber products, these chemical formulas are new raw materials which must be vulcanized, processed and fabricated into useful forms. But since they are basically different from rubber, processing them into such a complex product as a tire, for example, presents a completely new set of chemical problems. For many of the compounding materials used with latex cannot be used with the synthetics.

Here is a situation that calls for chemical ingenuity of the highest order. Developing the new compounds was only the beginning of the job. Finding the right processing materials to make them effective is as great, if not a greater problem. In this field Wishnick-Tumpeer, Inc. has been particularly successful. Special Witco Carbon Blacks, for instance, are helping to make synthetic tires tougher and more durable. Again, Stearite, a specially developed synthetic stearic acid, has made improvements in compounding possible. And No. 20 Softener, another product of the Witco research laboratory, has helped to solve a specific processing problem. Thus, one by one, difficulties are being solved by energetic, intelligently directed research. This close cooperation with the rubber industry is part of the service Wishnick-Tumpeer gives to the many industries using chemicals, oils, pigments, asphalts and allied products.

WISHNICK-TUMPEER, INC.
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New York, 295 Madison Avenue • Boston, 141 Milk Street • Chicago, Tribune Tower Cleveland, 616 St. Clair Avenue, N. E. Witco Affiliates: Witco Oil & Gas Company • The Pioneer Asphalt Company • Panhandle Carbon Company • Foreign Office, London, England



American Chemical Society[1]

105TH MEETING. Detroit, Mich., April 1943.

106TH MEETING. Minneapolis, Minn., September 6 to 10, 1943.

CHEMICAL ENGINEERING SYMPOSIUM. Palmer House, Chicago, Ill., December 28 and 29, 1942. "The Application of Kinetics to Design and Operation of Chemical Engineering Equipment". Ninth Annual Symposium.

NATIONAL CHEMICAL EXPOSITION AND NATIONAL INDUSTRIAL CHEMICAL CONFERENCE. Sherman Hotel, Chicago, Ill., November 24 to 29, 1942.

ORGANIC CHEMISTRY SYMPOSIUM. Boston, Mass., December 28 to 30, 1943. Tenth National Symposium.

Other Scientific Societies

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Netherland Plaza Hotel, Cincinnati, Ohio, November 16 to 18.

AMERICAN MINING CONGRESS, WESTERN DIVISION. Salt Lake City, Utah, November 16 and 17. Metal Mine War Conference.

AMERICAN PETROLEUM INSTITUTE. Palmer House, Chicago, Ill., November 9 to 13. Annual meeting.

AMERICAN SCIENCE TEACHERS ASSOCIATION. Hotel Pennsylvania, New York, N. Y., December 29 and 30.

EASTERN PHOTOELASTICITY CONFERENCE. Illinois Institute of Technology, Chicago, Ill., November 13 and 14.

ELECTROCHEMICAL SOCIETY. Hotel Roosevelt, Pittsburgh, Penna., April 7 to 10, 1943.

INDUSTRIAL HYGIENE FOUNDATION. Mellon Institute, Pittsburgh, Penna., November 10 and 11. Annual meeting.

SOCIETY OF CHEMICAL INDUSTRY, Montreal Section, Rubber and Plastics Division. McGill Faculty Club, Montreal, Que., November 13.

[1] The list of the SOCIETY's National Officers and Directors, Editors, members of Council, Divisional and Local Section Officers, Committees, and Chapters of Student Affiliates appears in CHEMICAL AND ENGINEERING NEWS three times a year—usually February 10, May 10, and October 10. The latest list is printed on page 1239 of the October 10 issue.

Local Sections

SECTION AND PLACE	NOV.	SPEAKER	SUBJECT
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Ames, Iowa	23	**F. F. Blicke**	Synthetic Local Anesthetics
Baton Rouge, La.	19	**W. L. Badger**	High-Temperature Heat Transfer
Central Texas, Austin	18	**W. L. Badger**	History of the Unit Operations
Chicago, Sherman Hotel	26	**V. K. Zworykin**	The Electron Microscope
Cleveland, Engineering Society, 2136 East 19th St.	18	**M. C. Banca**	The Electron Microscope
Colorado, Oxford Hotel, Denver	16	**F. F. Blicke**	Development of Synthetic Local Anesthetics
Columbus, Room 100, Chemistry Building, Ohio State University	17	**R. D. Fowler**	
Cornell, Baker Laboratory, Ithaca, N. Y.	18	**Ernst A. Hauser**	Anomalies in Surface Tensions of Solutions
Dallas–Fort Worth, Denton, Tex.	16	**W. L. Badger**	High-Temperature Heat Transfer
Delaware, Auditorium, Y. M. C. A., Wilmington	18	**J. H. Foulger**	Industrial Toxicology
East Tennessee, Dabney Hall, University of Tennessee, Knoxville	20	**Laurence L. Quill**	Nuclear Fission and the Transuranium Elements
Eastern New York, Rensselaer Polytechnic Institute, Troy	19	**Ernest A. Hauser**	Colloid Chemistry in Chemical Engineering
Erie, Allegheny College, Carnegie Hall, Meadville, Penna.	19	**M. C. Banca**	The Electron Microscope
Georgia, Banquet Room, Brittain Dining Hall, School of Technology, Atlanta	16	**Laurence L. Quill**	Nuclear Fission and the Transuranium Elements
Iowa, Chemistry Auditorium, State University of Iowa, Iowa City	24	**F. F. Blicke**	Development of Synthetic Local Anesthetics
Louisiana, Auditorium, Chemistry Building, Tulane University, New Orleans	20	**W. L. Badger**	History of the Unit Operations
Maryland, Remsen Hall, Johns Hopkins University, Baltimore	20	**R. W. Wood**	
Mid-Hudson, Sanders Laboratory, Vassar College, Poughkeepsie, N. Y.	20	**Ernst A. Hauser**	Colloid Chemistry in Chemical Engineering
Milwaukee, Science Building, Marquette University	25	**F. F. Blicke**	Development of Synthetic Local Anesthetics
Nashville, Furman Hall, Vanderbilt University	30	**I. M. Kolthoff**	
Nebraska, Avery Laboratory of Chemistry, University of Nebraska, Lincoln	19	**F. F. Blicke**	Development of Synthetic Local Anesthetics
North Carolina, Room 118, Withers Hall, North Carolina State College, Raleigh	17	**Laurence L. Quill**	The Uses and Properties of the Rare Earth Elements
Northeast Tennessee, Episcopal Church, Kingsport	19	**Laurence L. Quill**	The Uses and Properties of the Rare Earth Elements
Omaha, Chemical Lecture Room, Omaha University	20	**F. F. Blicke**	Development of Synthetic Local Anesthetics
Pennsylvania–New York Western Border, Carver House, Warren, Penna.	20	**M. C. Banca**	The Electron Microscope
Peoria, Ill.	19	**E. H. Volwiler**	Developments in Medicinals
Philadelphia, Lecture Hall, Franklin Institute	19	**C. A. Browne**	Philadelphia and the Sugar Industry
Pittsburgh, Mellon Institute	19	**L. I. Smith**	Vitamin E and Related Compounds
Rochester, Cutler Union, Prince Street Campus, University of Rochester	16	**Ernst A. Hauser**	The Chemist's Part in Our Elastic Emergency
Sioux Valley, Sioux City, Iowa	21	**F. F. Blicke**	Synthetic Local Anesthetics
South Jersey, Woodbury Country Club, Woodbury	17	**F. O. Rice**	Free Radicals and the Pyrolysis of Hydrocarbons
Southeast Tennessee, Chattanooga	21	**Laurence L. Quill**	The Uses and Properties of the Rare Earths
Syracuse, Auditorium, Bowne Hall, Syracuse University	17	**Ernst A. Hauser**	The Chemist's Part in Our Elastic Emergency
Texas A. & M., College Station	17	**W. L. Badger**	High-Temperature Heat Transfer
Virginia Blue Ridge, Randolph-Macon Woman's College, Lynchburg	18	**Laurence L. Quill**	The Uses and Properties of the Rare Earth Elements
Western Connecticut, Piccadilly Restaurant, Stamford	30	**Lyman C. Craig**	Some Newer Structures in the Field of Alkaloids
Western New York, Norton Hall, University of Buffalo	17	**Robert Meyers**	Synthetic Resin Exchangers
Wisconsin, Auditorium, Chemistry Building, University of Wisconsin, Madison	18	**David Klein**	Bile

Egloff Honored

PRESIDENT GUSTAV EGLOFF of the American Institute of Chemists was characterized by Marston T. Bogert as a man "who makes hay out of the grass that grows under the other fellow's feet" at a dinner given by the institute in his honor at The Chemists' Club, New York, on October 23. Speakers at the dinner in addition to Dr. Egloff were: Robert J. Moore, Bakelite Corp.; George A. Burrell, Atlantic States Gas Co.; Robert E. Wilson, Pan-American Petroleum and Transport Co.; Marston T. Bogert, Columbia University; and H. J. Halley, Universal Oil Products Co. E. H. Northey, of the Calco Chemical Division of American Cyanamid Co. and chairman of the institute's New York Chapter, presided.

Dr. Egloff, director of research of the Universal Oil Products Co., Chicago, looked into the future of petroleum products in an address entitled "Wartime Chemicals from Natural Gas". Synthetic tires having lives equal to that of the vehicle on which they are used, synthetic rubber at a price which will ensure its permanent place in our economy, and many other vital products of natural hydrocarbons were foreseen by Dr. Egloff as probable immediate outcomes of present research and development.

Consulting Chemists and Chemical Engineers Hold Meeting

THE annual meeting of the Association of Consulting Chemists and Chemical Engineers, Inc., was held at The Chemists' Club, New York, N. Y., on October 27, 1942, in the form of a symposium entitled "The Consulting Chemist and Chemical Engineer in War and Peace". Wm. J. Schepp of the Schepp Labs., Inc., East Paterson, N. J., was the speaker of the evening, the title of his address being "The Consultant and Industry or The Practical Catalyst".

The election of new officers and directors was announced as follows: president, H. P. Trevithick; vice president, Albert Parsons Sachs; secretary, Wm. C. Bowden; treasurer, Henry M. Shields; directors, Philip P. Gray, I. F. Laucks, C. Weaver, Erwin Di Cyan, Prentiss T. Bee, C. A. Crowley, Bernard L. Oser, Henry M. Shuldener, and Arthur W. Thomas.

Gasoline, Past, Present, and Future

THE Seventeenth Edgar Marburg Lecture, given by Graham Edgar before the 45th annual meeting of the American Society for Testing Materials, and entitled "Gasoline, Past, Present, and Future", has been published as a 14-page booklet. It is available at 35 cents a copy from A. S. T. M. Headquarters, 260 South Broad St., Philadelphia, Penna.

Rust Prevention Committee

AT THE request of the Quartermaster Corps, a technical committee has been appointed to formulate a program and undertake to investigate methods for the control of external corrosion of metal containers, with special reference to electrolytic tinplate. The personnel is as follows: E. J. Cameron, chairman, H. A. Gardner, H. W. Gillett, C. O. Ball, R. H. Lueck, C. E. Maier, G. C. Scott; alternates: Bruce Gonser, W. H. Harrison, Lee Hart, and H. R. Smith.

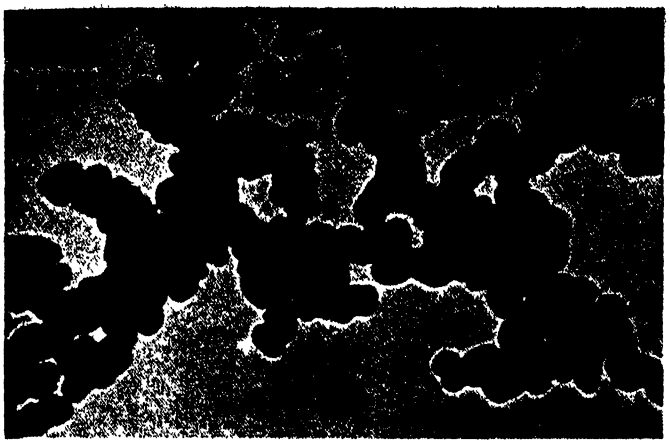
Training for Safety Auditors

THE third class of safety auditors has begun work in the headquarters of the Safety & Security Branch, Office of the Chief of Ordnance, 333 North Michigan Ave., Chicago, Ill., and includes eight women, the first to take explosives safety training in a class which also includes men. The intensive 6-week course prepares students to become explosives safety auditors in munitions and explosives plants.

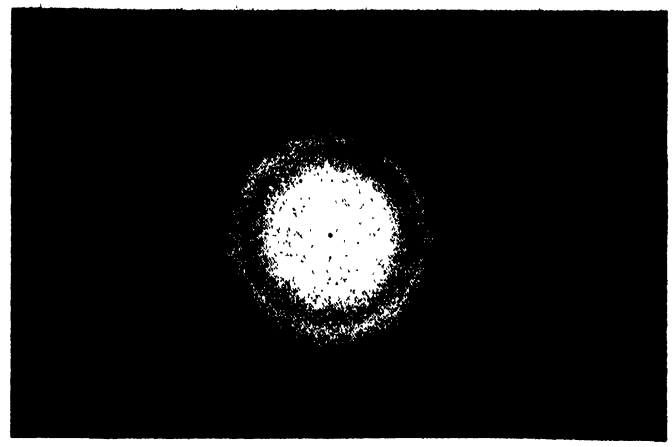
Government to Finance Synthetic Scrap

TO AUGMENT inadequate supplies of war-vital steel scrap the government is planning to finance production of synthetic scrap iron by a direct reduction process. At a recent meeting of the Association of Iron and Steel Engineers, E. S. Harman, production manager of the Loftus Engineering Co., said that his company at the request of the War Production Board was preparing preliminary plans to construct the country's first commercial plant to use a process which he developed. This plant, it is estimated, would produce six times as much scrap as the sponge iron produced by other means and would be the only one with commercial possibilities as to capacity.

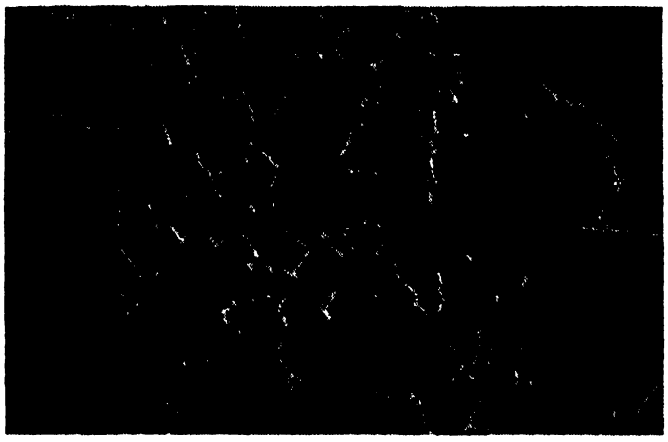




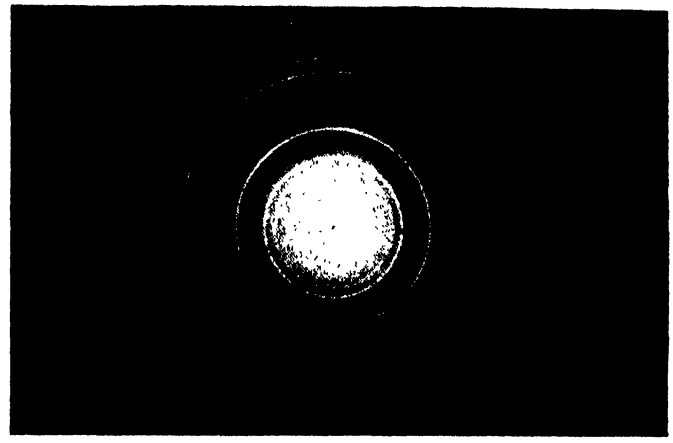
Lamp black, carbon, at 60,000 x magnification.



Transmission electron diffraction pattern of carbon.



Cubic crystals of magnesium oxide at 55,000 x magnification.



Transmission electron diffraction pattern of magnesium oxide.

HOW TO GET TWO SOLUTIONS TO ONE MYSTERY

A case-study of the practical application of the RCA Electron Microscope

The RCA Electron Microscope now offers research experts two different approaches to the mystery of sub-microscopic particles. First, it enables them to study physical appearances at magnifications never before obtainable. Secondly, it enables them to penetrate deeper, to peer into the atomic lattice itself and study the actual composition and structure.

By its inherent high resolving power making possible useful magnifications up to 100,000 diameters, the RCA Electron Microscope reveals details that furnish the scientist with invaluable clues. And by the use of an "adapter", it can quickly be converted into a diffraction camera—yielding the secrets of size, structure, position and relationship of the atoms in the substance...Thus the door is opened to significant new analyses and research about the materials America needs today and will need in the future.

The RCA Electron Microscope is a compact unit, drawing its power from an ordinary 110-volt, 60-cycle, single-phase A.C. outlet. Its operation can be mastered by a competent laboratory technician

Complete data and literature are available on request.

BUY U.S. WAR

SEE THE RCA ELECTRON MICROSCOPE AT THE NATIONAL CHEMICAL EXPOSITION

RCA ELECTRON MICROSCOPE

RCA MANUFACTURING COMPANY, INC.

CAMDEN, NEW JERSEY



Section of steel apron conveyor

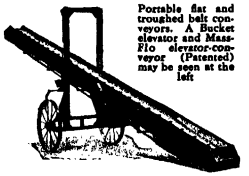


Section of scraper conveyor



Three-roll belt idler (Patented)



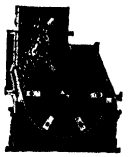


Portable flat and troughed belt conveyors. A Bucket elevator and Mass-Flo elevator-conveyor (Patented) may be seen at the left



Double roll coke sizer (Patented) — a section of spiral flight is shown below





Screenings grinders for chips, sewage and other delibering work

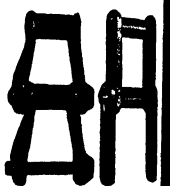


Finished roller chains in single, double or multiple strands—below is the Reliance Drag





Detachable, Hercules, Reliance and Steel Knuckle chains



JEFFREY MATERIAL HANDLING AND REDUCTION EQUIPMENT:

BIN VALVES — Bottom and side discharge types

CHAINS and SPROCKETS — A complete line for conveying, elevating and driving service

CONVEYORS — Apron, belt, bucket, portable, scraper, spiral, trolley and V-bucket

CRUSHERS — Pulverizers and Shredders — single roll, double roll, Flextooth, Rotary ring and swing hammer types

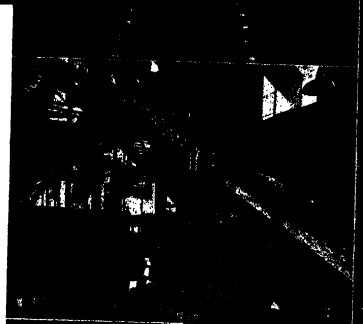
ELEVATORS — bucket and Mass-flo types

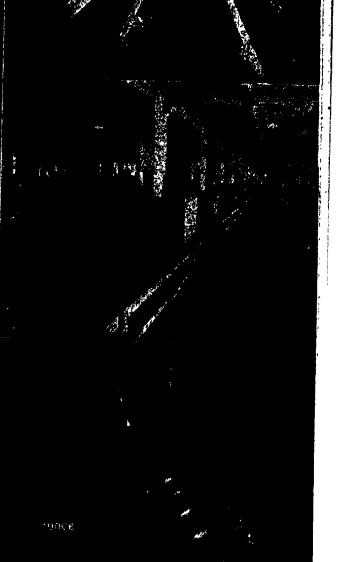
FEEDERS — Apron, belt and grizzly types

POWER TRANSMISSION MACHINERY — gears, pillow blocks, take-ups, couplings, clutches, pulleys and shafting

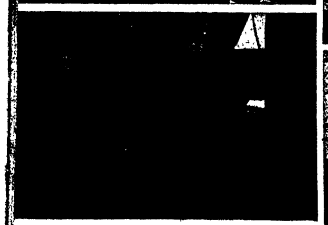
PORTABLES — Belt, bucket and scraper types for loading and unloading operations — also Stackers for bags, boxes, etc.

CAR PULLERS — Skip Hoists — Weigh Larries — Mono-veyor systems

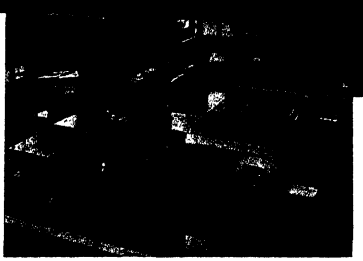
















JEFFREY-TRAYLOR ELECTRIC VIBRATING EQUIPMENT (Patented)

COOLERS — Custom built units for processing under closely-controlled conditions

CONVEYORS — for handling hot, gassed materials without dust lost or degradation — tubular or pan types

DRYERS — apply principle of balanced vibration to processing operations — solid or louvered type conveying surface

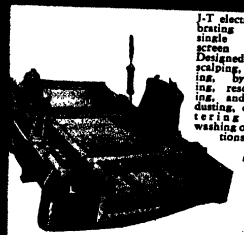
FEEDERS — special sizes and designs of decks to handle all kinds of feeding problems in chemical plants

PACKERS — high frequency vibration applied to packing operations — increases container capacity — decreases packing time

SCREENS — single or double deck sizes ranging from 2 to 40 sq. ft. of screening surface

WAYTROLS — used for continuous feeding where gravimetric accuracy is required. Completely automatic

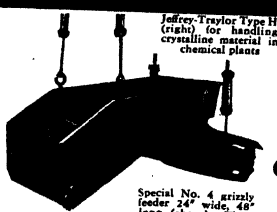
BIN CHECK VALVES — used in connection with vibrating feeders — prevents arching and flooding of finely divided material



J-T electric vibrating FB-2 single deck screen (left). Designed for scalping, sizing, by-passing, rescreening, and dedusting, dewatering and washing operations



J-T 36" x 72" No. 5 heavy duty electric vibrating feeder



Jeffrey-Traylor Type H direct-type Dryer (right) for handling crystalline material in chemical plants



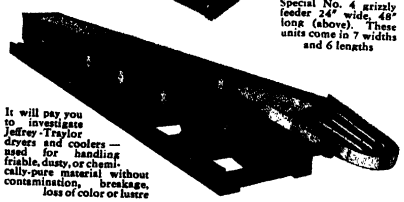
J-B small reagent feeder (right) with vibrating hopper. Special sizes and designs of decks to suit conditions



Waytrol (above) used for batching, porportioning, weighing and feeding.



No. 3 special low head barrel packer (above) — set level with floor for easy handling of barrel or container



It will pay you to investigate Jeffrey-Traylor dryers and coolers — used for handling friable, dusty, or chemically-pure material without contamination, breakage, loss of color or lustre

Special No. 4 grizzly feeder 24" wide, 48" long (above). These units come in 7 widths and 6 lengths



J-T water sprayed cooler (above) for plastics. Has built-in drip pan and equipped with nose screen, for scalping out foreign matter

Rotary bin check valve (above) — prevents flooding and arching of material

JM

THE JEFFREY MANUFACTURING COMPANY

885-99 North Fourth Street, Columbus, Ohio

Sales Offices: Indianapolis, Birmingham, Boston, Chicago, Cleveland, Cincinnati, Detroit, Harlan, Houston, Milwaukee, New York, Philadelphia, Scranton, Salt Lake City, St. Louis

Acid Treatment Shows Increase in Turpentine Yield

For some time the Forest Service of the U. S. Department of Agriculture has been experimenting with acid solutions applied directly to fresh streaks on slash pine trees immediately following chipping. The research work has been carried on at the Olustee Experimental Forest, 13 miles east of Lake City, Fla., where foresters found a 40 per cent solution of sulfuric acid most effective in increasing gum flow yields.

At the beginning of this year's naval stores season, a number of private operators in Florida and Georgia cooperated in tests with the sulfuric acid solution on slash pine. Their records show an average increase of 25 per cent gum flow. These commercial tests, conducted for the purpose of increasing turpentine and rosin yield for war needs, were sponsored by the Forest Service with the cooperation of the Agricultural Adjustment Agency.

Foresters tried out more than 100 possible stimulants but sulfuric acid has given the best results. They are still attempting to improve on the sulfuric acid solution by conducting tests with some 40 substances that might possibly provide greater stimulation.

Experiments also are under way looking to methods that will increase gum yield from longleaf pine as well as slash.

New Patented Rosin Process Available

Clean and brilliant rosin, unusually free from impurities, is possible through a new producing process for which a patent (U. S. Patent 2,295,235) has been issued to Jesse O. Reed, U. S. Department of Agriculture. The patent has been assigned to the Secretary of Agriculture.

An essential part of the process is that the crude oleoresin is made "dry" or water-free by adding turpentine near the end of the normal distillation period so that the whole mass can be readily filtered through media of various types, including paper.

By driving out the water in the rosin, the inventor has found that impurities can be easily filtered out, with the result that the final rosin is clean and brilliant. The turpentine added to the rosin to drive out the water need not be distilled off to produce a solid rosin, but may be retained to form a liquid product that can be handled in the same manner as other sticky materials.

Persons in the naval stores industry who wish to use this new process should apply to the Secretary of Agriculture for a license. Further information may be obtained by writing to the Naval Stores Division of the Bureau of Agricultural Chemistry and Engineering, United States Department of Agriculture, Washington, D. C.

Awards for War Production

The International Nickel Co. plant at Huntington, West Va., has received its third war production award, giving it the right to fly the Army-Navy "E" with two stars.

The Army-Navy Production Award has been presented to the Victory Plastics Co., which makes a scabbard of Tenite, for high achievement in the production of war materials.

On September 25 Rear Admiral E. J. O'Brien, chief of the British Admiralty Technical Mission, paid tribute to the part which employees of The Foxboro Co. are playing in war production.

John T. Nevitt, Jr., has received the first-prize war bond in a production-slogan contest for employees of Leeds & Northrup. His slogan was "V Depends on Me".

Tube-Turns, Inc., was the first company in the state of Kentucky to receive the Army-Navy "E", at a ceremony which took place on September 18.

The September issue of *Kodak* is devoted to an account of the presentation of the Army-Navy Production Award to the Eastman Kodak Co.

Receipt of the Army-Navy "E" by the Rustless Iron and Steel Corp. of Baltimore, Md., has focused attention on the company's special process which enables use of submetallurgical grade chromite in the making of stainless steel, resulting in savings of chromium and nickel nearly 50 per cent greater than those obtained with other processes.

Presentation of the Army-Navy "E" flag to the American Machine & Metals, Inc., East Moline, Ill., was made on October 1. The company doubled its original production quota of 20-mm. antiaircraft gun mounts and exceeded quotas on other war items.

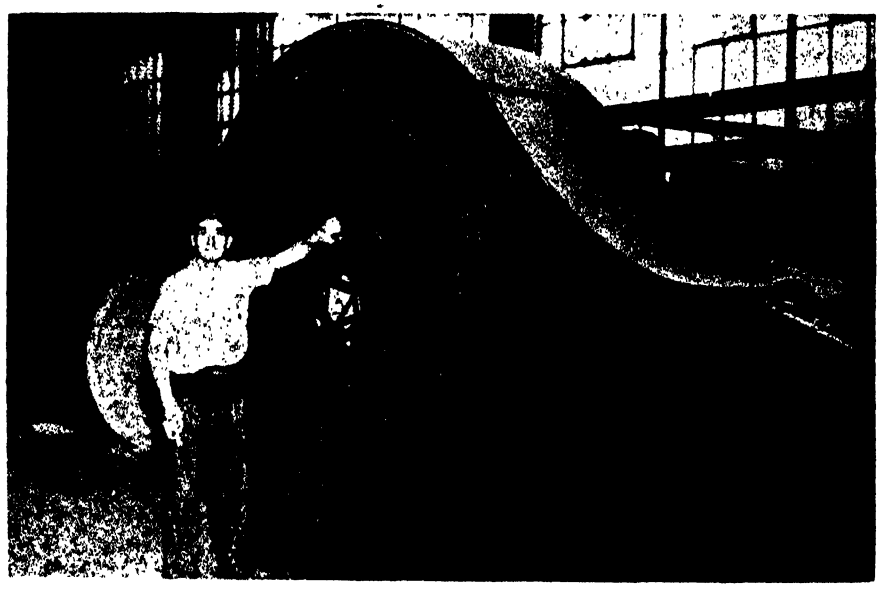
The seventh and eighth awards of an Army-Navy "E" to plants owned or operated by the du Pont company for outstanding accomplishment in production of war materials were made jointly on November 6 to the local plants of the Electrochemicals Department and the Chemical Warfare Service.

The Chemist in Three Wars

Otto Eisenschiml, Scientific Oil Compounding Co., Chicago, Ill., has added to his lengthy list of interesting contributions to literature "The Chemist in Three Wars", an historical paper read before the American Institute of Chemists in Chicago on September 18. It tells what chemists did in the Civil War and World War I, and what they are doing to help win the present war.

Deferment

Whenever appeals are filed by mail or Form 42-A is sent to a local board, they should always be sent by registered mail with a return receipt form.



Steel and Wire Reinforce Conveyor Belt

Although apparently no different from any other conveyor belt, this section of a new belt for the Olive Iron Mining Co. in Duluth, Minn., actually represents an epochal advance for belts of this type in that it has a steel-wire carcass instead of the conventional cord or fabric carcasses. It was developed by the Goodyear Tire & Rubber Co. of Akron, Ohio, to speed the flow of iron ore to the nation's war-humming mills, in addition to other tasks where extra-strong belts are required for the war effort.



IMPORTANT CHEMICAL REACTIONS IN WAR-TIME

POLYMERIZATION
ISOMERIZATION
ALKYLATION
HYDROGENATION
HYDROGENATION
DEHYDRATION
DEHYDRATION
NITRATION
DESULPHURIZATION

The manufacture of many synthetic products involves one or more of these reactions—the reactions, the processes and the finished products require chemical compounds. . . . . The production of these chemical compounds for synthetic organic processes has become a special job of the Harshaw Chemical Company. So many of these materials have been standard items in the past, that it is natural to step into the role of supplier to war-time industry. . . . . Whatever your requirements, call on Harshaw—if we do not have the material you want, we may be in a good position to make it for you, or possibly our technical staff can suggest some other material that will do the job as well or better. . . . . A few Harshaw chemicals are listed.

VITAL CHEMICAL MATERIALS

Anhydrous Hydrogen Chloride
Anhydrous Hydrogen Fluoride
Anhydrous Boron Trifluoride
Aluminum Salts
Antimony Salts
Chromium Salts
Cobalt Salts
Copper Salts
Manganese Salts
Nickel Salts
Silver Salts
Tin Salts



Irving M. Abrams has recently transferred from the University of Minnesota to Stanford University, Calif., where he is Bristol-Myers post-doctorate fellow and junior research associate. Dr. Abrams received his Ph.D. degree in physiological chemistry at the University of Minnesota at the close of the summer session.

John H. Adam, who has been associated with the Red Star Chemical Co., Inc., New York, N. Y., for the past year, has been appointed sales manager by the Allied Raw Materials Corp., New York, N. Y.

Captain L. F. Audrieth is on indefinite leave from the University of Illinois, where he is associate professor of chemistry, and has been called to active service in the Technical Group at Picatinny Arsenal as chief of the Research Division. F. T. Wall has succeeded him as editor of the Register of Phi Lambda Upsilon.

E. G. Bailey, vice president of The Babcock & Wilcox Co., New York, was presented with the first Percy Nicholls Award "for notable scientific or industrial achievement in the field of solid fuels" on September 30 at the banquet of the joint Fuels Conference of the Coal Division, American Institute of Mechanical Engineers, and Fuels Division, American Society of Mechanical Engineers.

Herman E. Bakken, who has been assistant director of research for the Aluminum Co. of America, has been made associate director. E. H. Dix. Jr., chief metallurgist, and R. L. Templin, chief engineer of tests, have been made assistant directors.

Elmore J. Baruth, for several years manager of the Depew Container Corp., Depew, N. Y., has resigned to become technical director for the McCreary Tire & Rubber Co., Indiana, Penna.

Benjamin Becker, formerly chemist for the Metal and Thermit Corp., is now staff sergeant technician in the Chemical Warfare Service, Edgewood Arsenal, Md.

Louis H. Brendel, manager of jobber distribution, Manning, Maxwell & Moore, Inc., Bridgeport, Conn., has entered the Navy as a Lieutenant Commander in the Incentive Division.

T. P. Callahan has become affiliated with The Alden Speare's Sons Co., 156 Sixth St., Cambridge, Mass.

James J. Carney is now employed as research chemist for Merck & Co., Inc., at Elkton, Va. He was formerly assistant professor of organic chemistry at the College of St. Thomas, St. Paul, Minn., and was recently granted a Ph.D. degree in organic chemistry by the University of Minnesota.

Ralph H. Carter has resigned his position as microbiologist with Chas. Pfizer & Co., and has accepted a position as research fellow, Department of Bacteriology, Iowa State College, Ames, Iowa.

John T. Clarke has transferred from the Research Laboratories of the Eastman Kodak Co., to the Research and Development Division of the Tennessee Eastman Corp., Kingsport, Tenn. He received the B.S. degree in organic chemistry from Harvard University in 1942.

G. M. Compeau has left the Calco Chemical Division, American Cyanamid Co., and has accepted a position as chemist with the National Oil Products Co., Harrison, N. J.

Walter A. Cook, head of the Chemistry Department, University of Akron, has been called to active duty by the War Department. Captain Cook is stationed at Edgewood Arsenal, Md., and has been assigned to the Chemical Research Division.

Margaret M. Cooper is now on the staff of the Texas State College for Women, Denton, Tex., as assistant professor of chemistry. She spent the preceding academic year in postdoctorate research in textile chemistry at the Pennsylvania State College.

William H. Coppock, since September 1939 assistant professor in the Chemistry Department, Eastern Illinois State Teachers College, is now assistant chief chemist of the Sangamon Ordnance Plant, in Illinois.

D. L. Cramer, who was granted the Ph.D. degree from the Department of Physiological Chemistry at The Ohio State University in August, is now employed as organic research chemist in the Division of Organic Research, Norwich Pharmacal Co., Norwich, N. Y.

William Crocker, managing director of the Boyce Thompson Institute for Plant Research, Yonkers, N. Y., is to spend the winter quarter, January to March 1943, at the University of Washington, Seattle, Wash., as Walker-Ames visiting professor. He will give a series of 10 lectures on "Special Chapters in Plant Physiology", dealing with projects developed at the institute during the past 18 years, and will also give several popular lectures and conduct a seminar in botany.

D. S. Davis, assistant professor of chemical engineering at Wayne University, is now research and development mathematician for the Michigan Alkali Co., Wyandotte, Mich. He will continue the college credit and ESMWT courses in nomography and empirical equations offered by Wayne.

Captain Cyrus G. Dunkle, C. W. S., formerly on the faculty of the Department of Technical Instruction, Chemical Warfare School, Edgewood Arsenal, Md., has been assigned as instructor and chemical warfare officer at the Army Administration Officer Candidate School, State College, Miss.

Charles G. Durbin has been transferred from the position of control chemist at the Naugatuck Chemical Division of the U. S. Rubber Co. to become assistant chemical superintendent of the Pennsylvania Ordnance Works, operated by the same concern.

Sidney Eisenberger, since 1930 faculty member of the Department of Chemistry, College of the City of New York, is now vice president of Academy Laboratories, Inc., Woodside, L. I., N. Y., which has recently completed construction of a plant for the manufacture of cocodylic acid and cocodylates, formerly made almost exclusively in France.

R. Maxwell Elliott has been appointed vice president of the Whiting Corp., Harvey, Ill. **D. Polderman, Jr.,** formerly district sales manager of the New York–Philadelphia district, has been made a member of the executive committee.

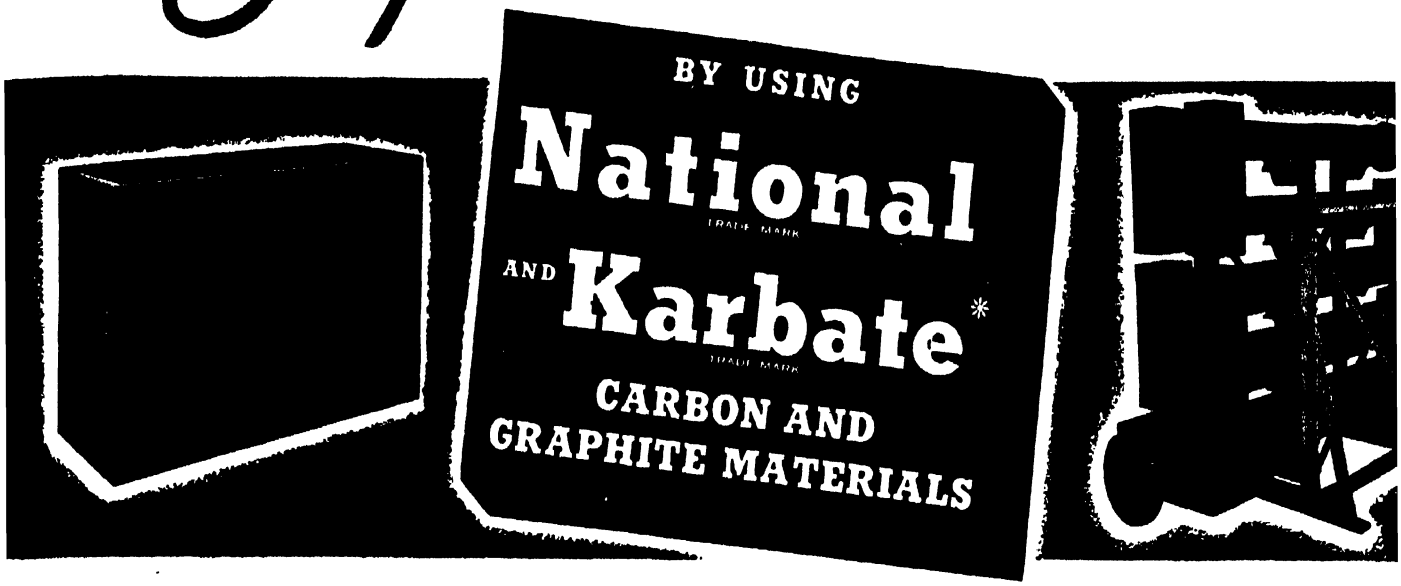
H. V. Fairbanks has left the University of Louisville, where he was instructor in chemical engineering, to go to the Rose Polytechnic Institute, Terre Haute, Ind., as assistant professor of chemical engineering, in charge of metallography and engineering materials.

G. J. Fink, formerly supervisor of research, Lime Products Section, United States

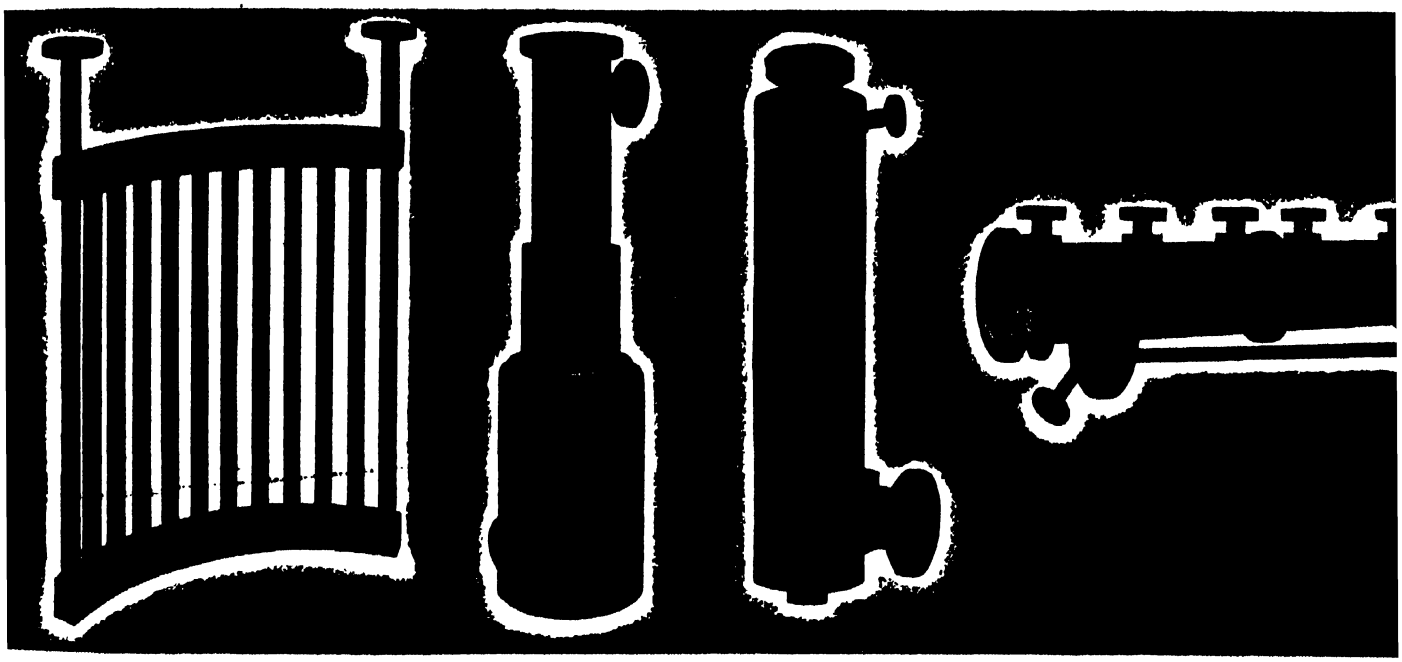
CONTINUED ON PAGE 1396

IN EQUIPMENT DESIGNED FOR THE PRODUCTION OR USE

Hydrochloric Acid



FOR THE CONSTRUCTION OF PROCESSING UNITS



● Carbon, graphite and "Karbate" materials are used in the construction of equipment for all processes involved in the manufacture or use of hydrochloric acid. This includes absorbing, cooling, rectifying, boiling and condensing units, conveying and circulating systems, vats, tanks and other containers.

These materials are resistant to the action of hydrochloric acid in all phases and concentrations. The excellent heat transfer properties of graphite base materials are of advantage in equipment used for heating, cooling and stripping processes. Good mechanical strength, exceptional resistance to thermal shock, ease of machining, and availability in a wide variety of forms adapt these products to the fabrication of practically any desired type of processing equipment.

EXPERIENCE HAS PROVED THE DURABILITY OF CARBON AND GRAPHITE MATERIALS IN THE PRESENCE OF HYDROCHLORIC ACID AND THE ECONOMY RESULTING FROM THEIR USE

WHATEVER YOUR PROBLEM — *Consider Carbon and Graphite* — WRITE FOR INFORMA

Gypsum Co., Chicago, Ill., has become research associate at the National Bureau of Standards, Washington, D. C. He will supervise cooperative research of the bureau and the National Lime Association on masonry mortars, as well as other research sponsored by the association.



Loren V. Forman

Loren V. Forman has been appointed a research associate at The Institute of Paper Chemistry, Appleton, Wis. He will be instructor in pulp and paper technology and in charge of pulp and paper testing. Since 1940 Dr. Forman has been associated with The Mead Corp., dividing his time between the Chillicothe, Ohio, and the Kingsport, Tenn., mills.

Francis Glick, while completing residence requirements for the Ph.D. in biochemistry at the University of Illinois, is employed as biochemist on an OSRD national defense project at the University of Illinois Medical School, Chicago, Ill.

Henry B. Hardt is now professor of chemistry and head of the department at the Stephen F. Austin State Teachers College, Nacogdoches, Tex., where he has a new and well-equipped science building. For three years Professor Hardt was at Westminster College, Fulton, Mo.

C. Sheldon Hart is now assistant professor in Carleton College, Northfield, Minn., where he is teaching analytical chemistry.

Walter R. Hausch, who received his M.S. degree from the University of Cincinnati in June, is a graduate assistant in the Department of Chemistry, Purdue University, Lafayette, Ind.

Eugene M. Hetzel has been promoted to superintendent of the Carondelet, Mo., plant, succeeding Mr. Wilson.



Eugene M. Hetzel

Florence E. Hooper recently resigned from the faculty of The Stout Institute, Menomonie, Wis., to become assistant professor in chemistry at George Washington University, Washington, D. C.

Captain Wm. S. Hutchinson, Jr., has been relieved from his assignment in the Industrial Service of the Office, Chief, Chemical Warfare Service, and assigned to the 83rd Separate Chemical Battalion, Camp Gordon, Ga., as battalion executive officer. He was formerly with the Mallinckrodt Chemical Works, Laboratory Chemical Sales Department.

Edwin P. Jones has accepted a position as a principal research chemist in the Engineering and Development Section, Eastern Regional Laboratory, Philadelphia, Penna.

Harold M. Kaplan has received the Ph.D. degree from the University of Michigan and has accepted a position on the research staff of the Solvay Process Co., Syracuse, N. Y.

Anson R. Kendall, professor of chemistry at Dakota Wesleyan University since 1936, has been appointed assistant professor of chemistry at the Michigan College of Mining and Technology, Houghton, Mich.

Lynn King, Charles W. Gould, and **Vincent C. Meunier,** formerly of the Columbia Chemical Division, Pittsburgh Plate Glass Co., are now employed at Marco Chemicals, 934 Bethlehem Pike, Philadelphia, Penna., organized by **I. E. Muskat,** formerly research director of Columbia.

Samuel Kohan, formerly control chemist for the Florasynth Laboratories of New York, has been assigned to the Chemical Warfare Service at Fort Story, Va., as assistant to **Lieutenant Harry C. Winter,** chemical officer of the Harbor Defenses of Chesapeake Bay and Fort Story, and formerly research chemist, Biochemical Research Foundation of the Franklin Institute.

A. C. Kracklauer, president, and **W. J. Kracklauer,** sales manager of the Sparkler Filter Manufacturing Co., Mundelein, Ill., have received awards in the $200,000 industrial study on arc welding of the James F. Lincoln Arc Welding Foundation.

Donald Long has been granted a research fellowship in chemistry at the Illinois Institute of Technology, Chicago, Ill., sponsored by the Quaker Chemical Products Corp.

Herbert E. Longenecker has been appointed associate professor of biochemistry and associate director of the Buhl Foundation projects at the University of Pittsburgh, during the absence of **Charles Glen King,** who is on leave to serve as scientific director of the Nutrition Foundation and visiting professor of chemistry at Columbia University.

William G. Luqueer, Raymond J. Carey, Carl Axel Bergman, Roy J. Ziegler, and **George Brownlee, Jr.,** are on leave of absence from the General Dyestuff Corp. for military service.



Charles G. Maier

Charles G. Maier, for nearly 20 years associated with the U. S. Bureau of Mines, has been named to the supervisory staff of the Battelle Memorial Institute, Columbus, Ohio, to direct and correlate an enlarged program of fundamental research.

Dean Edmund A. Schoeld has left Waldorf College, Forest City, Iowa, to take a position with the American Potash Co., Carlsbad, New Mex.

John L. Voth is now working for Basic Magnesium, Inc., Las Vegas, Nev., in the analytical chemistry department. Previously he was employed by the Sierra Magnesite Co.

Prestige

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HORRORS

IN THE

Sherman Hotel

SPACE NO. 50

NOV. 24 TO 29

This company was founded in 1930 on the idea of serving industry.

Our services definitely improve efficiency, increase production, add years to the life of equipment, and actually reduce operating costs.

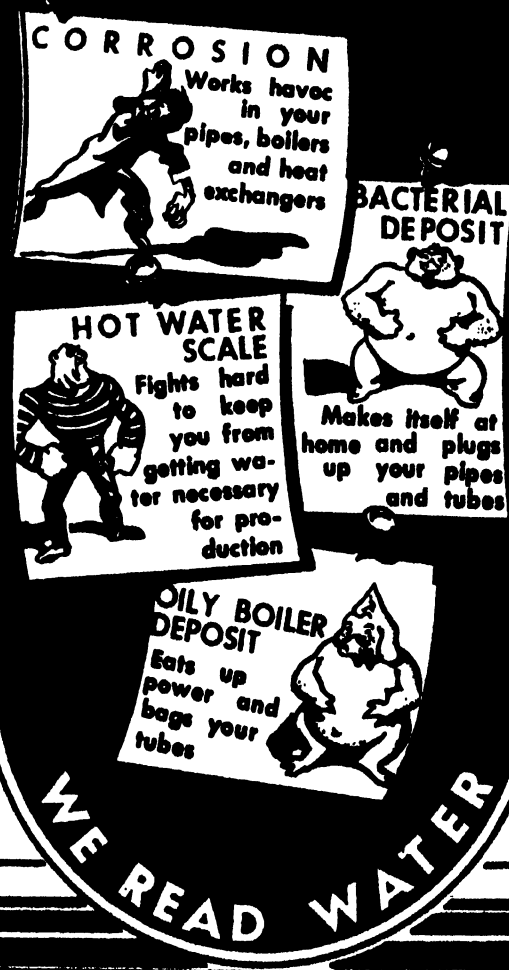
Our growth is due to the accomplishment of these four services for industrial plants throughout the nation. Today we are serving eleven times the number of plants that we served four years ago. So we must be accomplishing results.

Scale, corrosion and living organisms are destructive forces that sap the efficiency of your factory before you realize it.

We don't claim to know your conditions or your needs. We have to make a survey, fill out forms and take samples for analysis before we can begin to talk factually about your problems and what to do about them. That's one reason we succeed . . . each job is tailored to its individual requirements.

We don't charge for this preliminary survey and analytical work. We can't . . . it's too fundamental to finding out what, if anything, we can do for you. So, we invite you to take advantage of one of our surveys and reports. We will do it personally or by mail depending upon where you are and which you prefer. This is one service we can provide and we are providing to help win the war.

You won't be obligated in any way by asking for our advice, and if we can help you, whether it takes our products or not, we will be happy. Our advisory service is a contribution we are proud to have available for your use right now. Use it freely.



D. W. HAERING & CO., Inc.

GENERAL OFFICES: 205 West Wacker Drive

PREVIEW and GUIDE

1942 NATIONAL CHEMICAL EXPOSITION

●

COMMERCIAL EXHIBITS

NATIONAL INDUSTRIAL CHEMICAL CONFERENCE

EDUCATIONAL AND SCIENTIFIC EXHIBITS

EDUCATIONAL MOVIES

●

HOTEL SHERMAN CHICAGO

NOVEMBER 24, 25, 26, 27, 28, 29 1 - 9 - 4 - 2

CHEMICAL AND ENGINEERING NEWS

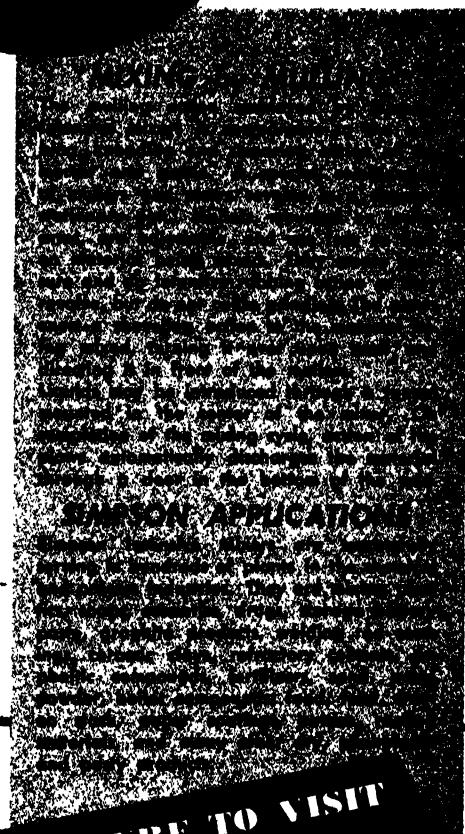
VOLUME 20, NO. 21 • NOVEMBER 10, 1942

SIMPSON *Intensive Mixers*

Mix it... BETTER FASTER *for* LESS!



IN mixing operations on dry, semi-plastic and pasty materials, Simpson Intensive Mixers will provide greater uniformity . . . improve quality . . . reduce mixing time — and all at lower labor, power and maintenance costs. They handle batch capacities from 100 lbs. to 2 tons, with smaller models for laboratory and small production work. They may be equipped for processing materials where heating, cooling, pressure or vacuum is required. Simpson Intensive Mixers will do your mixing better, faster and at lower cost. Write for complete information and literature, or call a National engineer to help solve your mixing problems.



Here is a stainless steel 24" Laboratory model Simpson Mixer equipped for vacuum. Be sure to see it in operation at the show.



BE SURE TO VISIT BOOTH NO. 149 at the CHEMICAL SHOW CHICAGO — NOV. 24 to 29

SIMPSON

National Industrial Chemical Conference

The general subject of applied chemistry and chemical research, with particular emphasis on fields related to the war effort, will be featured in the 1942 Conference. The following program will high-light the discussions of the Conference.

PROGRAM

MEETINGS

WEDNESDAY, NOVEMBER 25 2–4 P.M.

"PLASTICS AND PAPER"

Presiding, NORMAN L. SHEPARD, Chemical Director, American Cyanamid Company, New York

"Raw Material Supplies for Plastics Manufacture"
By ARTHUR E. PETERSEN, Chief of Organic Plastics and Resins Section, Materials Division, Chemical Branch, War Production Board, Washington, D. C.

"Paper and Paper Materials"
By ALLEN ABRAMS, Vice-President in Charge of Research and Development, Marathon Paper Mills Company, Rothschild, Wisconsin.

THURSDAY, NOVEMBER 26 6:30 P.M.

Joint meeting of the National Industrial Chemical Conference and the Chicago Section of the American Chemical Society

Presiding, R. C. NEWTON, Vice-President, Swift & Co., Chicago

"The Electron Microscope in Relation to Chemical Research"
By V. K. Zworykin, Associate Director, Research Laboratories, RCA Manufacturing Company, Camden, New Jersey.

FRIDAY, NOVEMBER 27 2–5 P.M.

"FOOD AND THE RELATION OF FOOD TO THE CHEMISTRY OF PLANTS AND THE SOIL"

Presiding, C. G. KING, Scientific Director, The Nutrition Foundation, Inc., New York

"The Soil and Crop Basis of Better Nutrition"
By L. A. MAYNARD, Director, School of Nutrition and the United States Plant Soil and Nutrition Laboratory, Cornell University, Ithaca, New York.

"Soil Fertility and the Human Species"
By W. A. ALBRECHT, Chairman, Department of Soils, College of Agriculture, Columbia, Missouri.

"Food and Nutrition as Related to War"
By C. G. KING, Scientific Director, The Nutrition Foundation, Inc., New York, New York.

FRIDAY, NOVEMBER 27 8–9:15 P.M.

Presiding, VICTOR CONQUEST, Director of Research, Armour & Company, Chicago

"The Cyclotron and Its Uses in Research"
By P. GERALD KRUGER, Department of Physics, University of Illinois, Urbana, Illinois

SATURDAY, NOVEMBER 28 1:45–5 P.M.

"A SYMPOSIUM ON INDUSTRIAL WAR PROBLEMS"

Presiding, C. S. MINER, Director, Miner Laboratories, Chicago

"Control of War Time Incendiaries"
By WARD V. EVANS, Professor of Chemistry, Northwestern University, Evanston, Illinois.

"Waste Treatment in Industry as Related to War Economy"
By F. W. MOHLMAN, Director of Laboratories, Sanitary District of Chicago, Chicago, Illinois.

"The Salvage and Conservation of Chemicals in Industry"
By S. DONALD PERLMAN, Executive Chemical Director, Industrial Salvage Section, Conservation Division, War Production Board.

INDUSTRIAL MOVIES

A continuous program of industrial movies will be shown during the National Chemical Exposition as an educational feature.

These movies will provide a liberal education in chemical processing. These films show interesting features in the manufacture of plastics, rayon, chemical stoneware, glass, bread, coke, white lead, canned foods, glass insulators, gelatin capsules, steel and aluminum, as well as miscellaneous subjects related to chemistry in the field of photography, natural resources and special plant construction.

SPECIAL EXHIBITS

The War Production Board (W.P.B.) is preparing a special exhibit to demonstrate the reclamation and recovery of solvents, paints, oils of all kinds, toluol and chemical by-products.

Mr. Clayton Grandy, Trade Association Director of the Industrial Salvage Section, Conservation Division, War Production Board, and Mr. S. Donald Perlman, Executive Chemical Director of the same section, are in charge of the preparation of this special exhibit.

The War Production Board is anxious that everyone concerned with industrial production see this special exhibit. More and more attention will have to be paid to salvage and conservation as the war continues. It is not likely to be long before there will be some degree of shortage of almost everything. It is an important subject and this exhibit will give everyone an excellent opportunity to learn the vital facts about it, and in the shortest possible time.

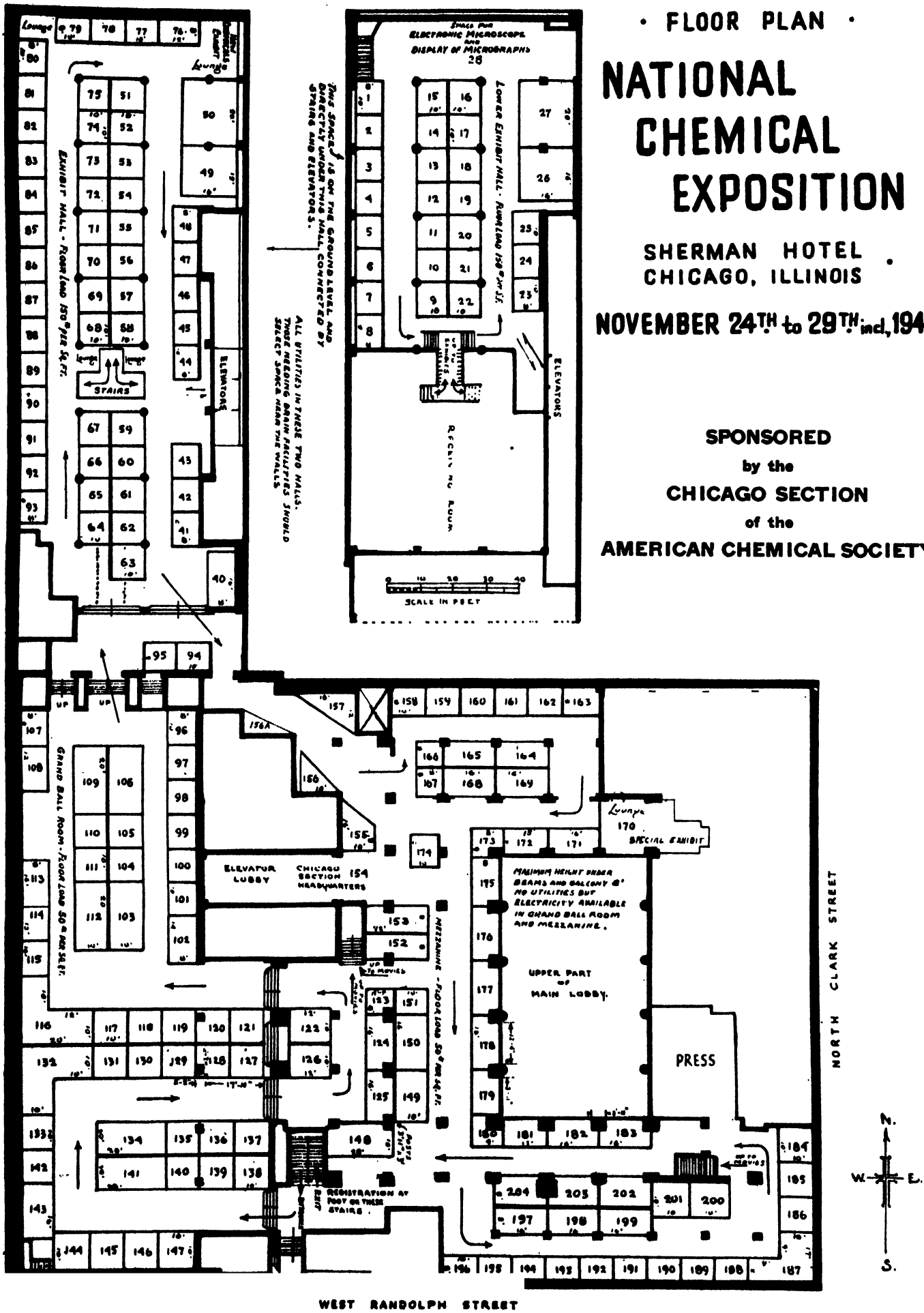
"Successful Alternates and Substitutes" will be the subject of an extensive exhibit now being prepared by Dr. Harrison E. Howe, editor of INDUSTRIAL AND ENGINEERING CHEMISTRY. This exhibit will show the old and the new. Dr. Howe will also have an exhibit showing "The Chemist's Part in Civilian Defense."

The "New Chemicals" exhibit by W. J. Murphy, editor of CHEMICAL INDUSTRIES takes on added significance at this time. Chemists from all over the nation will be carefully examining this display for chemicals to help them solve their emergency war problems.

LIST OF EXHIBITORS NATIONAL CHEMICAL EXPOSITION

The following list of exhibitors with their booth numbers was supplied by the management of the National Chemical Exposition, and is complete as of November 2nd.

	Booth No.
Ainsworth & Sons, Inc., Wm., 2151 Lawrence St., Denver, Colo.	58
Alloy Products Corp., 221 Madison St., Waukesha, Wis.	153
Alox Corporation, Buffalo Ave. & Iroquois St., Niagara Falls, N. Y.	194–195
American Heat Reclaiming Corp. (with F. M. deBeers & Assoc.)	125
American Instrument Co., Silver Spring, Md.	67
American Resinous Chemicals Corp., Peabody, Mass.	113
Ampco Metal, Inc., 1745 S. 38th St., Milwaukee, Wis.	99
Angel & Co., H. Reeve, 7–11 Spruce St., New York, N. Y.	120
Armour & Co., Chemical Division, 1355 W. 31st St., Chicago, Ill.	132
Atlas Powder Co., Wilmington, Delaware	107–108
Atlas Publishing Co., 133 W. 21st St., New York, N. Y.	53
Bareco Oil Co., Box 2009, Tulsa, Okla.	72
Bennett Mfg. Co., 14600 Princeton Avenue, Chicago, Ill.	98
Brabender Corporation, Rochelle Park, N. J.	174
Buffalo Foundry & Machine Co., Buffalo, N. Y.	143
Bump Pump Co., LaCrosse, Wisconsin	101
Campbell Co., The, Hammonton, N. J.	156
Central Scientific Co., 1700 Irving Park Road, Chicago, Ill.	178
Chemical Industries, 522 Fifth Avenue, New York, N. Y.	76–77
Chemical & Metallurgical Engineering, 330 W. 42nd St., New York, N. Y.	141
Chicago Pump Co., 2336 Wolfram St., Chicago, Ill.	110
Commercial Solvents Corp., Terre Haute, Ind.	150–151
Consolidated Products Co., Inc., 15 Park Row, New York.	182
Corn Products Refining Co., 17 Battery Place, New York.	51–52
Corning Glass Works, Corning, N. Y.	169
Croll Reynolds Co. (with F. M. deBeers & Associates)	125
Darco Corporation (with Atlas Powder Co.)	107–108
deBeers & Associates, F. M., 20 N. Wacker Drive, Chicago, Ill.	125
Denver Equipment Co., 1400—17th St., Denver, Colo.	131
Dicalite Co., The, 520 N. Michigan Avenue, Chicago, Ill.	168
Dorr Co., The, 570 Lexington Avenue, New York, N. Y.	89–90
Durametallic Corp., 2104 Factory St., Kalamazoo, Mich.	117–118
Eimer & Amend (with Fisher Scientific Co.)	115–116
Emery Carpenter Container Co., 3620 W. 38th St., Chicago, Ill.	173
Engelhard, Inc., Chas. (with Hanovia Chemical & Mfg. Co.)	59–60–61
Ertel Engineering Corp., 40 W. 48th St., New York, N. Y.	197
Eutectic Welding Alloys, Inc., 40 Worth Street, N. Y. C.	195–196
Fansteel Metallurgical, 2200 Sheridan Road, No. Chicago, Ill.	134
Federal Classifier Systems, 127 N. Dearborn St., Chicago, Ill.	164
Filter Paper Co., 57 E. 24th St., Chicago, Ill.	63
First Machinery Corp., E. 9th St. & East River Dr., New York, N. Y.	188
Fisher Scientific Co., 711–23 Forbes St., Pittsburgh, Pa.	115–116
Fitzpatrick Co., W. J., 111 N. Canal St., Chicago	177
Fletcher Works, Inc. (with F. M. deBeers & Associates)	125
General Ceramics Co., Keasbey, N. J.	80–81
Glycerine Producers Assn., c/o The Miner Laboratories, 9 S. Clinton St., Chicago, Ill.	157
Glyco Products Co., Inc., 230 King St., Brooklyn, N. Y.	62
Goslin-Birmingham Mfg. Co. (with F. M. deBeers & Associates)	125
Graver Tank & Mfg. Co., East Chicago, Ind.	104
Gump Co., B. F., 431–37 S. Clinton St., Chicago, Ill.	87–88
Haering & Co., D. W., 205 W. Wacker Drive, Chicago, Ill.	50
Hamilton Manufacturing Co., Two Rivers, Wisconsin	144–5–6–7
Hammond Drierite Co., W. A., Yellow Springs, Ohio	54
Hanovia Chemical & Mfg. Co., Chestnut St. & N. J. R. R. Avenue, Newark, N. J.	59–60–61
Hardinge Co., York, Pa.	82
Haveg Corp., Newark, Delaware	121
Hercules Powder Co., Wilmington, Delaware	129–130
Honan-Crane Corp., Lebanon, Ind.	181
Huppert Co., K. H., 152 W. Walton Place, Chicago, Ill.	97
Illinois Electric Porcelain Co., Macomb, Ill.	65
Industrial & Engineering Chemistry, 330 W. 42d St., New York, N. Y.	122–126
Industrial Instruments, Inc., 156 Culver Avenue, Jersey City, N. J.	92
Infilco, Inc. (Formerly International Filter Co.), 325 W. 25th Place, Chicago, Ill.	102
Insto-Gas Corp., 1900 E. Jefferson Avenue, Detroit, Mich.	56
Johns-Manville Corp., 22 E. 40th St., New York, N. Y.	83–84
Kewaunee Manufacturing Co., Adrian, Mich.	179–180
Kimble Glass Co., Vineland, N. J.	142
Kold-Hold Manufacturing Co., 424 N. Grand Ave., Lansing, Mich.	73
Koppers Co., Koppers Building, Pittsburgh, Pa.	68–69–70
Leader Iron Works, Inc., 2110 N. Jasper St., Decatur, Ill.	42
Lithgow Corporation, 333 W. 40th Place, Chicago, Ill.	155
Loeb Equipment Supply Co., 910–14 N. Marshfield Avenue, Chicago, Ill.	55
Ludlow-Saylor Wire Co., Newstead Avenue & Wabash R. R., St. Louis, Mo.	85–86
Lukens Steel Co., Coatesville, Pa.	136–7–8–9
Marathon Paper Mills Co., Rothschild, Wisconsin	96
McGraw-Hill Pub. Co., 330 W. 42nd St., New York, N. Y.	141
Merck & Co., Rahway, N. J.	105–106
Merco-Nordstrom Valve Co., 400 Lexington Avenue, Homewood, Pittsburgh, Pa.	40
Metal Glass Products Co., Belding, Mich.	166–167
Mojonnier Bros. Co., 4601 W. Ohio St., Chicago, Ill.	78
Morse Magneto Clock Co., 17 E. 42nd St., New York, N. Y.	91
National Engineering Co., 549 W. Washington Blvd., Chicago, Ill.	149
National Technical Laboratories, 820 Mission St., South Pasadena, Calif	23–24
Ohio Chemical & Mfg. Co., The, 1177–99 Marquette St., N. E., Cleveland, Ohio	119
Olson Filtration Engineers, 4630 W. Flournoy St., Chicago, Ill.	94
Omega Machine Co., 3409 E. 18th St., Kansas City, Mo.	140
Permutit Co., The, 330 W. 42nd St., New York, N. Y.	79
Peterson & Co., Inc., Leonard, 1222–34 Fullerton Avenue, Chicago, Ill.	176
Pfaudler Co., The, 89 East Avenue, Rochester, N. Y.	44–45
Pittsburgh Equitable Meter Co. (with Merco-Nordstrom Valve Co.)	40
Podbielniak Centrifugal Super-Contactor Co., 8312–44 So. Chicago Ave., Chicago, Ill.	27
Proctor & Schwartz, Inc., 7th St. & Tabor Road, Philadelphia, Pa.	112
Pulverizing Machinery Co., Chatham Road, Summit, N. J.	135
Raymond Pulverizer Div., Combustion Engineering Co., Inc., 1315–25 North Branch Street, Chicago, Ill.	111
Reinhold Publishing Corp., 330 West 42nd St., New York, N. Y.	122–126
Ross & Rowe, Inc., 75 Varick St., New York, N. Y.	43
Sarco Co., Inc., 475 Fifth Avenue, New York, N. Y.	175
Sargent & Co., E. H., 155 E. Superior St., Chicago, Ill.	127–128
Schaar & Co., 754 W. Lexington St., Chicago, Ill.	109
Schneible Co., Claude B., 3951 Lawrence Avenue, Chicago, Ill	199
Schnell Publishing Co., Inc., 59 John St., New York, N. Y.	171
Selas Co., The, Erie Ave. & D St., Philadelphia, Pa.	93
Sharples Corp., The, 23rd & Westmoreland Sts., Philadelphia, Pa.	114
Sheldon & Co., E. H., Muskegon, Mich.	103
Sivyer Steel Casting Co., 1675 S. 43rd St., Milwaukee, Wisconsin	74–75
Sparkler Manufacturing Co., Mundelein, Ill.	71
Sperry & Co., D. R., Batavia, Ill.	25
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.	148
Triangle Package Machinery Co., 906 N. Spaulding Ave., Chicago, Ill.	204
Union Bag & Paper Co., Woolworth Bldg., New York, N. Y.	172
United States Stoneware Co., The, 60 E. 42nd St., New York, N. Y.	123–124
Walker-Wallace Co., Inc., 14 W. Utica St., Buffalo, N. Y.	64
Wallace & Tiernan Co., Inc., Newark, N. J.	133
Waukesha Foundry Co., Waukesha, Wis.	46
Wheelco Instruments Co., 845 W. Harrison St., Chicago, Ill.	41
Wilkens-Anderson Co., 111 N. Canal St., Chicago, Ill.	57
Wilson Chemical Feeders, Inc., Buffalo, N. Y.	152
York Ice Machinery Corp., York, Pa.	474–8



• FLOOR PLAN •

NATIONAL CHEMICAL EXPOSITION

SHERMAN HOTEL
CHICAGO, ILLINOIS

NOVEMBER 24TH to 29TH incl., 1942

SPONSORED
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AMERICAN CHEMICAL SOCIETY

A BRIGHT SPOT AT THE SHOW...



BOOTH 153

Where a construction demonstration will highlight the tremendous possibilities for flawless process piping with the new A-P-C Welding Fittings!

When A-P-C Stainless Steel Sanitary Fittings were first announced, it was news — and important news for the dairy, food and allied industries.

Todays *new* A-P-C Fabricated Welding Fittings are equally important to you and your process. A-P-C Welding Fittings are flawlessly formed into two identical halves — then welded together and ground smooth. They are made of stainless steel — sheet or plate — from any analysis.

For further details and a chance to see A-P-C Welding Fittings and the A-P-C Expanding Process — don't fail to come to Booth 153!*

** If you can't come to Chicago — don't miss out entirely — write us. We'll gladly send you the story in print.*

1942 NATIONAL CHEMICAL EXPOSITION NOVEMBER 21-29 1942 SHERMAN HOTEL CHICAGO

ALLOY PRODUCTS CORP.

WAUKESHA, WISCONSIN

Descriptions of Exhibits

The following descriptions of exhibits were supplied to our editors and include all information obtainable up to closing date, November 2.

William Ainsworth & Sons, Inc., 2151 Lawrence St., Denver, Colo. **Booth 58**

Alloy Products Corp., 221 Madison St., Waukesha, Wis. **Booth 153**

Stainless Steel, fabricated type, welding fittings. Carbon Steel, fabricated type, welding fittings. Stainless Steel, fabricated type, sanitary fittings. APC Automatic expanding equipment. These fabricated type welding fittings have both light and heavy walls. No castings whatsoever are used in the fabrication hence blowholes and porous spots are totally eliminated.

Alox Corp., Buffalo Ave. & Iroquois St., Niagara Falls, N. Y. **Booths 194-195**

On display will be a full line of oxygenated hydrocarbons. These products are made from waste petroleum materials by carefully controlled oxidation (the Burwell process) into alcohols, ketones, acids, etc., which may be used as the starting point for esters, metallic soaps, acid halides, organic sulfides, thio ether, etc., for use in the lubrication, medicinal soap, pharmaceutical, and similar industries. Featured will be certain polarized oils.

American Instrument Co., Silver Spring, Md. **Booth 67**

On exhibition will be Constant Temperature Baths in operation, which can be held at temperatures within plus or minus 0.005° C. by means of such auxiliaries as Aminco LoLag immersion heaters, time-tested thermoregulators, etc: Also a new, improved oven, constant in temperature to plus or minus 0.5° C. and with a uniformity throughout the working chamber of plus-minus 0.25° C. In addition will be apparatus for high temperatures and pressures and latest developments in field of catalytic hydrogenation.

American Resinous Chemicals Corp., Peabody, Mass. **Booth 113**

On display will be products manufactured from the new synthetics, Vulprene and Sulprene, derived from non-critical materials. Specimens will include insulated wire, extruded tubing and molded products. Industrial examples typifying the use of resinous emulsions as latex replacements for paper, leather, textile, rubber, and metal industries will also be stressed.

Ampco Metals, Inc., 1745 E. 38th St., Milwaukee, Wis. **Booth 99**

On exhibit will be castings of Ampco metal used in acid and corrosion resistant service such as chains in pickling service, valves, etc. Extruded aluminum bronze heavy wall tubing will also be displayed as well as Ampco-Trode coated aluminum bronze welding rods and samples of welds.

H. Reeve Angel & Co., Inc., 7-11 Spruce St., New York, N. Y. **Booth 120**

On exhibit will be various types of filter papers for industrial and research laboratory use. Especially featured will be the Whatman chemically prepared filter papers and the Reeve Angel American filter papers.

Armour and Co., Chemical Div., 1355 W. 31st St., Chicago, Ill. **Booth 132**

New chemicals and fatty acids applicable and suitable to the war effort and their place in shaping things to come. Included, among others, will be Amines—octadecyl, octadecenyl, octadecadienyl, hexadecyl, tetradecyl, dodecyl, decyl, octyl, di-n-octadecyl, di-n-hexadecyl, di-n-tetradecyl, di-n-dodecyl, etc. Nitriles—octadecane, octadecene, octadecadiene, hexadecane, tetradecane, dodecane, decane, and octane; also 9-27-pentatriacontadien-18-one, 14-heptacosanone, 8-pentadecanone, and others. Fatty acids included will be stearic, oleic, palmitic, myristic, lauric, capric, caprylic, and unsaturated acids of the clupanodonic series. Also, glycerides containing high proportions of conjugated double bonds, cottonseed pitch, and marine pitch.

Atlas Powder Co., Wilmington, Del. **Booths 107-108**

New products and new techniques of use will be shown, important today for war, interesting for tomorrow's new world: Finishes for government specifications; partial fatty acid ester emulsifiers, wetting agents and dispersing agents; hexitols, hexamides and hexitans for synthesis; resin coated fabrics for military use; activated carbons for purification of liquids.

Atlas Publishing Co., 133 W. 21st St., New York, N. Y. **Booth 53**

Publications

Bareco Oil Co., Box 2009, Tulsa, Okla. **Booth 72**

On display will be the complete line of Be Square Special Waxes. These compounds are high melting point, microcrystalline petroleum waxes which, while not new, are finding many new uses in industry due to the lack of waxes ordinarily used. These materials are now being supplied to the armed forces and many war industries.

Bennett Mfg. Co., 14600 Princeton Ave., Chicago, Ill. **Booth 98**

Brabender Corp., Rochelle Park, N. J. **Booth 174**

Three Recording Viscosimeters will be shown: The Plastograph, for heavy, pliable material under controlled temperature conditions; the Viscograph, to record viscosities at increasing temperatures with the temperature increases fully automatic and at a constant rate; the Recording Viscosimeter, an inexpensive but highly versatile recording instrument with different speeds, paddles, and measuring springs. Also there will be shown a Moisture Tester, semi-automatic.

Buffalo Foundry & Machine Co., Buffalo, N. Y. **Booth 143**

Emphasis will be placed on the Research and Testing Plant Facili-

ties of this Company. Because of size limitations and scarcity of materials, photographs and drawings will constitute the main exhibit.

Bump Pump Co., LaCrosse, Wis. **Booth 101**

The Campbell Co., Hammonton, N. J. **Booth 156**

The Caulfield Pipettor permits the pipetting of fluids without the use of the mouth, avoiding accidents and contamination. A rubber bulb equipped with a special valve and very sensitive control permits the ingress of liquid. Measuring off is accurate to less than 1/100 of a c.c.

Central Scientific Co., 1700 Irving Park Rd., Chicago, Ill. **Booth 178**

Featured will be: A Waring Blendor in which metal has been replaced with plastic, providing better insulation and cooling; a Cenco cylindrical oven in which copper and steel have taken the place of aluminum without detriment to the performance or appearance; A Cenco-Cooley "Indexer" Furnace which has a rotating hearth for easy removal of crucibles or dishes; a Buechner Funnel for large volume filtrations; Corning new, low-actinic glassware; Cenco absorption cells made of "Pyrex," with fused windows ground and polished flat to within a few wavelengths.

Chemical Industries, 522 Fifth Ave., New York, N. Y. **Booths 76-77**

A series of New Chemicals for Industries.

Chemical and Metallurgical Engineering, 330 West 42nd St., New York, N. Y. **Booth 141**

Publications.

Chicago Pump Co., 2336 Wolfram St., Chicago, Ill. **Booth 110**

Featured will be a working model of a specialized unit for mixing and agitating. Photographic panels of various types of this equipment and pumps for service in the chemical industries will be displayed.

Commercial Solvents Corp., Terre Haute, Ind. **Booths 150-151**

Featured will be "New Chemicals at Work." The display will consist entirely of items which require one of the nitroparaffins for their manufacture—new types of waterproofing textiles, grinding and polishing assistants, dry cleaning soaps, new types of lacquers and dopes, textile dyes, synthetic rubber products and dozens of other materials. Introduced only a little over two years ago, the Nitroparaffins are already serving practically every type of industry.

Consolidated Products Co., Inc., 15 Park Row, New York, N. Y. **Booth 182**

Corn Products Refining Co., 17 Battery Place, New York, N. Y. **Booths 51-52**

Due to present conditions no products will be on display. However, there will be an exhibit of materials made from these products, and a comfortable place to sit and discuss problems.

Corning Glass Works, Corning, N. Y. **Booth 169**

A complete line of laboratory and industrial glassware, showing how glass conserves vital materials. Featured will be: Nash Centrifugal Pump with "Pyrex" glass parts, in operation (widely used in chemical, food and beverage, paper and pulp, textile and steel industries); "Pyrex" glass piping in a variety of sizes, with fittings; a modified Soxhlet design "Pyrex" extraction apparatus in operation, especially adaptable for extracting large volumes of materials.

F. M. deBeers & Associates, 20 N. Wacker Drive, Chicago, Ill. **Booth 125**

On exhibit will be equipment from Goslin-Birmingham Co., Fletcher Works, Inc., American Heat Reclaiming Corp., and Croll-Reynolds Engineering Co. Featured will be a cut-away model of spiral heat exchanger, a heavy duty centrifugal, a steam jet unit made of Synthane, Flexo disc expansion joints for high temperature and pressure work, and a Conkey dewaterer.

Denver Equipment Co., 1400—17th St., Denver, Colo. **Booth 131**

An interesting display case will be exhibited showing the importance of the flotation process in removing the outer, bitter hulls around a grain of wheat and its importance to the food industry for increasing the vitamin content of bread. Flowsheets of metallurgical plants showing the actual products produced, will also be used.

The Dicalite Co., 520 N. Michigan Ave., Chicago, Ill. **Booth 168**

There will be a complete specimen display of all Dicalite products. In addition, specimens of actual products in which Dicalite is used as an ingredient or which have been clarified with Dicalite Filteraids will be shown. This will demonstrate how Dicalite replaces critical materials in part or whole, or how it extends supplies of these materials.

The Dorr Co., Inc., 570 Lexington Ave., New York, N. Y. **Booths 89-90**

The central theme of this exhibit will be a summary of the work being done by the Dorr Co. in processing of essential metals for the war effort, based on the three basic Dorr operations of agitation, classification and sedimentation. A secondary theme will be the critical materials substitution in Dorr equipment, shown by means of colored working drawings. The Dorr Hydro-Treator, a self-contained water treatment unit, will also be featured.

Durametallic Corp., 2104 Factory St., Kalamazoo, Mich. **Booths 117-118**

DURA SEAL—A Mechanical Seal that rotates with the shaft.

DURA PRESSURE UNIT—for circulating lubricating oil at uniform pressure.

DURAMETALLIC—A flexible twisted metallic packing.

DURA PLASTIC—A plastic semi-metallic packing.

DURA HOOKS—A flexible handled packing puller.

Emery - Carpenter Container Co., 3620 W. 38th St., Chicago, Ill. **Booth 173**

Charles Engelhard, Inc., Newark, N. J. **Booths 59-61**

This exhibit is part of that of Hanovia Chemical & Mfg. Co. Indicating and Recording Pyrometers, Flualyzers and Gasalysers will be featured.

The Problem — —

One of Today's Vital Needs Is to Extend Supplies of Rubber and Latex

One Solution —

Resin and Lacquer Emulsions

—Developed to meet the need for *Substitutes*, *Extenders* and *Modifiers* for LATEX

VULPRENES—Solid Extenders and Substitutes

—for CRUDE, RECLAIMED and SYNTHETIC RUBBER

Resin and Lacquer Emulsions have been finding an ever-widening use in many industries. They have proved invaluable in replacing other materials in adhesives, modifiers, binders and fillers, grease proofing, waterproofing, sizing, impregnating, coating, color dispersions and innumerable other uses.

In the Rubber Industry these emulsions are being used today as *Latex Modifiers* and *Complete Latex Replacements* to extend, thicken, stabilize, increase penetration, improve resistance to acids, oils and solvents; in *Coatings* to produce adherent pigmented or clear coatings on paper, fabric, and rubber and as intermediate coats for lacquer on rubberized cloth; in *Rubberizing* textiles; in *Latex Treated Papers* to increase strength and improve ageing; in *Adhesives*, for paper, for leather to cloth, and cloth to cloth.

These are just a few of the known applications in the rubber field. Undoubtedly in your own plant you will find many uses for these emulsions to improve your products and extend the supply of the vital materials, LATEX, RECLAIMS, and SYNTHETICS.

Our Technical Staff Will Be Glad to Help You Solve Your Problems...

Write Today for Any Additional Information You May Require on our Products...

A few of Our Products of Interest to the Rubber Industry

VULPRENES A series of polymers designed to replace rubber for insulation, coatings, and moldings where the extreme flexibility, tensile strength, and abrasion resistance of rubber are not required. Available in a wide variety of modifications for individual requirements.

ALKYD 18 An alkyd type resin emulsion which is non-yellowing and non-oxidising. Film is water-white and non-tacky. Preferred where slight oxidising action may be considered harmful to rubber. Extender for latex in coating, combining and impregnating processes.

EMULSION 58-8 A series of emulsified elastomers containing up to 65% solids. Recommended for use as full latex replacements in impregnation and combining.

PIGMENT BASES Concentrated aqueous dispersions of pigments in resin bases, available in all shades and viscosities, suitable for spreading, spraying, etc.

Also Acrylic, Vinyl, Maleic, Phenolic, Hydrocarbon, Ethyl Cellulose, Cellulose Acetate and Nitrate emulsions and solutions for various applications.



AMERICAN RESINOUS CHEMICALS CORPORATION

Coatings • Rubber Synthetics • Resin, Wax, Lacquer Emulsions

MAIN OFFICE and LABORATORIES

PEABODY, MASS.

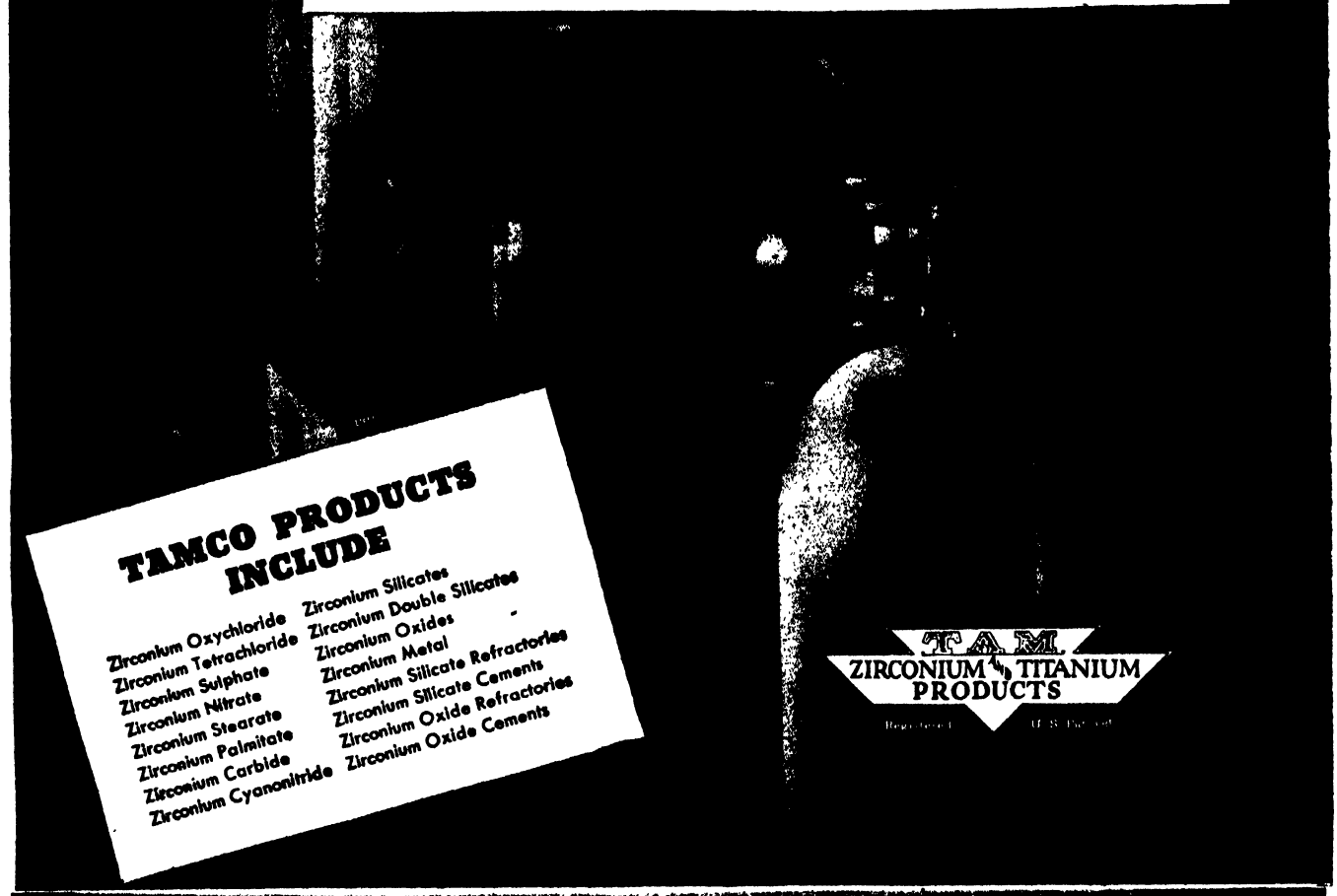
Factory Branches: Newark, N. J., and Chicago, Ill.

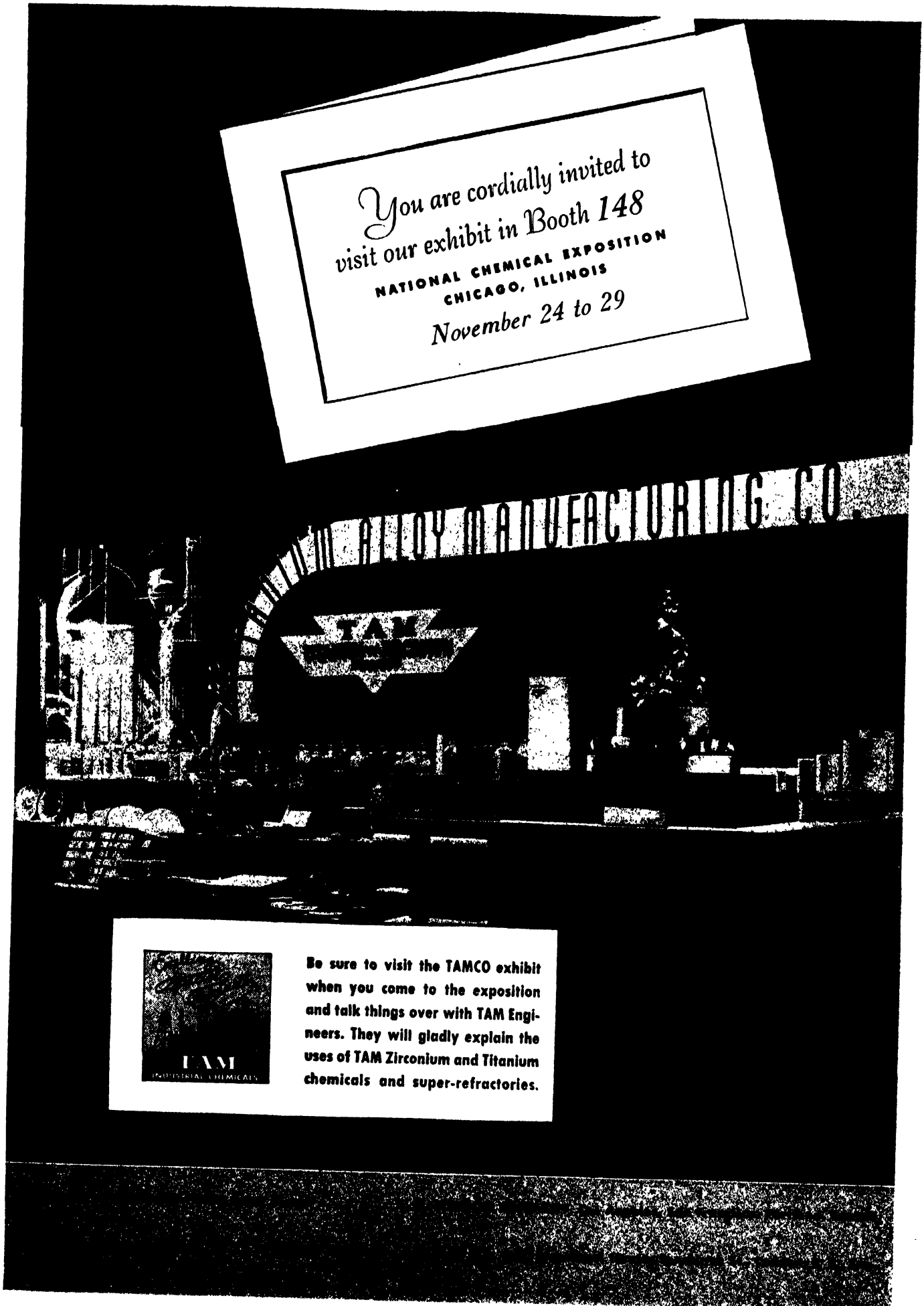
ZIRCONIUM
in industry

Today, Defense and non-defense manufacturing has emphasized the ever-increasing uses and possibilities of the element ZIRCONIUM and its compounds in industry. TAMCO Zirconium compounds are being used successfully in the manufacture of Refractories, Electrical Resistors, Resins, Dye Extenders, Water Repellents, Catalysts, Abrasives, and Ceramics.

TAMCO'S development engineers and research laboratories have long been cooperating with the industry. Write today, for a TAM resident field engineer to call at your plant and discuss the potential use of Zirconium Compounds with you.

TITANIUM
ALLOY MANUFACTURING COMPANY




You are cordially invited to
visit our exhibit in Booth 148
NATIONAL CHEMICAL EXPOSITION
CHICAGO, ILLINOIS
November 24 to 29
TAM
Be sure to visit the TAMCO exhibit when you come to the exposition and talk things over with TAM Engineers. They will gladly explain the uses of TAM Zirconium and Titanium chemicals and super-refractories.

Ertel Engineering Corp., 40 W. 48th St., New York, N. Y. Booth 197

In general there will be on display equipment for the process industries. Particularly featured will be the hard rubber filter and acid-resistant pump made by this company, self priming and suitable for liquids up to 200° F.

Eutectic Welding Alloys, Inc., 40 Worth St., New York, N. Y. Booths 195-196

Castolin Eutectic Alloys will be demonstrated, showing their advantages in production welding and the reclamation of equipment. The process used allows low temperatures, combined with high tensile strength and is applicable to steel of all compositions, cast iron, malleable iron and non-ferrous metals. This process is valuable for salvage work and maintenance.

Fansteel Metallurgical Corp., 2200 Sheridan Rd., N. Chicago, Ill. Booth 134

Featured will be a plant for the production of anhydrous hydrogen chloride. Models, charts and photographs will describe HCl absorption systems, anhydrous HCl plants, gas coolers for chlorine, heat exchangers for corrosive equipment and Tantalum parts for chemical plant use.

Federal Classifier Systems, Inc., 127 N. Dearborn St., Chicago, Ill. Booth 164

On display and in action will be laboratory air classifying units that serve to separate finely ground material according to particle size. Also a semi-commercial battery operating under positive pressure and adapted to chemicals, plastics plus various powdered metals of any density.

The Filter Paper Co., 57 E. 24th St., Chicago, Ill. Booth 63

On display will be a complete line of filter papers, asbestos filter pads and fibre, filter aids, cloth and quartz, laboratory filter presses, pumps and motors, stainless steel and glass-lined tanks, Filco easy ride conveyors, and similar material. The strategic position of filter media and equipment will be featured.

First Machinery Corp., East 9th St. & East River Drive, New York, N. Y. Booth 188

A full line of second hand machinery and chemical equipment for the industries will be outlined with posters and literature.

Fisher Scientific Co. & Eimer and Amend, 711-23 Forbes St., Pittsburgh, Pa.; 633 Greenwich St., New York, N. Y. Booths 115-116

Here is a combination exhibit of apparatus and chemicals. The Fisher Scientific Company will show recent developments in instruments and apparatus for laboratory and research work, particularly for the industrial plant. The Eimer and Amend Company will have on display a full line of Tested Purity Reagents.

W. J. Fitzpatrick Co., 111 N. Canal St., Chicago, Ill. Booth 177

Models exhibited will be of completely new design, two of them especially developed for war work. On display will be a Model D Comminuting Machine in three models and a Model A Triturating Machine in a single model.

General Ceramics Co., Keasbey, N. J. Booths 80-81

Featured will be corrosion-proof ceramic equipment for the chemical industries, of standard design, for many purposes outside of the strictly chemical field. Stoneware pumps, valves, piping and containers will constitute most of the exhibit. Also on display will be a new porous diaphragm of ceramic ware for electrochemical operations.

Glycerin Producers Assn., c/o Miner Laboratories, 9 S. Clinton St., Chicago, Ill. Booth 157

With the approval of the government, glycerine will be on display. No active promotion will be attempted due to the restriction on glycerine sales.

Glyco Products Co., Inc., 234 King St., Brooklyn, N. Y. Booth 62

Featured will be a number of esters of various Polyhydric Alco-



Let's talk "Turkey" about NORDSTROM valves



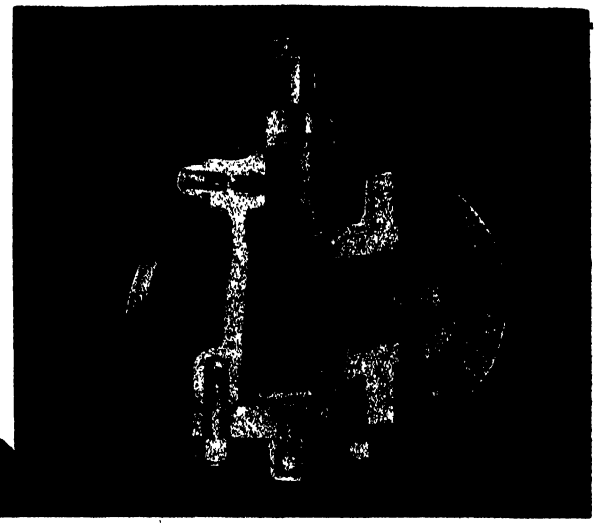
You've probably seen hundreds of Nordstrom Valves in various chemical plants — yet you yourself may never have tried them. We claim without reservation that Nordstrom Valves will cost you less to operate than any other type of valve you have ever used. We claim that they are easiest to operate, most fool-proof in construction, most compact in design. Because they are lubricated with "Sealdport" lubrication they most effectively guard against corrosion, erosion, etc. For such extreme conditions and for high temperatures we recommend our Merchrome Coated valves. Ask for further details.

MERCO NORDSTROM VALVE COMPANY

A Subsidiary of Pittsburgh Equitable Meter Co.

Main Offices: Pittsburgh, Pa. Branches in principal cities.

KEEP UPKEEP DOWN



hols which are suggested as plasticizers, synthetic waxes, emulsifying agents, softeners, etc. Also on display will be new chemicals to meet the requirements and problems of the war industries and products made from available raw materials to be used as substitutes for materials no longer available.

Graver Tank & Mfg. Co., East Chicago, Ind. **Booth 104**

On display will be the Graver Remote Control Chemical Proportioner, with diagrammatic drawings showing the application of this unit to water treating plants. Various installation photographs covering water conditioning equipment will also be displayed. Featured will be a Proportioner which provides accurate feeding of chemicals in proportion to the volume of water being treated.

B. F. Gump Co., 431-437 S. Clinton St., Chicago, Ill. **Booths 87-88**

On exhibit will be full sized models of Bar-Nun rotary sifters, Draver Feeders and continuous mixing systems, Bar-Nun "Auto-Check" net weighers and Vibrox Barrel packers. These units will be ready for operation, to show their uses in grinding, sifting, mixing, weighing and packaging dry, powdered or granular products.

D. W. Haering & Co., 205 W. Wacker Drive, Chicago, Ill. **Booth 50**

A complete exhibit of scale and corrosion specimens will be featured as a "Chamber of Horrors" including many charts and diagrams relating to this control. An operating model cooling system and a model proportioning installation will also be displayed as well as chemical pumps, and water treatment chemicals.

Hamilton Manufacturing Co., Two Rivers, Wis. **Booths 144-147**

On exhibit will be an assembly of various items of furniture for the industrial laboratory such as a fume hood, storage cases, titration tables, work tables and sinks. Also a line of Victory Filing units of wooden construction.

W. A. Hammond Drierite Co., Yellow Springs, Ohio **Booth 54**

This industrial dehydrating agent will be shown in regular, DuCal, Indicating and molded forms. Particular emphasis will be placed on the use of this material in defense and war industries. Also shown will be a Flosdorf-Mudd Cryochem apparatus widely used in the dehydration of serums from the frozen state.

Hanovia Chemical & Mfg. Co., Chestnut St. & N. J. R.R. Ave., Newark, N. J. **Booths 59-61**

A comprehensive display of ultraviolet ray lamps in many sizes and capacities as used in industrial plants. Illustrated will be the ultraviolet water sterilizer apparatus for formation of vitamin D from sterols and equipment for polymerization and halogenation processes, such as the chlorination of synthetic rubber, acrylic acid, acetic acid and mineral wax. Fused quartzware of many shapes will also be featured.

Hardinge Co., York, Pa. **Booth 82**

This exhibit will be based on the major products manufactured, such as cone mills, rod, tube and batch mills, the Hardinge "Feedometer," classifiers, dryers, thickeners, and similar equipment for the process industries.

Republic **HOMOGENEOUS LEAD COATINGS**

are:

INSEPARABLE FROM THE BASE METAL

•

TIN FREE

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DENSE—NON-POROUS

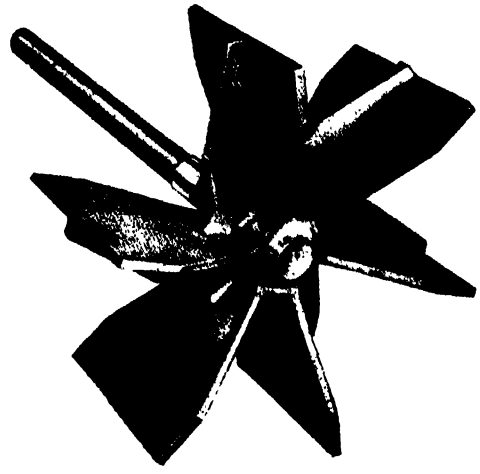
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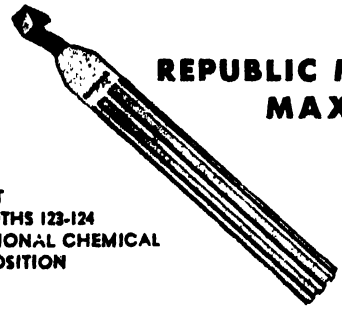


Even the sharp edge of a chisel cannot separate a Republic homogeneous lead coating from its steel base. Republic's exclusive "tin-free", non-metallic flux permits bonding lead to steel with a bond virtually inseparable — comparable to Class 2 A.S.M.E. Welding. Republic homogeneous coatings expand and contract with the base metal — no embrittlement . . . no cracking . . . no buckling.

Republic's exclusive process results in a lead coating of unrivalled purity (99.97% pure) plus a dense, non-porous structure which prevents "pin-hole" rusting through the pores of the lead.

Write for new Bulletin No. 1700, today.





REPUBLIC MULTI-EDGE ANODES PROVIDE MAXIMUM THROWING POWER

The efficiency of a lead anode is in direct proportion to the number of its throwing edges. Republic's 10-cornered lead anode gives maximum throwing power, and hence, greatest plating efficiency. Hooks are made to specification and are burned into the anodes by the exclusive Schlundt process.

VISIT
BOOTHS 123-124
NATIONAL CHEMICAL
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REPUBLIC LEAD EQUIPMENT CO.

JONES ROAD • CLEVELAND, OHIO

A UNIT OF THE UNITED STATES STONEWARE CO.

Two Ways to Find SUBSTITUTES for *hard-to-get* materials!



A few classifications of Glyco Products and some of the industries that use them:

Products

Polyhydric Alcohol Esters	Special Emulsions
Defoaming Agents	Synthetic Waxes
Deodorizers	Preservatives
Emulsifying Agents	Synthetic Resins
Plasticizers and Flexibilizers	Wetting and Foaming Agents

Industries

Abrasives	Oils
Adhesives	Paper
Cements	Pigments
Ceramics	Polishes
Coatings	Rubber
Leather	Textiles
Lubrication	Soaps and Cleaners

1. If you plan to come to the National Chemical Exposition in Chicago, be sure to visit our booth. Here you will find complete information on replacements available in regular commercial quantities for such products as:

Glycerin	Dibutyl Phthalate
Beeswax	Carnauba Wax
Montan Wax	Aluminum Stearate (Technical)
Japan Wax	Olive Oil (Technical)
Ozokerite	Vegetable Gums (For thickening)

Industrial chemists from our laboratories will be in attendance to discuss your specific problems. Glyco Products have proven themselves a dependable source to scores of manufacturers and chemists who have been looking for substitutes for *hard-to-get* materials. Also on display at the booth will be Glyco's regular products: emulsifying agents, polyhydric alcohol esters, synthetic waxes, etc. . . . they have helped many people — maybe they can help you.

2. If you are unable to attend the show, write today for your free copy of our new catalog. It contains many formulae, new ideas, and complete information on a wide selection of synthetic materials. Our laboratories are always available to people who are looking for replacements of hard-to-get materials or who have specific problems in which Glyco Products may be of service. May we hear from you?

CHEMICALS BY GLYCO

GLYCO PRODUCTS CO., INC.

248 KING STREET BROOKLYN, N. Y.

Haveg Corp., Newark, Del. **Booth 121**

Featured will be typical examples of the wide range of applications which have been developed to substitute Plastics for critical materials of construction. New plastics are available for strong acid and caustic processes. Also featured will be the important, new Haveg-Saran pipe and tubing.

Hercules Powder Co., Wilmington, Del. **Booths 129-130**

A report on the latest news on available chemicals for industry will be given. Major focus will be on war-important uses and the choice of materials to meet them. Several new products, among them Dresinate, Hercules chlorinated paraffin, and hydroabietyl alcohol, will also be presented.

Honan - Crane Co., Lebanon, Ind. **Booth 181**

K. H. Huppert Co., 152-156 W. Walton Place, Chicago, Ill. **Booth 97**

On exhibit will be electric furnaces for production and laboratory use. This display will consist of units covering a multiple range of temperatures and sizes. Included will be automatic and manual temperature control equipment.

Illinois Electric Porcelain Co., Macomb, Ill. **Booth 65**

Featured will be the use of porcelain pipe and fittings to replace strategic materials in process industries today. There will be on display samples of high grade wet porcelain piping, with fittings, flanges, valves, which form a complete, corrosion and resisting unit.

Industrial and Engineering Chemistry, 330 West 42nd St., New York, N. Y. **Booths 122-126**

Publications of the American Chemical Society.

Industrial Instruments, Inc., 156 Culvert Ave., Jersey City, N. J. **Booth 92**

A complete line of conductivity apparatus for laboratory and plant test and control will be exhibited. Also on display will be Limit Bridges, conventional Wheatstone Bridge, Resistance and Capacitance Decade Boxes, Megohm Bridge and Voltage Breakdown Testers—equipment adapted from laboratory technique for use in general industrial practice.

Infilco, Inc., 325 W. 25th Place, Chicago, Ill. **Booth 102**

On exhibit will be the Accelator, Cation and Anion Exchangers, Gel Catalysts, Silica Gels and Zeolites. Featured will be an example of solids precipitation from process industry liquids by the Accelator process; production of "distilled water" without distillation, by the Catanexer and new uses for silica gel and gel catalysts.

Insto - Gas Corp., 1900 E. Jefferson Ave., Detroit, Mich. **Booth 56**

The famous trade character "Gassy Gus" will assist in showing the instant lighting and safety features of Insto-Gas torches and furnaces and their many uses for the chemical factory maintenance. Various types and sizes of torches and metal melting furnaces will be on display, particularly the No. 1-A lead welding torch.

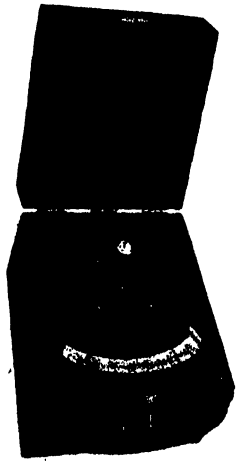
PRECISION
SIMPLICITY
DEPENDABILITY

3 "MUSTS" in your instrumentation purchases for war-time production!

All three are an integral part of your purchase when you buy "Engelhard" Industrial Precision Instruments. For these qualities and many new and special features are "built in" by skilled workmen who have spent their lives on precision instrument work. *Simplicity* has been achieved only through careful and extended tests. *Precision* and *dependability* — under the most severe service conditions — result from the fine tolerances required in Engelhard construction and in close attention to even the most minute details.

Manufacturers of Precision Instruments for Over 40 Years!

Indicating and Recording Pyrometers
Automatic Temperature Control

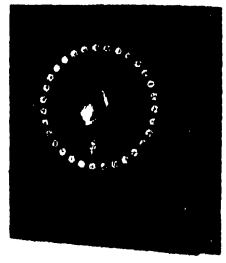


Industrial, Automotive and Fuel Gas Analyzers



Thermocouples and Accessories
Packless Solenoid Valves





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90 CHESTNUT ST., NEWARK, NEW JERSEY

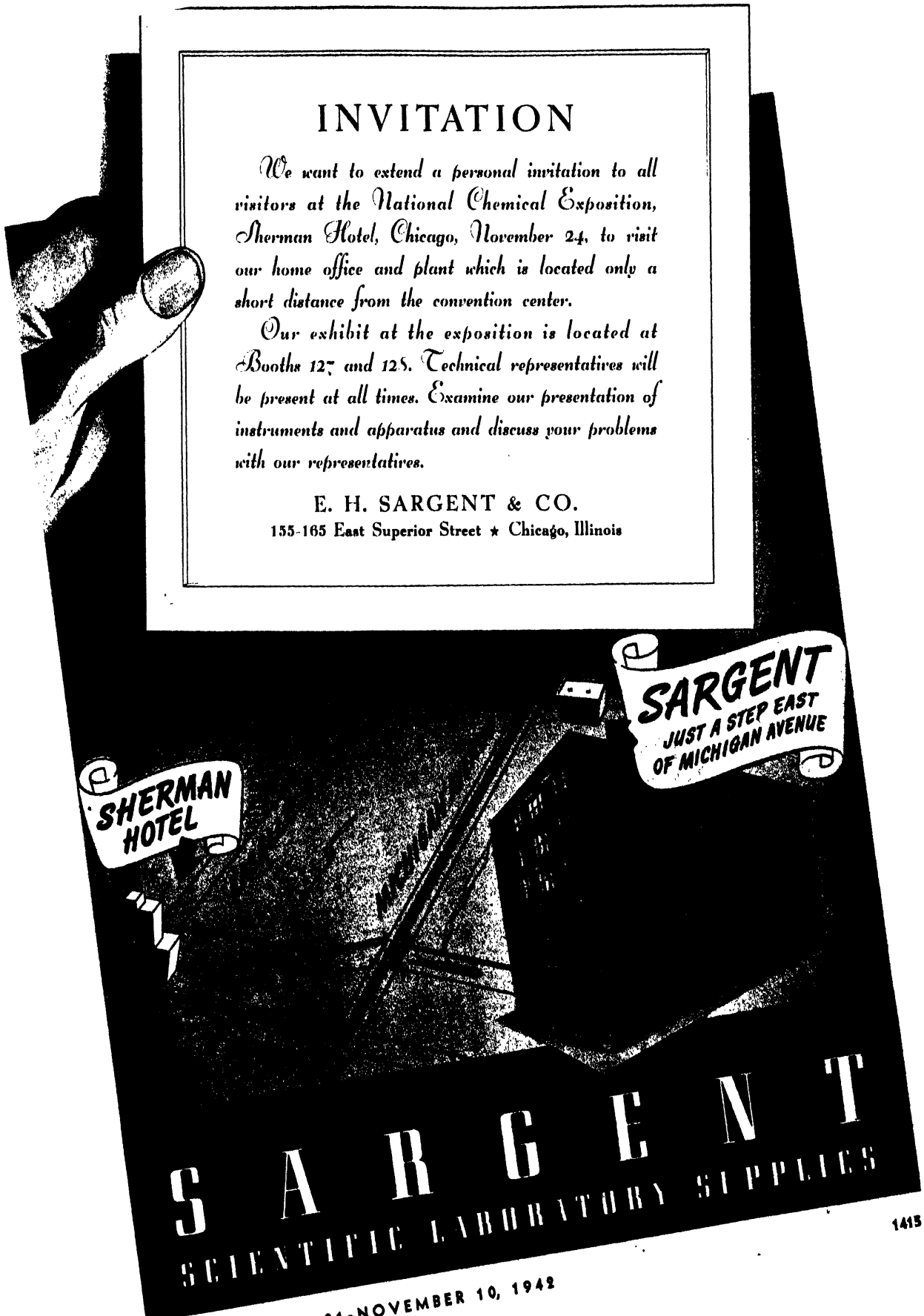
INVITATION

We want to extend a personal invitation to all visitors at the National Chemical Exposition, Sherman Hotel, Chicago, November 24, to visit our home office and plant which is located only a short distance from the convention center.

Our exhibit at the exposition is located at Booths 127 and 128. Technical representatives will be present at all times. Examine our presentation of instruments and apparatus and discuss your problems with our representatives.

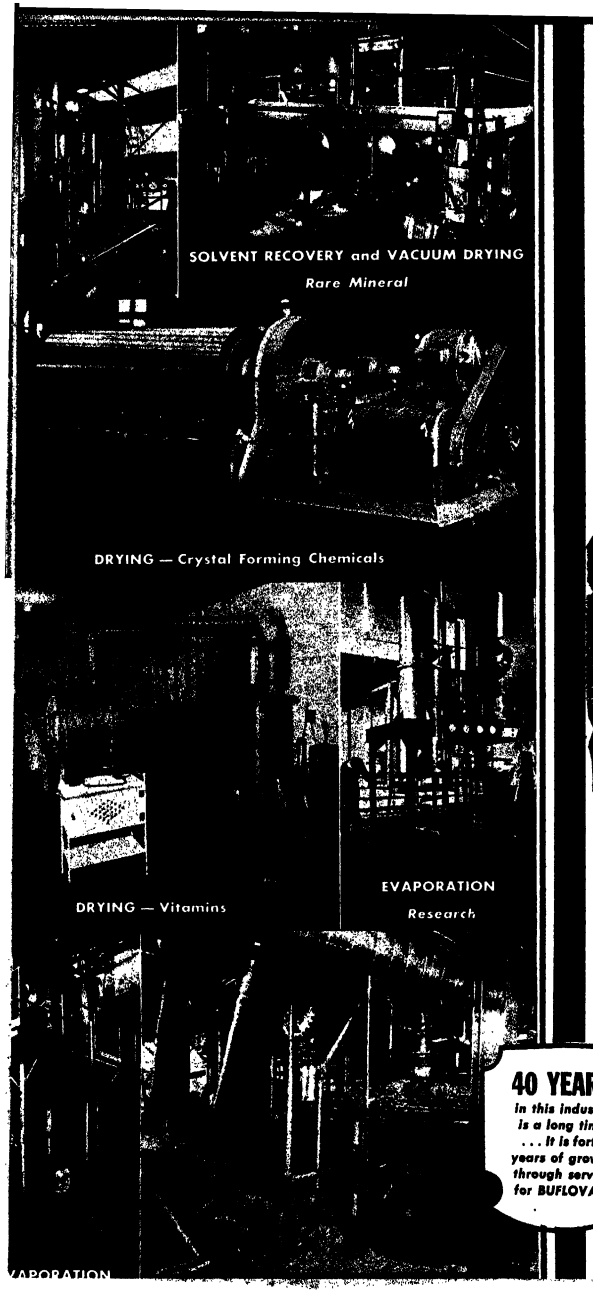
E. H. SARGENT & CO.

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To Help You

PLAN TODAY



BOOTH 143
NATIONAL CHEMICAL EXPOSITION
CHICAGO NOV. 24–29

for TOMORROW

IN striving to meet the seemingly impossible production requirements and changed processes imposed by the war, many American manufacturers are keenly aware of the inadequacy of their present equipment. The major problem, in most cases, is one of equipment conversion . . . to meet today's needs with yesterday's equipment, *and still plan for tomorrow.*

To solve such problems successfully often requires more than a conference of plant executives. It's a job for men who have served the whole processing industry; and who are, therefore, abreast; or even ahead of the times in creative design. This is a job requiring combined technical advice with adequate research facilities.

To help you with such problems, we invite you to meet the BUFLOVAK Engineers at the National Chemical Exposition in Chicago, this month . . . Submit your problems to them—they can offer many valuable suggestions right there.

If they haven't the answer, they will get it for you promptly, thru the facilities of the BUFLOVAK Engineering Department, Research and Testing Plants. This is the source from which more than 4000 processing problems involving drying, evaporation, extraction, impregnation, solvent recovery, crystallization, etc., have been successfully handled during the past 30 years.

To those unable to attend the National Chemical Exposition, we extend this offer: Send us your problem in detail and we will submit a complete, unbiased report or suggestion prepared by our Technical Staff.

BUFFALO FOUNDRY & MACHINE COMPANY • 1551 Fillmore Avenue • BUFFALO, N. Y.

PLAN TODAY ... **BUFLOVAK** for TOMORROW

DESIGNERS AND BUILDERS OF

Autoclaves
Atmospheric Drum Dryers
Chemical Plant Equipment
Vacuum Drum Dryers
Vacuum Shelf Dryers
Rotary Dryers
Vacuum Rotary Dryers
Pan Dryers
Evaporators
Flakers
Impregnators
Solvent Recovery Equipment

BOOTH 125

A Center for Process Machinery and Equipment

Handling ASSOCIATED LINES with a call on the COMBINED and successful EXPERIENCE of old established companies clearing through our exchange, we offer a COMPLETE SERVICE to all who need DATA, PRICES, etc.

• • • •

Representing—

Goslin-Birmingham Mfg. Co.
Main Office & Shops—
Birmingham, Ala.
Sales—350 Madison Ave.
New York

EVAPORATORS—Modern, high velocity multiple-effects. F. C. Concentrators—all other types. Any metal or alloy—cast or welded.

FILTERS—Complete line—all sizes.
VALLEZ—rotating leaf clarifying pressure filters.
McCASKELL—Rotary disc continuous pressure filters. New. ROTARY VACUUM DRUM filters. All types for every service.

SPECIAL PROCESS MACHINERY. Flakers—Sugar house equipment. Conkey Dewaterers—heaters, etc.

• • • •

American Heat Reclaiming Corp.
1270 Sixth Ave.—New York

THE
SPIRAL HEAT EXCHANGER—a tube-less, full counter-flow unit. Hundreds in service—offering the following operating advantages:—

- High heat trans. coefficients.
- Low pressure drop—streamline flow.
- Small floor space—compact.
- All surfaces easily cleaned.
- Minimum radiation losses.
- Reduced scaling due to rapid, centrifugal, turbulent flow.
- Uniform-rapid-temperature change.
- Extra wall thickness can be used for corrosive materials.

See our interesting exhibit.

• • • •

F. M. deBeers & Associates
CHEMICAL ENGINEERS
20 North Wacker Drive
Chicago, Ill.-Tel. RANdolph 2326

Serving the Middle-West thru representation of well-known, progressive builders of modern Process Machinery and Equipment.

Johns-Manville Corp., 22 E. 40th St., New York, N. Y. Booths 83-84

J-M Celite Filter-Aids and Mineral Fillers feature this exhibit, the keynote being the high-flow rate grades that, in many cases, are making it possible to get greater production from present processing equipment without the sacrifice of clarity or quality, using the filter aids; and the many war uses, including camouflage paints, of the mineral filler.

Kewaunee Manufacturing Co., Adrian, Mich. Booths 179-180

Featured at this exhibit will be a new material "Kemrock" for table tops, sinks, vats, fume hoods, etc., where a high resistance to acids and alkalis is required. Also a new, adjustable stool which is instantaneous in its adjustment, of wood, and with less than five ounces of metal in its construction. A special titration table, with unusual lighting for easy and accurate reading will also be featured.

Kimble Glass Co., Vineland, N. J. Booth 142

A comprehensive display of Kimble Blue Exax and Normax Precision Retested graduated ware and the special Kimble Brand laboratory glassware and apparatus. A new unit is the Brewer culture dish cover—an ingenius but simple device for easy cultivation of anaerobes without expensive equipment. Featured will be bottles and other items for preparation and injection of parenterals, especially blood plasma.

Kold-Hold Manufacturing Co., 424 N. Grand Ave., Lansing, Mich. Booth 73

On exhibit will be a Hi-Low Cabinet, a Hot and Cold Bath unit and a minus 90° F. 5 cubic foot model cabinet, all in actual operation. These machines are for the production calibration and type testing of instruments, temperature processing of sub-assemblies, rapid cooling and heating of metal parts in shrink fits, and for the rapid aging of heat-treated parts. All models come in horizontal types, too.

The Koppers Co., Koppers Bldg., Pittsburgh, Pa. Booths 68-70

No actual products will be exhibited but displayed will be an illuminated background on which

BOOTH 125

A Center for Process Machinery and Equipment

Handling ASSOCIATED LINES with a call on the COMBINED and successful EXPERIENCE of old established companies clearing through our exchange, we offer a COMPLETE SERVICE to all who need DATA, PRICES, etc.

• • • •

Representing—

Croll-Reynolds Co.
Croll-Reynolds Eng. Co.
17 John St.—New York

Complete plants for high vacuums. Boosters. Single and multi-stage steam jet units. Barometric Condensers. Vacuum cooling and Refrigeration plants. EVACTORS for deodorizing, deaerating, distilling service. See the corrosion resistant Evactor made of Synthane—also other items in our exhibit.

FLEXODISC packless expansion joints for high temperatures and pressures. Widely used in steam plants, also in many large, modern refineries for high octane gasoline.

• • • •

Fletcher Works Inc.
Main office and plant—
Philadelphia, Pa.

High speed CENTRIFUGALS—Perforate—also solid baskets. Suspended types—overhead motors—bottom discharge. Under-driven machines—top and bottom discharge. Vapor Tight hoods—liquid seals. Baskets—curbs—made of any metal. Also lined with silver, resistant alloys, lead, rubber, etc. Over 75 years of experience. See our Centroid speed control for unloading—safe, dependable—automatic. We'll be exhibiting our new model 12" Pilot plant centrifugal. Drop in and see this sturdy machine operate.

• • • •

F. M. deBeers & Associates
CHEMICAL ENGINEERS
20 North Wacker Drive
Chicago, Ill.-Tel. RANdolph 2326

Serving the Middle-West thru representation of well-known, progressive builders of modern Process Machinery and Equipment.

DESPITE tremendous preoccupation with the war effort, we are represented at the National Chemical Show with much of interest and import now and for the future.

Developments have been accelerated by war-imposed scarcities; war conditions are responsible for some highly specialized techniques to meet current demands. The progress report of chemical applications in industry is exceedingly interesting and you may find developments of real significance to your own business. Our technical representatives will be on hand.

ATLAS CHEMICALS

Plasticizers
Emulsifiers
Humectants
Resins
Chemical Raw Materials for Synthesis

ATLAS EXPLOSIVES

DARCO ACTIVATED CARBONS

for Purifying, Deodorizing and Decolorizing

ZAPON FINISHES

for Planes, Gliders, Shells, Trucks, Army Equipment, Packaging, etc.—Substitutes for Critical Materials

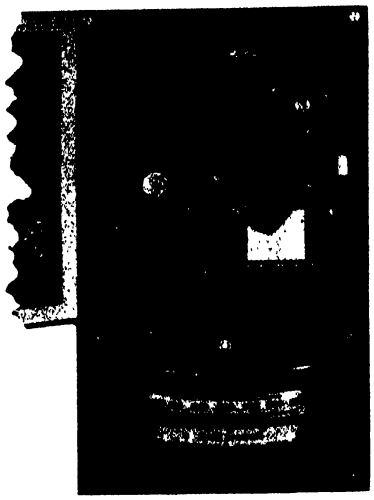
ZAPON-KERATOL

Coated fabrics—for Army Raincoats, Life Belts, Rafts, etc.

CHEMICALS ATLAS

ATLAS
POWDER COMPANY
Wilmington Delaware

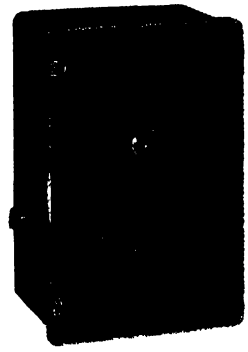
DARCO
CORPORATION
50 East 42nd St., New York, N.Y.



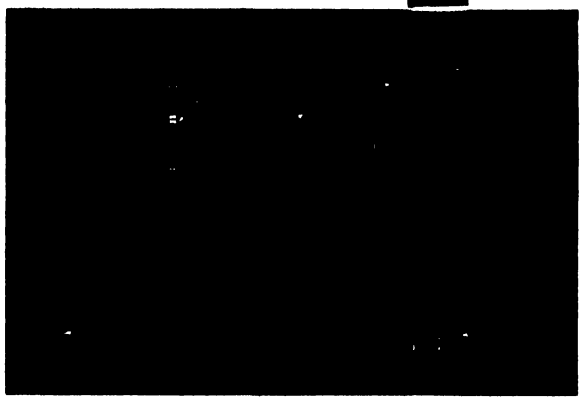
Wheelco UNIVERSAL
Program Controller

THESE *Wheelco*

The Wheelco UNIVERSAL "Electronic Principle" Controller, with Program Control integrally incorporated, provides dependable enforcement of any heating or cooling cycle with completely automatic temperature regulation, plus instantaneous control action and extreme accuracy of temperature measurement. UNIVERSAL Program Controllers are available as Capacitrols, Potentio-trols or Resistance Therm-otrols, and adaptable to all types of processes for measuring, indicating or controlling temperatures from −50 to +3600°F., or equivalent °C.

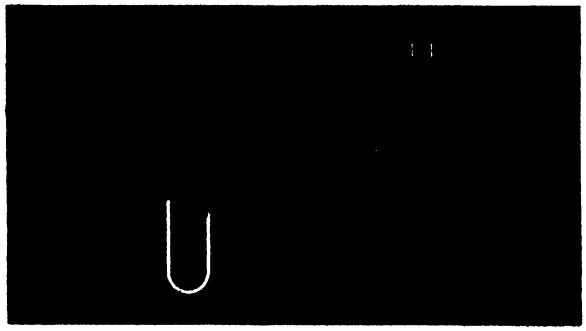


Wheelco REMOTE
CONTROLLER



INTERFACE CONTROL — An Interface Pick-up Unit is placed in the vessel with the tip at the point where the interface is to be maintained. A movement of the interface between the two liquids causes control action.

These Remote Controllers employ the Wheelco "Electronic Principle" Control System and can be utilized for most applications where control is essential. In no case is it necessary to have any contact between the factor being controlled and the actual control apparatus. They operate on a differential of .001 to .125 inch change in liquid level. They may be used with electrolytic liquids as well as dielectric liquids having dielectric constants of as low as 1.8. Wheelco Remote Controllers can be actuated by any means which will affect the capacity or inductance of the Pick-up Unit as is suggested by the diagrams on the left and below. See this Controller in operation, or write for Bulletin Z6000.



FLOW OR DIFFERENTIAL PRESSURE CONTROL — The Pick-up Unit is applied to a differential pressure manometer measuring pressure drop across a flow meter orifice plate. Flow is governed by means of a motorized throttling valve, energized by a Remote Controller.



LIQUID LEVEL CONTROL — The Immersion Pick-up is used where gage glasses are not permissible. The Remote Controller will energize the valve motor to open or close the valve, according to the position of the liquid level with respect to the Pick-up Unit.

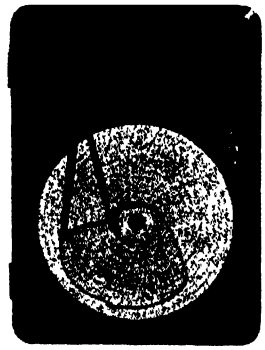
CONTROLLERS

Save . . .

VITAL WAR PRODUCTION MAN HOURS and MATERIAL

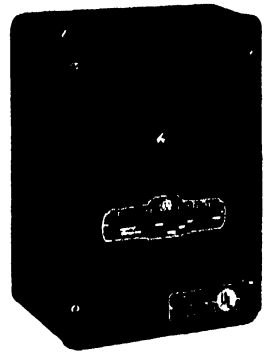
—thru the famous "Electronic Principle" Control System that revolutionized the temperature control field when it was introduced in 1935, and which has since been proved to provide faster, more accurate control than any other type of control. The Proved-in-Service Superiority of the "Electronic Principle" Control has been demonstrated in every application where temperature control is essential. It pays daily dividends in the form of product uniformity, reduced spoilage and increased production by eliminating the faults inherent in other types of controllers.

Wheelco "Electronic Principle" Temperature Controllers may be combined with Flame-otrol (combustion safety control), Proportioning Control, Program Control or Purging Timers. Scale ranges from −50 to +3600°F., or equivalent °C. Request Bulletin No. Z6000.



Wheelco Program Therm-otrol

The Wheelco Program Therm-otrol combines the Proved-in-Service Superiority of the "Electronic Principle" Thermometer Controller with Program Control to provide dependable enforcement of any heating or cooling cycle, with completely automatic temperature regulation. Therm-otrols are available as Indicating or Recording Controllers and may also be combined with Flame-otrol (combustion safety control), Proportioning Control or Purging Timers. Scale ranges from −50 to +1000°F., or equivalent °C. Request Bulletin Z6000.



Wheelco Flame-otrol

The Flame-otrol is a combustion safeguard which assures positive protection against combustion explosion hazards, regardless of fuel burned. The Flame-otrol provides instantaneous shut-off of fuel supply in case of flame failure. It is the only combustion safeguard listed and approved by both Underwriters' Laboratories and the Associated Factory Mutual Laboratories for all types of fuel. Furnished for any complete operation—electric ignition, manual or automatic, time delay for purging or any other sequence desired. Request Bulletin L2.

Wheelco Instruments Co.
851 W. HARRISON STREET CHICAGO, ILL.

Originator of "Electronic Principle" Temperature Controls

See these and other *Wheelco* Instruments
In SPACE 41 at the Chemical Exposition
or — WRITE FOR DESCRIPTIVE LITERATURE

will be featured Ammonium Thyocyanate. The basic construction features of Koppers Coke Ovens will also be shown.

Leader Iron Works, 2110 N. Jasper St., Decatur, Ill. **Booth 42**

Principally through the media of photographic illustrations, there will be exhibited a wide variety of steel and alloy process equipment including tanks, kettles, heat exchangers, fractionating columns, and special equipment of other types.

Lithgow Corp., 333 W. 40th Place, Chicago, Ill. **Booth 155**

Featured will be the unusual applications and corrosion tests of two special coatings: Lithcote and Cotoid. The former is based on phenolaldehyde resins, the latter on copolymer vinyl resins. Most of the immersion tests to be shown have been in progress for over five years.



Loeb Equipment Supply Co., 910-914 N. Marshfield Ave., Chicago, Ill. **Booth 55**

Used equipment for the process industries. Also Alsop electric mixers, glass-lined tanks, filters and like equipment.

The Ludlow-Saylor Wire Co., Newstead Ave. & Wabash R. R., St. Louis, Mo. **Booths 85-86**

Screens and wire cloth will be shown in a variety of square and oblong meshes from coarse screens woven of one-inch rods to gauges having 325 meshes per lineal inch. Included in the exhibit will be samples of stainless steel, Monel metal, nickel, aluminum, tinned steel, galvanized and plain steel, brass, bronze and other commercial metals and alloys.

Lukens Steel Co., Coatesville, Pa. **Booths 136-139**

The preparation and rolling of slabs of Nickel-Clad, Inconel-Clad and Monel-Clad Steels, their subsequent rolling and flanging and the fabrication of various pieces of equipment will be shown in a kodachrome motion picture. Also, in movie form will be shown the casting, in the open hearth of a huge 110,000-lb. ingot and its final form of a 76,000-lb. plate.

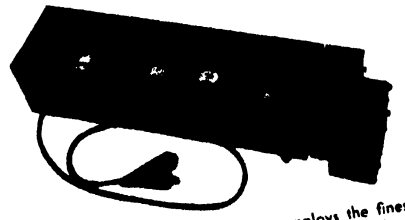
Marathon Paper Mills Co., Rothschild, Wis. **Booth 96**

This exhibit will feature the use of lignin to replace metals and other strategic materials. The paper products shown are designed to replace metal foils, tin plate and similar materials in the food industry. Lignin plastics are for use in place of certain phenolic plastics or metal.

Merck & Co., Inc., Rahway, N. J. **Booths 105-106**

The vital role of nutrition in wartime will be featured. A high light of this will be a striking display of the crystalline structure of individual, pure vitamins. Other sections will show the part played by the sulfonamides and other chemotherapeutic agents in the treatment of war burns and wounds, as well as strategic chemicals essential to the war program.

SAVE TIME with these Beckman Instruments



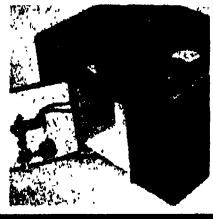
THE BECKMAN SPECTROPHOTOMETER employs the finest type crystal quartz monochromator covering the full spectral range of interest in spectrophotometry 200 mu in the ultra-violet to 2000 mu in the infra-red. Interchangeable light sources adapt it for all types of spectraphotometric work and direct readings can be made in both % Transmission and Density, simultaneously. Although remarkably versatile and accurate, this instrument is unusually simple to operate. Send for descriptive literature!

Today minutes are priceless. Anything that will speed up industrial processes...anything that will save time in research work ...anything that will help you do your job better, *faster*, is worth investigating thoroughly.

And that's where Beckman equipment fits into the picture. For in thousands of laboratories and industrial plants throughout the nation, Beckman instruments are cutting vital hours from process operations...are speeding up production of essential materials...are reducing waste... are increasing the ease and accuracy of research and control determinations.

Read about these instruments. Note their many outstanding features... *features provided by no other similar equipment on the market today.* Then send for *detailed information* on the instruments you need to speed up YOUR production!

THE BECKMAN LABORATORY pH METER provides highest accuracy and versatility in pH research and control work. Has direct temperature compensation. - 1300 to + 1300 mv scale for oxidation-reduction potentials ..continuous (non-ballistic) indication of circuit unbalance and many other time-saving features A wide variety of special electrodes is available for use with this instrument, adapting it to the many requirements of research work Ask for Bulletin 31!



NATIONAL TECHNICAL LABORATORIES • South Pasadena, Calif.

THE BECKMAN INDUSTRIAL pH METER combines unusual simplicity with the ruggedness necessary for portable plant and field use. Its sealed and shielded glass electrode system can be used anywhere with complete freedom from electrical disturbances. It gives instant pH readings at the touch of a button .. and also provides continuous pH indication over the full range 0 to 14 pH. Ask for Bulletin 21!

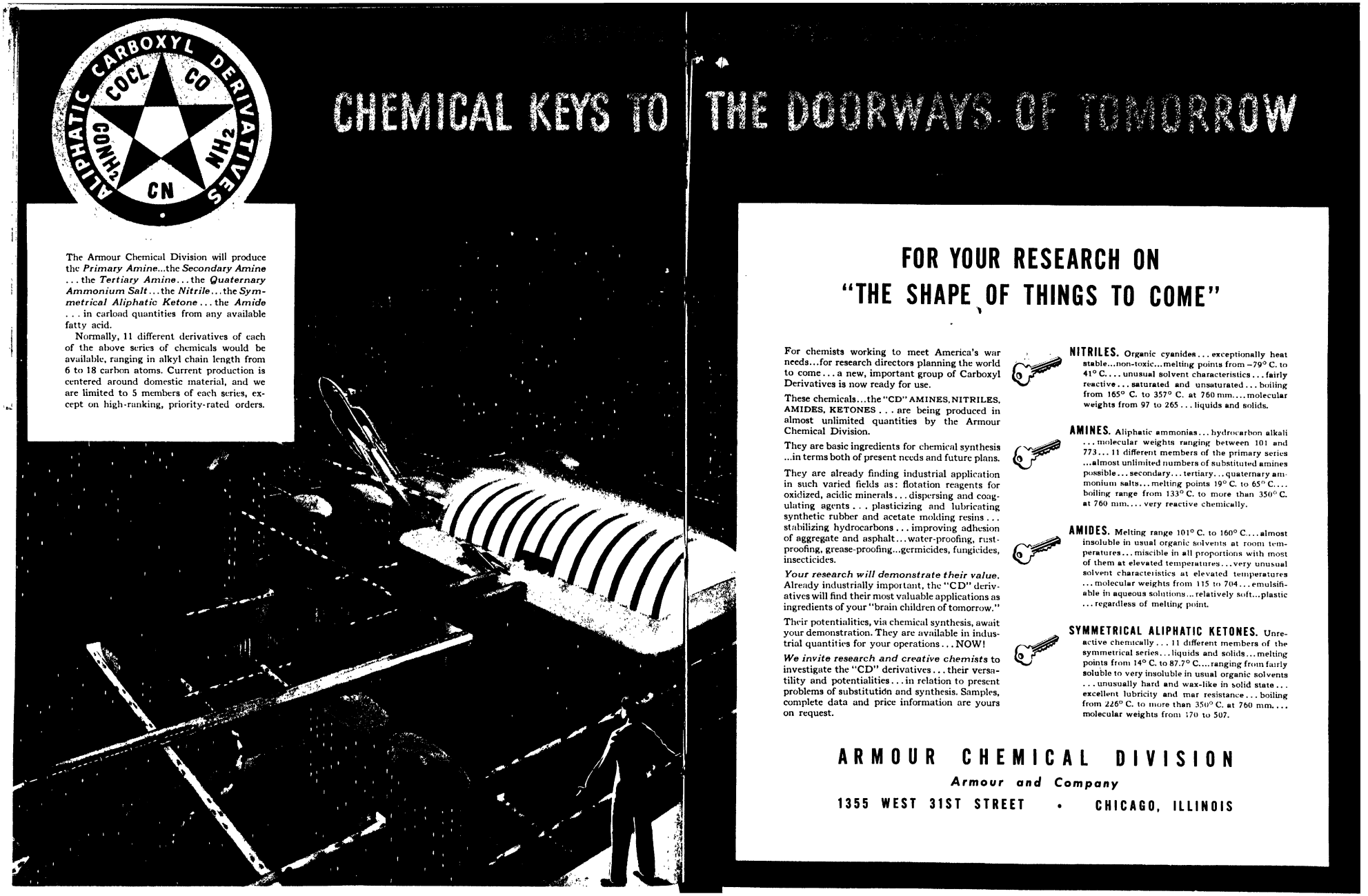


THE BECKMAN AUTOMATIC pH METER is the most advanced pH instrument available today. It is used to control —*automatically*—large scale industrial process operations ...operates directly from 115-volt AC current (no batteries) ...and incorporates all the famous Beckman pH developments such as Sealed and Shielded Glass Electrodes...Automatic temperature compensation... use of Beckman High Temperature and High pH Electrodes for difficult conditions...etc. Can be used with *any* standard potentiometric recorder and control equipment. Ask for Bulletin 16!



IMPORTANT! Among the many advancements available in Beckman pH Equipment *exclusively* are *Beckman High Temperature Glass Electrodes*—the *only* glass electrodes that can be used continuously at temperatures to as high as 100°C. (212°F.)...and *Beckman High pH Electrodes*—the *only* glass electrodes that can be used in highly alkaline solutions, *even in the presence of sodium ions.* These important features mean wider adaptability, higher accuracy, greater speed in your pH control operations. *Only Beckman equipment has them!*

Beckman INSTRUMENTS SPEED PRODUCTION ...REDUCE WASTE



CHEMICAL KEYS TO THE DOORWAYS OF TOMORROW

The Armour Chemical Division will produce the *Primary Amine*...the *Secondary Amine* ... the *Tertiary Amine*... the *Quaternary Ammonium Salt*... the *Nitrile*... the *Symmetrical Aliphatic Ketone*... the *Amide* ... in carload quantities from any available fatty acid.

Normally, 11 different derivatives of each of the above series of chemicals would be available, ranging in alkyl chain length from 6 to 18 carbon atoms. Current production is centered around domestic material, and we are limited to 5 members of each series, except on high-ranking, priority-rated orders.

FOR YOUR RESEARCH ON "THE SHAPE OF THINGS TO COME"

For chemists working to meet America's war needs...for research directors planning the world to come... a new, important group of Carboxyl Derivatives is now ready for use.

These chemicals...the "CD" AMINES, NITRILES, AMIDES, KETONES ... are being produced in almost unlimited quantities by the Armour Chemical Division.

They are basic ingredients for chemical synthesis ...in terms both of present needs and future plans.

They are already finding industrial application in such varied fields as: flotation reagents for oxidized, acidic minerals... dispersing and coagulating agents ... plasticizing and lubricating synthetic rubber and acetate molding resins ... stabilizing hydrocarbons ... improving adhesion of aggregate and asphalt... water-proofing, rust-proofing, grease-proofing...germicides, fungicides, insecticides.

Your research will demonstrate their value. Already industrially important, the "CD" derivatives will find their most valuable applications as ingredients of your "brain children of tomorrow."

Their potentialities, via chemical synthesis, await your demonstration. They are available in industrial quantities for your operations... NOW!

We invite research and creative chemists to investigate the "CD" derivatives... their versatility and potentialities... in relation to present problems of substitution and synthesis. Samples, complete data and price information are yours on request.

NITRILES. Organic cyanides... exceptionally heat stable...non-toxic...melting points from −79° C. to 41° C.... unusual solvent characteristics... fairly reactive... saturated and unsaturated... boiling from 165° C. to 357° C. at 760 mm.... molecular weights from 97 to 265... liquids and solids.

AMINES. Aliphatic ammonias... hydrocarbon alkali ... molecular weights ranging between 101 and 773... 11 different members of the primary series ...almost unlimited numbers of substituted amines possible... secondary... tertiary... quaternary ammonium salts... melting points 19° C. to 65° C.... boiling range from 133° C. to more than 350° C. at 760 mm.... very reactive chemically.

AMIDES. Melting range 101° C. to 160° C.... almost insoluble in usual organic solvents at room temperatures... miscible in all proportions with most of them at elevated temperatures... very unusual solvent characteristics at elevated temperatures ... molecular weights from 115 to 704... emulsifiable in aqueous solutions... relatively soft...plastic ... regardless of melting point.

SYMMETRICAL ALIPHATIC KETONES. Unreactive chemically... 11 different members of the symmetrical series... liquids and solids... melting points from 14° C. to 87.7° C.... ranging from fairly soluble to very insoluble in usual organic solvents ... unusually hard and wax-like in solid state... excellent lubricity and mar resistance... boiling from 226° C. to more than 350° C. at 760 mm.... molecular weights from 170 to 507.

ARMOUR CHEMICAL DIVISION

Armour and Company

1355 WEST 31ST STREET • CHICAGO, ILLINOIS

Merco - Nordstrom Valve Co., 400 Lexington Ave., Homewood, Pittsburgh, Pa. Booth 40

An illuminated center unit will illustrate Nordstrom patented "Sealdport" lubrication. Nordstrom valves will be displayed to show ease of operation. In addition will be featured various types of gas meters, gas pressure regulators and Pittsburgh-National liquid meters.

Metal Glass Products Co., Belding, Mich. Booths 166-167

Mojonnier Bros. Co., 4601 W. Ohio St., Chicago, Ill. Booth 78

Featured here will be a set of photomurals showing the Mojonnier Vacuum spray dehydrators for converting products into powder; a new, high-density evaporator; cold wall tanks that are used for storage and cooling; Mojonnier Foamless Fillers especially suited for filling chemical products where care must be taken not to incorporate air.

The Morse Magneto Clock Co., 17 East 42nd St., New York, N. Y. Booth 91

On exhibit will be the Morse Tape Clock, a portable watchman's clock with a tape in place of a dial. Distinctive features of this clock are: a printed record; order of stations visited distinctly shown; a three-day record on one tape; an unlimited number of stations, 900 or more.

National Engineering Co., 549 W. Washington Blvd., Chicago, Ill. Booth 149

On display will be a 24-inch model stainless steel laboratory-size Simpson Intensive Mixer, equipped for mixing under vacuum. The exhibit will also include examples of a wide variety of products whose ingredients were blended by the mulling action of the Simpson Mixer, showing its adaptability to many chemical industry problems.

National Technical Laboratories, 820 S. Mission St., South Pasadena, Calif. Booths 23-24

On exhibit will be: automatic pH Indicators for the continuous measurement of industrial proc-

IN PEACE AND IN WAR FEDERAL CENTRIFUGAL CLASSIFIERS ARE REQUISITIONED FOR THE JOB THAT IS RATED IMPOSSIBLE

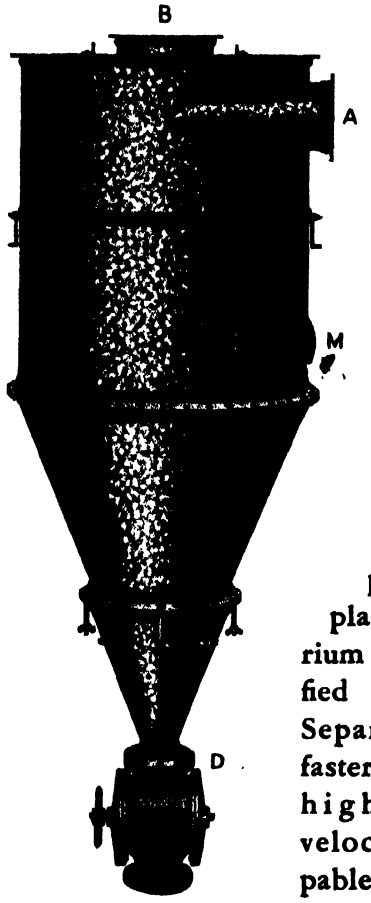
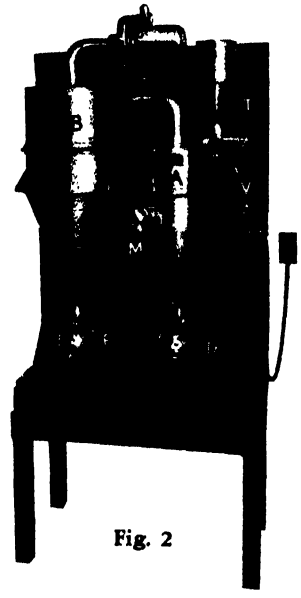
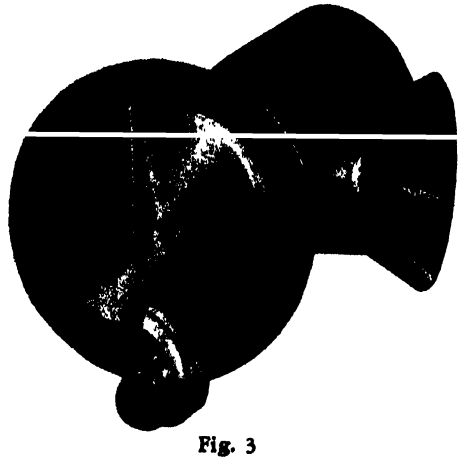


Fig. 1

Years of experimental work made it possible for Federal engineers to design and provide workable systems that refine vast tonnages of bauxite and aluminum oxide for ultimate production of rod, bar and sheet aluminum, also 1.5 micron powder for surfacing metal. Another achievement is amorphous silica for parachute cloth and for finishing transparent plastic sheets required to protect airplane pilots. Barium nitrate, classified with Federal Separators burns faster, resulting in higher muzzle velocity. Impalpable iron oxide serves to polish binocular lenses.


Fig. 2


Fig. 3

With power taken from light socket single Federal Laboratory Unit (Fig. 2) *classifies 3000 lbs. of powdered iron in 24 hours* for the Signal Corps. Valve, shown in (Fig. 3), controls particle size.

See Units Operating at Chemical Show, Chicago, November 24-29 Booth 164.

FEDERAL CLASSIFIER SYSTEMS, INC.
127 North Dearborn St. Chicago, Ill.

esses; a spectrophotometer suitable for measuring in the range of from 220 to 1000 millimicrons; another spectrophotometer for routine measurements in the 2 to 22 micron range; glass electrodes for the pH range of 0 to 14 and temperatures of 0° to 100° C.

Ohio Chemical Mfg. Co., 1177-1199 Marquette St., N. E., Cleveland, Ohio — **Booth 119**

On exhibit will be samples of the rare and common gases which are supplied to research and industrial laboratories.

Olson Filtration Engineers, 4630 W. Flournoy St., Chicago, Ill. — **Booth 94**

Omega Machine Co., 3409 E. 18th St., Kansas City, Mo. — **Booth 140**

Here will be shown a working model of 1/8 scale size, of a Gravimetric Feeder and Slaker actually feeding and slaking quicklime at high temperatures. Also shown are volumetric feeders and variable speed transmissions for feed drives and other light duty applications.

The Permutit Co., 330 W. 42nd St., New York, N. Y. — **Booth 79**

Operating will be equipment showing the use of materials for the removal of cations and anions as applied to water, the refining of solutions, recovery of small concentrations of ions, the separation of ionizable substances from non-ionizable substances—the technique of cation and anion exchange and removal as applied to industry.

Leonard Peterson & Co., Inc., 1222-34 Fullerton Ave., Chicago, Ill. — **Booth 176**

Laboratory furniture, including accessories in connection with it, will be on exhibit, special attention being given to equipment for industrial plants and research laboratories.

The Pfaudler Co., 89 East Ave., Rochester, N. Y. — **Booths 44-45**

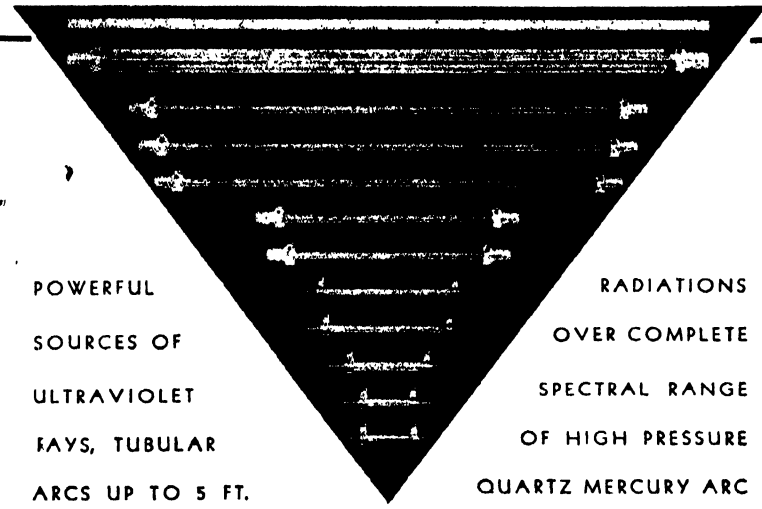
On display will be a small, high pressure, and glass-lined reaction kettle; glass-lined pipe, which, when jacketed, is used for heat exchanger. Emphasis will be the increased yield and decreased processing time, through elimination of undesired catalysis, by use of glass-lined equipment, as well as increased yield through high pressures and larger capacities.

Podbielniak Centrifugal Super-Contactor Co., 8312-44 S. Chicago Ave., Chicago, Ill. — **Booth 27**

Exhibit will consist of displays of precise laboratory fractionating apparatus, covering the entire boiling point range of distillable materials; also photographs, charts, etc., on the centrifugal counter-current contacting type of pilot and production scale fractional distillation and liquid-liquid reacting apparatus. A new apparatus, the "Semi-Robot," low-temperature fractionation analysis apparatus, and the "Hyper-Cal" high temperature unit will be shown, as well as the "Hyd-Robot" with new, automatic controls.

Proctor & Schwartz, Inc., 7th St. & Tabor Road, Philadelphia, Pa. — **Booth 112**

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actual units of drying and dehydrating machinery will be displayed. Photographs and diagrams will show the most advanced developments in industrial drying machinery. Samples of dehydrated foods from the new Food Dehydrator will also be shown.

Pulverizing Machinery Co., Chatham Rd., Summit, N. J. **Booth 135**

Exhibited will be several units appropriate for laboratory, pilot plant, or small industrial use. The MIKRO-PULVERIZER for demonstrating the usefulness for greater production, power savings, and fewer man hours of labor. The Bantam MIKRO-PULVERIZER for jobs too small for the bigger units. A stainless steel unit especially adapted for use on such products as pharmaceuticals, where absolute purity is necessary.

Raymond Pulverizer Div., Combustion Engineering Co., Inc., 1315 N. Branch St., Chicago, Ill. **Booth 111**

Small model unit of various separators and pulverizers will be on display. Features will be model units of air separators (mechanical air classifiers) for laboratory and commercial use; mechanical air separators; a laboratory mill for soft and medium hard materials, with feeder, screen mill, etc.

Reinhold Publishing Corp., 330 West 42nd St., New York, N. Y. **Booths 122-126**

Books for the chemical profession and the process industries, including the American Chemical Society Monographs.

Ross & Rowe, Inc., 75 Varick St., New York, N. Y. **Booth 43**

A complete line of various grades of Lecithin will be on exhibit. Also there will be shown the advancements made during the past year, in the quality and standardization of lecithin and the application of the correct grade of lecithin both as a surface tension modifier and antioxidant agent. The use of this material in camouflage paint will be demonstrated, as well as its use as a shortening extender in baked goods.

Sarco Co., Inc., 475 Fifth Ave., New York, N. Y. **Booth 175**

Steam Traps of four types; thermostatic, high pressure, for individual trapping of process equipment and related supply lines; low pressure for steam heating systems; float-thermostatic for hot water generators, heat exchangers and process equipment requiring accurate temperature control; inverted bucket type for general industrial use.

Temperature Regulators, self-operating and electric, for hot water heaters, fuel oil heaters and all types of process work in chemical industries.

Pipe Line Strainers, for water, steam, compressed air, gas, etc.

E. H. Sargent & Co., 155-165 E. Superior St., Chicago, Ill. **Booths 127-128**

Emphasis will be placed principally on instruments for metallurgical analysis, such as modern high speed electrolytic analyzers and the Heyrovsky polarograph. Also on exhibition will be a wide variety of instruments and apparatus essential to the general industrial, testing, control, analytical and research laboratories.

Cenco's 6



Booth 178

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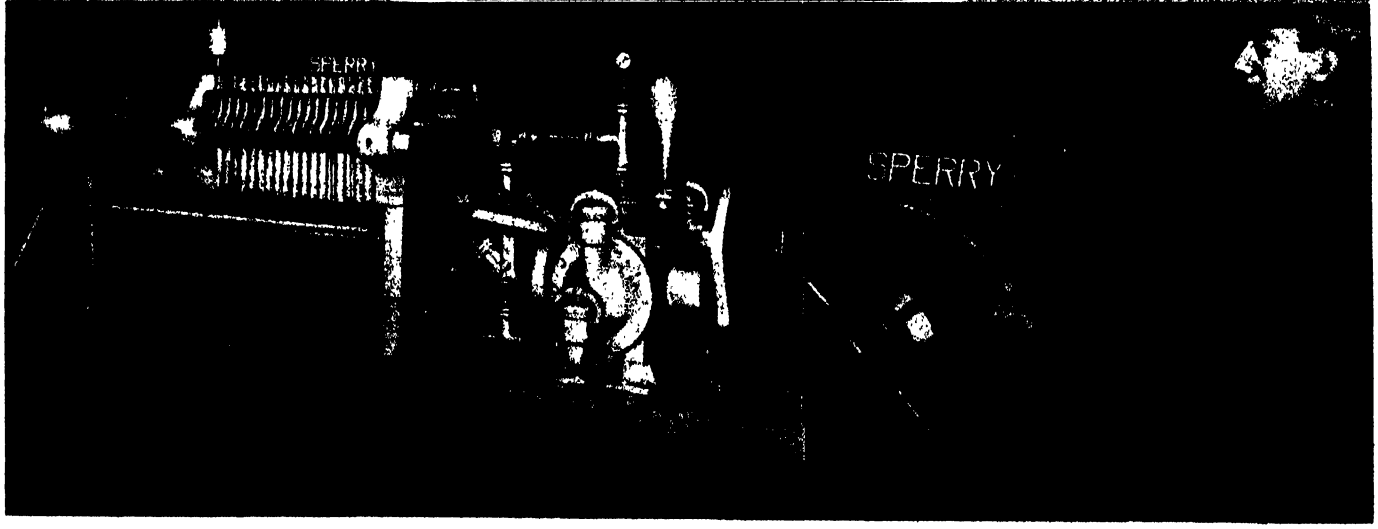
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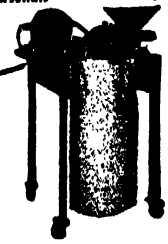
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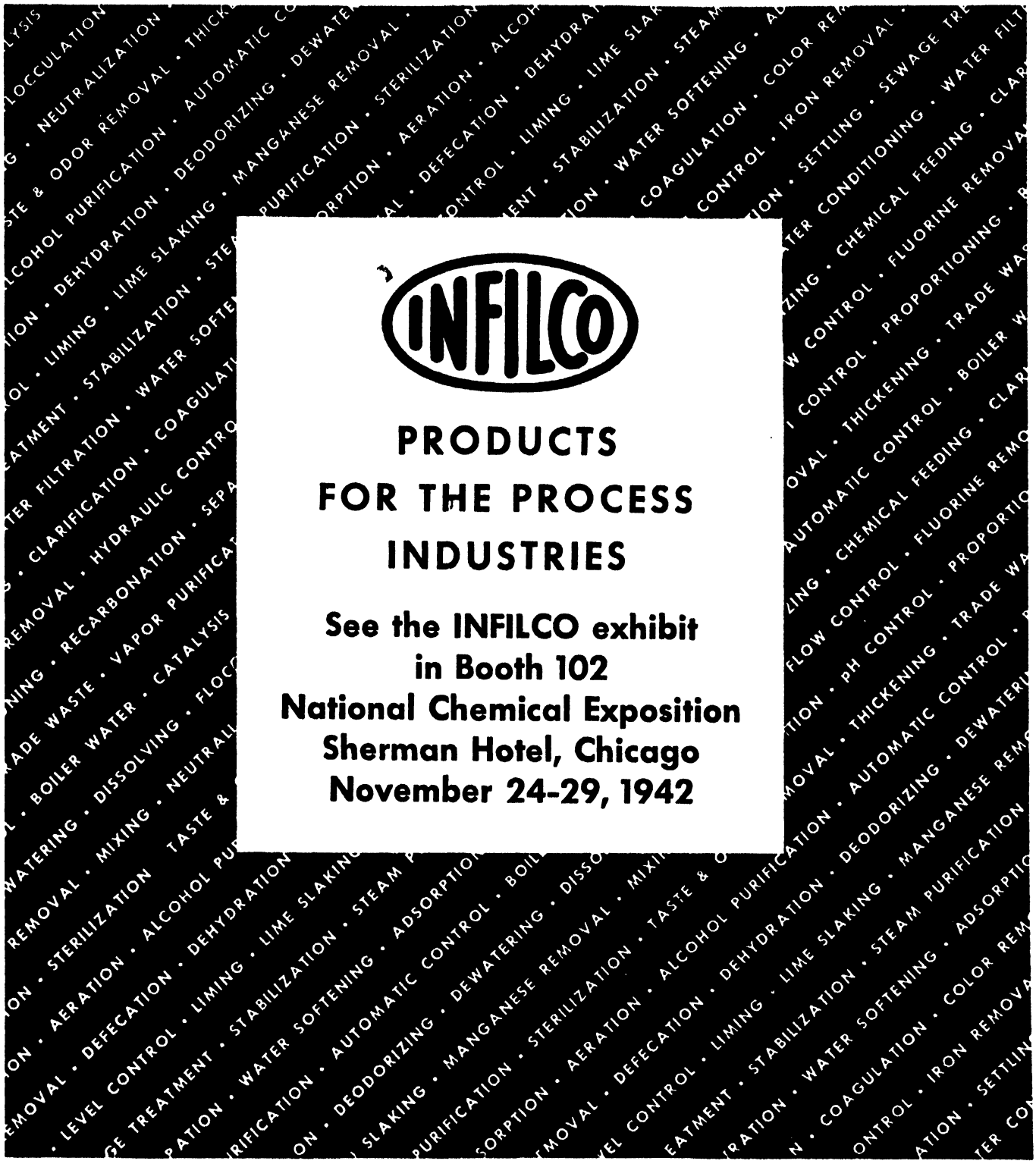
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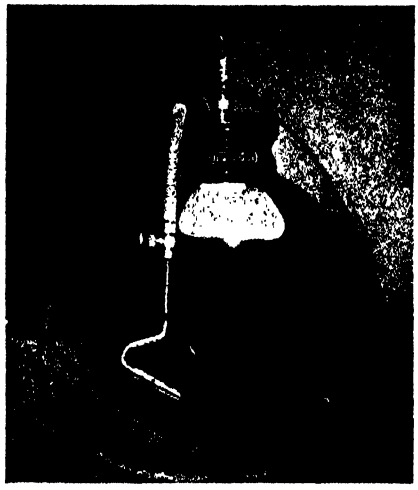
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Schaar Co., 754 W. Lexington St., Chicago, Ill. **Booth 109**

Here will be featured complete equipment for today's laboratories, with particular emphasis on new pieces of apparatus which will make the work of the chemist and the technician easier, faster and more accurate. Murgatroyd and Ermintrude will be present to assist, and make you feel at home.

Claude P. Schneible Co., 3951 W. Lawrence, Chicago, Ill. **Booth 199**

On display will be a Multi-Wash Collector equipment unit for the removal of dust, fumes or odors from exhaust air, to ventilate plant operations, remove nuisance or recover valuable products. An operating unit, with glass shell to demonstrate features and principles, will be in operation. Photomurals of installations will be exhibited also.

Schnell Publishing Co., Inc., 59 John St., New York, N. Y. **Booth 171**

Publications

The Selas Co., Erie Ave. & D St., Philadelphia, Pa. **Booth 93**

Micro-Porous porcelain filter crucibles—an outstanding example of substitution for chemical analytical filtrations. Other types of these filters eliminate the use of centrifuges and other separatory devices. Industrial grades of microporous ceramic media to replace corrosion resistant wire screen will also be featured.

The Sharples Corp., 23rd & Westmoreland Sts., Philadelphia, Pa. **Booth 114**

Due to present conditions, this exhibit will be limited to large size photographs illustrating the operation of the latest types of Sharples centrifuges. A laboratory model Super-Centrifuge will be on display to give a three-dimensional illustration of the principles covered in the photographs and cross sectional views.

E. H. Sheldon & Co., Muskegon, Mich. **Booth 103**

On display will be laboratory furniture and shop benches, fume hoods, wall tables, acid resistant table top material and similar equipment.

Sivyer Steel Casting Co., 1675 S. 43rd St., Milwaukee, Wis. **Booths 74-75**

A complete display will feature stainless steel castings, heat resistant steel castings, and similar units, both in the rough and machined stages. These include valves, fittings, filter press plates, and other important pieces of chemical industry equipment.

Sparkler Manufacturing Co., Mundelein, Ill. **Booth 71**

On display will be a laboratory filter with glass sides, in operation to show the building up of a filter cake on a horizontal plane. There will also be two new laboratory filters, one with an electrically heated jacket, the other with a steam heated jacket. There will also be a production size model in stainless steel, with a capacity of 600 gallons per hour.

D. R. Sperry & Co., Batavia, Ill. **Booth 25**

This exhibit will display many different types of industrial filter press plates as well as samples of various kinds of filter cloth. A small press will also be shown, complete, together with photographs and diagrams which explain the operation of the Electric Hydraulic Closing Device.

Titanium Alloy Mfg. Co., Niagara Falls, N. Y. **Booth 148**

Samples of their products will be on exhibit. These materials, such as zirconium, are taking the place of strategic materials in various industries. Zirconium oxide is for the ceramic industry, to replace tin oxide and antimony oxide. Zirconium and titanium products are being used also in the electrical field to replace mica and steatite.

Union Bag & Paper Co., Woolworth Bldg., New York, N. Y. **Booth 172**

Triangle Package Machinery Co., 906 N. Spaulding Ave., Chicago, Ill. **Booth 204**

On exhibit will be an eight section, volumetric filler of new design,

air operated for high speed and the accurate measuring and filling of powders and free flowing materials. Also on display will be reversible, rotating agitators which come to rest between discharges—a new unit in filling equipment.

Featured will be large multiwall paper bags now being used for types of shipping containers no longer available. Also a miscellaneous collection of special bags for automotive parts, tools, insecticides and many other uses and materials.

United States Stoneware Co., 60 East 42nd St., New York, N. Y. — **Booths 123-124**

Featured will be: "Tygon" synthetic rubber-like tank linings, tubing, gasket material, corrosion resistant paint; "Resilon" (depolymerized colloidal resin) tank linings for the replacement of rubber. Also on display will be a line of Chemical Stoneware and Ceramic equipment, including stoneware lined centrifugal acid pumps, chemical stoneware piping, valves, etc.

Walker - Wallace, Inc., 14 W. Utica St., Buffalo, N. Y. — **Booth 64**

Exhibited will be the APV Plate Heat Exchangers. These units come in either the H.E.R. or the "Paraflow" type, depending on the size and rate of flow needed. These units are available in five models of frames and ten types of plates, serving every purpose.

Wallace & Tiernan Co., Inc., Newark, N. J. — **Booth 133**

On display will be chlorine control apparatus, chemical feed control, water treatment equipment and reagent solution pumps. Featured will be experience and case histories showing the importance of chlorination and proper water treatment in eliminating production waste, as related to process and cooling waters.

Waukesha Foundry Co., Waukesha, Wis. — **Booth 46**

On exhibit will be examples of rough, polished and machined castings of corrosion resistant "Waukesha Metal," Monel, Nickel, Everdur, Brass, Bronze and Aluminum. Also on display are Waukesha pumps, ball bearing, rotary seal medols of positive displacement, slow speed type. One model will be in operation to illustrate adaptability for pumping operations in synthetic rubber and other chemical processing plants.

Wheelco Instruments Co., Harrison & Peoria Sts., Chicago, Ill. — **Booth 41**

On display will be the Universal Model Temperature Controller, Remote Controllers with gage glass, Immersion and Interface Pickups, Recording Thermometer Controller and the Flame-otrol, a combustion safety controller. In operation will be the Remote Controller and the Flame-otrol. Featured will be the interchangeable elements of the Universal Controller and the many applications of the Remote Controllers.

Wilkens - Anderson Co., 111 N. Canal St., Chicago, Ill. — **Booth 57**

New laboratory instruments will be displayed, among which the following will be especially featured: the Bendix Electro Deplater for tin plating; the Coleman Electronic Photofluorometer and Spectrophotometer; the WACO Electrolytic Apparatus for metal deposition. Also, of special interest, will be the Semi-Micro apparatus, which stretches the college chemical inventory 10 to 15 times.

Wilson Chemical Feeders, Inc., Buffalo, N. Y. — **Booth 152**

The Wilson "Pulsafeeder" a chemical feeder designed to feed practically any chemical in solution form will be shown in operation, with cut-away parts to show the construction. The important detail about this unit is the fact that the solution being pumped, whether it be sulfuric acid, a slurry, or other chemical solution, does not come in contact with any working part of the feeder.

York Ice Machinery Corp., York, Pa. — **Booths 47-48**

Through graphic presentation, the importance of air conditioning and refrigeration equipment to the total war effort will be given, particularly on applications in industrial chemistry. Featured will be manufacturing facilities or processes which have originated from or have been stimulated by the war-time requirements.

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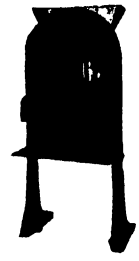


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PRODUCTS OF THE EXHIBITORS

With Booth Numbers

While this Index is intended to assist the visitors at the National Chemical Exposition in finding manufacturers of various materials and equipment, it should be noted that it is not, necessarily, complete in every case. For use as a guide to the general type of materials manufactured, we trust it will be of considerable value.

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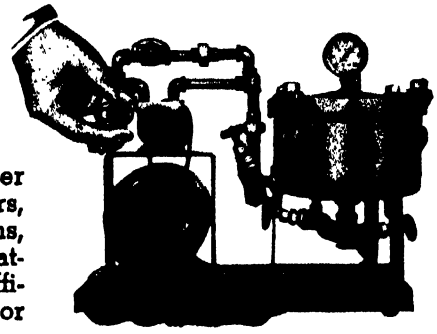
(Continued on page 1436)

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The unvarying quality and dependability of Merck Laboratory Chemicals are the result of a traditional insistence on the highest standards for the production of all products bearing the Merck label. Raw materials are obtained from the best-known sources of supply. Progressive research and control chemists are constantly engaged in the important work of improving the manufacturing processes to satisfy the high Merck standards and the exacting demands of modern industry. The tireless search for new and better products also is reflected in the development of containers which keep step with the most advanced trends and requirements.



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Our plants are working at full capacity day and night, coincident with the supply of raw materials, to meet the demands of the War Program, as well as the increasing requirements of our customers whom it is our desire to serve to the limit of our ability and our resources.

In these trying times, we trust that we may have the benefit of your cooperation and good will in order that we may be of every possible service during the National Emergency.

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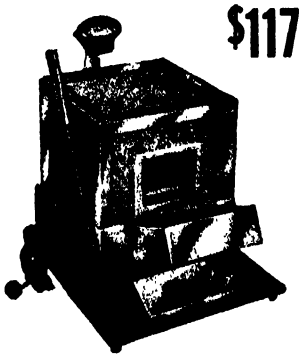
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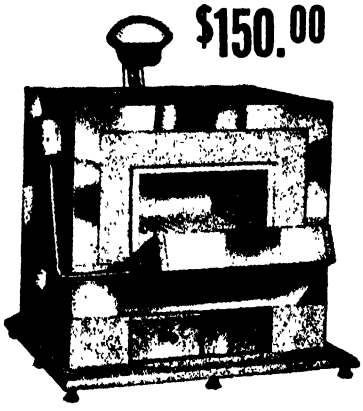
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Three heat ranges. High, 1400° F. to 2000° F. Medium, 800° F. to 1400° F. Low, 0 to 800° F. Seven point adjustment in each range permits maintaining the exact temperature desired. Large, accurate Pyrometer.

Extra large interior dimensions: 4½" wide, 3¾" high, 9" deep. Overall dimensions, 15" wide, 19" high, 25" deep. 110 or 220 volts, A.C. or D.C. Wattage load from 400, minimum, to 1700, maximum.

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Designed for heat treating various metals, laboratory samples and test work. Has three heat ranges: 0–800° F., 800°–1200° F. and 1200°–2000° F.

Furnished with removable porcelain tray, may be had with or without pyrometer, has counter weighted door, fully enclosed contacts, and Transite Base.

Operates on 110 v. A.C. or D.C.; min. load 800 w., max. load 1750 w. Special voltages also available at additional cost. Inside dimensions: 8" wide, 4" high, 6" deep (2" throat)

Huppert Furnaces are ruggedly built for heavy duty service, with no exposed contacts. Prices range from $24.75 up with standard heat ranges up to 2500° F. (Special voltages, dimensions and temperature ranges to order.)

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K. H. HUPPERT

196 W. Walton Place Chicago, Ill.

PRODUCTS OF THE EXHIBITORS

With Booth Numbers

(Continued from page 1434)

BARRELS AND DRUMS

Bennet Mfg. Co. 98
Emery-Carpenter Container Co. (fibre drums for dry products, semi-liquids, dangerous articles) 173

BASKETS—Dipping or Other

General Ceramics Co. 80-81
Haveg Corp. 121
Metal Glass Products Co. 166-167
United States Stoneware Co. 123-124

BEARINGS

Ampco Metal, Inc. 99
Buffalo Foundry & Machine Co. 143

BLENDERS

Metal Glass Products Co. 166-167
National Engineering Co. 149
Pfaudler Co. 44-45
Pulverizing Machinery Co. 135
Sarco Co., Inc. 175

BLOWERS

Federal Classifier Systems, Inc. 164
General Ceramics Co. 80-81
E. H. Sheldon & Co. 103

BOOKS

The McGraw-Hill Publishing Co. 141
Reinhold Publishing Corp. 122-126

BOTTLING MACHINERY

Ertel Engineering Corp. 197
Filter Paper Co. 63
Mojonnier Bros. Co. 78

BRICK—Acid Proof

General Ceramics Co. 80-81
United States Stoneware Co. 123-124

BRICKS—Insulating

Johns-Manville Corp. 83-84
Titanium Alloy Mfg. Co. 148

BRICKS—Refractory

Johns-Manville Corp. 83-84
Titanium Alloy Mfg. Co. 148
United States Stoneware Co. 123-124

BUILDING MATERIALS

Johns-Manville Corp. 83-84

BURNERS

Eimer & Amend 115-116
Central Scientific Co. 178
Fisher Scientific Co. 115-116
Insto-Gas Corp. 56
Schaar & Co. 109
Selas Co. 93
Wilkens-Anderson Co. 57

CABINETS—Chemical, Filing and Laboratory

Fisher Scientific Co. 115-116
Kewaunee Mfg. Co. 179-180
Leonard Peterson & Co., Inc. 176
E. H. Sheldon & Co. 103

CALORIMETERS

American Instrument Co. 67
Central Scientific Co. 178
Eimer & Amend 115-116
E. H. Sargent & Co. 127-128
Schaar & Co. 109
Wilkens-Anderson 57

CANS

Bennett Mfg. Co. 98
Marathon Paper Mills Co. 96
Schaar & Co. 109
Wilkens-Anderson Co. 57

CARBON

Atlas Powder Co. 107-108 (activated)
Commercial Solvents Corp. 150-151
The Filter Paper Co. 63

CARBOY TILTERS

Central Scientific Co. 178
Eimer & Amend 115-116

CARS—Tank

Alloy Products Corp. 153

CASTINGS

Ampco Metal, Inc. 99
Buffalo Foundry & Machine Co. 143
Croll Reynolds Co. 125
Koppers Co. 68-70
Waukesha Foundry Co. 46

CATALYSTS

Infilco, Inc. 102
Permutit Co. 79

CAUSTIC POTS

Buffalo Foundry & Machine Co. 143

CELLULOSE

Hercules Powder Co. 129-130

CEMENT

Hercules Powder Co. 129-130
Titanium Alloy Mfg. Co. 148
United States Stoneware Co. 123-124

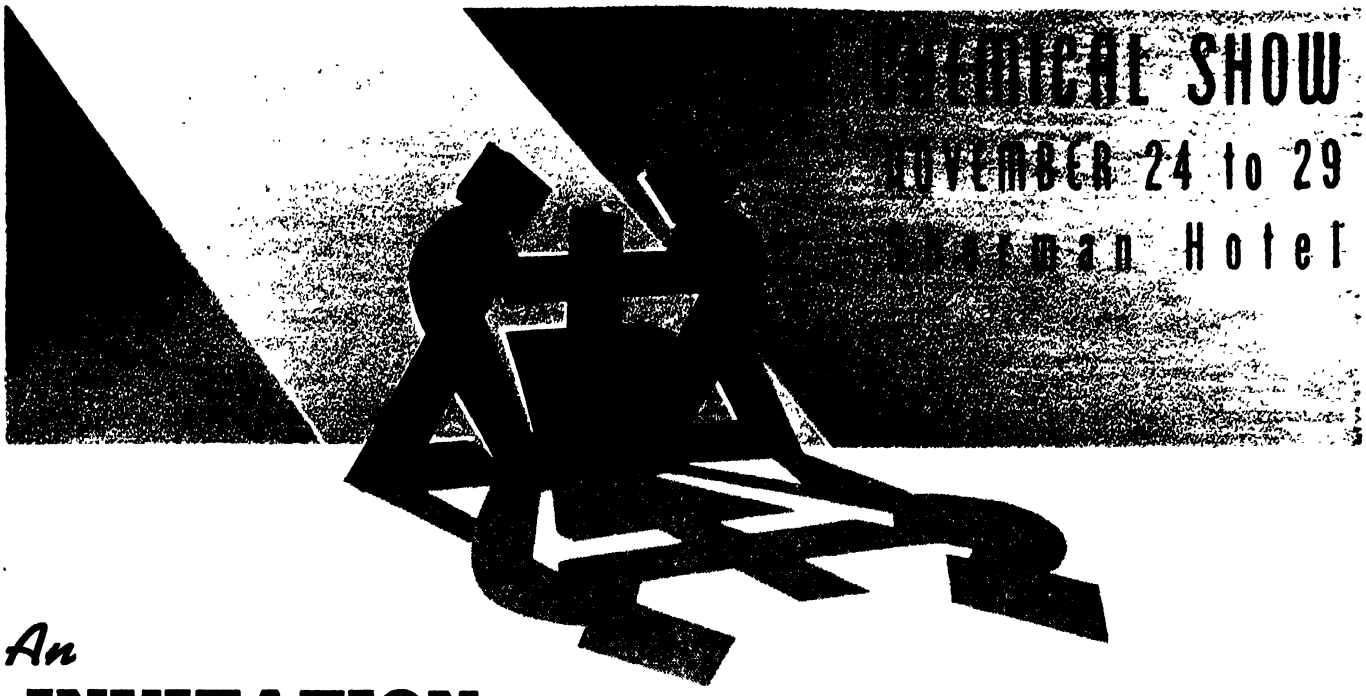
CENTRIFUGALS

Dorr Co., Inc. 88-89
Federal Classifier Systems, Inc. 164
Fletcher Works, Inc. 125
Schaar & Co. 109
Sharples Corp. 114

CERAMICS

General Ceramics Co. 80-81
Selas Co. 93
Titanium Alloy Mfg. Co. 148
United States Stoneware Co. 123-124

(Continued on page 1438)



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(Continued from page 1436)

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American Instrument Co. 67
Buffalo Foundry & Machine Co. 143
Corning Glass Works 169
Croll Reynolds Co. 125
Dorr Co., Inc. 88-89
Ertel Engineering Corp. 197
Fansteel Metallurgical Corp. 134
Federal Classifier Systems, Inc. 164
The First Machinery Corp. 188 (second hand)
Fisher Scientific Co. 115-116
Fletcher Works, Inc. 125
General Ceramics Co. 80-81
Goslin-Birmingham Mfg. Co. 125
Graver Tank & Mfg. Co., Inc. 104
Hardinge Co., Inc. 82
Haveg Corp. 121
Koppers Co. 68-70
Leader Iron Works 42
Loeb Equipment Supply Co. 55 (second hand)
Metal Glass Products Co. 166-167
National Engineering Co. 149
National Technical Laboratories 23-24
Permutit Co. 79
Pfaudler Co. 44-45
Pulverizing Machinery Co. 135
Raymond Pulverizer Div., Combustion Engineering Co. 111
Selas Co. 93
E. H. Sheldon & Co. 103
United States Stoneware Co. 123-124

CHEMICAL STONEWARE—Acid Proof

General Ceramics Co. 80-81
Kewaunee Mfg. Co. 179-180
Selas Co. 93
E. H. Sheldon & Co. 103
United States Stoneware Co. 123-124

CHEMICALS—Industrial

Alox Corp. 194-195
American Resinous Chemicals Corp. 113
Armour & Co. 132
Atlas Powder Co. 107-108
Commercial Solvents Corp. 150-151
Corn Products Refining Co. 51-52
Glycerine Producers Assn. 157
Glyco Products Co., Inc. 62
D. W. Haering & Co., Inc. 50
Hercules Powder Co. 129-130
Koppers Co. 68-70
Marathon Paper Mills Co. 96
Merck & Co., Inc. 105-106
Permutit Co. 79
Titanium Alloy Mfg. Co. 148

CHEMICALS—Laboratory

Alox Corp. 194-195
Atlas Powder Co. 107-108
Central Scientific Co. 178
Commercial Solvents Corp. 150-151
Corn Products Refining Co. 51-52
Elmer & Amend 115-116
Fisher Scientific Co. 115-116
Glyco Products Co., Inc. 62
Merck & Co., Inc. 105-106
Ohio Chemical & Mfg. Co. 119
E. H. Sargent & Co. 127-128
Schaar & Co. 109
Wilkens-Anderson Co. 57

CLARIFIERS

Dorr Co., Inc. 88-89
Ertel Engineering Corp. 197
Filter Paper Co. 63
Fletcher Works, Inc. 125
Graver Tank & Mfg. Co., Inc. 104
Hardinge Co., Inc. 82
Infilco, Inc. 102
Ladder Iron Works 42
Permutit Co. 79
The Sharples Corp. 114

CLASSIFIERS

Denver Equipment Co. 131
Dorr Co., Inc. 88-89
Federal Classifier Systems, Inc. 164
Hardinge Co., Inc. 82
Raymond Pulverizer Div., Combustion Engineering Co. 111

COATINGS

American Resinous Chemicals Co. 113
Atlas Powder Co. 107-108
Corn Products Refining Co. 51-52
Koppers Co. 68-70
Lithgow Corp. 155

COILS

Alloy Products Corp. 153
General Ceramics Co. 80-81
Metal Glass Products Co. 166-167
United States Stoneware Co. 123-124

COLLECTORS

Federal Classifier Systems, Inc. 154
General Ceramics Co. 80-81
Claude B. Schneible Co. 199

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Pulverizing Machinery Co. 135
E. H. Sargent & Co. 127-128

COLORIMETERS

American Instrument Co. 67
Central Scientific Co. 178
Elmer & Amend 115-116
National Technical Laboratories 23-24
E. H. Sargent & Co. 127-128
Schaar & Co. 109
Wilkens-Anderson Co. 57

COMPRESSORS

Croll Reynolds Co. 125

CONCENTRATORS

Dorr Co., Inc. 88-89
Hardinge Co., Inc. 82
Haveg Corp. 121
Permutit Co. 79
Pfaudler Co. 44-45

CONDENSERS

Buffalo Foundry & Machine Co. 143
Corning Glass Works 169
Fansteel Metallurgical Corp. 134
General Ceramics Co. 80-81
Goslin-Birmingham Mfg. Co. 125
Haveg Corp. 121
Metal Glass Products Co. 166-167
Pfaudler Co. 44-45
Schaar & Co. 109
Walker-Wallace, Inc. 64

CONTAINERS

Alloy Products Corp. 153
Emery Carpenter Container Co. 173
Haveg Corp. 121
General Ceramics Co. 80-81
Graver Tank & Mfg. Co., Inc. 104
Kimble Glass Co. 142
Union Bag & Paper Co. 172
United States Stoneware Co. 123-124

CONTROLLERS

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Fletcher Works, Inc. 125 (speed)
Hardinge Co., Inc. 82
Industrial Instruments Co. 92
Infilco, Inc. 102 (pH)
National Engineering Co. 149
National Technical Laboratories 23-24 (pH)
Omega Machine Co. 140 (speed)
Sarco Co., Inc. 175 (temperature)
Wallace & Tiernan Co., Inc. 133 (chlorine control apparatus)
Wheelco Instruments Co. 41 (temperature liquid level)

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Federal Classifier Systems, Inc. 164
The Filter Paper Co. 63
Fletcher Works, Inc. 125
Hardinge Co., Inc. 82
Koppers Co. 68-70
Mojonnier Bros. Co. 78
National Engineering Co. 149

COOLERS

Croll Reynolds Co. 125
Fansteel Metallurgical Corp. 134
General Ceramics Co. 80-81
Hardinge Co., Inc. 82
Kold-Hold Mfg. Co. 73
Metal Glass Products Co. 166-167
Mojonnier Bros. Co. 78
Pfaudler Co. 44-45
Walker-Wallace, Inc. 64
United States Stoneware Co. 123-124

COUPLINGS

Alloy Products Corp. 153
Koppers Co. 68-70

CRUCIBLES

Central Scientific Co. 178
Corning Glass Works 169
Elmer & Amend 115-116
Fisher Scientific Co. 115-116
Schaar & Co. 109
Selas Co. 93

CRUSHERS, GRINDING MILLS & PULVERIZERS

Central Scientific Co. 178
Denver Equipment Co. 131
Fisher Scientific Co. 115-116
W. J. Fitzpatrick Co. 177
Hardinge Co., Inc. 82
Pulverizing Machinery Co. 135
Raymond Pulverizer Div., Combustion Engineering Co. 111
Schaar & Co. 109

CRYSTALLIZERS

Goslin-Birmingham Mfg. Co. 125
Leader Iron Works 42

CRYSTALLIZING EQUIPMENT

Buffalo Foundry & Machine Co. 143
General Ceramics Co. 80-81
Haveg Corp. 121
Metal Glass Products Co. 166-167
Pfaudler Co. 44-45

(Continued on page 1439)

PRODUCTS OF THE EXHIBITORS
With Booth Numbers

(*Continued from page 1438*)

CYLINDERS FOR HIGH PRESSURE GAS

Alloy Products Corp. 153
Leader Iron Works 42
Ohio Chemical & Mfg. Co. 119

CO_2 RECORDS

Charles Engelhard, Inc. 59-61

DECOLORIZING AND PURIFYING MATERIALS

Dicalite Corp. 168
Filter Paper Co. 63
Infilco, Inc. 102
Permutit Co. 79

DETERGENTS

Atlas Powder Co. 107-108
Commercial Solvents Corp. 150-151
Darco Corp. 107-108
Glyco Products Co., Inc. 62

DIGESTERS

Dorr Co., Inc. 88-89
Fansteel Metallurgical Corp. 134
General Ceramics Co. 80-81
Graver Tank & Mfg. Co., Inc. 104
Hardinge Co., Inc. 82
Haveg Corp. 121
Leader Iron Works 42

DISSOLVERS

Commercial Solvents Corp. 150-151
General Ceramics Co. 80-81
Haveg Corp. 121
Pfaudler Co. 44-45

DISTILLING MACHINERY AND APPARATUS

Buffalo Foundry & Machine Co. 143
General Ceramics Co. 80-81
Leader Iron Works 42
Metal Glass Products Co. 166-167
Pfaudler Co. 44-45
Podbielniak Centrifugal Super-Contactor Co. 27
Schaar & Co. 109
Walker-Wallace, Inc. 64

DRUMS—Rotary—Vacuum

Buffalo Foundry & Machine Co. 143
Goslin-Birmingham Mfg. Co. 125

DRYERS—Centrifugal

Buffalo Foundry & Machine Co. 143
Fletcher Works, Inc. 125
Sharples Corp. 114

DRYING AGENTS

Atlas Powder Co. 107-108
W. A. Hammond Drierite Co. 54
Infilco, Inc. 102
E. H. Sargent & Co. 127-128

DRYING MACHINERY & EQUIPMENT

Buffalo Foundry & Machine Co. 143
W. A. Hammond Drierite Co. 54
Hardinge Co., Inc. 82
Mojonnier Bros. Co. 78
National Engineering Co. 149
Proctor & Schwartz, Inc. 112
Raymond Pulverizer Div., Combustion Engineering Co. 111
Selas Co. 93

DUST COLLECTING SYSTEMS

Federal Classifier Systems, Inc. 164
Hardinge Co., Inc. 82
Claude B. Schneible Co. 199

EJECTORS

Croll Reynolds Co. 125
General Ceramics Co. 80-81
Haveg Corp. 121
United States Stoneware Co. 123-124

ELECTRICAL EQUIPMENT

Fisher Scientific Co. 115-116
Fansteel Metallurgical Corp. 134
Industrial Instruments, Inc. 92

(*Continued on page 1440*)



Acid-proof masonry can be ready for use within 24 to 36 hours after the last brick is laid, with U.S. Stoneware's "Vitric-10" —the remarkable quick-setting, chemical-hardening cement.

"Vitric-10" is resistant to all mineral acids, salts, solvents and hydrocarbons (hot or cold), with the one exception of hydrofluoric acid. "Vitric-10" possesses strong bonding and adhesive properties; is highly resistant to abrasion; is unaffected by abrupt temperature changes; and is simple to handle.

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"Portite"— sulphur base heat-and-pour type cement.

"Vitric" Fire-proof cement — for acid conditions continuously above 500 degrees F.

"Duralon"—a new synthetic resin cement, completely non-porous with high compressive and tensile strength.

With U.S. Stoneware's "USSCO" acid-brick and U.S. Stoneware's wide range of acid-proof cements, suitable combinations can be found to work satisfactorily under the most severe operating conditions.

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AKRON, OHIO

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With Booth Numbers

(Continued from page 1439)

EMULSIFIERS

Atlas Powder Co. 107-108
Commercial Solvents Corp. 150-151
Pfaudler Co. 44-45
Ross & Rowe, Inc. 43

ENAMELED APPARATUS

Ertel Engineering Corp. 197
Metal Glass Products Co. 166-167

ENAMELS

Atlas Powder Co. 107-108

ENGINEERS

Buffalo Foundry & Machine Co. 143
Ertel Engineering Corp. 197
General Ceramics Co. 80-81
Goslin-Birmingham Mfg. Co. 125
D. W. Haering & Co., Inc. 50
National Engineering Co. 149
Olson Filtration Engineers 94
D. R. Sperry & Co. 25

EVAPORATORS

Buffalo Foundry & Machine Co. 143
Croll Reynolds Co. 125
Fansteel Metallurgical Corp. 134
General Ceramics Co. 80-81
Goslin-Birmingham Mfg. Co. 125
Graver Tank & Mfg. Co., Inc. 104
Haveg Corp. 121
Leader Iron Works 42
Metal Glass Products Co. 166-167
Mojonnier Bros. Co. 78
Pfaudler Co. 44-45

EXHAUSTERS

General Ceramics Co. 80-81
Haveg Corp. 121
Kewaunee Mfg. Co. 179-180
United States Stoneware Co. 123-124

EXPLOSIVES

Atlas Powder Co. 107-108
Hercules Powder Co. 129-130

EXTRACTORS

Corning Glass Works 169 (laboratory)
Fletcher Works, Inc. 125
Leader Iron Works 42
Pfaudler Co. 44-45
Podbielniak Centrifugal Super-Contactor Co. 27

FANS

General Ceramics Co. 80-81
Haveg Corp. 121
Kewaunee Mfg. Co. 179-180
United States Stoneware Co. 123-124

FEEDERS

Federal Classifier Systems, Inc. 164
Graver Tank & Mfg. Co., Inc. 104
B. F. Gump Co. 87-88
Hardinge Co., Inc. 82
Infilco, Inc. 102
Omega Machine Co. 140
Wilson Chemical Feeders, Inc. 152

FILLERS

Dicalite Co. 168
Johns-Manville Corp. 83-84

FILLING MACHINES

Ertel Engineering Corp. 197
Mojonnier Bros. Co. 78
Pfaudler Co. 44-45
Pittsburgh Equitable Meter Co. 40 (drum)
Triangle Package Machinery Co. 204
Wilson Chemical Feeders, Inc. 152

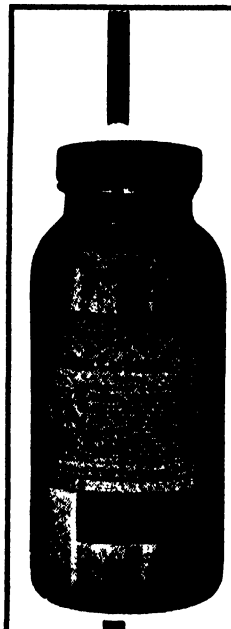
FILTER AIDS

Dicalite Co. 168
Ertel Engineering Corp. 197
The Filter Paper Co. 63
Johns-Manville Corp. 83-84

FILTER CLOTH

Ertel Engineering Corp. 197
The Filter Paper Co. 63

(Continued on page 1442)



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Ammonium thiocyanate has a behavior similar to other ammonium salts, but it also provides the variations of the thiocyanate group which is very stable and, in many reactions, resembles the halogens.

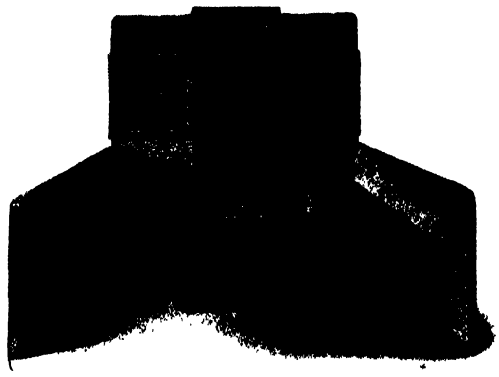
If you are now using any ammonium salts in your processes, such as chloride, acetate, oxalate, carbonate or nitrate, you may find you can use ammonium thiocyanate to advantage.

Samples and quotations on request.

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STABILITY is built into every Ainsworth balance . . . through precision workmanship and a sure knowledge of construction and design.

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Ludlow-Saylor Wire Co. 85-86 (metallic)
Sparkler Mfg. Co. 71
D. R. Sperry & Co. 25

FILTER PAPER

Angel & Co., H. Reeve 120
Central Scientific Co. 178
Eimer & Amend 115-116
Ertel Engineering Corp. 197
The Filter Paper Co. 63
Fisher Scientific Co. 115-116
E. H. Sargent & Co. 127-128
Schaar & Co. 109
Sparkler Mfg. Co. 71
D. R. Sperry & Co. 25
Wilkens-Anderson Co. 57

FILTERS

Corning Glass Works 169
Denver Equipment Co. 131
Ertel Engineering Corp. 197
The Filter Paper Co. 63
General Ceramics Co. 80-81
Goslin-Birmingham Mfg. Co. 125
Graver Tank & Mfg. Co., Inc. 104
Hardinge Co., Inc. 82
Haveg Corp. 121
Honag-Crane Corp. 181
Infilco, Inc. 102
Permutit Co. 79
Selas Co. 93
Sparkler Mfg. Co. 71
D. R. Sperry & Co. 25
United States Stoneware Co. 123-124

FITTINGS

Alloy Products Corp. 153
Bump Pump Co. 101

FLOORING

Haveg Corp. 121
United States Stoneware Co. 123-124

FLUXES

Eutectic Welding Alloys, Inc. 195-196

FOOD INDUSTRIES EQUIPMENT

Alloy Products Corp. 153
Ertel Engineering Corp. 197
Federal Classifier Systems, Inc. 164
Filter Paper Co. 63
Metal Glass Products Co. 166-167
National Engineering Co. 149
Pfaudler Co. 44-45
Pulverizing Machinery Co. 135
Waukesha Foundry Co. 46
Wilkens-Anderson Co. 57

FURNACES AND ACCESSORIES

American Instrument Co. 67
Eimer & Amend 115-116
K. H. Huppert Co. 97
Insto-Gas Corp. 56
Schaar & Co. 109
Selas Co. 93
Wilkens-Anderson Co. 57

GAGES

American Instrument Co. 67 (coating thickness on metals, high pressure)
Corning Glass Works 169 (manometer & flowmeter)
Ohio Chemical & Mfg. Co. 119
Pittsburgh Equitable Meter Co. 40

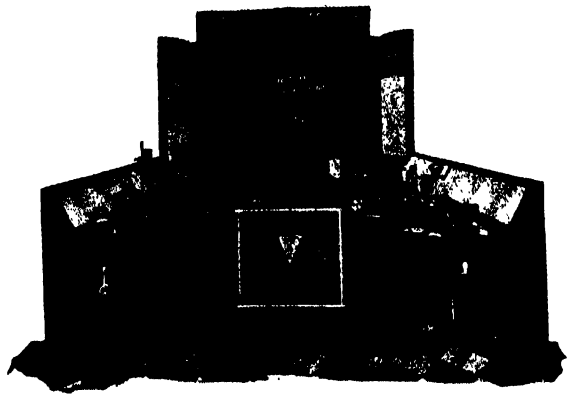
GAS PURIFIERS

Federal Classifier Systems, Inc. 164
W. H. Hammond Drierite Co. 54

GASES

Ohio Chemical & Mfg. Co. 119

(Continued on page 1443)



BOOTH 57 COME into our booth at the National Chemical Exposition and operate those newer laboratory instruments . . . our Modern Tools for the Chemist.

THE college chemistry instructor knows WACO for its close cooperation with authorities in Chemistry . . . particularly the Semi-Micro technic for Qualitative and for Elementary Organic classes. Semi-Micro fits perfectly into the 3-year college course and the present need for saving Victory materials!

INDUSTRIAL chemists, too, will find much in the way of time-saving pieces . . . among these the Bendix Electro De-Plater, Coleman Spectrophotometer and Photofluorometer, pH Meters, WACO Electrolytic Deposition Apparatus, WACO Electronic Relay . . . all ready for a trial run!

★ IF you are unable to visit our Booth at the National Chemical Exposition in Chicago, Nov. 24th to 29th, write for WACO Catalyst, Vol. 6-IE . . . it shows a complete listing of all the WACO exhibit apparatus.

WILKENS ANDERSON COMPANY
Laboratory Supplies and Chemicals
111 NORTH CANAL STREET, CHICAGO

PRODUCTS OF THE EXHIBITORS

With Booth Numbers

(Continued from page 1442)

GLASSWARE

The Campbell Co. 156
Central Scientific Co. 178
Corning Glass Works 169
Elmer & Amend 115-116
Filter Paper Co. 63
Fisher Scientific Co. 115-116
Kimble Glass Co. 142
E. H. Sargent & Co. 127-128
Schaar & Co. 109
Wilkens-Anderson Co. 57

HEAT EXCHANGERS

American Heat Reclaiming Corp. 125
Buffalo Foundry & Machine Co. 143
Corning Glass Works 169
Croll Reynolds Co. 125
Fansteel Metallurgical Corp. 134
General Ceramics Co. 80-81
Goslin-Birmingham Mfg. Co. 125
Graver Tank & Mfg. Co., Inc. 104
Haveg Corp. 121
Koppers Co. 68-70
Leader Iron Works 42
Metal Glass Products Co. 166-167
Mojonnier Bros. Co. 78
The Permutit Co. 79
The Pfaudler Co. 44-45
Walker-Wallace, Inc. 64
York Ice Machinery Co. 47-48

HEATERS

American Instrument Co. 67
Croll Reynolds Co. 125
Fansteel Metallurgical Corp. 134
Fisher Scientific Co. 115-116
Haveg Corp. 121
Mojonnier Bros. Co. 78

HEATING SYSTEMS AND ACCESSORIES

American Instrument Co. 67
Sarco Co., Inc. 175
Selas Co. 93

HOODS—Fume

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(Continued on page 1444)

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(Continued from page 1443)

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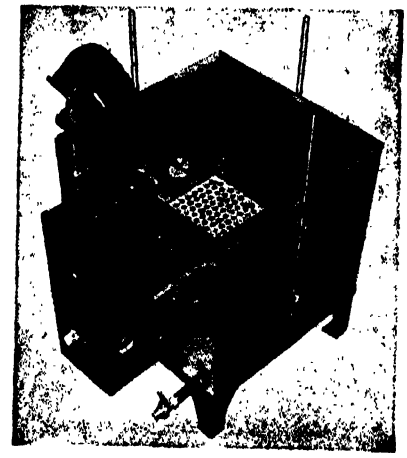


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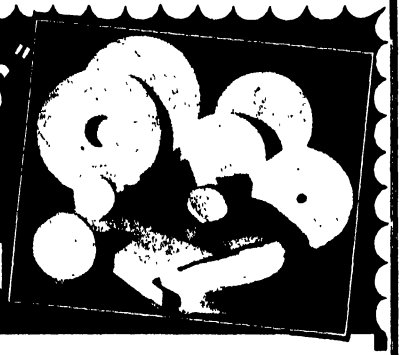
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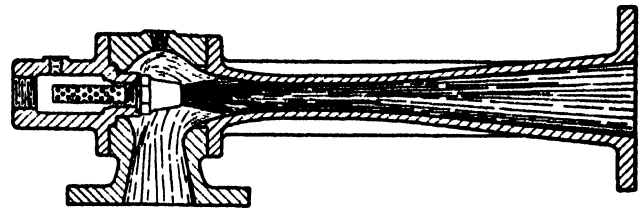
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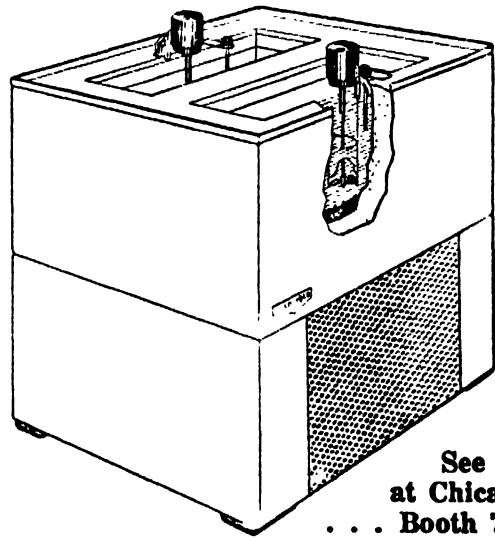


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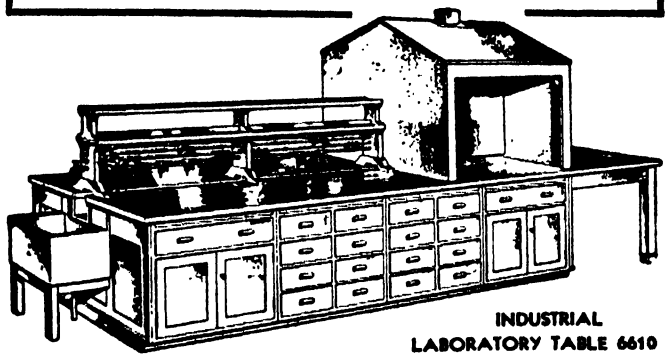
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635 Greenwich St., New York, N. Y., U.S.A.

PRODUCTS OF THE EXHIBITORS

With Booth Numbers

(Continued from page 1449)

Omega Machine Co. 140 (proportioning)
Claude B. Schneible Co. 199 (abrasive resistant)
United States Stoneware Co. 123-124 (acid)
Wallace & Tiernan Co. 133 (acid resistant, proportioning, reciprocating)
Waukesha Foundry Co. 46 (positive, corrosion and acid resisting, "Waukesha" metal, pure metal, Monel, stainless steel)
Wilson Chemical Feeders, Inc. 152

PYROMETERS

Charles Engelhard, Inc. 59-61 (thermocouples, rare and base metals)
Fisher Scientific Co. 115-116
K. H. Huppert Co. 97
E. H. Sargent & Co. 127-128
Wheelco Instruments Co. 41
Wilkens-Anderson Co. 57

QUARTZ

Hanovia Chemical & Mfg. Co. 59-61

RAW MATERIAL

Commercial Solvents Corp. 150-151
Corn Products Refining Co. 51-52
Glycerine Producers Assn. 157
Hercules Powder Co. 129-130

RAYON EQUIPMENT

Havey Corp. 121
Pfaudler Co. 44-45

RECORDING INSTRUMENTS

Brabender Corp. 174
Charles Engelhard, Inc. 59-61
Fisher Scientific Co. 115-116
Permutit Co. 79 (gas)
Pittsburgh Equitable Meter Co. 40
Wheelco Instruments Co. 41

REFRACTORIES

Johns-Manville Corp. 83-84
Titanium Alloy Mfg. Co. 148
United States Stoneware Co. 123-124

REFRIGERATION EQUIPMENT

Croll Reynolds Co. 125
Kold-Hold Mfg. Co. 73
Schaar & Co. 109
York Ice Machinery Corp. 47-48

REGULATORS—Pressure and Temperature

Durametallic Corp. 117-118
Charles Engelhard, Inc. 59-61 (temperature)
Ohio Chemical & Mfg. Co. 119
Pittsburgh Equitable Meter Co. 40
Sarco Co., Inc. 175
Wheelco Instruments Co. 41
Wilkens-Anderson Co. 57

RESINS & OILS

American Resinous Chemicals Corp. 113
Atlas Powder Co. 107-108
Hercules Powder Co. 129-130
Lithgow Corp. 155

RUBBER PRODUCTS & EQUIPMENT

American Instrument Co. 67
American Resinous Chemicals Corp. 113
Schaar & Co. 109
United States Stoneware Co. 123-124

RUST PROOFING

D. W. Haering & Co., Inc. 50
United States Stoneware Co. 123-124

SAFETY EQUIPMENT

Ampco Metals, Inc. 99
The Campbell Co. 156
Fisher Scientific Co. 115-116
Insto-Gas Corp. 56

(Continued on page 1451)

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PRODUCTS OF THE EXHIBITORS

With Booth Numbers

(Continued from page 1450)

SCALES

B. F. Gump Co. 87-88
Schaar & Co. 109

SCREENS—Inclined, Vibrating, Gyratory

Denver Equipment Co. 131 (concentrating—tables, pulsating jigs)

SCREENS—Other

Ludlow-Saylor Wire Co. 85-86

SEPARATORS

Croll Reynolds Co. 125
Dorr Co., Inc. 88-89
Federal Classifier Systems, Inc. 164 (air)
Fletcher Works, Inc. 125
Hardinge Co., Inc. 82 (air)
Raymond Pulverizer Div., Combustion Engineering Co. 111 (air)
Sharples Corp. 114 (centrifugal)

SHEET METAL WORK

Alloy Products Corp. 153
Buffalo Foundry & Machine Co. 143
Insto-Gas, Inc. 56

SIEVES—Laboratory

Central Scientific Co. 178
E. H. Sargent & Co. 127-128

SIFTERS

B. F. Gump Co. 87-88

SINKS—Laboratory—Acid Proof

General Ceramics Co. 80-81
Hamilton Mfg. Co. 144-147
Haveg Corp. 121
Kewaunee Mfg. Co. 179-180
Leonard Peterson & Co., Inc. 176
E. H. Sargent & Co. 127-128
Schaar & Co. 109
E. H. Sheldon & Co. 103
United States Stoneware Co. 123-124

SOLVENT RECOVERY EQUIPMENT

Buffalo Foundry & Machine Co. 143
Ertel Engineering Corp. 197
Filter Paper Co. 63
Koppers Co. 68-70
Leader Iron Works Inc. 42
Metal Glass Products Co. 166-167
Pfaudler Co. 44-45
Podbielniak Centrifugal Super-Contactor Co. 27

SOLVENTS

Atlas Powder Co. 107-108
Commercial Solvents Corp. 150-151
Koppers Co. 68-70

STEELS

Graver Tank & Mfg. Co., Inc. 104
Lukens Steel Co. 136-139

STERILIZERS

Buffalo Foundry & Machine Co. 143
Central Scientific Co. 178
Elmer & Amend 115-116
Fisher Scientific Co. 115-116
Schaar & Co. 109
Wallace & Tiernan Co. 133

STILLS

American Instrument Co. 67 (laboratory)
Buffalo Foundry & Machine Co. 143 (solvent recovery, fractionation, fatty acid)
Central Scientific Co. 178
Elmer & Amend 115-116 (water)
Fisher Scientific Co. 115-116 (laboratory)
General Ceramics Co. 80-81 (chemical stoneware)
Leader Iron Works 42
Metal Glass Products Co. 166-167
Pfaudler Co. 44-45 (glass lined)
Podbielniak Centrifugal Super-Contactor Co. 27
Schaar & Co. 109 (laboratory)
United States Stoneware Co. 123-124 (acid)
Wilkens-Anderson Co. 57

STRAINERS

General Ceramics Co. 80-81
Ludlow-Saylor Wire Co. 85-86
Sarco Co., Inc. 75

TANKS

Alloy Products Corp. 153
Ertel Engineering Corp. 197
The Filter Paper Co. 63 (glass-lined, stainless steel)
General Ceramics Co. 80-81 (stoneware)
Graver Tank & Mfg. Co., Inc. 104
Haveg Corp. 121
Kewaunee Mfg. Co. 179-180
Leader Iron Works 42
Metal Glass Products Corp. 166-167 (metal-aluminum glass-lined)
Mojonnier Bros. Co. 78
Pfaudler Co. 44-45 (glass-lined, nickel, stainless steel)
United States Stoneware Co. 123-124 (acid)

TESTING EQUIPMENT

Kold-Hold Mfg. Co. 73 (high-low temp.)
Wallace & Tiernan Co. 133 (chlorine)

THERMOMETERS

American Instrument Co. 67
Central Scientific Co. 178
Elmer & Amend 115-116
Fisher Scientific Co. 115-116
Kimble Glass Co. 142
Sarco Co., Inc. 175
E. H. Sargent & Co. 127-128
Schaar & Co. 109
Wheelco Instruments Co. 41

THICKENING & DEWATERING MACHINERY

Denver Equipment Co. 131
Dorr Co., Inc. 88-89
Graver Tank & Mfg. Co., Inc. 104
Hardinge Co., Inc. 82
Permutit Co. 79
Claude B. Schneible Co. 199

TORCHES

Insto-Gas Corp. 56
Selas Co. 93

TOWER PACKING & FILLING

Corning Glass Works 169
General Ceramics Co. 80-81
Haveg Corp. 121
United States Stoneware Co. 123-124

TOWERS

Corning Glass Works 169 (glass, fractionating)
General Ceramics Co. 80-81
Graver Tank & Mfg. Co., Inc. 104
Haveg Corp. 121
Leader Iron Works, Inc. 42
United States Stoneware Co. 123-124

TRAPS

General Ceramics Co. 80-81
Haveg Corp. 121
Kewaunee Mfg. Co. 179-180
Sarco Co., Inc. 175

TUBES

Alloy Products Corp. 153
Corning Glass Works 169 (glass)
General Ceramics Co. 80-81 (chemical stoneware)
Hanovia Chemical & Mfg. Co. 59-61
Haveg Corp. 121
Schaar & Co. 109

ULTRAVIOLET LAMPS

Fisher Scientific Co. 115-116
Hanovia Chemical & Mfg. Co. 59-61
National Technical Laboratories 23-24

VALVES & FITTINGS

Alloy Products Corp. 153
Ampco Metal, Inc. 99
Corning Glass Works 169
Filter Paper Co. 63
Fletcher Works, Inc. 125
General Ceramics Co. 80-81
Haveg Corp. 121
Koppers Co. 68-70
Merco-Nordstrom Valve Co. 40
Pfaudler Co. 44-45 (glass-lined)
Sarco Co., Inc. 175 (mixing)
D. R. Sperry & Co. 25
United States Stoneware Co. 123-124
Wallace & Tiernan Co. 133 (cylinder, gas, control)
Wheelco Instruments Co. 41
York Ice Machinery Corp. 47-48

VATS

Alloy Metal Products Corp. 153
Graver Tank & Mfg. Co., Inc. 104
Haveg Corp. 121
Kewaunee Mfg. Co. 179-180
Leader Iron Works 42
Mojonnier Bros. Co. 78
Pfaudler Co. 44-45
United States Stoneware Co. 123-124

VENTILATING APPARATUS

General Ceramics Co. 80-81
Haveg Corp. 121

WATCHMEN'S CLOCKS

Morse Magneto Clock Co. 91

WATERPROOFING COMPOUNDS

American Resinous Chemicals Co. 113
Koppers Co. 68-70
Titanium Alloy Mfg. Co. 148

WATER SOFTENING EQUIPMENT

Dorr Co., Inc. 88-89
Graver Tank & Mfg. Co., Inc. 104
D. W. Haering & Co. 50
Infilco, Inc. 102
The Permutit Co. 79

WELDING EQUIPMENT

Alloy Products Corp. 153
Ampco Metals, Inc. 99
Eutectic Welding Alloys, Inc. 195-196
Graver Tank & Mfg. Co., Inc. 104
Insto-Gas Corp. 56
Leader Iron Works, Inc. 42
Titanium Alloy Mfg. Co. 148

WIRE CLOTH

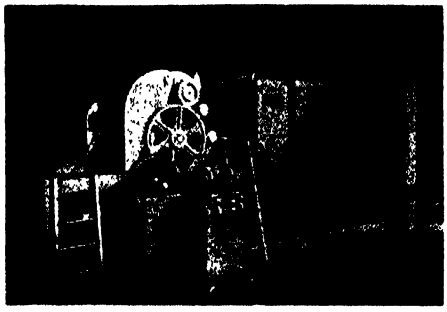
Filter Paper Co. 63
Ludlow-Saylor Wire Co. 85-86

PROCTOR DRYING MACHINES

FOR THE PROCESS INDUSTRIES . . . . . .



For speedily, uniformly drying wet-solid materials having characteristics permitting the holding of a definite shape after extrusion, there is the Proctor Aero-Form Drying System with Rolling Extruder Feed shown above.



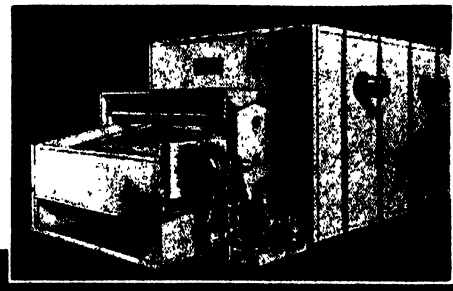
For materials that are in an extremely moist state after filtering, settling, etc., there is the Proctor Aero-Form Dryer with Fin Drum Feed which slightly pre-dries the material before it goes through the actual drying cycle.

Proctor & Schwartz engineers have solved drying problems, both simple and complex, for most of the outstanding firms in the process industries. The installation of Proctor Dryers, engineered to fit each particular need have assured drying processes of the highest efficiency.

Illustrated here and briefly described in the captions are some of the satisfactory means evolved by Proctor engineering for satisfactorily drying wet-solid and plastic materials *automatically and continuously* instead of by the slow, and far less efficient batch method.

Among the great number of chemicals dried successfully on Proctor Machines are compounds of aluminum, barium, calcium, copper, lead, iron, magnesium, manganese, nickel, zinc, etc.... colors and dyestuffs...crystalline materials...cellulose and protein plastic bases, cellulose acetate, etc.

Proctor's over half a century of broad experience in designing and building drying equipment for almost every industry, from food to veneer, has earned this company widespread recognition as the leader in its field.



PROCTOR & SCHWARTZ • INC.

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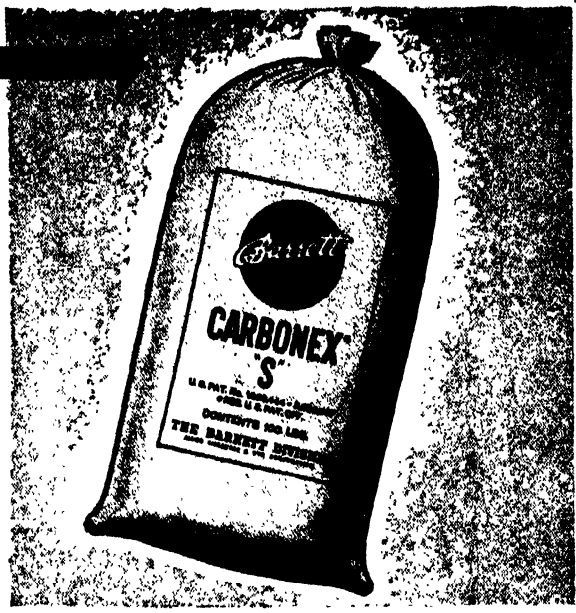
The Proctor Aero-Form Drying System with Granulator Feed, shown at left, is for the uniform, speedy drying of lumpy or granular materials and for particularly hard framed press cake.

See our Exhibit - Booth 112

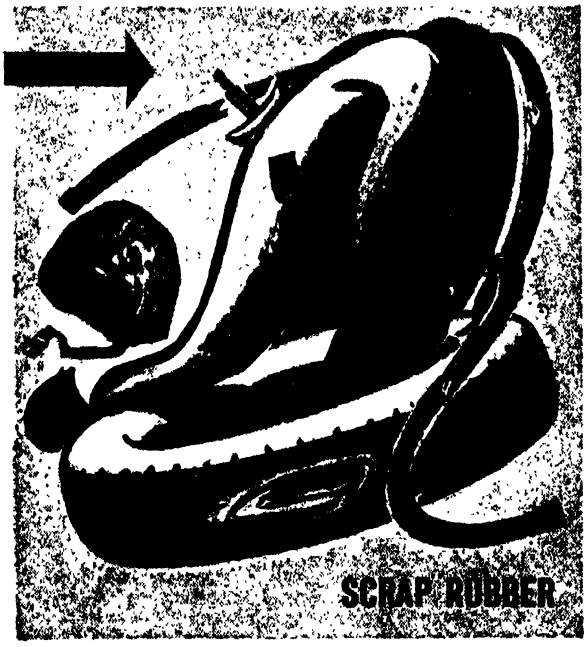
NATIONAL CHEMICAL EXPOSITION

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MIX



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FOR



In the cause of victory few things are more vital than conservation of the nation's dwindling rubber supplies. But fortunately there are hundreds of thousands of tons of scrap rubber available. Fortunately, too, there is no shortage of Barrett Carbonex* S.

When used in reclaim rubber stocks this improved coal-tar compounding material displays a number of significant properties.

Extender—up to 15% of the rubber hydrocarbon.

Reinforcing Softener—A highly practical control of toughness.

Rapid Extrusion—Minimizes swelling, sagging and flattening.

Improved Tear Resistance—An important factor to increase wear.

Promotes Better Processing—Calendering and extruding properties greatly improved.

Excellent Aging Qualities—A final great help in conservation.

The staff of the Barrett Research Laboratories will be glad to cooperate with you in using Carbonex S and other Barrett rubber compounding materials to meet your requirements. Wire or write today for full information.

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ALLIED CHEMICAL & DYE CORPORATION
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*Reg. U. S. Pat. Off.

Experiments Made in Eucalyptus Oil Production

THE largest eucalyptus tree plantations in Brazil are found in the State of São Paulo, according to a recent survey, and this state is also the principal center of eucalyptus oil production. Started in 1937, the industry has not gone beyond the experimental stage. Of the 100,000,000 eucalpytus trees in São Paulo, only 1,000,000 are of a type suitable for distillation of the oil.

Several Brazilian companies have produced oil experimentally but the results have not come up to the standard of oils imported from Australia. Unfortunately for the essential oil industry, the tall eucalyptus tree is valued chiefly in Brazil for its use as a fuel and in construction. Usually leaves from felled trees are removed for distillation with little regard for the age of the tree, selection and maturity of the leaves, time of year, and weather conditions. The resultant oils, therefore, lack uniformity.

Potash Produced from Alunite Deposits

THE Commonwealth Supply and Development Minister recently announced that the government of Western Australia will produce potash from the alunite deposits in Lake Campion, according to a report received by the Department of Commerce. It is expected that Australia will eventually supply its total requirements from this source; production will begin with 5,000 tons a year.

Sales of Industrial Chemicals Decrease

WHOLESALERS' sales of industrial chemicals of 20 establishments decreased 10 per cent this August, as compared with August a year ago, according to a report of the Bureau of Census. Sales decreased 7 per cent over those made in July; total August sales were $1,477,000.

Sales of chemicals for the first eight months of this year were reported at $16,216,000. Inventories at the end of August, as reported by 15 establishments, were valued at $916,000, 35 per cent more than those of the previous August. Stock sales ratio for August was 76; for July, 72; for August, 1941, 49.

Sweden Reveals Insecticide Shortage

RECENT reports from Sweden to our Government indicate an increasing shortage of insecticides. There are still substantial stocks of arsenic powder, but nicotine preparations cover only two thirds of the requirements. Supplies of copper sulfate for the treatment of potatoes against plant mold are sufficient for only 10 per cent of the potato acreage.

THE annual consumption of phenol in Mexico amounts to approximately 10,000 kg., it is stated in an industrial report to the Department of Commerce. The United States, and formerly Germany and the Netherlands, have been the chief suppliers.

Venezuela Develops New Asbestos Deposit

A PROMISING asbestos deposit has been found near Tinaquillo in the State of Cojedes, Venezuela, and is being developed by Cia. Anon Minas de Amianto de Tinaquillo of Caracas, Venezuela. Most of the asbestos is in irregular cross-fiber veins similar to those in Quebec, Canada.

A mill capable of handling 6,000 tons of asbestos fiber a year is now under construction and is scheduled to be put into operation by the end of 1942.

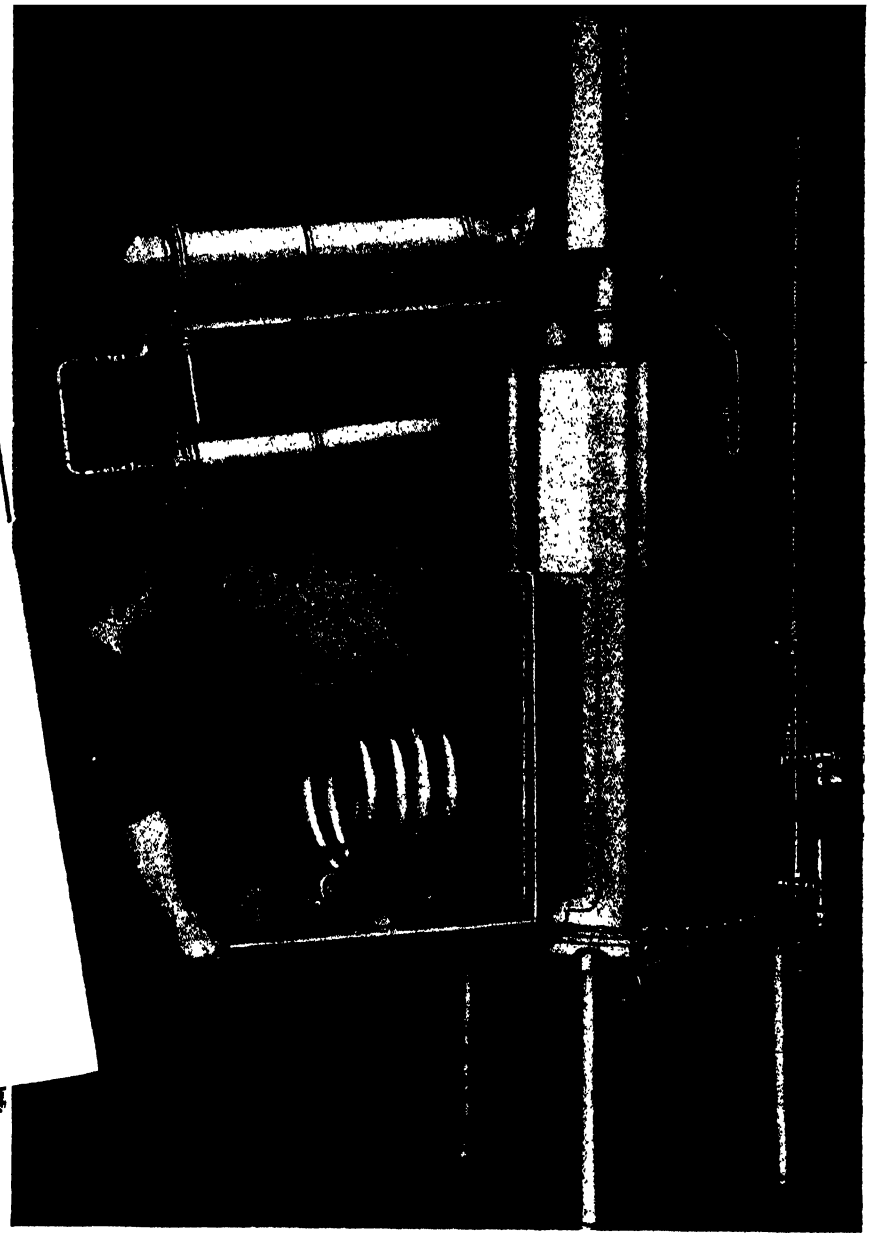
Germany Studies Magnesite Industry

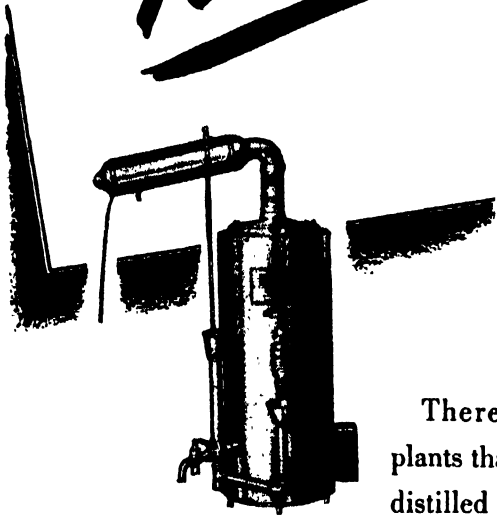
GERMAN controlling interests are studying methods of bolstering Austria's magnesite industry, according to a report to the Department of Commerce. Within the past year a research group has been looking into the production and treatment of magnesium metal, and a company has been organized to investigate the use of magnesite refractories.

FIVE known deposits of alunite in Australia have been reported by investigators appointed by the South Australian Chemical Institute to study the state's alunite possibilities, says an unofficial report to the government. One of the deposits merits particular attention because of its location close to Port Pirie, where adequate shipping and transport facilities are available.



They Put Plants and Labs *On Even Terms*





There are many plants that need pure distilled water for actual product productions as well as for experimental laboratory work. And to be on the safe side—to insure production quality on a par with laboratory work—these plants use Barnstead Water Stills on both the production line and laboratory bench.

Barnstead large industrial type stills produce distilled water that is just as pure in quality as the distillate of the small Barnstead laboratory type stills. Moreover, they produce this pure distilled water at a very low cost. They are operated economically by steam and they have easy-cleaning facilities and special features for preventing scale formations within the still.

There is a Barnstead Water Still for every requirement. Sizes range from ½ to 500 gallons per hour. Operation of laboratory type stills is by gas, steam, or electricity.

Barnstead
STILL & STERILIZER CO. Inc.

19 LANESVILLE TERRACE, FOREST HILLS, BOSTON, MASSACHUSETTS

New Chemical Method of De-salting Water

Replaces

DISTILLED WATER

at a fraction of the cost in



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The ILLCO-WAY method of purifying water is one of ion exchange, using Amberlite synthetic resins to produce a final effluent which compares very favorably with single-distilled water. The water is not evaporated, so no heat is used in the process which is daily meeting the exacting standards of industrial and technical concerns requiring purified water.

1,000 gallons for less than a dollar!

LOW COST — The cost of the treated water is amazingly low — *less than a dollar per thousand gallons*, on the average water supply, including depreciation and maintenance. And when the supply is low in dissolved solids, the cost may be considerably less.

No Heat Used— No Fuel Required!

Operation is completely automatic (between periodic regenerations). Pipes will not lime up. Maintenance costs are reduced to a minimum. A unit delivering 300 gallons an hour occupies a space about 4 x 10 feet. Made of finest materials to protect the purity of water. Available in units producing from 100 to 50,000 gallons an hour.

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PROVED IN THE FIELD

Tungsten Production in Americas Increased

CHIEF producers of tungsten are Bolivia and Argentina, both of which have signed agreements for sale of their exportable tungsten to the United States. Argentina is expected to increase her tungsten production to about 3,000 tons a year, according to a release from the Office of the Coordinator of Inter-American Affairs. Some tungsten is produced in Peru, Mexico, Brazil, and Chile.

Algin Used in Waterproofing Agents

THE Industrial Research Council in Eire has been experimenting with the utilization of algin in making waterproofing agents and plastic materials. A product was prepared which proved upon testing to be a satisfactory substitute for sago flour in the sizing of twine. The possibilities of this material as a substitute for starch are also being investigated.

Syrian Alcohol Production Decreases

ALCOHOL was formerly manufactured in Syria from molasses imported from Czecho-Slovakia, and the cutting off of imports from that country obliged manufacturers to use seeds and grains obtainable locally. The higher cost of these materials resulted in a considerable increase in the price of alcohol, which rose to about $2.75 per gallon at the end of last year. This caused a decreased demand, and the output for 1941 dropped to 130 tons, about 50 per cent of the normal annual production.

New Franco-German Dyestuffs Company Created

CREATION of a new Franco-German dyestuffs company has been approved by the Vichy government, according to an unofficial report. The company will be known as Société Anonyme de Matières Colorantes and Produits Chimiques Francolor, and capital has been fixed at 800,000,000 francs. It is stipulated that at least half the directors shall be French and that the president of the company must always be a Frenchman. German capital, however, holds a controlling interest in the stock.

BRAZIL'S principal chemical imports in 1940–1941 were as follows: mineral salts, caustic soda, and other inorganic chemicals, 93,933 tons in 1940 and 85,306 in 1941; pharmaceutical and other synthetic organic chemicals, 45,627 tons in 1940 and 42,420 in 1941; aniline dyes, essences, etc., 4,778 tons in 1940 and 6,682 in 1941.

Corn Fungus Used For Medicinal Purposes

IN MEXICO the prosaic corn plant, products of which range from Bourbon whisky to paper, harbors a fungus which may become an important substitute for ergot, if unofficial reports from that country prove to be correct. Experiments are being conducted with a view to determining the efficacy of this parasite.

Rubber and Cinchona Development in South America

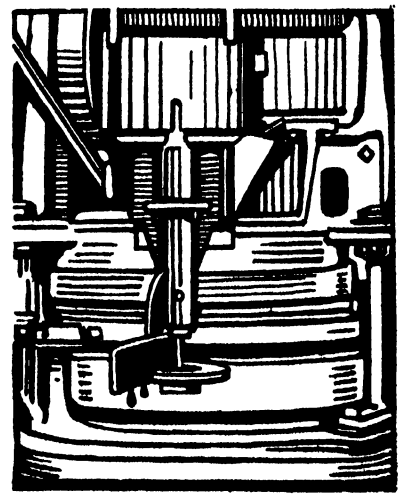
THE United Fruit Co. may establish plantations to cultivate rubber and cinchona in several South American countries, including Colombia.

ALTHOUGH the extension of the war and the shortage of tonnage destroyed many former markets, unofficial reports received from Chile by the Department of Commerce indicate the nitrate industry maintained a high level of activity during the past year. For the first time since 1933 stocks on hand were low enough to require extra production to build them up as a reserve against possible heavy sales.

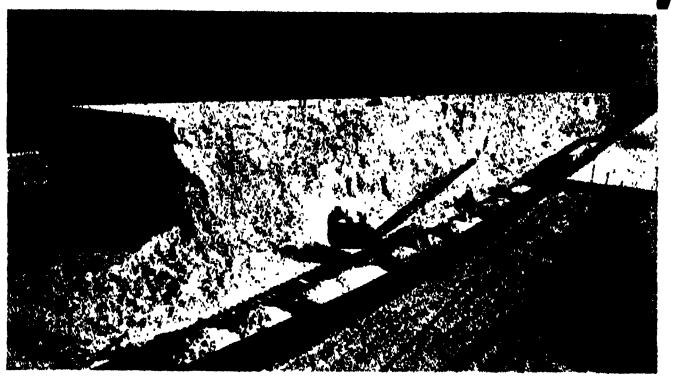
HAITIAN trade statistics, obtained through a Department of Commerce report, show 18,673 kg. of chemical and pharmaceutical products imported during May, valued at $6,489. For the 8 months October 1941 to May 1942, imports were 471,758 kg., with a value of $133,074.

A PROJECT to increase the production of power alcohol in India has been approved by the War Resources Committee, states an unofficial British report to the government. Twelve plants have been ordered from the United States.

THE Chile nitrate plant "Rica Aventura", which had been closed for 12 years, is again in operation and production has begun. it is stated in an unofficial report from Britain.



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assure America all it needs
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plays a vital part in the production of chemicals, rubber, petroleum, steel, fertilizer and insecticides, paint and pigment, pulp and paper, rayon and film, dye and coal tar products — and many other essentials for the "Arsenal of Democracy."

SULPHUR **IN AMPLE QUANTITIES**
is mined at large company owned mines in Louisiana and Texas. Both mines operate continually on a top-speed war-time basis.

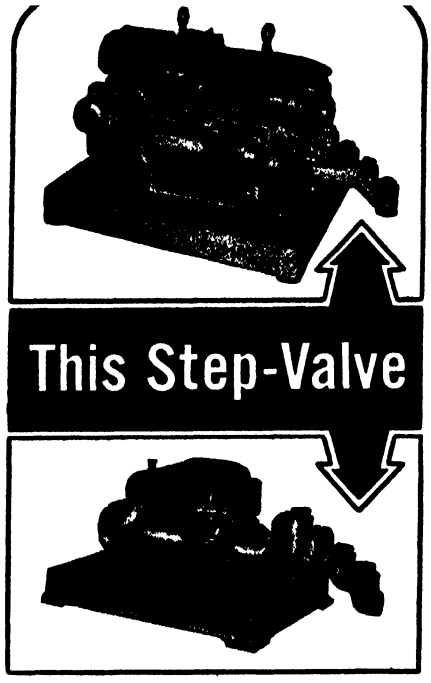
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is a certainty, because of a tremendous reserve supply — constantly maintained above ground.

SULPHUR **AT A NORMAL BASE PRICE**
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With a Milton Roy Step-Valve Pump you can handle chemicals in precise quantities, from full pump capacity *down to one pint or less per hour.*

You can pump acid sludge, slurries, liquid latex, asphalt, fibrous materials in suspension, etc. . . . as well as acids, alkalis, oils and treating chemicals.

You have a wide choice of materials of construction . . . any metal which can be cast or forged and machined . . . or machined from the solid, metal or transparent plastics.

Milton Roy Pumps are simple, with few moving parts. Step-Valves, with double-ball checks, are non-clogging and self-cleaning, eliminate air-binding entirely, minimize wire-drawing.

Other features include adjustable plunger stroke, while operating if desired; integral-gear motors; compact design; heavy construction.

Capacities: Simplex Pumps, 1300 g.p.h.; Duplex Pumps, 2600 g.p.h. Special pumps to order. Write for catalog.

We are still making prompt deliveries of most standard pumps. If we can help in your war effort 'phone or wire.

Roy PUMPS

Foundation Appointments

THE appointments to fellowships under the sixth annual series of fellowship awards of the Lalor Foundation, which covers the academic year 1942–43, are:

A. Calvin Bratton from the University of Texas to work with E. K. Marshall at Johns Hopkins University Medical School.

Edward H. Frieden from the University of California to work with Roger J. Williams at the University of Texas.

Francis J. Reithel from the University of Oregon to work with Edward A. Doisy at St. Louis University School of Medicine.

James R. Weisiger from Johns Hopkins University to work with A. Baird Hastings at Harvard University Medical School.

The work of these men is in fields closely associated with problems related to the war.

Owing to war conditions, appointments to the five remaining fellowships originally scheduled for the 1942–43 series have been postponed.

The present plan of the foundation is to discontinue its regular program of fellowship awards until the demobilization of scientific personnel at the end of the war. Thus the usual fellowship awards will go into a reserve to form an accumulation for post-war assignment. To date 15 such awards are scheduled to be made available at that time for post-doctorate research in chemistry. The standard annual stipend of a Lalor Foundation award is $2,000.

Annual Tables of Physical Constants

THE Annual Tables of Physical Constants and Numerical Data are being delivered in installments of 32 pages, and the first installment of the issue for 1942 has just been sent out. It includes fundamental constants, structure in liquids, transference numbers of electrolytes, and heat and entropy of fusion. Headquarters are at the Frick Chemical Laboratory, Princeton, N. J.

URUGUAY has taken steps to conserve its supplies of medicinal chemicals, according to an unofficial report to the Government. Stocks must be declared and a committee of doctors and pharmacists has been appointed to control their allocation.

THE manufacture of vanillin from sulfite lye will be attempted for the first time in Germany by Ligrowa, G. m. b. H., according to unofficial sources. This company was recently established at Mannheim, with a capital of 1,200,000 marks.

RESERVE stocks of phosphate are being built up in the Netherlands West Indies, shipments for the June quarter being less than in the previous quarter. The Newport phosphate mine has continued to operate with about 300 men employed.

P. Duff & Sons Establishes Industrial Fellowship

P DUFF & SONS, INC., Pittsburgh, Penna., has founded in Mellon Institute an industrial fellowship that will be concerned with the scientific investigation of the production, improvement, properties, and uses of cane molasses; the development of better and new cake mixes; and the evolution of other ready-to-use mixes for baking purposes, embracing composition, preparation, packaging, and storage.

Arthur J. Nolte, a food specialist, assumed the incumbency of this fellowship on October 22. Since 1935 he has been with the U. S. Bureau of Agricultural Chemistry and Engineering at Winter Haven, Fla., as chemist.

Montana Awards in Chemistry

IN THE item regarding awards in chemistry at Montana State College [CHEM. ENG. NEWS, 20, 1238 (1942)] the name of Sam Eagle, who received the award in 1931, was omitted. Mr. Eagle is now with the Standard Oil Co., Richmond, Calif.

Institute of Gas Technology

NEW appointments to the research staff of the Institute of Gas Technology, Chicago, Ill., are Paul E. Peters, formerly of the North Shore Chemical Industries, E. P. Walter, recently of Stepan Chemical Co., and Paul W. Garbo, recently with the Barrett Division.

Isopropyl Ether Explosion

IT IS well known that isopropyl ether forms peroxides very readily, and that these peroxides may cause an explosion if the ether is distilled or an ether extract is taken to dryness on a hot plate. It seems less well known that an old sample of isopropyl ether may detonate if jarred.

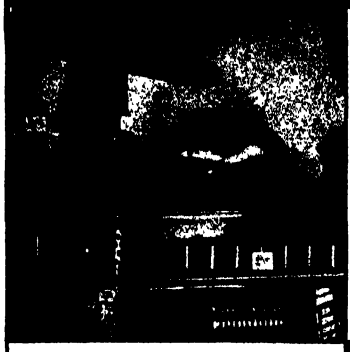
A 5-gallon can, about one quarter full of isopropyl ether, was placed on the floor under a shelf in the stockroom several years ago and apparently forgotten. One morning a janitor decided to move it when he swept. As soon as he lifted the can, it exploded. The detonation occurred in the liquid phase, not in the vapor. The upper part of the can was uninjured. The tin in contact with the liquid showed no evidence of great force outward, but the metal was stretched severely. The tin was pulled thin, and many small tears appeared, a few millimeters in length. The two largest tears were 4 and 14 cm. long.

Fortunately, the ether did not catch fire, and the janitor was uninjured.

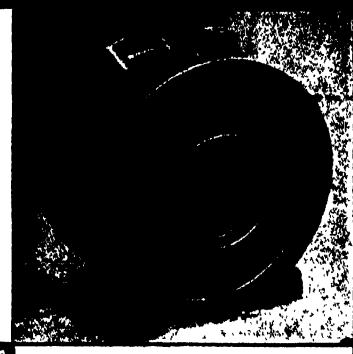
B. L. HERRINGTON

CORNELL UNIVERSITY
ITHACA N. Y.
October 15, 1942.

CHECK CORROSION

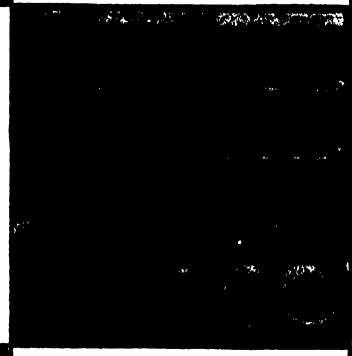


Entirely
Acid-Proof
All the Way
Through



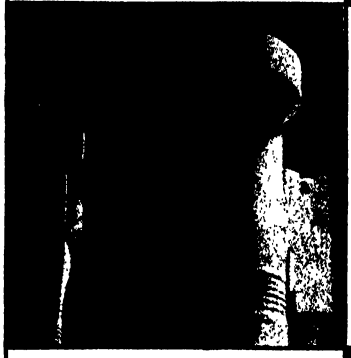
Clean
Lasting
Versatile
Economical

Brick
Pipe
Condensers
Valves

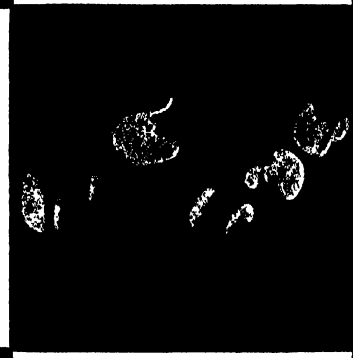


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Filters
Tanks
Towers





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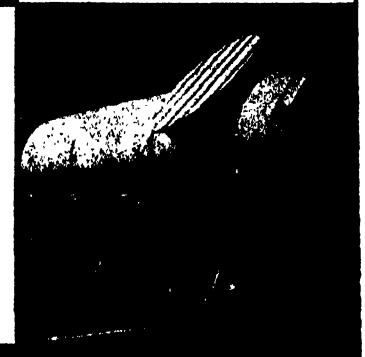


Acid-Proof
Linings for
Concrete
or Steel

Equipment for
Hydrochloric
Nitric and
Sulphuric Acids



For Chlorine
Phosphoric Acid
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Second Annual Science Talent Search

TWENTY-FIVE thousand high school principals and teachers have been invited to take part in a nation-wide search among the country's 1,650,000 high school seniors for the 40 most talented young scientists of that age in America.

The 40 are to be singled out for special honors and opportunities including attendance at a five-day Science Talent Institute at Washington next February, and up to $14,000 in scholarships.

The invitation was sent by Science Clubs of America, an organization fostered by Science Service. The Science Talent Search, second to be held, is made financially possible by the Westinghouse Electric & Manufacturing Co., which will award Westinghouse Science Scholarships to at least 10, and possibly 40, of the young scientists of the future.

During the institute the contestants will compete in final examinations for the scholarships, which will result in the awarding of eight four-year Westinghouse Science Scholarships of $400 each and two four-year Westinghouse Science Grand Scholarships of $2,400 each, worth $600 per year. One boy and one girl will be selected as winners of the Grand Scholarships. Alternates will be named. Additional $100 scholarships will be awarded at the discretion of the judges.

The Science Talent Search is administered by a committee of four: Harlow Shapley, director, Harvard Observatory, and chairman of Science Service's executive committee; Watson Davis, director, Science Service; G. Edward Pendray, assistant to president, Westinghouse Electric & Manufacturing Co.; and E. B. Roberts, assistant to vice president of Westinghouse.

Corrosion Division of Electrochemical Society Formed

ON OCTOBER 9 at the fall convention in Detroit, the Corrosion Division of The Electrochemical Society was organized. At this meeting bylaws were adopted and the following officers elected: chairman, L. G. Vande Bogart, Research and Development Laboratories, Crane Co., Chicago, Ill.; vice chairman, H. H. Uhlig, General Electric Co., Research Laboratory, Schenectady, N. Y.; secretary-treasurer, R. H. Brown, Metallurgical Division Aluminum Research Laboratories, Aluminum Co. of America, New Kensington, Penna.

The Corrosion Division was organized because of the interest displayed by a large number of the members of The Electrochemical Society in this phase of the work. Its object is to coordinate the interests of the society relating to corrosion with individuals and organizations which are particularly interested and active in this field, to solicit papers, and plan symposia.

Conservation of Critical Materials

APPLICATION to the war production effort of all the skill and management "know how" acquired by General Motors through many years of manufacturing experience is resulting in the conservation of thousands of tons of critical materials, in important savings in man hours (thus releasing men and machines for further vital work), in sharply reduced costs, in the organization of new methods in maintenance and service, and in substantial contributions to an advancing military technology, Alfred P. Sloan, Jr., chairman of the corporation, states.

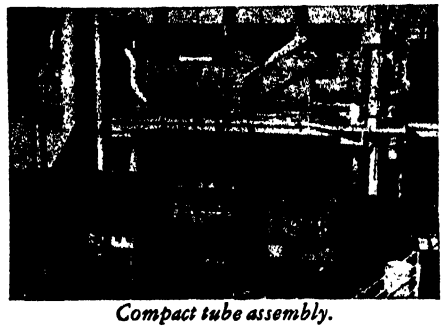
Mr. Sloan says that production rates have been accelerated, engines have been increased in horsepower, guns have been simplified and given longer life, and improvements have been made in tank construction, in airplane propeller design, and in the manufacture of shells. New devices have been developed, new characteristics built into old devices. Meanwhile, a sound basis has been established for continued advance in war production techniques.

Henry Sonneborn, III, resigned his position as assistant technical director of L. Sonneborn Sons, Inc., to accept an ensign's commission in the U. S. Naval Reserve, and is attached to the Naval Ammunition Depot, Portsmouth, Va.

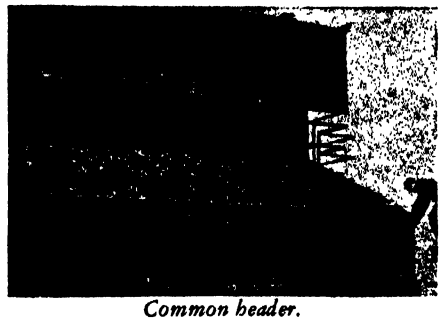
MULTICLONES

Eliminate MANIFOLDING

Multiclone's exclusive vane design permits any number of tubes to be installed with one inlet header and one outlet header simplifying construction and eliminating the complications of manifolding. Less material is needed. Less floor area and less headroom are required. Because the gas travels over a smaller surface there is less surface subject to wear and because of the vane type of construction, should wear occur, it can affect only parts that are easily and readily replaceable without dismantling the entire unit. In the Multiclone, the simplified header construction together with the enclosure of the tubes by the hopper greatly reduces heat radiation. This facilitates temperature control and where condensation might occur reduces insulation requirements to a minimum. The Multiclone design makes possible its installation in existing structures in what would otherwise be waste space and in places where manifolding would be impossible. The single manhole through which all tubes can be reached simplifies inspection. Thus the elimination of manifolding simplifies installation, saves space, decreases wearing surface, reduces heat radiation and gives better temperature control.



Compact tube assembly.



Common header.

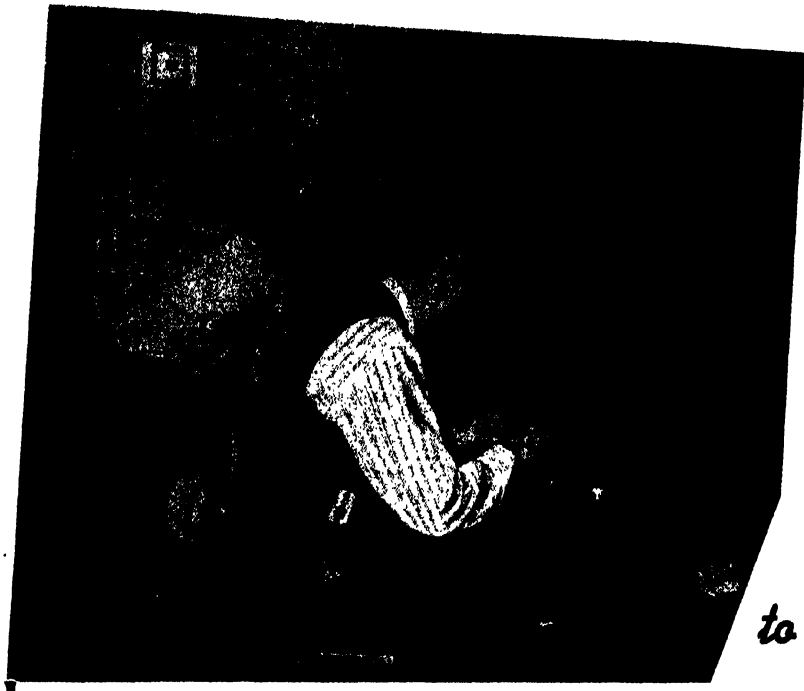


No manifolding. Multiclone discharges directly into flue.

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But remember the men who build the Jeeps—those who train to operate and follow them—and the millions of others who are engaged in our war effort. For all, there had to be an abundance of water. It was the Layne Organization, who in the majority of cases, drilled the wells and built the systems that provide water by the millions of gallons. To a well water system, the name Layne is as famed as is the name Jeep to a four wheel vehicle.

Layne's reputation like that of the Jeep has been won on the field of action. Throughout the entire Nation, Layne wells and pumps are doing a magnificent job—providing water for ordnance plants, munition factories, training camps, air fields, ship yards and all kinds of war material producers. For late bulletins, address,

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Lead Substituted for Critical Materials

EVER since the Bureau of Industrial Conservation of the War Production Board several months ago placed lead in the group of materials available in sufficient quantity to be used as a substitute for more critical materials, the WPB, Army and Navy officials, as well as industry, have been searching diligently for uses of lead that would relieve more critical materials. Lead is the only common metal classified in the least critical group. Already considerable progress has been made.

The use of lead to save critical materials falls naturally into two categories. First, there are many purposes for which lead is normally used to a greater or lesser extent in competition with other materials now critical, for example, in plumbing and for sheet metal work on buildings. Lead-base bearing alloys are rapidly supplanting tin-base alloys in ship construction, Diesel engines, and many other places. Lead-base die-casting alloys are supplanting zinc-base alloys for many purposes when high strength is not important but where good casting qualities are. The lead-base alloys, in addition, are generally superior for corrosion resistance.

Lead pipe and tank linings are taking the place of rubber in many industrial operations. Lead gaskets are, in many instances, proving superior to rubber gaskets used for a multitude of purposes. Lead collapsible tubes have largely displaced those made of tin and aluminum, and lead foil laminated wrappings are finding wide use. Lead coatings are saving much zinc, tin, cadmium, and nickel, formerly used to protect iron and steel products.

In the paint field, considerable savings of critical materials are also possible through wider use of lead pigments.

Lead alloy name plates, hard lead drum trap covers and rings, and water closet floor flanges take the place of brass. Lead alloy couplings are being employed in place of copper and bronze on certain types of cement-asbestos pipe.

Schenley Research Institute

THE Schenley Research Institute, Inc., formerly in the Empire State Building, New York, N. Y., has recently been moved to Lawrenceburg, Ind., where it previously has maintained divisional laboratories. The present laboratories are located in much larger quarters and will combine current research activities.

The laboratory is under the direction of A. J. Liebmann, president, assisted by six divisional heads: G. de Becze, W. Nelson, F. Pellett, M. Rosenblatt, E. Stevens, and T. Wiehe, Jr.

Soap Dispersions Speed Production

OF DEFINITE importance in large-scale industrial and war work is a revolutionary type of paint recently developed. It consists essentially of a suspension of synthetic resins and pigment in soapy water. This paint is nonflammable, quick drying, and eliminates noxious vapors. Resin emulsion paints are being used to camouflage gun emplacements, munitions depots, and large war plants. The dull finish for many Army vehicles is supplied by emulsion paints.

Soap is applied to other war problems in a modern method for the preparation of building blocks from clayey soil and a bitumen emulsion (U. S. Patent 2,275,087). Large numbers of field structures must be put up quickly in modern warfare, and any method which eases the strain on transportation facilities is of obvious value. In this new process only a portable mixer-extruder and a small amount of soap bitumen emulsion need be transported. The main component of the blocks can usually be obtained from the ground around the building area. Another advantage is that the blocks dry within 24 hours, so that fast construction with little storage space is possible.

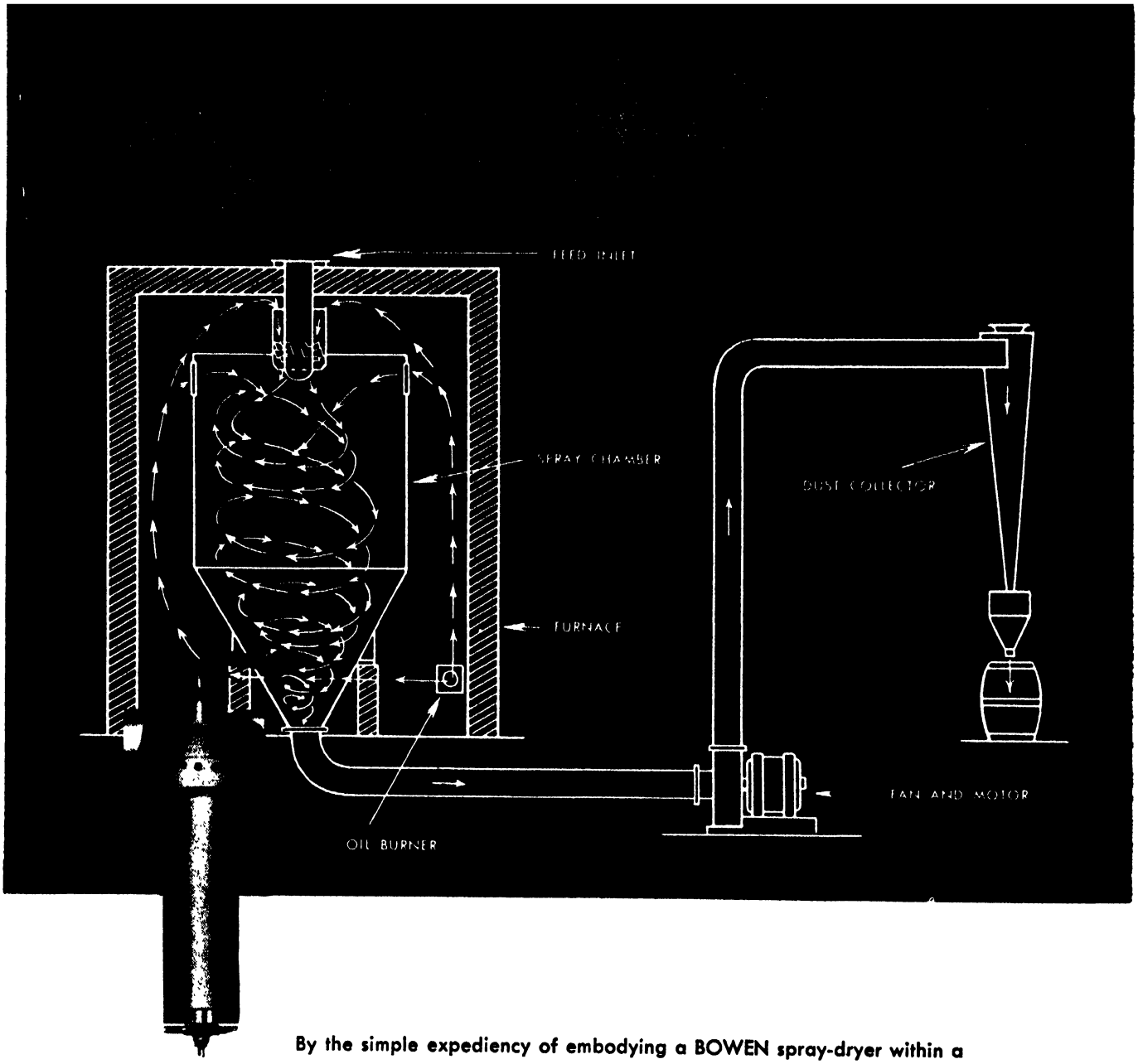
Asphaltic emulsions will also help alleviate the rubber tire shortage when the new "wrap-around" substitutes are ready for sale. These consist essentially of a heavy ruglike cloth coated with an asphalt emulsion, which can literally be wrapped around the worn-out tires. While the mileage obtainable from these coatings is not great in comparison with rubber treads it is reported that their use is justified by their low cost.

Soap as a Road Builder

THE value of soap as a road-building material was tested recently in experiments made by the Michigan State Highway Department. Soap was mixed with fine sand and used in an effort to resist surface scaling resulting from the use of calcium chloride and sodium chloride spread to remove ice in winter.

Soap a Black-Out Aid

IN BRITAIN where enemy bombers can be guided to their objectives by light-colored roads visible from the air, bituminous emulsions made with soap are being considered to black-out these conspicuous surfaces. By painting a dilute bitumen emulsion on the roadway and dusting with pulverized coal, a cheap and durable blackening effect is obtained (British Patent 534,889).



By the simple expediency of embodying a BOWEN spray-dryer within a furnace, so that the walls of the chamber are radiant, the rate of evaporation is speeded tremendously. A drop of water under such conditions becomes similar to a "Black Body" because the radiant heat is all absorbed, and none is given out. The products of combustion enter the drying chamber in the usual manner and perform their drying operation by conduction and convection, but in addition, the radiant walls of the drying chamber adds heat to the particle of water with the speed of light. This heat penetrates to the center of every particle, vastly increasing its enternal energy and rate of evaporation. Inquiries are invited.

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For the manufacture of paint and varnish driers; for mordants in textile and leather dyeing; and as a catalyst in various organic syntheses.

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For the manufacture of paint, varnish and lacquer pigments; linoleum and oil cloth; inks; insecticides and fungicides; wallpaper; and as a mordant in the dyeing of furs and textiles.

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Live and Learn

After thirty-odd years of experience in the chemistry and technology of foods I recently have had two experiences which suggest that a specialist may be surrounded by everyday facts connected with his speciality but concerning which he is utterly ignorant.

1. I have long deemed it expedient to order poached eggs at restaurants of questionable standing in view of the fact that only a first-class egg will poach successfully. A short time ago at a restaurant of reasonably high grade I was served a "sour" poached egg and on complaining was informed that they always put vinegar in the water in which eggs were to be poached and that an apology (and another egg) were due me because this time the chef had overdone the acidification. I wonder whether this custom is due to an accidental discovery or to expert professional advice.

2. On the diner recently I was served ice cream, the taste of which brought me up standing almost literally. There was an acrid pungency to it utterly foreign to my experience with this favorite delicacy. Instantly I was flooded with thoughts of toxic bacterial activity. I called the steward and reported, expecting him to register at least mild excitement. Not at all. He explained quite casually that the strange taste was that of the dry-ice in which the ice cream had been packed and that my experience was a common one. I tasted again gingerly and was convinced it was the flavor of the useful, necessary carbon dioxide and none other, obviously highly soluble in ice cream mix at freezing temperatures.

Carl S. Miner

9 South Clinton St.
Chicago, Ill.

McGill University Course on Elastomers

The Department of Chemistry, McGill University, Montreal, Canada, is offering for the fifth consecutive year an extension course on the chemistry and technology of resins and elastomers. The instructor is R. V. V. Nicholls, assistant professor of chemistry and secretary of the Rubber and Plastics Division, Society of Chemical Industry. The course is planned especially for industrial chemists, fabricators, and sales promotion men.

Sulfur Production Continues Upward

Production of sulfur in the United States increased 25 per cent in the first 8 months of 1942 compared with the same period of 1941, according to a statement released by the Bureau of Mines, Department of the Interior. Mine shipments increased 9 per cent. Producers' stocks of sulfur at mines, in transit, and in warehouses were built up from 4,685,843 long tons on January 1 to 4,927,673 tons on August 31, 1942, a gain of 5 per cent.

Decontamination Squad

The laboratory of the American Cyanamid Corp., Stamford, Conn., has organized, trained, and equipped what is believed to be the first decontamination squad in the State of Connecticut, and is now training a city squad in the same work. T. F. Bradley, a research group leader at the laboratory, is leader of the squad there and is instructor of the city squad, as well as gas identification expert for the Auxiliary Police.

The laboratory squad numbers ten, all trained in how to combat the effects of gas, and equipped with masks and gasproof clothing.

Cellophane Protecting Army Rations

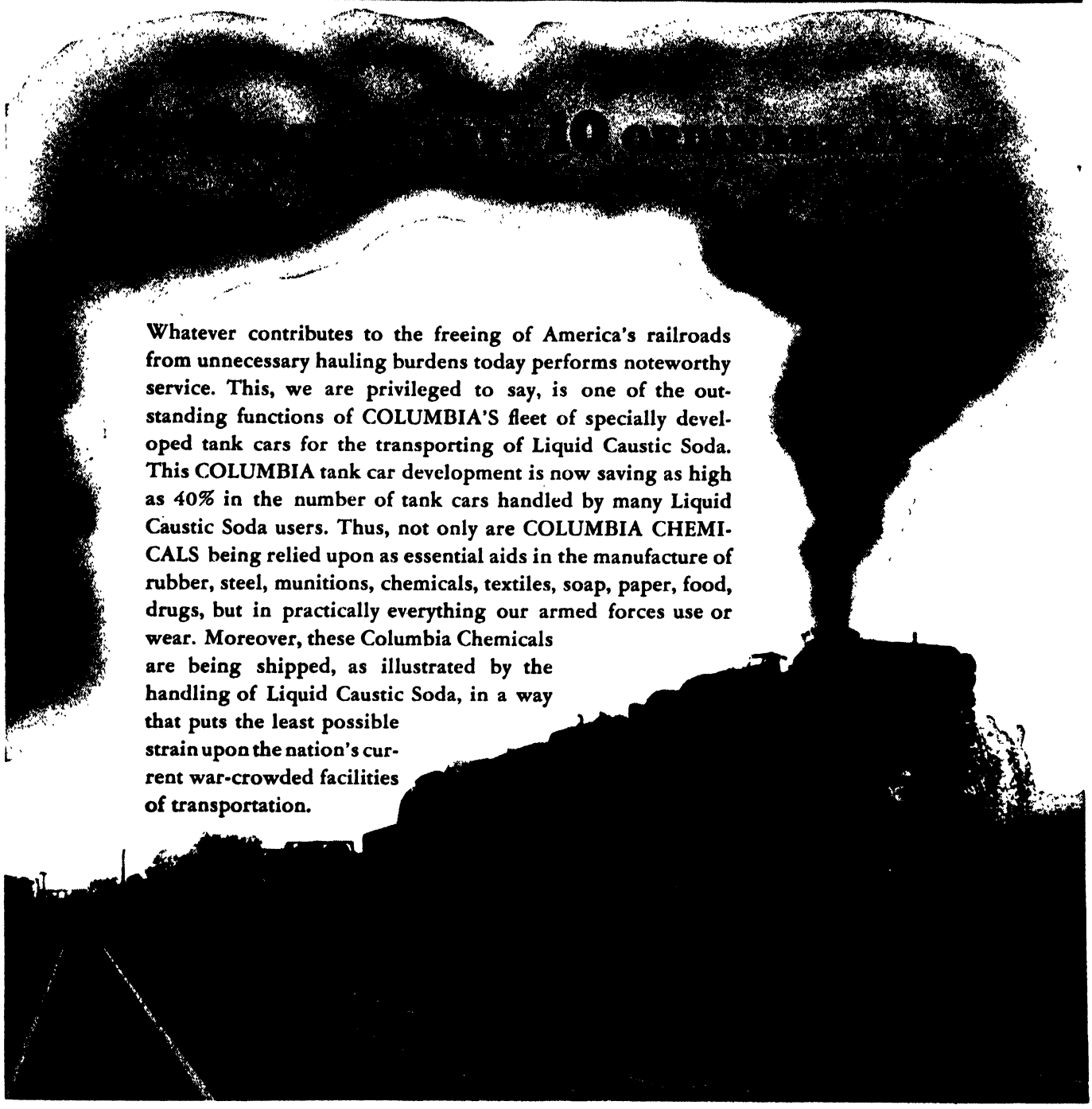
Cellophane is among the materials tested and approved by the U. S. Army Quartermaster Corps for the protection of emergency rations, and tons of cellophane have gone into this use. The packaging must keep foods satisfactorily for a year, protecting them from snow and subzero temperature as well as the sun, heat, and high atmospheric humidity of the tropics. The K ration, formerly called "parachute ration", is now intended for general use in training maneuvers and in many fighting areas. It consists of three meals, weighing slightly more than 2 pounds and providing more than 3,700 calories of energy.

Nutritional Charts for Medical Specialists

Nutritional Charts prepared expressly for medical, dental, and dietetic specialists by the staff of the Research Department, H. J. Heinz Co., Pittsburgh, Penna., has recently been issued in its 11th edition. This is a 44-page compilation that brings up to date information on biotin and other newer members of the vitamin family, and includes a table on clinical criteria of early deficiency disease symptoms in human beings, enzyme-vitamin relationships, and summarized information on the conservation of the nutritive value of foods.

After preliminary experiments conducted by Industrial Gases, Ltd., and the Electricity Supply Board, a plant has been completed in Dublin for the manufacture of zinc oxide. Production, according to unofficial reports, is now progressing at the rate of 10 cwt. weekly.

COLUMBIA CHEMICALS



Whatever contributes to the freeing of America's railroads from unnecessary hauling burdens today performs noteworthy service. This, we are privileged to say, is one of the outstanding functions of COLUMBIA'S fleet of specially developed tank cars for the transporting of Liquid Caustic Soda. This COLUMBIA tank car development is now saving as high as 40% in the number of tank cars handled by many Liquid Caustic Soda users. Thus, not only are COLUMBIA CHEMICALS being relied upon as essential aids in the manufacture of rubber, steel, munitions, chemicals, textiles, soap, paper, food, drugs, but in practically everything our armed forces use or wear. Moreover, these Columbia Chemicals are being shipped, as illustrated by the handling of Liquid Caustic Soda, in a way that puts the least possible strain upon the nation's current war-crowded facilities of transportation.

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The Stone That Burns. *Williams Haynes.* 345 pages. D. Van Nostrand Co., Inc., 250 Fourth Ave., New York, N. Y., 1942. Price, $3.75.

AT LAST the tale of the long struggle to make the United States independent in production of sulfur has been written. Williams Haynes' finest and most readable book to date is the result of combining careful research among original sources with fine writing and structure. For years it has been recognized that the story of the development of the Frasch process constituted one of the truly romantic episodes in the pioneering of the American industrial scene. It is indeed fortunate that this story has been told by someone able to appreciate its significance before all of the living participants in the early heroic days have gone.

With the theory and practice of Frasch process mining so well worked out today, as exemplified by four separate companies at five mining locations, it is hard to realize what an adventure the early days of the industry were. This story of MEN and trouble, with the final victory in nearly every chapter won by perseverance, determination, and engineering skill, is not only fascinating reading in itself, but has all the value of history—and this, too, in a field which seldom receives the kind of attention ordinarily reserved for efforts in the fields of war and statecraft.

The first page fittingly sets the stage for the story by dramatizing the moment when sulfur was first pumped out of the ground as a liquid. The first chapter recounts the long and dangerous attempts to mine the salt dome deposits by conventional methods. From this point on the story is told chronologically. Of particular interest to the chemist and engineer is the exposition of economic and financial, political and human complications, which all too often are lost sight of by technical and scientific minds. It is obvious that Herman Frasch could never have succeeded had he not possessed sound business judgment and ability, as well as extraordinary capacity as an engineer and boundless determination and faith.

Chapters IV and V provide a history of competitive difficulties in world markets and production from the earliest beginning of the chemical industry, and outline under what troubled world market conditions Herman Frasch projected his development. Subsequent chapters describe the organization of companies and mining which have stemmed from the original operations at Sulphur, La., while the final chapters of the book discuss the present and future of the sulfur economy.

The book is profusely illustrated with fine pictures, foreign and domestic, old and new. Sketches showing the structure of salt dome formation and well equipment give a very clear exposition of the mechanics of sulfur mining by the Frasch process. An appendix contains the salient statistics of the industry in well arranged form. The author has wisely decided to include only a page giving the chief properties of sulfur, leaving to Mellor the detailed discussion of the more remarkable and controversial data on the more obscure properties. The statistics on production and consumption include much information, such as tables of soil sulfur balance, sulfur content of foods, analysis of pyrites from different sources, etc., which are frequently useful but of heretofore limited accessibility.

The book is not only to be recommended to the scientific and technical personnel of the nation and to the general public for its general reader interest, but also to students of chemistry and engineering. These students will find it excellent collateral reading, as it gives a side of the industrial picture which usually can be seen only after formal education has been completed and the school of hard knocks has taken over one's education.

D. B. MASON

Organic Syntheses. Vol. XXII. *Edited by L. I. Smith.* 114 pages. John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y., 1942. Price, $1.75.

VOLUME 22 of the well-known series of "Organic Syntheses" maintains the high standards of former volumes. Forty-

CONTINUED ON PAGE 1468

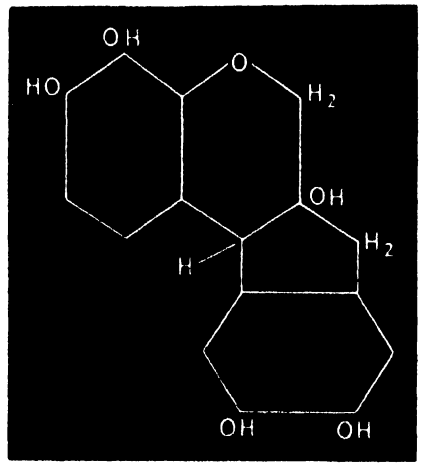
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RESEARCH

EVEN Pollyanna might have difficulty in finding a ray of sunshine in the situation in which many manufacturers have been placed because of present shortages of many materials. Nevertheless the resulting frenzied search for substitutes has often uncovered a hitherto overlooked product which has proven satisfactory or even superior to that formerly used.

Unfortunately, however, it has quite often been found that a new discovery is available in only limited amounts since the producer had not previously received sufficient encouragement to warrant installation of the equipment necessary for large-scale production. Even in such cases the research has not been in vain since with the return of normal conditions the producer will be able to supply the product in adequate amounts, the value of it having been established, and the user will have been awakened to the necessity of investigating all materials which he might use.

There is often a temptation to consider a particular product of manufacture as being entirely satisfactory as regards both quality and cost and to curtail research involving it. Because of present shortages of raw materials and equipment there is also a temptation to curtail research involving new products or new uses for present products.

Chas. Pfizer & Co., Inc. does not subscribe to such views. We believe that when the job now in hand is successfully completed our nation will find itself with a productive capacity greatly in excess of any that it has previously enjoyed and that now is the time to prepare to utilize this. We are increasing our research program, primarily of course in order to help do our share toward finishing this present job as quickly as possible, but also secondarily that new products and new uses for old products may be available for any surplus productive capacity to come.



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Beyond the Flyleaf

CONTINUED FROM PAGE 1466

three contributors other than members of the board have submitted 34 syntheses in widely diversified fields. The usual form is followed, presenting first the reaction in detail followed by the procedure. As in previous volumes numerous notes are included, and these add materially to the value of the preparations. The listing of other methods of preparation is continued as a separate heading under each preparation. It is believed that still another heading might advantageously be added. Presumably each contribution is submitted by its author because it is of value in some particular field or is a unique reaction. A heading similar to the three now employed, but indicating the field in which the reaction is of interest, is suggested. A brief statement that the compound is of utility as an intermediate in the synthesis of certain vitamins, dye sensitizers for photographic films, or that the reaction is a unique method of introducing a radical would tend to make the preparations of greater interest to chemists not directly involved in that specific field.

The present volume contains four preparations of sugar derivatives, four of amino acids, and four of organic iodine compounds. The isolation of pure linoleic and linolenic acid from natural oils is described. The unusual reaction of *m*-dinitrobenzene with methanolic potassium cyanide to yield 2-nitro-6-methoxy benzonitrile is employed to give an intermediate for the preparation of 2,6-dimethoxybenzonitrile.

But few errors appear and these are inconsequential. It is questionable whether *d,l*-phenylglycine is a proper synonym for *d,l*-alpha-amino phenyl acetic acid (page 23) and whether 2,3-dimethyl anthraquinone should be referred to as "the yellow quinone" (page 38).

The volume is printed in the usual clear type on good paper and the binding is consistent with previous volumes. The index covers the compounds of this volume as well as those of Volumes 20 and 21. The book should be welcomed as an added tool in the hands of all organic chemists.

A. L. Fox

Proceedings of the Chemical Engineering Division, Society for the Promotion of Engineering Education.

The mimeographed Proceedings of the Chemical Engineering Division of the Society for the Promotion of Engineering Education is a compilation of all the papers presented at the 48th meeting at the University of California, as well as information on past and present officers, constitution, and committees of the Chemical Engineering Division of the society.

This is the first time that a complete report of the Proceedings has been issued since the inception of the Chemical Engineering Division in 1934. The Proceedings should be of interest to teachers in the field of chemical engineering to acquaint them with many of the personnel constituting the division and also to give such men an idea of the type of papers presented by the members at the annual meetings of the division.

In the Proceedings four papers are given on the "Training of Chemical Engineers for Industry", four papers on "Laboratory Course Instruction in Chemical Engineering", four papers on "Lecture Recitation Courses in Chemical Engineering", and six papers on "General Methods of Teaching Chemical Engineering".

Papers presented by such a large group of men naturally are written in many styles and treated in quite a varied fashion. Two of the papers included are in offset printing. The mimeographed papers vary considerably in make-up—some of them double spaced, others single spaced, some with elite and some with pica type. There is a tendency to crowd too much on the pages, showing bad margining and detracting from the appearance of the book. It has a rather light cover, is stapled, and requires some care in handling to prevent disintegration.

The book is intended primarily as a report to the members of the Chemical Engineering Division and is of considerable value to those members who could not make the long trip across country. These men are provided with a full report of the 48th Annual Meeting of the Division.

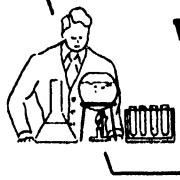
Frank C. Vilbrandt

Modern Electroplating. 399 pages. The Electrochemical Society, Inc., 3000 Broadway, New York, N. Y., 1942. Price, $5.50.

This book is the outgrowth of a symposium on electroplating held by the Electrochemical Society in October 1941. The volume contains nineteen papers solicited and edited by the Electrodeposition Division of the Society, with a record of the discussion of these papers and with approximately 800 references to the literature. The 26 authors selected to contribute to this symposium are closely connected with the electroplating industry and have turned out papers that are exceedingly practical and yet thoroughly scientific. As a result this book offers the most up-to-date and comprehensive account of electroplating available.

CONTINUED ON PAGE 1470

SALVAGE



— — — A BIG WORD IN THE CHEMICAL PROCESS INDUSTRY

WITH the word "salvage" uppermost in the minds of all of us on the home front, let's make sure that the Chemical Process Industry is doing its share in "salvaging" and conserving war-essential chemicals. Many companies are saving untold gallons and pounds of chemicals by the recovery or reclamation of acid, alkali, dye, and other liquors by treatment with NUCHAR Active Carbon.

Check through the following list of chemical products being either recovered or reclaimed by simple low-cost treatment with NUCHAR Active Carbon . . . your plant might be wasting one of these right now, or they might give you an idea on the use of Nuchar for a similar product which you are now discarding after a single use: Recovery of Iodine, Tungsten, Phenol, Glycerin, and Sodium Glutamate; Reclamation of Electroplating Solutions, Drycleaning Solvents, Acetic Acid, Formic Acid, Muriatic Acid, Cellulose Acetate, Nitrate, Scrap Paraffin, and Sulphuric Acid.

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MOTOR COOLING FLUIDS

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SOLVAY SALES CORPORATION

Beyond the Flyleaf

CONTINUED FROM PAGE 1468

The first paper presents an excellent discussion of general principles and methods of electroplating. This is followed by papers dealing specifically with the following metals: brass, cadmium, chromium, cobalt, copper, gold, iron, lead, nickel, silver, tin, zinc, and metals of the platinum group. Another paper deals with alloy plating. Accordingly, the book covers practically all metals whose plating is important.

Recent developments in plating thick silver deposits for bearings and in the use of indium bearings are barely mentioned. Another topic which has not been adequately treated is bright copper, for which at least three types of solution, besides the one considered, have attained commercial significance. Finally, there is hardly any reference to the rapidly increasing importance of electroplating in the steel mill, as exemplified particularly in electrogalvanizing and electrolytic tinning.

This book is directed primarily to chemists and chemical engineers in the plating industry, but will also be of value to plating plant operators. Those interested in fundamental research and in the development of new and improved methods for electroplating will find here many suggestions for unsolved problems.

LOUIS WEISBERG

Technique of Plywood. *Charles B. Norris.* 249 pages. I. F. Laucks, Inc., 911 Western Ave., Seattle, Wash. Price, $2.50.

THIS book is a consolidation of a series of articles that have appeared in various trade magazines during the past few years, to which is added a section on "Scientific Principles of Gluing" by I. F. Laucks. The early chapters of the book discuss the problems of balanced construction in plywood and the deflection and strength of horizontal plywood loading. Following is a description of the loading of plywood walls, outlining the problems of elastic stability both in compression and shear. Some seven subsequent chapters are devoted to the elastic theory of wood and plywood. The author's analyses of the various problems are reduced to mathematical formulae, of which 72 are given. This gives an excellent foundation on which engineers can determine proper and suitable strength evaluations and probable design behavior.

A third section of the book treats rather briefly the manufacture of plywood, stressing the hot pressing methods with resin adhesives. The warpage of plywood is given careful analysis in the fourth section, and methods are indicated to keep this at a minimum. The final section on "Scientific Principles of Gluing" is an excellent summary of the fundamentals that a user ought to know about the application of glue to wood.

Norris has spent his adult life in the plywood and adhesives industry, first at the Forest Products Laboratory at Madison, then at the Haskelite Manufacturing Co., Grand Rapids, and I. F. Laucks, Inc., of Lockport. He has recently been called back to the Forest Products Laboratory at Madison to assist in the emergency war program there. No one is better qualified to write such a book, and the job has been well done. It will be a useful volume in the working library of any engineer.

THOMAS D. PERRY

Mercerising. *J. T. Marsh.* 458 pages. D. Van Nostrand Co., Inc., 250 Fourth Ave., New York, N. Y., 1942. Price, $9.00.

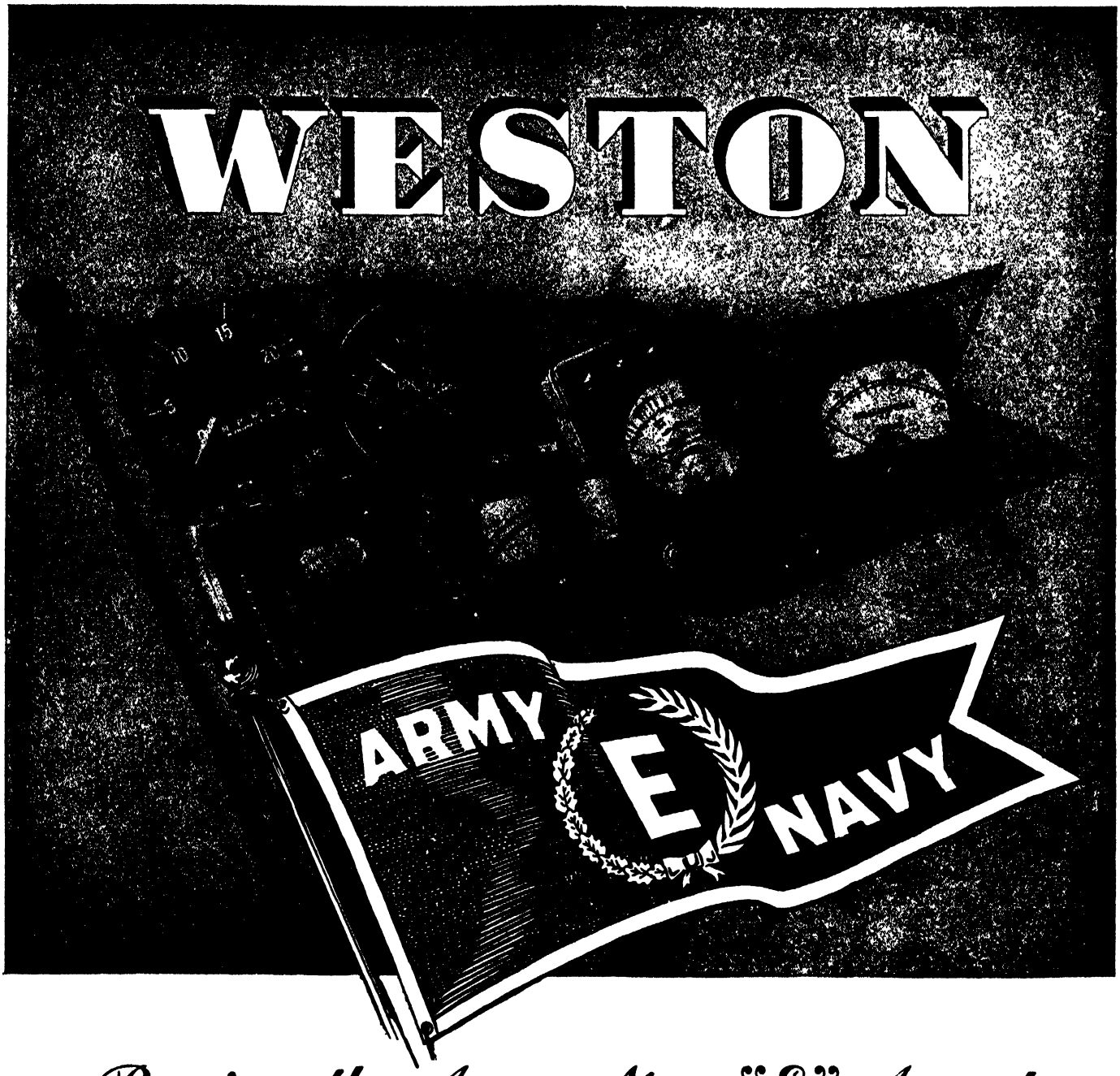
TO MOST textile chemists the term mercerization immediately brings to mind one of the romances of science and industry. It began in 1844 when John Mercer, an English calico printer, while attempting to filter a solution of caustic soda through a piece of cotton cloth noticed that although the solution passed through rapidly at first, it always went through slower and slower and finally almost entirely stopped. This observation led to the patenting in 1851 of a process of treating cotton yarn and cloth with caustic soda solution to improve them, particularly as to increase strength, durability, and capacity for absorbing dyes. The process soon became known as mercerization.

It was not until 1899, however, that the most valuable application of mercerization was discovered. At that time Horace Lowe and other experimenters found that if yarn and cloth were mercerized under tension, a high luster was obtained. Adaptation of this treatment led to modern mercerization, which for many years has been one of the most important processes of cotton finishing.

Probably no process in textile finishing has engaged the attention of so many textile chemists as the study of the phenomena of mercerization, its causes, methods of control, and improvement. The author of this book has brought together in one volume the important knowledge available in regard to all phases of this subject, not only chemical and physical, but also the mechanical application of the finishing industry. While other chemicals, such as zinc chloride and sulfuric acid, have been patented and used to

CONTINUED ON PAGE 1472





Receives the Army-Navy "E" Award

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Only short months ago, the instrument goal in this mechanized war seemed unattainable. In almost unbelievable quantities instruments were needed for our huge plane program—for a two-ocean navy—for tanks, guns and walkie-talkies — for our arsenals and factories — and for countless new devices of war.

To approach this goal meant far more at WESTON than the mere addition of factory and laboratory equipment, and the usual worker-training program. It meant imparting to untrained hands the skill and instrument sense which ordinarily takes years to acquire. For it's this rare instrument sense, backing up sound engineering, which has been responsible for WESTON's continued leadership.

This "E" award to the workers at WESTON—the first to any group in this specialized field—means recognition of their efforts in striving to attain the goal in numbers, while never relinquishing the WESTON quality ideal.

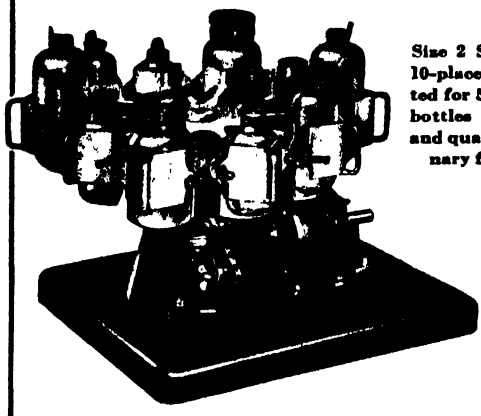
And to our courageous fighting men everywhere, it conveys the assurance that they can depend on the men and women at WESTON to continue furnishing the essential instruments in ever increasing quantities . . . *until victory is won.*

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Size 2 Shaker with 10-place head adapted for 500-1000 ml. bottles and pint and quart size ordinary fruit jars.

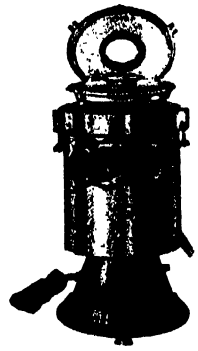
A motion is produced similar to shaking by hand, but much more rapid and effective. It is not only reciprocating up and down, but also elliptical and produces within the container a circulation as well as concussion of the fluid. More compact construction is obtained by employing a satisfactory friction drive in place of the conventional belt drive.

International Bottle Shaking Machines can also be furnished with an explosion proof motor for hazardous locations or when volatile materials are being used.

The Size 2 Shaker can be furnished with a variety of heads.

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Beyond the Flyleaf

CONTINUED FROM PAGE 1470

some extent, the author has confined his attention to the treatment of cotton with caustic soda, with minor mention made of its action on linen and rayon.

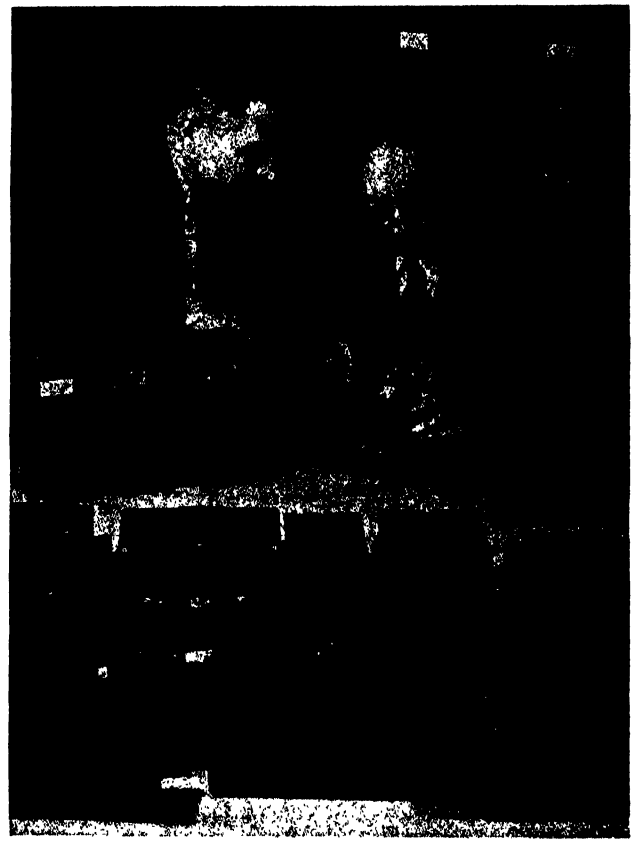
The text is well arranged, thoroughly illustrated and systematically divided into subsections as follows: Historical Introduction, Cotton, The Mercerising Process, Native Cellulose and Hydrate Cellulose, Theoretical Aspect of the Action of Alkali Absorptive Capacity, and The Efficiency of the Process.

This book is undoubtedly the most complete work that has ever been published regarding mercerization and is highly recommended to everyone who may be interested in the subject.

L. A. OLNEY

J. W. Richardson left his position of assistant supervisor of chemistry for ESMDT at The Pennsylvania State College, which he held from September 1941 to July 1942, to take a position with the Röhm & Haas Co., Plastics Division, Bristol, Penna. He is on leave of absence from his former position of assistant professor of chemistry at the San Jose State College, San Jose, Calif.

K. R. Van Tassel has been appointed manager of sales of the newly formed Integral-Horsepower Motor Section, Motor Division, General Electric Co., Schenectady, N. Y.



Design Simplification Saves Steel

Seen in the foreground are 14 old types of circuit breakers which will be replaced by four new units, developed by the Westinghouse Electric and Manufacturing Co. H. D. Dorfman, Westinghouse engineer, points out the new space-saving contact to J. A. Butts, manager Westinghouse small breaker division. The new line saves 38 per cent steel and 18 per cent copper, reducing weight.

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Convertible from gas to Diesel fuel.
STEAM TURBINES
All types, for generator and equipment drives.
SPEED CHANGE GEARS
Reducing and increasing.
V-BELT DRIVES—(Worthington-Allen)
Complete drives, sheaves or belts only.
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For chemical, hot or cold water, etc.
PORTABLE COMPRESSORS
AIR TOOLS
For general plant maintenance.

WORTHINGTON

ICS-39

WORTHINGTON PUMP AND MACHINERY CORPORATION • HARRISON, NEW JERSEY



Waste Nylon

THE Nylon Division of E. I. du Pont de Nemours & Co., Inc., has developed a method of converting nylon yarn waste back to some of the complex chemicals from which the fibers were made originally.

After Pearl Harbor, style stepped aside for strategy and nylon production was converted to the manufacture of yarn for vital military uses. The urgency of these military requirements, as well as the shortage of chemicals needed as raw materials in the production of nylon, are the reasons for its waste-reclaiming move. The company is evaluating all-nylon and part-nylon stockings in its experimental recovery project. Some of the nylon waste, that which is undyed and unmixed with other materials, is converted to nylon "flake", a white, crystalline substance looking like soap chips, which is the raw material actually used in spinning nylon yarn. In the case of dyed waste, more complicated treatments must be given. The du Pont Nylon Division is not seeking types of waste that can be used to produce "spun nylon yarn" for direct military purposes.

Ultraviolet Unit

PFALTZ & BAUER, INC., Empire State Bldg., New York, N. Y., are offering a new pure fused quartz ultraviolet generator. This unit is particularly valuable to the chemist for the classification of solid inorganic substances by the characteristic color of their fluorescence. It may also be used for the detection of impurities.

Plastic Patterns

A PLASTIC which for years has given strength and resiliency to box toes of shoes now speeds military production in foundries by affording quick, easy, economical repairs and alterations for patterns of metal castings.

A colloid-treated fabric trade-marked "Celastic", this plastic is double-napped cotton flannel, similar to a cotton blanket, impregnated with cellulose nitrate and a fire retardant making it slow-burning. Wet down with a solvent, it may be formed into any shape, and will retain that shape on drying. It has good adhesive properties, and will stick to wood, metal, and other materials.

Celastic is made by The Celastic Corp., Arlington, N. J., which is owned jointly by the United Shoe Machinery Co. and E. I. du Pont de Nemours & Co., Inc.

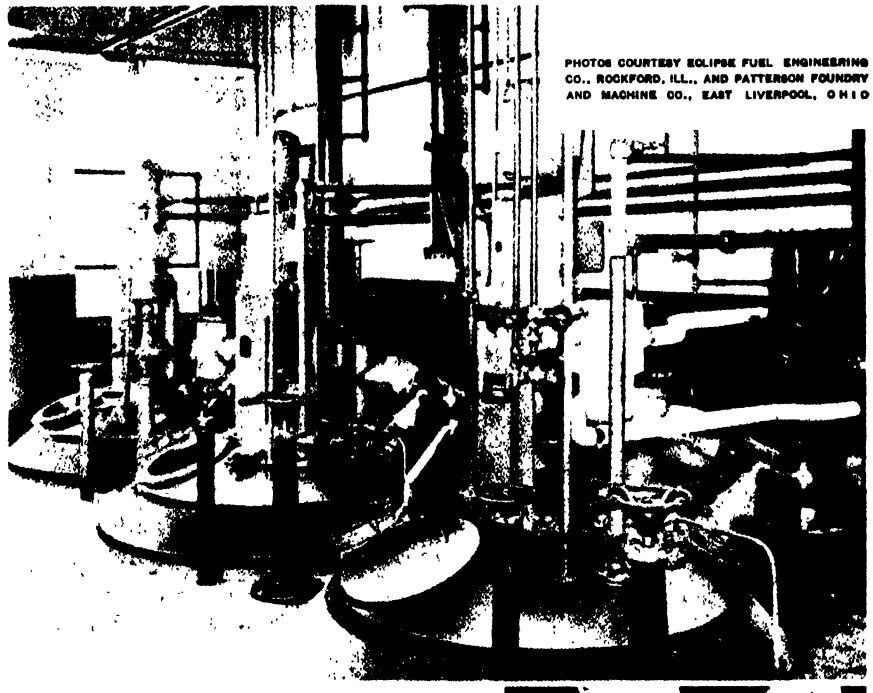
Three-Way Butterfly Valve

QUICK action is provided in a three-way valve of the butterfly type, designed for mixing and interchange service and adapted to fully automatic control by means of an air diaphragm motor or hydraulic cylinder.

The valve is constructed of cast steel or cast iron for pressures up to 600 p. s. i.

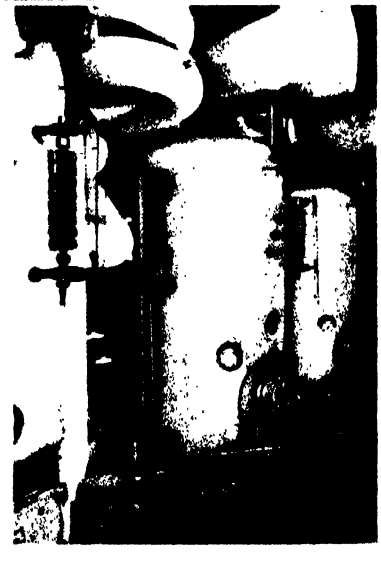
A special feature is the self-cleaning, double-beveled, streamlined vane, which seats wedge-tight against the body of the valve, producing a tight shut-off as well as positive control of volume and pressure. The valve is made by the R-S Products Corp., Wayne Junction, Philadelphia, Penna

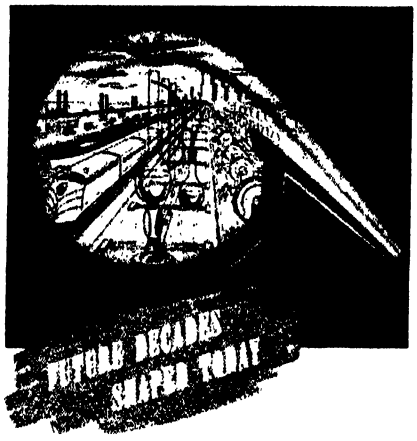
PHOTOS COURTESY ECLIPSE FUEL ENGINEERING CO., ROCKFORD, ILL., AND PATTERSON FOUNDRY AND MACHINE CO., EAST LIVERPOOL, OHIO



Varnish Processing

Top. Years ago varnish was heated in heavy, flat-bottom, copper kettles on wheels over gas, oil, or coke fires. Without automatic temperature control, local overheating and discoloration of the varnish were both inevitable, as was the danger of boiling over and resultant fire. Uniform cooling was impossible, and only relatively small batches could be cooked at one time. Consequently, fuel and labor costs were exceedingly high. *Center and Right.* The three 1,000 gallon, jacketed kettles shown above are heated by the three 1,000,000 B. t. u. McKee Dowtherm Vaporizers at right. Heating or cooling is accomplished instantly by flicking a switch, or it can be done automatically. A better colored varnish results, and each kettleful is the same as the ones which preceded it. The smoky oil fumes and fire hazard of the old process are gone. 700 or 800 gallon batches can be cooked at one time, thereby lowering fuel and labor costs. Three new type kettles make more varnish than 18 of the old kettles.

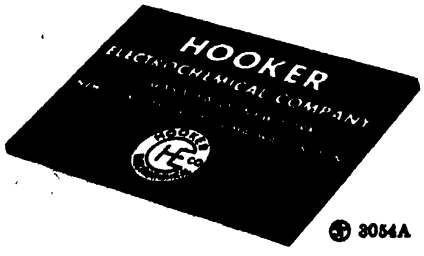




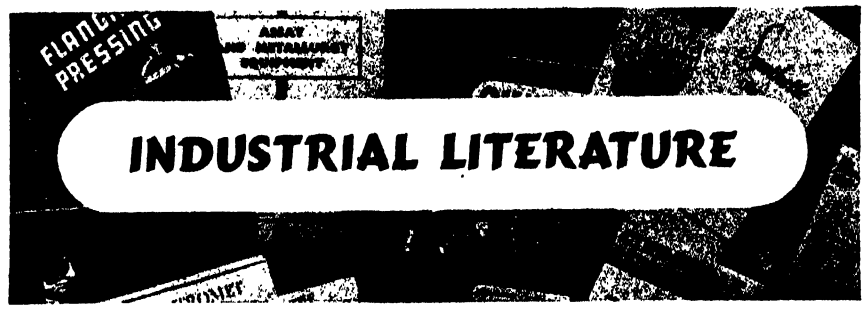
In the many chemical laboratories where modern marvels are being wrought, future decades are taking shape under our very eyes. Yesterday's achievements have become antiquities, and its farthest horizons are already at our backs.

In this far-reaching progress, HOOKER laboratories are shouldering their full share of responsibility. Never before have the chemists of this country had a greater profusion of chemicals, more uniformly controlled quality, more fully known properties or a greater fund of technical assistance.

HOOKER is glad indeed to be so fortunate in its ability simultaneously to serve chemists, chemistry and our Country.



3054A



Listed publications should be requested directly from the company concerned. Use business stationery, mention bulletin numbers, and refer to this journal. Publications will be sent free unless otherwise noted.

Barrel Pump. A new bulletin, complete with engineering sectional views, describes an electric-hydraulic barrel pump for pumping oil, light, medium, or heavy greases directly from the original container. The pump operates from any electric outlet and discharges constant volume regardless of pressure head. Six capacity and pressure combinations are available to meet all service requirements. *Engineering Bulletin 425 CEN.* TRABON ENGINEERING CORP., Cleveland, Ohio.

Brushes. This bulletin contains information on Staplbond Tampico brushes and steel wire brushes which embody a newly developed type of construction. Other brushes described are circular brass and steel-wire scratch brushes, brushes for glue and sawdust, cotton potash brushes, lacquer, circular cotton wick, spiral wire ring brushes, and many others. *Bulletin Br-103 CEN.* HANSON-VAN WINKLE-MUNNING CO., Matawan, N. J.

Chemicals. A 36-page catalog of chemicals, including sodium sulfite and hyposulfite, phosphoric acid, sodium phosphates, and photographic chemicals. *Catalog CEN.* A. R. MAAS CHEMICAL CO., 4570 Ardine St., South Gate, Calif.

Colloidal Graphite. This is a 4-page informative bulletin on the use of "dag" colloidal graphite as a lubricant for running-in internal combustion engines, compressors, and other mechanical equipment. *Bulletin 421-BB CEN.* ACHESON COLLOIDS CORP., Port Huron, Mich.

Conservation of Copper. This bulletin describes five ways of saving copper in plant electric systems. Diagrammatic layouts cover all five points and the story of copper saved in each case amounts to tons. *Bulletin GED-1011 CEN.* THE GENERAL ELECTRIC CO., Schenectady, N. Y.

Constant Temperature Oven. This leaflet describes a constant temperature oven in the moderate-price field. Illustrations show the oven and its construction which features double-walled door and cabinet, glass-wool insulation, hazard-safe elements, ventilation control, automatic heat control sensitive to plus-minus 0.5° C., from room temperature to 150° C. Thirteen other types of ovens are also illustrated and briefly described. *Leaflet CEN.* PRECISION SCIENTIFIC CO., 1730-54 N. Springfield Ave., Chicago, Ill.

Dehydrator. An illustrated, descriptive pamphlet on dehydrators for eggs, milk, fruit sauces, and other liquid or semi-liquid products. A diagrammatic drawing shows the whole operation; specifications and capacities of various models are given and a low-cost plan of building and equipment set-up is included. Units for filling either glass or tin containers are also shown. *Bulletin 115 CEN.* MOJONNIER BROS. CO., 4601 W. Ohio Street, Chicago, Ill.

Electric Motor Care. This is a series of seven bulletins on the installation, care, and adjustment of electric motors. They have been prepared in an effort to help the user of motors get the longest possible service. A system of suggested checks is offered for locating trouble when the motor or generator fails to operate. *Manuals 21-27 CEN.* CENTURY ELECTRIC CO., St. Louis, Mo.

Electronic Tubes. A quick-selection and comprehensive chart of electronic tubes for industry. Technical data on applications and tubes in tabular form makes it easy to select a tube to fit a particular problem. Bulletin numbers are listed for each tube described for aid in installation and operation. *Chart 168-1-8850 CEN.* GENERAL ELECTRIC RADIO, TELEVISION AND ELECTRONICS DEPT., Schenectady, N. Y.

Fluorescent Lamp Ballast. The new Acme F 100-25, four-lamp fluorescent ballast, is described in detail in this bulletin along with other sizes of ballasts. The manufacturer claims that this unit is designed to provide equalized and balanced secondary voltage to each lamp and that all four lamps will light at the same time, with no drag, delay, or flashing. Core and coil elements are said to be impregnated and compounded to minimize normal resonant vibration. *Bulletin 157 CEN.* ACME ELECTRIC & MFG. CO., Cuba, N. Y.

High-Frequency Heating. High-frequency electrostatic heating is discussed in a 22-page illustrated booklet, which discusses several applications of Thermex equipment and outlines the process. *Booklet CEN.* THE GIRDLER CORP., THERMEX DIVISION, Louisville, Ky.

Hot Water Unit Heaters. This is a standard code for testing hot water unit heaters, and is published to assure the public of uniform practices of tests in industry. Definitions and ratings of heaters, outlines of tests, equipment for testing, test procedure, and computation of results are some of the items covered. *Bulletin AIA 30-d-11 CEN.* INDUSTRIAL UNIT HEATER ASSOCIATION, 5-208 General Motors Bldg., Detroit, Mich.

Lift-Truck. This complete manual tells what a lift-truck is and what performance can be expected of it. It is divided into

six chapters devoted to design, construction, power plant, operating and control, etc., and contains illustrations and diagrams. *Manual 37 CEN.* TOWMOTOR Co., E. 152nd St., Cleveland, Ohio.

Lockers. A leaflet describes the new line of Victory lockers for shop, factory, and all industrial uses. Made of wood, and containing no critical materials, these lockers are light, durable, and strong. Construction details and sizes are given. *Pamphlet CEN.* CURTIS COMPANIES, INC., Clinton, Iowa.

Micro Program Switch. This leaflet describes a new switch for use in controlling the operation of compressor motors, pumps, solenoid valves or motor-operated valves, pasteurizers or industrial process work. The unit is a series of snap-acting cam-operated switches with a Microtrol driving unit. Adjustable cams may be rotated to change the operation of the switches and the timing of the Microtrol driving unit is also adjustable. It is available with single-pole, single-throw, or single-pole, double-throw switches. *Bulletin F-1420-3 CEN.* BARBER-COLEMAN Co., Rockford, Ill.

Operation Time Recorders. A new bulletin describes both mechanical and electrically operated types of recorder and explains their application to the processes of various industries. Their importance in test engineering, production control, etc., is discussed and diagrams show typical installations for different kinds of work. Complete specifications are included for the single and multi-pen instruments. *Bulletin A-321 CEN.* THE FOXBORO Co., Foxboro, Mass.

Ovens and Dryers. This bulletin gives a description of various types of ovens and dryers for industrial use. Many photographs show installations on all types of plants. Oven construction and method of heating are described in full. Such units as core ovens, heat-treating ovens, web dryers, floor conveyor ovens, drum dryers, overhead trolley and batch type ovens, as well as air heaters are included. Space is devoted to the source of heat and to the various means of handling materials as they pass through the several types of dryers and ovens. *Bulletin 130 CEN.* J. O. ROSS ENGINEERING CORP., 350 Madison Ave., New York, N. Y.

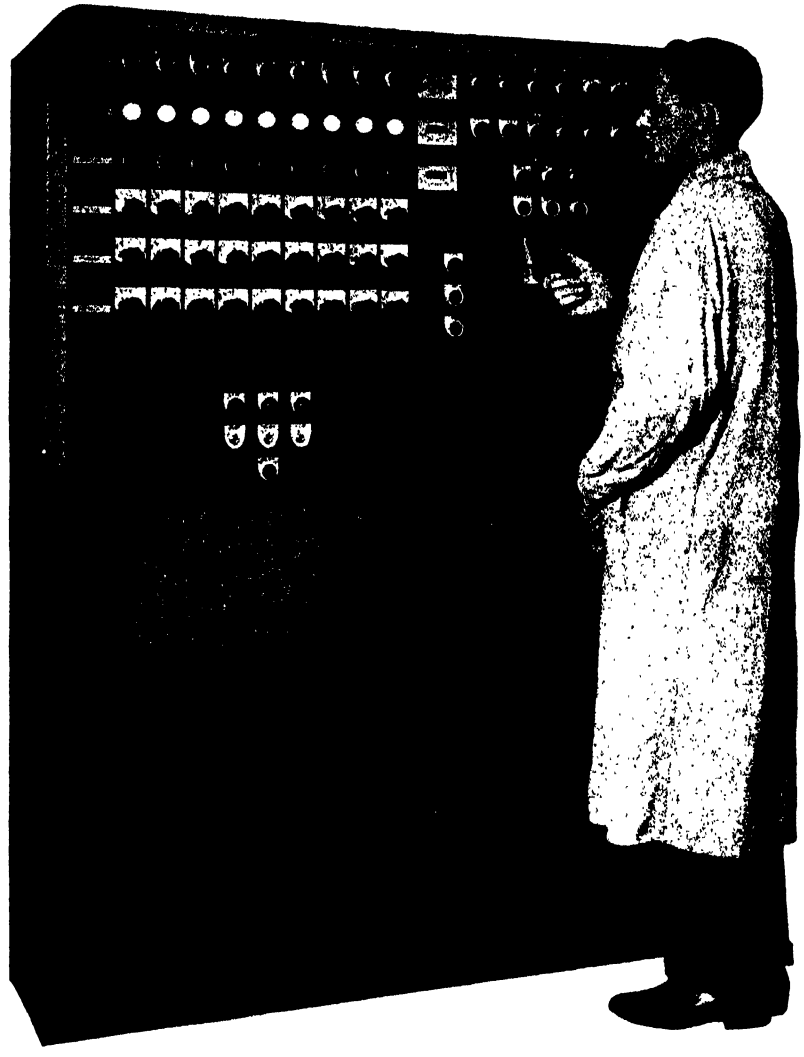
Process Equipment. This 8-page bulletin describes in full a complete line of special and standard equipment for the process industries. Fabrication methods and facilities are discussed along with illustrated descriptions of such units as thermocoil equipment, roasters, reducers, nitrators, vacuum stills, retorts, kettles, etc. Sizes and dimensions on most of the units are also added, as well as plant layouts of equipment for several industries. *Bulletin CEN.* BETHLEHEM FOUNDRY & MACHINE Co., Bethlehem, Penna.

Safety Siphon. A 4-page leaflet gives rules for the operation of a safety siphon for handling acids and other corrosive materials. *Leaflet CEN.* THE ALDEN SPEARE'S SONS Co., 156 Sixth St., Cambridge, Mass.

Speedways Conveyors. This circular describes a line of lightweight conveyors for the process industries. There are many illustrations showing these units in

Weighing

THE WAY TOLEDO DOES IT!



● This man is weighing 9 different ingredients that go into 3 furnaces of an alloy steel plant. He could just as well be controlling the batching operation of a glass plant... a chemical plant... or any other type of plant where batches are proportioned by weight.

The operation is made simple, fast, accurate and completely automatic by Toledo Scale control. Toledo Hopper Scales are set to pre-determined amounts for each ingredient. From there on Toledo automatic controls take over. Scales are electrically interlocked with one another and with related equipment. Accurately weighed batches may be carried away on conveyor belt. Rapid accurate operations with no chance for human error.

Toledo has solved countless problems in weighing, balancing, force-measuring and counting. Look to Toledo for the answer to *your* weighing problems. Write for complete information. Sales and Service in 181 cities in U.S. and Canada.
Toledo Scale Company, Toledo, Ohio.

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INDUSTRY LOOKS TO TOLEDO
FOR ALL TYPES OF SCALES



required by many companies to meet Federal Specifications on vital war work. So we will not be able to exhibit at the Chemical Show November 23.

A personal invitation is extended to all visitors at the Show to call at our factory, 361 West Superior Street, Chicago, and see the largest Ometer plant in the world. See Ometers in the process of manufacture and in operation. Just five minutes in a taxi from the Sherman Hotel. We'll be looking for you.

C. W. Jameson

ATLAS ELECTRIC DEVICES CO.

FADE-OMETER

LAUNDER-OMETER

WEATHER-OMETER

actual use and a list of a number of companies using this equipment is included. *Circular CEN.* CHARLES S. JACOBOWITZ CORP., 1432 Niagara St., Buffalo, N. Y.

Stoker Coal Crushers. An 8-page bulletin describing a practical 2-stage coal crushing circuit. Line drawings and photographs amplify the description. Crushing recommendations, capacities, dimension tables, test results on different coals and construction features complete the bulletin. *Bulletin 442 CEN.* McNALLY PITTSBURGH MFG. CORP., 307 N. Michigan Ave., Chicago, Ill.

Super Refractories. A bulletin on these refractories for the process industries. The various types of the Frax line are described and physical characteristics, thermal conductivity and thermal expansion tables are given. Settings for boilers, gas generators, muriactic acid furnaces, still settings, retorts, and similar processes are described, with accompanying line drawings. Filter and diffuser media, catalyst carriers and laboratory ware are also mentioned. *Pamphlet CEN.* THE CARBORUNDUM CO., Refractory Division, Perth Amboy, N. J.

"Tygon" Synthetic. This bulletin brings complete technical and engineering data on "Tygon" synthetic, a rubberlike material useful in the industrial field. A general description of the "Tygons", their characteristics, their chemical resistance to strong and weak acids and alkalis, and organic solvents are presented. Highly illustrated, general and specific applications of these materials as linings for tanks, molded parts, transparent sheets, protective coatings, valve diaphragms, coated pipe and fittings, lined fans and ventilating equipment, insulation, tubing, etc. The impregnation of fabric and future possibilities are also taken up, as well as shatter-resistant glass coatings. *Bulletin 1620 CEN.* THE UNITED STATES STONEWARE CO., Akron, Ohio.

Valves and Fittings. A 4-page pamphlet covering a large assortment of valves and fittings. These include oval, square, and round flanged valves with their accompanying fittings, check valves, elbows, unions, tees, etc. Tables accompanying each type give the pipe sizes and working pressures of each unit. Working temperatures are from minus 70° F. to 300° F. Special alloys and packing can be supplied if the case warrants it. *Pamphlet 192-A CEN.* FRICK CO., Waynesboro, Penna.

Water Analyses. A 20-page booklet "Apparatus and Chemicals for Water Analyses", well illustrated, presenting the various apparatus and chemicals which are used for industrial water analyses for plant control. The book features the test sets required for such determinations as hardness, alkalinity, phosphate, sulfate, dissolved oxygen, pH value, silica, etc. In addition, numerous comparators, photometers, turbidimeters, and similar equipment are displayed. *Booklet CEN.* W. H. AND L. D. BETZ, Frankford, Philadelphia, Penna.

Welding at Low Temperature. This bulletin gives comprehensive data on Castolin Eutectic low temperature welding for repairs and salvage of existing equipment. Comparisons are made, throughout a typical welding case, with bronze welding. The advantages of this method of

welding are aptly set forth, stressing the fact that no copper is needed, and a much lower temperature is required. Such welds need but a temperature of 950° to 1400° F. and the finished joints can be galvanized or porcelainized. *Bulletin 165 CEN.* Eutectic Welding Alloys Co., 40 Worth St., New York, N. Y.

Strategic Materials and National Strength. *Harry N. Holmes.* 106 pages. The MacMillan Co., 60 Fifth Ave., New York, N. Y., 1942. Price, $1.75.

Obviously Professor Holmes, as indicated in his preface, pointed this book for lay consumption and it will contain little that is new to the well informed member of the chemical profession.

It is briefly written, subjects are treated lightly, the analysis of each penetrating no deeper than the outer layer of skin.

Professor Holmes touches on most of the shortages and technical developments of the current war and winds up with a chapter about the future.

It will serve all those who want a quick picture of current shortages and the reasons behind them.

Refractories. *F. H. Norton.* 2nd ed. XIV + 798 pages. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York, N. Y., 1942. Price, $7.50.

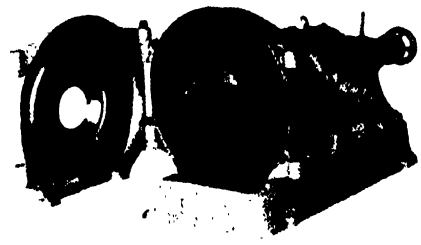
This second edition of "Refractories" reflects the progress in both scientific knowledge and technical art made during the past ten years. The 24 chapters are classified in four sections. The first of these is introductory and deals with the history and economics of the refractories industry, the literature on refractories, and an especially meritorious chapter on "Some Fundamental Concepts of Matter in the Solid State". The second section deals with the various raw materials and the methods of their preparation and manufacture; and in this section, the chapter on "The Firing of Clay and Other Refractory Materials" is especially well done.

The section on properties includes eight chapters, the first of which deals with phase equilibrium diagrams. The reviewer naturally has a special interest in this section which may affect his judgment, but considering the importance of these diagrams, it seems that the treatment is inadequate. One not conversant with the subject will get little help in either their interpretation or application; and more references to the original literature would help the critical reader to make for himself the lacking appraisal of the dependence to be placed in the various diagrams of widely differing reliability. The contrast between the definitive information furnished by the phase equilibrium diagrams and the empirical information afforded by the "fusion points" is not brought out; nor is there a discussion of the lack of correlation between the softening point test for refractory materials and any definable physical property or characteristic. The discussion of spalling is good, but that of the reaction between refractories and slags leaves an unsatisfied feeling which is not entirely due to the unfortunate paucity of information on this highly important subject. The discussion of heat transmission is as adequate as can be compressed into the small space allowed it, but the reviewer would have preferred to have had it elaborated, even at the cost of omission of technological data obtainable from the catalogs of manufacturers. The five chapters on the use of refractories give a brief survey of the field.

These are minor differences of opinion as to the distribution of emphasis, which do not affect the reviewer's opinion that this is a thoroughly satisfactory treatment of the subject of refractories, unusually well written and comprehensive in scope, and he unhesitatingly recommends it to all interested in the subject.

George W. Morey

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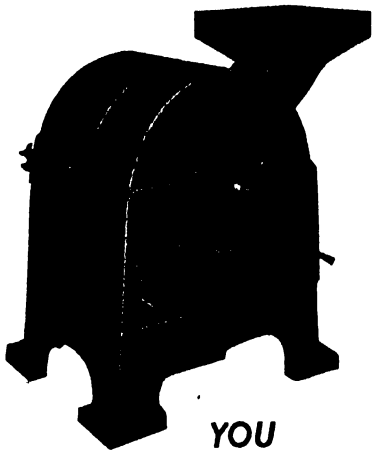
PULVERIZE — Producing finely ground powders from a wide range of friable materials including Citric Acid, Resins, Dried Molasses, Dried Distillers Grains, Caustic Soda, Charcoal, Clays, Stearic Acid, Grains, etc., etc.

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The Disc Mill is manufactured in sizes ranging from discs of 12 to 36 inches with horsepowers ranging from three to 300. Its versatility in applications comes through changes in plate designs, speeds, inlet and discharge provisions.

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Pliofilm in Military Equipment

FAMILIAR in peacetime as wrapping for fruit and other perishables, thin sheets of glossy, waterproof film are now speeding the flow of airplanes and other military equipment to the U. S. Army and Navy. Chemists of the Goodyear Tire & Rubber Co. in cooperation with engineers of the Peerless Photo Products Co., Shoreham, L. I., N. Y., have developed an emulsified Pliofilm which has the property of maintaining its exact size under all conditions of wetting and handling. This new product, known as Transphoto film, is being used throughout the airplane and similar industries to hurry the fabrication of templates for war-expanding factories everywhere in the United States, and is saving thousands of precious man-hours previously needed to make the templates. It is said to be highly superior in accuracy to any process used before.

The Transphoto template process can be adapted also to producing similar layouts on masonite, plywood, and similar nonmetallic surfaces if the material is coated first with a special zinc base paint. In one instance of the use of the Pliofilm process, a total of 108 shop templates were reproduced from 18 master layouts in approximately 300 hours, representing a saving of 1,100 man-hours over the time which would have been required by previous methods.

Plastic Replacement for Rubber

TELESCOPING a decade of normal research and development to nine months, the plastic interlayer for automobile safety glass has been converted into a versatile replacement for rubber in numerous military applications, the Plastics Department of E. I. du Pont de Nemours & Co. announced.

Raincoats, bags for transporting drinking water to soldiers, hospital sheeting, life rafts and belts, food bags, water-proof and oil-resistant suits for sailors, and surgical plaster will be made from a fabric coated with "Butacite" polyvinyl acetal resin, instead of rubber.

New Plant of Farrel-Birmingham Co.

COMPLETED and in partial production five months after site excavation was started, the new plant of the Farrel-Birmingham Co., Buffalo, N. Y., records another triumph of cooperation between industry, governmental agencies, and the building contractor in the interests of speeding the war effort.

Virtually a duplicate of the original building of the company and now operating in conjunction with it, the new structure is a modern plant containing 150,000 square feet.

Direct Current Motor-Operated Valves

THE direct current motor-operated valves of the Barber-Coleman Co., Rockford, Ill., have been designed for two-position (on off) control of steam, water, or gas. The majority of types available may be used for oil or brine. The valves are suitable for use on heating and cooling coils, bottle washers, plating tanks, humidifiers, hot water storage tanks, boiler feed water control, etc.



Filter Paper

ANOTHER new grade has been added to the line of Hank brand filter papers, produced by Henry E. Jacoby, 205 East 42nd St., New York, N. Y., and will be designated as No. 850. It was developed primarily for filtering intravenous and subcutaneous injectables.

Suggestions Save Time and Materials

EIGHT thousand man-hours and more than 125,000 pounds of scarce steel will be saved because of the ingenuity shown recently by four war workers at the General Electric Co.'s plant at Schenectady, N. Y. The four men headed a group of 60 employees of this plant which received awards totaling $1,575 in one week recently for suggestions which speed war production. Approximately $100,000 has been paid out by General Electric this year for 11,000 suggestions adopted.

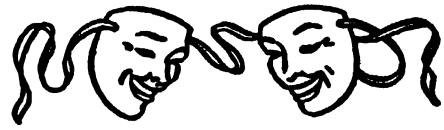
Cutting Oils

DEVELOPMENT of a new line of cutting oils which will help speed the American battle of production by increasing machine productivity in war industries is announced by the Standard Oil Co. of Indiana, Chicago, Ill.

The new cutting oils permit faster speeds and new methods of tooling, closer tolerances in sizes and finishes, and increased use of alloy steels which have lower machinability ratings than the metals commonly encountered.

Productioneers

THE name "productioneers" for soldiers in overalls has been coined by the Link-Belt Co., Chicago, Ill., which issues a house organ known as the *Link-Belt Productioneer*.



EMANATIONS

Curing the DTs, or Hair of the Dog That Bit You

THE gloom that heavy water brings
Will quickly vanish, like smoke rings,
If ethyl firewater flows
In due dilution, 'neath your nose.
With Tritium, the plot now thickens,
We've complications, like the dickens:
H_2O, D_2O, T_2O,
HDO, HTO, DTO.
But alcoholic vapors here
Once more relieve a prospect drear.
Tritium has a predilection
For alcohol, as per this diction:
$C_2H_5OH + DTO = C_2H_5OT + HDO$
Thus alcohol the DT cures—
No inebriety endures.

JEROME ALEXANDER

50 EAST 41ST ST.,
NEW YORK, N. Y.

Fuel Conservation

THE Office of Price Administration, Washington, D. C., in an effort to stimulate discussion on fuel conservation and thereby save valuable fuels that might otherwise be wasted, has sent to selected organizations a letter requesting cooperation. A leaflet on "How to Heat Your Home with Less Fuel This Winter" has also been issued, together with information on the fuel prospect, by states, heating plant efficiency, and conversion.

The chemist is in a particularly favorable position to be of service in this work, by familiarizing himself with the actual conditions and acting as a source of reliable information. He can thus help people to reach a proper decision as to their procedure under the circumstances and to appreciate the seriousness of the situation.

Coffee Bags Made from Colombian Fibers

THE American republics are experimenting with native fibers for the manufacture of bagging to be used for coffee, sugar, grain, and other agricultural commodities in place of Indian jute. An important result of this research has been the development of fique fiber in Colombia, where the 1941 output totaled about 38,500,000 pounds, compared with about 23,000,000 in 1940. Some 4,000,000 bags of coffee are now reported going into export in Colombian-made sacks.

Short Course in Coal Utilization

THE papers presented at the sixth short course in coal utilization, held at the University of Illinois from May 21 to 23, 1941, have been collected into a 112-page booklet, Circular 43, which is available at fifty cents a copy from the University of Illinois, Urbana, Ill. It includes 14 papers that present technical and practical information pertaining to coal and its efficient utilization.

Chemists in Civilian Defense

AN ARTICLE on "War Gases, the Chemist's Part in Civilian Defense", illustrated with molecular models of mustard gas, adamsite, phosgene, chloropicrin, and lewisite, is the lead-off in the latest issue of *The Laboratory*, published by the Fisher Scientific Co., Pittsburgh, Penna. The war gases are briefly described, with directions for first aid treatment and decontamination.

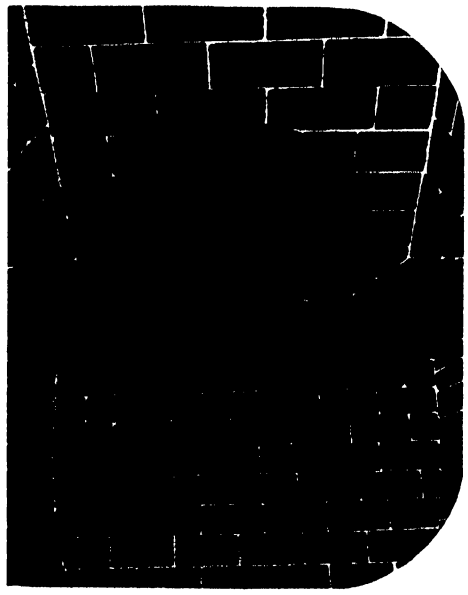
MELLON INSTITUTE, Pittsburgh, Penna., is distributing gratis to all interested specialists who request them copies of a publication entitled "Structure and Antipneumococcic Activity in the Cinchona Series".

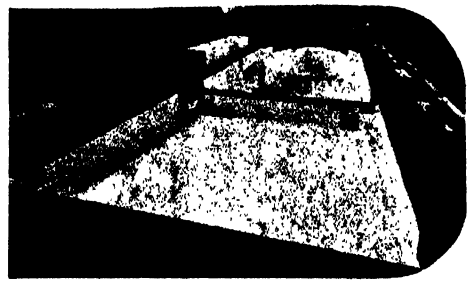
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By employing Stebbins Service, plant owners are assured of a design according to latest engineering practice, materials specifically adapted to operating conditions and superior construction. Under a lump sum contract, Stebbins Service provides all materials and labor with an unqualified guarantee of complete satisfaction.

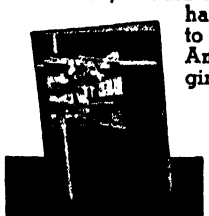
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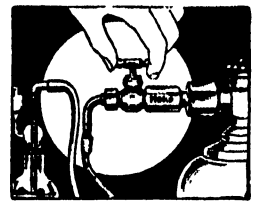


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Can be handled, metered, and applied with economy and efficiency.

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Business Statistics

We are indebted to the Manufacturing Chemists' Association, 608 Woodward Bldg., Washington, D. C., for the following figures showing business conditions.

Monthly Statistical Report on Business Conditions

	Seasonally Adjusted			Without Adjustment		
	Sept. 1942	Aug. 1942	Sept. 1941	Sept. 1942	Aug. 1942	Sept. 1941
(Base 1935-39 = 100)						
Industrial production[a]	185[b]	183	161	191[b]	187	167
Chemical production	172[b]	173	146	174[b]	170	148
Steel production	219	218	200	219	218	200
Freight car loadings	136	142	130	152	144	145
(Base 1923-25 = 100)						
Construction contracts, residential	65[b]	65	105	65[b]	64	105
All other	259[b]	278	206	262[b]	300	208
Department store sales, value	123[b]	130	116	133[b]	103	125

	Sept. 1942	Aug. 1942	Sept. 1941
Index of factory employment[c]:			
All manufacturing	148.2[b]	145.9	135.2
Chemicals	193.2[b]	194.4	182.4
Drugs	166.7[b]	162.8	142.9
Fertilizers	110.0[b]	97.5	110.2
Compressed gases	161.0[b]	162.0	139.0
Index of factory pay rolls[c]:			
All manufacturing	220.5[b]	214.7	162.6
Chemicals	307.4[b]	309.1	250.9
Drugs	224.0[b]	212.2	176.1
Fertilizers	137.3[b]	121.0	111.6
Compressed gases	229.2[b]	233.3	154.8
(Base 1926 = 100)			
Wholesale price indexes:			
All products (except farm products and foods)	95.5[b]	95.6	91.6
Chemicals	96.3	96.3	88.2
Drugs and pharmaceuticals	128.9	129.0	104.4
Fertilizer materials	78.2	78.3	76.6
Purchasing power of the dollar:			
All products (except farm products and foods)	$1.048	$1.047	$1.092
Chemicals	1.039	1.039	1.134
Drugs and pharmaceuticals	0.776	0.775	0.958
Fertilizer materials	1.279	1.278	1.305

[a] Source of statistics in first six items: Federal Reserve Board.
[b] Preliminary figures.
[c] U. S. Department of Labor.

As evidence of a growing interest in quinine production in India, the Bengal Provincial Government's budget provides Rs. 1,250,000 for new cinchona plantations, according to unofficial reports to our Government.

South Africa is now producing lactic acid and sulfonated oils in addition to chrome salts and sodium sulfide. Other new products are aluminum sulfate, casein glues, ethyl chloride, and nitrocellulose finishes.

The value of chemicals and allied products manufactured in Canada in 1941 is unofficially reported to the Department of Commerce as $268,500,000. Output in 1940 was valued at $193,900,000.

Package Sizes Revised by Bureau of Standards

Substitution of fiber containers to conserve steel is included in Simplified Practice Recommendation R41-42 issued by the National Bureau of Standards. Covering package sizes for agricultural insecticides and fungicides, this revision of simplified Practice Recommendation R41-40 has been approved by a large majority of the manufacturers, as well as by a representative group of distributors and users of agricultural insecticides and fungicides. Effective November 1, it eliminates several types of packages and also gives a simplified schedule of recommended standard packages for dry lime sulfur. Until printed copies are available, mimeographed copies may be obtained without charge from the Division of Simplified Practice, National Bureau of Standards, Washington, D. C.

Bureau of Standards Issues Paint Specifications

New specifications for road-marking paints have been issued by the National Bureau of Standards following the recent amendment to WPB Order M-56 which permitted the use of certain natural resins in such paint.

Known as "Emergency Alternate Specifications for Paint: Traffic, Exterior, White and Yellow, E-TT-P-115", these specifications are for the purpose of standardizing a satisfactory quality of paints from the natural resins recently made available for this purpose. Until the amendment to M-56, restrictions on both natural and synthetic resins had reduced the properties of the paints to the point where undue waste of pigments was being encountered.

Copies of the new specifications may be obtained from the National Bureau of Standards, Washington, D. C., or from the Protective Coatings and Materials Section, Chemicals Branch, War Production Board, Railroad Retirement Bldg., Washington, D. C.



Crown and Gem Quality
AMORPHOUS MINERAL WAXES
185° to 195° F. Melting Point
Manufactured by
AMERICAN WAX REFINING CORPORATION
CAVEN POINT ROAD JERSEY CITY, N. J.
Phone BErgen 4-3237, 3238

EDWAL Special Chemicals
Cetyl Chloride
Fluorenone
o-Iodobenzoic Acid
Acetone Semicarbazone
NOW READY! . . . Edwal's New Catalog No. 26N describing many new chemicals with prices. The above are only a few of the many special items listed. Write for the catalog and for quotations on your requirements.
The EDWAL Manufacturing Division Laboratories, Inc.
32 FEDERAL STREET CHICAGO, ILLINOIS

NEVILLE
RESINS
Available Now!

☆ With the restrictions and slow deliveries on Natural Resins and many of the synthetic resins, many manufacturers are turning to available Neville Coumarone-Indene Resins. Some of the more available grades are listed below.

These resins are neutral, waterproof resistant to chemicals, and soluble in low-priced solvents. Pale or dark colors in 5-160° C melting points.

NEVINDENE*
NUBA*
PARADENE*
"R" RESINS
"G" RESIN
465 RESIN

THE NEVILLE COMPANY
PITTSBURGH · PA.
Chemicals for the Nation's War Effort

A-3 * Reg. U. S. Pat. Off.

4/5ths of the Y.M.S. MINESWEEPERS DEPEND ON Westco PUMPS
for BOTH fresh and salt water supply



...and they are equally efficient in YOUR plant!

When fighting ships put to sea, they can't take chances with equipment breakdowns. Particularly in smaller vessels where repair facilities are limited and there's no room for standby equipment, absolute dependability is VITAL!

That's why it is *doubly* significant that in *four out of every five* YMS Minesweepers, Westco Pumps have been given the job of handling BOTH fresh and saltwater supplies. In addition, Westcos are going into Troop Ships, Sub-Chasers, Tankers, Coast Guard Cutters, and other naval vessels.

What better testimony is there to the amazing stamina, high efficiency, and rugged dependability built into Westco Pumps?

TAKE A TIP FROM THE NAVY. When you buy pumps for YOUR plant, remember—*you can't beat Westco performance!*

POMONA PUMP CO.
2621 LOCUST STREET · ST. LOUIS, MISSOURI

Rayon Rope In Hydraulic Machines

FUNCTIONING as mechanical packing material to seal against the entrance or escape of water, brine, oil, and other fluids, ropes of rayon are performing many vital war tasks. In numerous instances they are serving as well or better than the packing they have replaced, according to advices reaching the du Pont company's Rayon Department, which developed the special form of rayon used in this application.

The rayon packing helps retain the high operating pressures of hydraulic shears, punches, and presses as they stamp out airplane parts and other military equipment. Collars of the rayon material fit snugly around shafts of accumulators which build up the tremendous hydraulic power. This type of equipment is used extensively in the war effort where high pressures are needed to stamp out metal parts. Rayon packing properly made up is suitable for hydraulic elevators, for the big pumps at the "water works", and for thousands of other pumps, great and small, throughout industry.

Reducing Spectacle Breakage

THE Temp-R-Lens Corp., Michigan City, Ind., has developed a new method for treating spectacles to increase resistance to breakage. It is particularly important in its application to rimless glasses, where lens breakage is high.

Heat Circulator

THE new Reco heat circulator is said to keep rooms comfortably warm with less fuel. The Reco forces the hot air at the ceiling down, making the air a uniform temperature at the ceiling, at the floor and throughout the room. It is manufactured by the Reynolds Electric Co., 2650 West Congress St., Chicago, Ill.

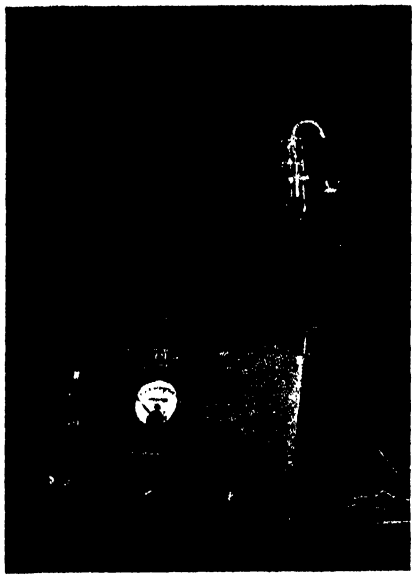
THE LeVal Filter Co. is moving its plant and office to a new location at 925 Wrightwood Ave., Chicago, Ill.

MURIATIC (HYDROCHLORIC) ACID
FOR ALL USES

BAY CHEMICAL COMPANY, INC.
1048 CONSTANCE ST. NEW ORLEANS, LA.

TELEPHONE: RAymond—3111

Distillation Products Ionization Gage Meter



A LIMITED number of portable ionization gage meters, Type HG-200, may soon be available from Distillation Products, Inc., Rochester, N. Y. This meter, which is designed to operate in conjunction with the ionization gage, Type VG-1, provides a method of measuring pressures from 10^{-3} to 10^{-9} mm. of mercury.

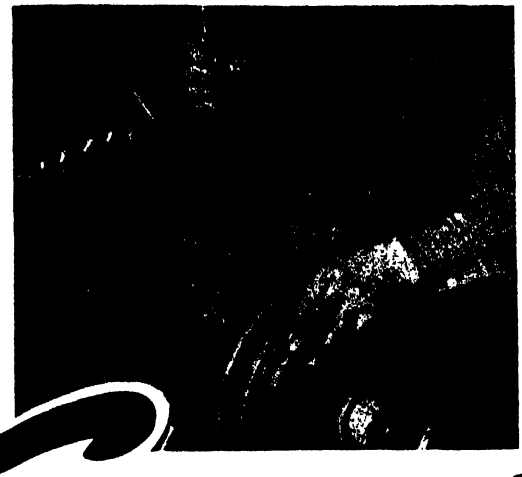
The ionization gage meter circuit features a stabilized amplifier in a balanced vacuum tube of voltmeter design with negative feedback, and an integral amplifier recalibration for elimination of amplifier variation. Other variations in performance are prevented by gas tube voltage regulation and automatic grid current control.

New Type of Conveyor Belt

ALREADY speeding the flow of iron ore to the Nation's blast furnaces, a new type of conveyor belt which uses steel cables in place of the customary cords or fabric has been announced by the Goodyear Tire & Rubber Co., Akron, Ohio.

One of the steel-carcass conveyor belts is already in use at the Oliver Iron Mining Co., Duluth, Minn., one of the Nation's principal suppliers of iron ore for guns, armor plate, and other military equipment. This belt is being used at the mine to lift ore 240 feet in a 1,100-foot conveyor. By means of the newly developed carcass of steel cables, the belt completes the lifting task in one continuous operation. It obviates the one, two, or three transfers from individual belts which would have been necessary with the old type of conventional cotton fabric or cotton cord construction.

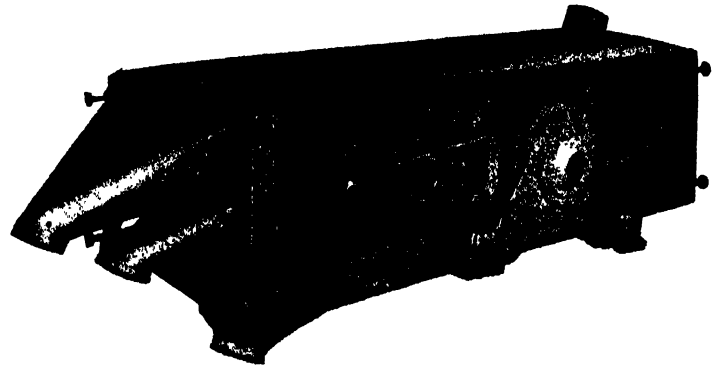
FOR the fifth successive year, the Board of Judges of the Direct Mail Advertising Association has selected Merck & Co., Inc., Rahway, N. J., as one of the Fifty Direct Mail Leaders of the United States and Canada. This year, the company also won the typography plaque awarded by the American Type Founders Corp. for "The Best Example of Modern Typography in a Direct Mail Campaign".



Selectro

CONTROLLED VIBRATION SCREENING IN THE CHEMICAL INDUSTRY

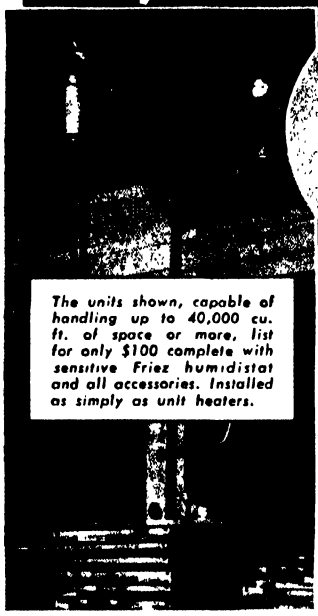
LEADERS of the nation's chemical industry have overwhelmingly endorsed SELECTRO by their repeat orders. On a basis of product output, operating cost and maintenance, SELECTRO has proven itself the best screen buy.



Of particular importance to chemical screening are the SELECTIVE THROW and ADJUSTABLE TILT features of the SELECTRO. Practically all plant men have observed that the same material under slightly varying moisture, temperature or other conditions, gives an entirely different product. Too fine a stroke may not open the mass sufficiently to permit satisfactory removal of fines. Too heavy a stroke may cause degradation, resulting in excessive fines. SELECTRO is the only screen that you can adjust quickly to meet these conditions as they arise.

PRODUCTIVE EQUIPMENT CORP.
2926 W. LAKE ST. CHICAGO, ILL.

Dry Air Robs Output



ARMSTRONG Steam-Type HUMIDIFIERS

They give results that end your dry air problems permanently.

The units shown, capable of handling up to 40,000 cu. ft. of space or more, list for only $100 complete with sensitive Friez humidistat and all accessories. Installed as simply as unit heaters.

DRY air causes fiber breakage in textile mills, warping and checking of wood, shrinkage of paper, excessive static electricity, spoilage of certain foods, cracking of leather, loss of weight, excessive dust and many other evils that cut deep into wartime output.

Hundreds of leading plants in all types of industries are using Armstrong Humidifiers to stymie the dry air nuisance. Ask for literature on this practical method of humidification today.

WRITE TODAY
for your copy of Armstrong's new bulletin, "Armstrong Humidifiers for Industry". It shows how plants in virtually every industry have solved their dry air problems.

ARMSTRONG MACHINE WORKS
870 Maple Street • Three Rivers, Michigan
Built by the Makers of Armstrong Steam Traps

A New LOW PRICED PHOTOELECTRIC COLORIMETER



PORTABLE Lumetron MODEL 400



Accurate and dependable for routine colorimetric and turbidimetric analysis.

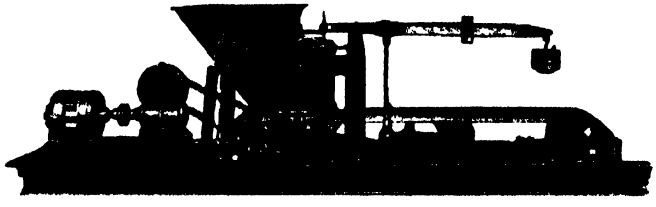
An ideal instrument for clinical and metallurgical work and for industrial and educational laboratories.

- Simple to operate
- Portable, Compact, Rugged
- Always Ready For Readings
- Plugs into Any 105 to 130 Volt A.C. or D.C. Light Circuit.

LUMETRON MODEL 400
Complete with 6 color filters and 12 matched test tubes . . . $105

WRITE FOR INFORMATIVE BULLETIN

SCHAAR & COMPANY
Complete Laboratory Equipment
754 WEST LEXINGTON ST., CHICAGO



SCHAFFER POIDOMETER

For Speed and Accuracy In Proportioning Materials

The pressure of wartime production places special importance on speed and accuracy. In the proportioning of materials the Schaffer Poidometer guards these factors with unvarying exactness. With its use no proportioning errors can creep in to upset the uniformity or cause variation of the mix.

Schaffer Poidometers are sturdily built to take the punishment of sustained high speed.

If you have a proportioning problem — raw or finished materials — write for Catalog No. 3.

SCHAFFER POIDOMETER CO.
2828 Smallman St. Pittsburgh, Pa.



Processes involving use of sprays must be given the benefit of the right nozzle. You can't get the results you expect by using any handy nozzle. It takes a nozzle built to do the work.

Spraying Systems Co. products and engineers do just one job—provide the right nozzle for any spraying operation. It makes no difference what you want a spray to do, our complete line includes the right nozzle. Our nozzles do better jobs for you and do them faster. And you get still more for your money when you let our engineers submit their solutions to your spraying problems.

Now is the time to get the information you need. Write today.

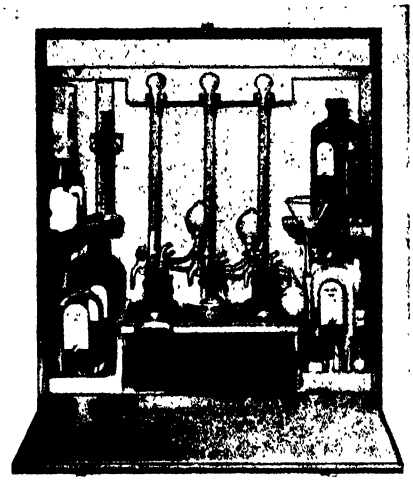
SPRAYING SYSTEMS CO.
4027 W. Lake St. — Chicago, Ill.

SPECIALISTS IN THE DESIGN AND MANUFACTURE OF SPRAY NOZZLES

THE WALL STREET OF CHEMISTRY

	Annual Earnings		Per Common Share	
	1941	*1942*	*1941*	*1942*
Owens-Illinois Glass Co.	$8,672,797	$8,439,037	$3.26	$3.17
E. R. Squibb & Sons	2,200,788	2,432,386	4.05	5.01
Nine Months				
Atlantic Refining Co.	9,163,045	1,522,000	3.27	0.40
Bausch & Lomb Optical Co.	1,302,643	893,566	2.67	1.70
Ferro Enamel Corp.	450,539	101,759	1.93	0.44
Hercules Powder Co.	4,356,632	3,143,457	3.01	2.09
Industrial Rayon Corp.	1,706,251	1,506,403	2.25	0.98
Six Months				
U. S. Industrial Alcohol Co.	986,072	418,128	2.62	1.11
Three Months				
American Agricultural Chemical Co.	195,622	167,518	0.31	0.26
Johns-Manville Corp.	1,470,183	1,085,947	1.62	1.23
Lehn & Fink Products Corp.	129,292	84,511	0.32	0.21
McKesson & Robbins	1,352,825	693,565	..	..
Mathieson Alkali Works	431,226	244,757	0.47	0.25
National Gypsum Co.	556,581	311,224	0.37	0.18
Norwich Pharmacal Co.	251,552	249,297	0.32	0.31
Penick & Ford	412,277	344,510	1.12	0.93
Texas Gulf Sulphur Co.	1,469,959	2,716,507	0.38	0.71
Union Carbide and Carbon Corp.	7,611,940	8,941,246	0.82	0.96

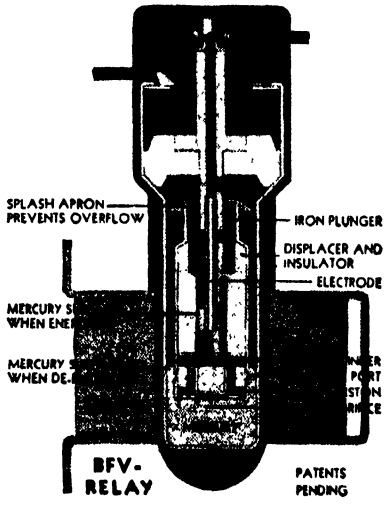
Water Testing Equipment



A new series of water test sets is announced by W. H. and L. D. Betz, Gillingham and Worth Streets, Frankford, Philadelphia, Penna. These A series test sets include the necessary chemicals and apparatus for determining hardness, alkalinities, chlorides, phosphates, and sulfites in water, when any two, three, or four of these tests are required. A special cabinet designed for use on table or wall is provided.

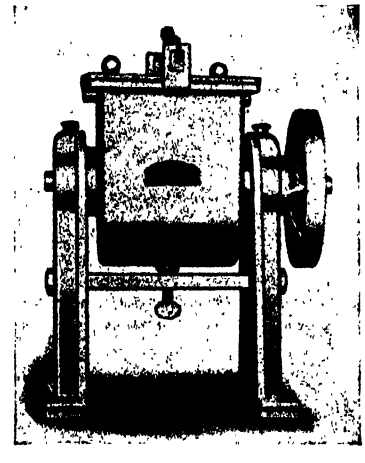
Time Delay Relays

Nearly all types of time delays are now made by Durakool, Inc., 1010 North Main St., Elkhart, Ind. The new BFV type is illustrated in the accompanying cross section. This particular type delays its action upon closing the control circuit and, after such delay, closes the main line circuit, and upon opening of the control circuit the main line follows instantly to an open position. Innumerable types of delays can be readily built up on the foundation of the BFV. The B model, illustrated, has a maximum of 30 amperes. These relays cool, quench, and preserve their contacts as they operate.



IS GRINDING OR MIXING CAPACITY YOUR PRODUCTION BOTTLENECK?

If so you will find a modern Paul O. Abbé grinder or mixer among the highly efficient types we manufacture exactly suited to the requirements of your production.



PAUL O. ABBÉ GRINDERS AND MIXERS

are saving time and labor in the manufacture of smokeless powder, tracer powder, black-out and camouflage paints, abrasives, welding wire coverings, porcelains, drugs, chemicals, nitro-cellulose, and many other materials.

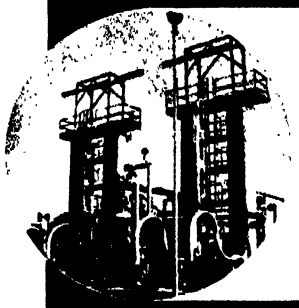
Consult Us About Your Immediate Needs

PAUL O. ABBÉ

OF LITTLE FALLS, NEW JERSEY

249 Center Street

Specify Florite Desiccant



A NATURAL GAS PLANT is the illustration — might have been a unit for dehydrating propane, butane, gasoline, air, nitrogen, carbon dioxide, refrigeration compounds, or other fluids. All these are treated with superior drying efficiency by use of FLORITE. Hard, granular, stable, non-corrosive, non-poisonous, available in various mesh sizes. Selectively adsorbs 4 to 20% its weight of water — is regenerated by heating to 350°F. Write for literature — names of important users in your own field.

FLORIDIN COMPANY, INC.
ADSORBENTS
159 LIBERTY AVE. WAR...

OK'd by the Best!

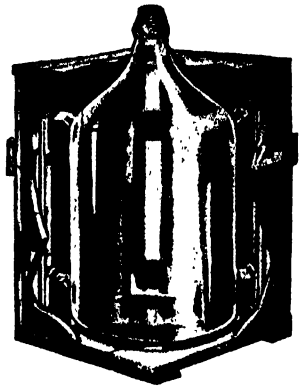
Sure we're bragging, but — when companies like duPont, Socony-Vacuum, Shell Oil and Warner Quinlan use our tachometer we've got a right to be proud. Portable — less than 2 lbs. in weight, Jones Hand Tachometers are ideal for speed and rating checks on revolving platens, generators, turbines and motors of all types.



Write today for further information.

JONES•MOTROLA
432 FAIRFIELD AVENUE,
STAMFORD, CONN.

HERCULES CARBOY BOXES



ICC-1A, in 5 or 13 gallons, or special sizes.

Drop it in — it's packed!

Just drop the bottle in — nail down the top — simple, quick. Saves time, space, reduces breakage, no skilled labor. Cork cushions interchangeable.

Specialists for 35 years

NATIONAL BOX & LUMBER CO.
NEWARK, N. J.



Automatically Maintains Predetermined Temperatures

The "Alnor" controller accurately and dependably controls the temperature of any industrial furnace, melting pot, oven, or other heating device whether heated electrically or by gas or oil within 0.2% of the scale length. Furnished for either A. C. or D. C. operation.

Write for Bulletin 3197-A

ILLINOIS TESTING LABORATORIES, INC.
429 N. LaSalle St. Chicago, Illinois

Carboy Truck

THE Ipco carboy truck, designed to handle carboys with ease and safety, has been developed by the Industrial Products Co., 2820 North Fourth St., Philadelphia, Penna.

Shafts are adjustable for any size carboy and the 24-inch diameter wheels are sufficiently large to carry the load over rough floors.

Textile Finishing Agent

THE development of a new product known as Avitone A textile finishing agent, that releases material now needed for military purposes, has been announced by E. I. du Pont de Nemours & Co., Inc. The new finish is derived from petroleum.

For textile purposes, 100 pounds of Avitone A will replace about 140 pounds of sulfonated tallow, from which some 10 pounds of glycerol may be recovered.

Plastic-Housed Electric Water Light

ADDED protection for crews of coast guard and merchant marine vessels involved in submarine attacks is afforded by a new plastic-housed electric water light attached to life preservers and life rafts, E. I. du Pont de Nemours & Co., Inc., reports.

Upon hitting the water, a weighted base turns the light upright, automatically illuminating it. Use of Lucite methyl methacrylate plastic has reduced the weight to one fifth that of the usual water light.

Magnetic Log Washer

AN IMPROVED type of magnetic log washer for treating fine abrasive and similar materials in the wet state, has been designed by the Stearns Magnetic Mfg. Co., Milwaukee, Wis.

This magnetic log washer consists of a single ribbon type screw conveyor operating at 30 to 32 r. p. m. on a slope with adjustable frame supports over the magnetic field and driven by a gear reduction motor through well guarded variable pitch V belts and sheave.

Ammonia
Argon
Boron Trifluoride
Butadiene
Butane
Butene 1
Butene 2
Carbon Dioxide
Carbon Monoxide
Chlorine
Dimethylamine
Dimethyl Ether
Ethane
Ethyl Chloride
Ethylene
Ethylene Oxide
Freon (12)
Helium
Hydrogen

The Matheson Co.

38 Rare & Common
GASES
in six different sizes of cylinders from ½ pound to 150 pounds.

The MATHESON CO.
East Rutherford, N. J.

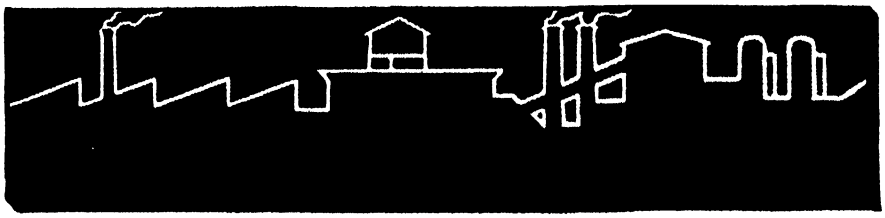
Hydrogen Chloride
Hydrogen Fluoride
Hydrogen Sulphide
Isobutane
Isobutylene
Methane
Methyl Bromide
Methyl Chloride
Monoethylamine
Monomethylamine
Nickel Carbonyl
Nitrogen
Nitrous Oxide
Oxygen
Phosgene
Propane
Propylene
Sulphur Dioxide
Trimethylamine

from our own laboratories . . . . .

Calcium hexose di-phosphate
NAPHTHORESORCINOL
GLUTATHIONE
SODIUM NUCLEATE
NUCLEIC ACID POLIDASE

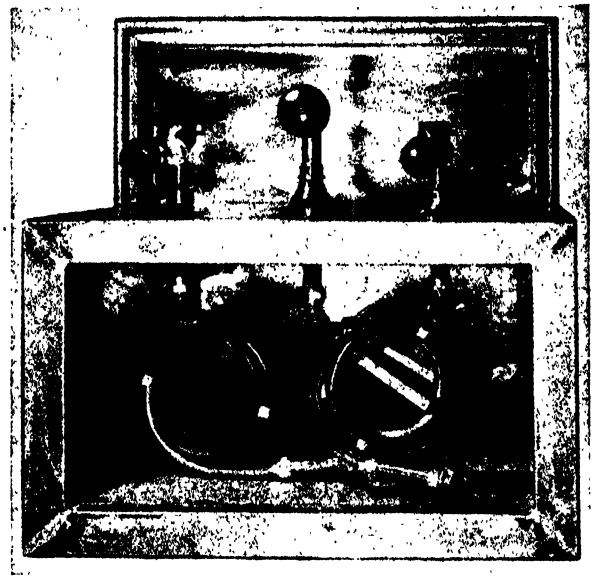
Our Chemical Laboratories and our staff of chemists, technologists and professional engineers are available for consultation and research.

Schwarz **LABORATORIES, INC.**
202 East 44th St. • New York, N. Y.



Transparent Tenite Pipe

TRANSPARENT Tenite pipe is available in the standard sizes used in beverage dispensing industries. According to the distributor, it has been accepted by leading breweries to replace block-tin pipe in the brewing industry and in dispensing draft beer. The Tenite pipe is used to carry the beer from the kegs, through the cooling system, to the taps in the bar dispenser. It can be readily formed into spiral and flat coils for the commercially used ice-cooling systems and also may be used on the direct draw systems with automatic refrigeration.



This new plastic pipe possesses many advantages not found in other type piping. Its transparency allows the beer to be observed throughout its flow from barrel to faucet. The pipe is kept clean and sanitary by the customary cleaning devices in use, and it can be employed in conjunction with all present standard beer connections and fittings. The inside surface is perfectly smooth and is said to be more uniform than any other beer pipe used heretofore or now on the market. According to the distributor, the beer is conducted through this pipe without losing any of its color, flavor, or head.

Tenite pipe is manufactured, from a cellulose acetate butyrate formula produced by Tennessee Eastman Corp., Kingsport, Tenn. It is extruded in continuous seamless lengths by Extruded Plastics, Inc., Norwalk, Conn., and distributed by North Penn Co., 72 Fifth Ave., New York, N. Y., under the name of "Pennco". The pipe is stocked in both long-length coils and 12-foot straight lengths. The diameters range from $^{3}/_{16}$ inch to $1^{1}/_{2}$ inches outside diameter.

RUBBER and synthetic rubber products can be rendered surface-tack free by means of Hevealac, a liquid coating product produced by the Glyco Products Co., Inc., 230 King St., Brooklyn, N. Y.

Goodyear War Tires

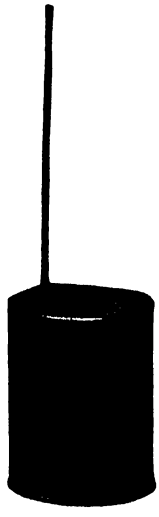
PASSENGER car tire building rooms of The Goodyear Tire & Rubber Co., Akron, Ohio, are beginning to take on their prewar appearance of activity as the company makes ready to go into quantity production of its new war tire.

The new tire, which will give 10,000 miles if driven at speeds of 35 miles per hour and less, contains only four ounces of crude rubber, used in cementing the plies; the balance is reclaim.

The company has completed plans for quantity production. Tire building machines, molds, and ample supplies of reclaim are on hand. It is expected that quantity deliveries to tire dealers can be made by the time the Government's tire-gas rationing plan is placed in effect.

CONTINUED ON PAGE 1495



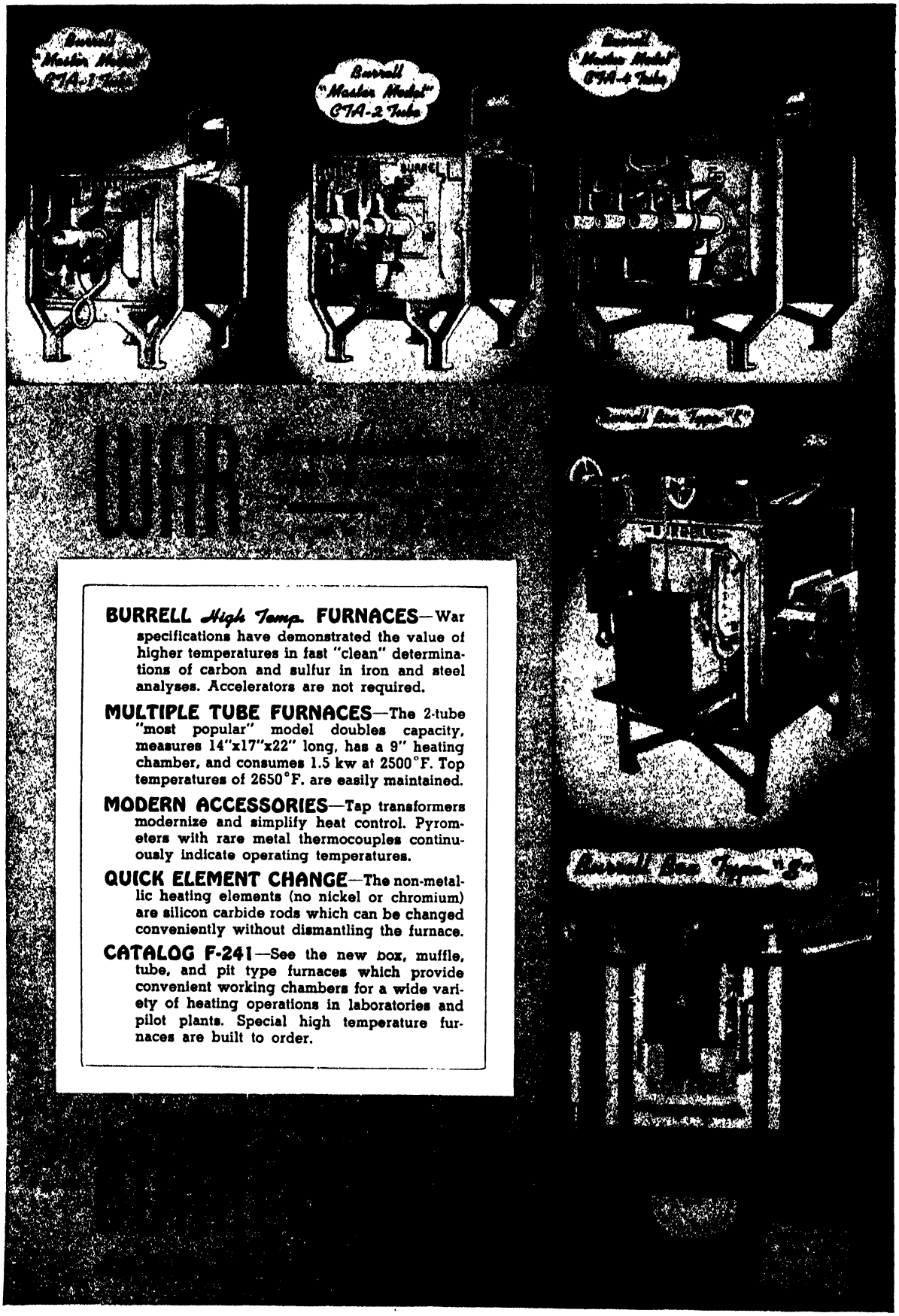


The American Platinum Works
N. J. R.R. AVE. AT OLIVER ST.
Newark, N.J.
EST. AW 1875

PLATINUM ELECTRODE—FIGURE 77—OUR CATALOG N 17

Victory thru Efficiency

Burrell High Temp. Furnaces help



BURRELL *High Temp.* FURNACES—War specifications have demonstrated the value of higher temperatures in fast "clean" determinations of carbon and sulfur in iron and steel analyses. Accelerators are not required.

MULTIPLE TUBE FURNACES—The 2-tube "most popular" model doubles capacity, measures 14"x17"x22" long, has a 9" heating chamber, and consumes 1.5 kw at 2500°F. Top temperatures of 2650°F. are easily maintained.

MODERN ACCESSORIES—Tap transformers modernize and simplify heat control. Pyrometers with rare metal thermocouples continuously indicate operating temperatures.

QUICK ELEMENT CHANGE—The non-metallic heating elements (no nickel or chromium) are silicon carbide rods which can be changed conveniently without dismantling the furnace.

CATALOG F-241—See the new box, muffle, tube, and pit type furnaces which provide convenient working chambers for a wide variety of heating operations in laboratories and pilot plants. Special high temperature furnaces are built to order.

CHEMICAL MARKET PRICES

October 30, 1942

Compiled from weekly current price listings in the *Oil, Paint, and Drug Reporter*, with permission of the publisher under its copyright. These prices, unless otherwise specified, are those prevailing in the New York market for technical grades in usual large commercial quantities.

Acetaldehyde, drums, c/l., wks.	lb.	.11
Acetamide, tech., kegs, 500-lb. lots, works	lb.	.30
Acetanilide, tech., powd., bbls.	lb.	.27
Acetic anhydride, drums, c/l., frt. allowed	lb.	.11½
Acetone, C. P., drums, c/l., dlvd.	lb.	.08½
Acetophenetidin, bbls., 1000 lbs.	lb.	1.00
Acetophenone, drums, 100 lbs.	lb.	1.55
Acid, abietic, drums, c/l.	lb.	.08½
Acetic, 28%, bbls., c/l.	100 lbs.	3.38
56%, bbls., c/l.	100 lbs.	5.58
Glacial, synth., drums, c/l.	100 lbs.	9.15
Glacial, U. S. P., drums, works	100 lbs.	10.95
Acetylsalicylic, U. S. P., bbls.	lb.	.40
Anthranilic, tech., bbls.	lb.	.95
Battery, cbys., c/l., E. wks.	100 lbs.	1.60
Benzoic, tech., bbls.	lb.	.43
Boric, tech., gran., bags	ton	99.00
Butyric (99%), drums, c/l., wks.	lb.	.22
Chloroacetic, mono-, tech., bbls. wks.	lb.	.17
Chlorosulfonic, drums, c/l., wks.	lb.	.03
Chromic, 99%, drums	lb.	.16½
Cinnamic, bottles	lb.	3.50*
Citric, cryst., bbls., c/l.	lb.	.20
Cresylic, H. B., 210–215°, drums, c/l., wks., frt. equal	gal.	.81
Formic, 90%, cbys., f. o. b. works, c/l.	lb.	.10½
Gallic, tech., bbls.	lb.	1.10
Hydriodic, 57%, 5-lb. bot.	lb.	2.90
Hydrobromic, 34%, cbys.	lb.	.35
Hydrochloric, 20°, tank, wks.	100 lbs.	1.75
Hydrofluoric, 30%, bbls., wks.	lb.	.06
60%, lead cbys.	lb.	.14
Hydrofluosilicic, 30%, bbls., wks.	lb.	.08
Hypophosphorus, U. S. P., 30%, 5-gal. demis.	lb	.75
Lactic, dark, 22%, bbls.	100 lbs.	2.90
Light, 22%, bbls., wks.	100 lbs.	3.90
Maleic, powd., drums	lb.	.30
Mixed, tanks, wks. N unit,	lb.	.05
S unit,	lb.	.0085
Naphthenic, 220–230, drums	lb.	.13
Nitric, C. P., cbys.	lb.	.13
36°, cbys., c/l., wks.	100 lbs.	5.00
Oxalic, bbls., wks.	lb.	.11¼
Phosphoric, U. S. P., 50%	lb.	.10½
Picramic, kegs	lb.	.65
Picric, bbls.	lb.	.35
Pyrogallic, tech., bbls.	lb.	1.45
Salicylic, tech., bbls.	lb.	.33
Stearic, distilled, d. p., bags, dlvd.	lb.	.14
Sulfanilic, tech., 250-lb. bbls.	lb.	.17
Sulfuric, 66°, cbys., c/l., E. wks.	100 lbs.	1.50
66°, tanks, E. wks.	ton	16.50
60°, tanks, E. wks.	ton	13.00
Oleum, 20%, tanks, E. wks.	ton	19.50
Tannic, tech., bbls.	lb.	.71
Tartaric, U. S. P., cryst., bbls.	lb.	.70½
Tungstic, pure, 100-lb. pkg.	lb.	2.86
Alcohol, ethyl, 190 proof, from molasses, drums, c/l.	gal.	11.99
Amyl, from pentane, tanks	lb.	.131
Butyl, normal, tanks, frt. allowed	lb.	.12½
Cinnamic, bottles	lb.	3.00
Denatured, C. D. 14, drums, c/l., wks., E.	gal.	.65
Diacetone, tech., drums, c/l.	lb.	.11
Furfuryl, tech., drums, c/l., wks.	lb.	.20
Isobutyl, ref., drums, works	lb.	.0860
Alcohol, isopropyl, ref., 91%, drums, c/l., f. o. b. dest	gal.	.40½
Wood, *see* Methanol		
Aldol, 95%, drums, c/l., wks.	lb.	.12
Alpha-naphthol, bbls.	lb.	.52
Alpha-naphthylamine, bbls.	lb.	.32
Alum, ammonia, lump, bbls., wks.	100 lbs.	4.25
Chrome, bbls.	lb.	.12½
Potash, lump, bbls., wks.	100 lbs.	4.50
Soda, bbls., wks.	100 lbs.	3.25
Aluminum, metal, 98–99%, drums, c/l.	lb.	.15
Chloride, anhyd., commercial, drums extra, c/l., wks.	lb.	.08
Stearate, bbls., c/l.	lb.	.23
Sulfate, comm'l, bags, c/l., wks., frt. equal	100 lbs.	1.15
Iron-free, bags, wks.	100 lbs.	1.75
Ammonia, anhydrous, fertilizer, f. o. b. wks., frt. equalized	ton	90.00
Pure, cyls.	lb.	.16
Ammonia, aqua, 26°, tanks (on NH3 content), f. o. b. wks.	lb.	.04
Ammonium bicarbonate, drums	lb.	.0564
Bifluoride, bbls.	lb.	.16
Bromide, bbls.	lb.	.31
Carbonate, tech., bbls.	lb.	.08¼
Chloride, gray, bbls.	100 lbs.	5.50
U. S. P., gran., bbls.	lb.	.10
Iodide, 25-lb. jars	lb.	3.65
Linoleate, 80%, anhyd., bbls.	lb.	.12
Nitrate, tech., bags, c/l., wks.	100 lbs.	4.35
Oleate, bbls.	lb.	.14
Oxalate, kegs	lb.	.23
Persulfate, cases	lb.	.25½
Phosphate, dibasic, tech., bbls.	lb.	.07¼
Sulfate, bulk, c/l., f. o. b. cars, ports contract	ton	29.20
Sulfide, liq. 40–45%, basis 100%, tanks, dlvd.	lb.	.07½
Amyl acetate, from pentane, tanks, frt. allowed	lb.	.14½
Chloride, mixed, tanks, wks.	lb.	.06
Mercaptan, drums, l. c. l., wks.	lb.	1.10
Oleate, drums, l. c. l., wks.	lb.	.31
Stearate, drums, l. c. l., wks.	lb.	.32½
Amylene, tanks, wks.	lb.	.09
Anilin oil, drums	lb.	.15
Anthraquinone, subl., bbls.	lb.	.70
Antimony, chloride, soln., cbys.	lb.	.17
Needle, Bolivian, 67%	lb.	.18½
Oxide, bags, c/l.	lb.	.15
Salts, 65%, bbls.	lb.	.40
Argols, test 75–80%, basis 100%, f. o. b. Spanish ports	100 kilos	105.00
Arsenic, metal, kegs	lb.	No prices
White, c/l., kegs	lb.	.04
Arsenous chloride, cans	lb.	4.85
Barium carbonate, natural, 99%— 200 mesh, bags, c/l., wks.	ton	43.00
Chloride, tech., cryst., bgs., c/l.	ton	77.00
Dioxide, drums, wks.	lb.	.10
Hydroxide, bbls., wks.	lb.	.06
Nitrate, casks	lb.	.11
Barytes, floated, 350-lb. bbls., wks.	ton	27.65
Benzaldehyde, tech., drums	lb.	.45
Benzidine base, bbls.	lb.	.70
Benzol, tanks, frt. allowed E. of Omaha	gal.	.15
Benzoyl chloride, carboys	lb.	.23
Benzyl acetate, F. F. C., drums	lb.	.59*
Beta-naphthol, tech., bbls.	lb.	.23
Beta-naphthylamine, tech., kegs	lb.	.51
Bismuth, metal, ton lots	lb.	1.25
Bismuth nitrate, cans	lb.	1.30
Oxychloride, kegs	lb.	3.10
Subnitrate, powd., barrels	lb.	1.20
Blanc fixe, dry, bags, c/l.	ton	60.00
Bleaching powder, drums, wks.	100 lbs.	2.25
Bone black, 4, bbls., c/l., frt. allowed E.	lb.	.11
Borax, tech., gran., bulk, c/l., frt. allowed	ton	41.50
Bordeaux mixture, drums	lb.	.11
Bromine, cases	lb.	.25
Bromoform, cbys.	lb.	1.42
Butyl acetate, drums, c/l., frt. allowed	lb.	.14½
Aldehyde, drums, l. c. l.	lb.	.16½
Lactate, drums	lb.	.26½
Stearate, drums	lb.	.31
Cadmium, metal, ingots, cases	lb.	.90
Bromide, 25-lb. jars	lb.	1.65
Sulfide, boxes	lb.	1.10*
Caffeine, 100-lb. drums, 10,000 lbs. or more	lb.	2.60
Calcium acetate, bags	100 lbs.	3.00
Arsenate, bgs., c/l.	lb.	.07
Carbonate, precip., bags, 50 lbs., c/l., wks.	lb.	.02½
Chloride, bags, flake, c/l., dlvd.	ton	18.50
Gluconate, U. S. P., bbls., 150 lbs.	lb.	.52
Phosphate, dibasic, 38–40% P_2O_5, bags, Atlan. pts.	unit-ton	No prices
Tribas, bbls.	lb.	.0635
Calomel, bbls., kegs, 50 lbs. or more	lb.	2.95
Camphor, synthetic, dom., tech., gran., drums, ton lots	lb.	.42
Carbazole, 95%, drums, ton lots, wks.	lb.	.70
Carbon bisulfide, drums, c/l.	lb.	.05
Black, reg., uncomp., bgs., c/l., works	lb.	.03625
Dioxide, liq., cyl.	lb.	.06
Tetrachloride, drums, c/l., frt. allowed	gal.	.73
Casein, dom., 20–30 mesh, bags, c/l.	lb.	.19
Cerium oxalate, bbls., wks.	lb.	.35
Charcoal, willow, powd., bbls.	lb.	.06
China clay, bulk, c/l., wks.	ton	7.60
Chloral hydrate, drums	lb.	.90
Chlorine, liq., c/l., cyl., dlvd.	lb.	.05¼
Tanks, wks., frt. equal	100 lbs.	1.75
Chlorobenzene, mono-, drums	lb.	.07
Chloroform, tech., drums	lb.	.20
Chromium acetate, 24%, powd., bbls.	lb.	.22
Coal tar, crude, bbls., c/l., wks.	bbl.	8.25
Cobalt oxide, black, kegs	lb.	1.84
Copper carbonate, 52–54%, bbls.	lb.	.18
Chloride, bbls.	lb.	.23¼
Cyanide tech., bbls.	lb.	.34
Metal, elec.	lb.	.12
Oxide, black, bbls., tons, wks.	lb.	.19½
Sulfate, bbls., c/l., wks.	100 lbs.	5.15
Copperas, cryst., bulk, c/l., wks.	ton	14.00
Cream of tartar, bbls.	lb.	.57½
Cresol, U. S. P., drums, c/l., wks.	lb.	.10¼
Crotonaldehyde, 97%, c/l., wks.	lb.	.15
Cyanamide, 21% N, pulvd., works, contracts	unit-ton	1.52½*
Diamylamine, drums, c/l., wks.	lb.	.61
Diamylene, tanks, wks.	lb.	.09½
Diamyl phthalate, tanks	lb.	.21
Diatomaceous earth, dom., bags, c/l., Pacific Cst.	ton	22.00

Dibutylamine, drums, l. c. l., wks.	lb.	.64
Dibutylphthalate, drums, c/l., dlvd.	lb.	.21
Tartrate, drums	lb.	.92
Dichlorethyl ether, drums, c/l., wks.	lb.	.15
Diethanolamine, drums, c/l., wks.	lb.	.28½
Diethylaniline, drums	lb.	.40
Diethyleneglycol, drums, c/l., wks.	lb.	.14
Monobutyl ether, drums, wks.	lb.	.22½
Monoethyl ether, drums, c/l., wks.	lb.	.14½
Diethyl phthalate, drums, c/l.	lb.	.22
Sulfate, tech., drums, wks.	lb.	.15
Diglycol oleate, light, bbls.	lb.	.17
Dimethylaniline, drums	lb.	.23
Dimethyl phthalate, drums, c/l., dlvd.	lb.	.20
Dinitrobenzene, tech., drums	lb.	.18
Dinitrochlorobenzene, bbls.	lb.	.14
Dinitronaphthalene, bbls.	lb.	.35
Dinitrophenol, bbls.	lb.	.22
Diphenyl, bbls., c/l., wks.	lb.	.15
Diphenylamine, bbls.	lb.	.25
Diphenylguanidine, bbls.	lb.	.35
Epsom salt, tech., bags	100 lbs.	1.80
Ether, concn., drums	lb.	.11
Nitrous, bots., 100 lbs.	lb.	.93
Ethyl acetate, 85–90%, tanks, frt. allowed	lb.	.11
Acetoacetate, drums, c/l., wks.	lb.	.37½
Bromide, drums	lb.	.50
Chloride, drums	lb.	.18
Formate, drums	lb.	.27¾
Methyl ketone, drums	lb.	.09
Ethylene dichloride, drums, c/l., wks., frt. allowed	lb.	.0742
Glycol, drums, c/l.	lb.	.14½
Monobutyl ether, drums, wks.	lb.	.16½
Monoethyl ether, drums, wks.	lb.	.14½
Monoethyl ether acetate, drums, wks.	lb.	.11½
Monomethyl ether, drums, wks.	lb.	.15½
Feldspar, 20 mesh, bulk, wks.	ton	9.75
Film scrap colors, dk., cs., 1000 lbs., E. wks.	lb.	.13½
Fluorspar, 95%, bags, f. o. b. mines	ton	36.20
Formaldehyde, bbls., c/l.	lb.	.05½
Fuller's earth, bags, c/l., mines	ton	8.50
Furfural, tech., drums, contract, works	lb.	.10
Glauber's salt, bbls., c/l.	100 lbs.	1.05
Glycol phthalate, drums	lb.	.38
Stearate, drums	lb.	.26
Hexamethylenetetramine tech., drums	lb.	.32
Hydrogen peroxide, 100 vol., cbys., c/l.	lb.	.16
Hydroquinone, kegs	lb.	.90
Indigo, synth., liq., bbls.	lb.	.16½
Iodine, resubl., jars	lb.	2.00
Iodoform, drums, 100 lbs.	lb.	3.95
Iron acetate, N. F. IV, cbys.	lb.	.17
Iron chloride, tech., cryst., bbls., wks., frt. allowed	lb.	.05
Isopropyl acetate, tanks, frt. allowed	lb.	.10
Lead acetate, white, broken	lb.	.12½
Arsenate, bbls.	lb.	.11
Metal, N. Y.	1 lb.	.0650
Oxide, litharge, bbls., 20-ton lots	lb.	.0800
Peroxide, powd., tech.	lb.	.23
Red, bbls., 20-ton lots	lb.	.09
Sulfate, bbls.	lb.	.0725
White, basic carb., bbls.	lb.	.0825
Lecithin, edible, drums, c/l.	lb.	.28½
Tech., dms., c./l.	lb.	.26
Lime, live, chemical, bulk, wks.	ton	7.00
Lime-sulfur, dry, bags, c/l.	lb.	No prices
Lithopone, ordinary, bbls.	lb.	.04½
Magnesite, calcined, dom., bags	ton	84.00
Magnesium carbonate, tech., bags, c/l.	lb.	.06¼
Chloride, drums	ton	32.00
Fluosilicate, cryst., bbls.	lb.	.18
Oxide, light, bbls.	lb.	.26
Manganese chloride, bbls.	lb.	.14*
Dioxide, 85–90%, bbls., c/l., wks.	ton	74.00
Sulfate, anhyd., bbls., wks.	lb.	.11¼
Mannitol, commercial, bbls., wks.	lb.	.35
Menthol, nat., cans	lb.	13.00
Mercury bichloride, cryst., drums, 50 lbs. or more	lb.	2.39
Mercury, flasks, 76 lbs., mines	flask	191.00
Meta-phenylenediamine, kegs	lb.	.65
Meta-toluylenediamine, kegs	lb.	.70
Methanol, synthetic, drums, frt. allowed, c/l.	gal.	.34½
Tanks, frt. allowed	gal.	.28
Methyl acetate, 97–99%, tanks	gal.	.09½
Chloride, cylinders	lb.	.32
Formate, l. c. l., drums	lb.	.89
Hexylketone, drums, tech., wks.	lb.	.60
Salicylate, drums	lb.	.35
Monoamylamine, drums, c/l., wks.	lb.	.61
Monobutylamine, drums, l. c. l., wks.	lb.	.51
Monoethanolamine, drums, wks.	lb.	.24
Naphthalene, crude, dom., 74 deg., bags, c/l., wks.	100 lbs.	2.75
Nickel salt, single, bbls.	lb.	.13
Niter cake, bulk	ton	16.00
Nitrobenzene, drums	lb.	.08
Nitrocellulose, ester-sol., 30-35, ¼, ½ sec., bbls., wks.	lb.	.26
Nitromethane, drums, l. c. l., wks.	lb.	.25
Octanol, normal, drums	lb.	.85
Oil, castor, No. 3, tanks	lb.	.12¾
China wood, dms.	lb.	.39
Coconut, crude, tanks	lb.	.0835
Cod, Newf., bbls.	gal.	.90
Corn, crude, tanks, mills	lb.	.12¾
Cottonseed, cooking, bbls.	lb.	.16¾
Linseed, raw, tanks	lb.	.1240
Menhaden, crude, tanks, f. o. b. Baltimore	gal.	.0880
Neat's-foot, pure, bbls.	lb.	.19¼
Oiticica, bbls.	lb.	.25
Oleo, No. 1, bbls.	lb.	.13¼
Olive oil, denat., bbls.	gal.	3.50
Edible, Calif., drums	gal.	4.00
Palm, Niger, bbls.	lb.	.0825
Peanut, crude, tanks	lb.	.13
Perilla, drums	lb.	.2450
Rapeseed, denatured, c. i. f.	gal.	.1150
Red, bbls.	lb.	.11¾
Soy bean, crude, tanks	lb.	.12¼*
Sperm, 38°, bbls.	lb.	.1301
Whale, bbls., natural, refined	lb.	.1070*
Ortho-dichlorobenzene, drums	lb.	.06
Ortho-nitrochlorobenzene, kegs	lb.	.15
Ortho-nitrotoluene, drums	lb.	.09
Ortho-toluidine, bbls.	lb.	.19
Para dichlorobenzene, drums, c/l.	lb.	.11
Para-formaldehyde, drums	lb.	.23
Paraldehyde, tech., drums	lb.	.12
Para-nitraniline, drums	lb.	.45
Para-nitrochlorobenzene, drums	lb.	.15
Para-nitrotoluene, bbls.	lb.	.30
Para-phenylenediamine, bbls.	lb.	1.25
Para-toluidine, bbls.	lb.	.48
Paris Green, 250-lb. kegs	lb.	.24
Perchlorethylene, drums, c/l., wks.	lb.	.09
Phenol, drums, c/l., wks.	lb.	.12½
Phenolphthalein, yellow, drums, ton lots	lb.	.80
Phenylethyl alcohol, bottles	lb.	2.10
Phloroglucinol, tech., tins, wks.	lb.	15.00
C. P., tins, wks.	lb.	20.00
Phosphorus, red, cases	lb.	.40
Oxychloride, 175-lb. cylinders	lb.	.15
Trichloride, cyl.	lb.	.15
Phthalic anhydride, bbls., c/l.	lb.	.14½
Platinum, metal, solid	oz.	36.00
Potash, caustic, solid, drums	lb.	.06¼
Potassium acetate, tech., bbls.	lb.	.28
Bicarbonate, gran., bbls.	lb.	.19
Bichromate, casks, c/l., wks.	lb.	.09½
Bromide, U. S. P., gran., bbls.	lb.	.27
Carbonate, 80–85%, calc., casks.	lb.	.06½
Chlorate, cryst., kegs	lb.	.11*
Chloride, tech., cryst., bgs.	lb.	.08*
Cyanide, drums	lb.	.55
Meta-bisulfite, bbls.	lb.	.18
Muriate, fert., bulk	K_2O unit	.53½
Permanganate, tech., drums	lb.	.19¾
Prussiate, red, bbls.	lb.	.70
Yellow, casks	lb.	.17
Pyridine, denat., drums	gal.	1.71
Pyrocatechin, C. P., drums	lb.	2.15
Quinine, 100-oz. cans	oz.	.97½
Resorcinol, tech., kegs	lb.	.68
Rochelle salt, powd., bbls.	lb.	.43½
Saccharin, drums	lb.	1.45
Salt cake, bulk, wks.	ton	15.00
Saltpeter, gran., bbls.	100 lbs.	6.20
Silica, amorph., 96%, 325 mesh, bags, c/l., wks.	ton	17.00
Silver nitrate, vials	oz.	.32½
Soda, ash, 58%, light, paper bags, contract, wks.	100 lbs.	1.05
Caustic, 76%, solid, drums, contract, wks.	100 lbs.	2.30
Sodium acetate, flake, 60%, bbls.	lb.	.05
Alginate, drums	lb.	.79
Antimoniate, bbls.	lb.	.15
Benzoate, U. S. P., bbls.	lb.	.46
Bicarbonate, U. S. P., powd., bbls., c/l., wks.	100 lbs.	1.85
Bichromate, c/l., wks.	lb.	.07¾
Bisulfite, bbls.	100 lbs.	3.00
Bromide, U. S. P., bbls.	lb.	.27
Chlorate, cryst., bags	lb.	.06¼
Chloride, bags	ton	15.70
Cyanide, 96–98%, dom., drums	lb.	.14
Fluoride, white, 90%, bbls., c/l., frt. alld.	lb.	.08
Metallic, untrimmed bricks, drums, f. o. b. Niagara Falls	lb.	.15½
Metasilicate, gran., bbls.	100 lbs.	2.50
Naphthionate, bbls.	lb.	.50
Nitrate, crude, bulk, works	ton	27.00
Nitrite, bbls.	lb.	.06¾
Perborate, bbls.	lb.	.14¾
Phosphate, disodium, cryst., bags, c/l., wks.	100 lbs.	2.55
Phosphate, trisodium, bags, c/l., wks.	100 lbs.	2.70
Picramate, kegs	lb.	.65
Prussiate, yellow, bbls.	lb.	.11
Silicate, drums, c/l., 40°	100 lbs.	.80
Silicofluoride, dom., bbls.	lb.	.09
Stannate, drums	lb.	.33½
Sulfate, anhyd., bags	100 lbs.	1.70
Sulfide, cryst., bbls.	100 lbs.	2.40
Solid, 60%	100 lbs.	3.15
Sulfocyanide, C. P., bbls.	lb.	.55
Thiosulfate, reg., cryst., bgs.	100 lbs.	2.25
Tungstate, tech., kegs	lb.	No prices
Strontium carbonate, tech., bbls.	lb.	.25*
Nitrate, bbls.	lb.	.07¾
Sulfur, bulk, mines	ton	16.00
Chloride, drums	lb.	.03
Dioxide, commercial, cyl., wks.	lb.	.07
Tetrachloroethane, 50-gal. drums	lb.	.08
Thiocarbanilid, bbls.	lb.	.24
Tin, Straits	lb.	.52
Crystals, bbls.	lb.	.39
Oxide, bbls.	lb.	.55
Tetrachloride, anhydrous, drums, bbls.	lb.	No price
Titanium dioxide, bags	lb.	.14¾
Toluene, tanks	gal.	.28
Triamylamine, drums, c/l., wks.	lb.	.98
Triamylborate, drums, l. c. l., wks.	lb.	.33
Tributylamine, drums, c/l., wks.	lb.	.78
Trichloroethylene, drums, wks, frt. allowed	lb.	.08
Tricresyl phosphate, tech., drums.	lb.	.25
Triethanolamine, drums, c/l., wks.	lb.	.19
Triphenyl phosphate, barrels	lb.	.31
Tungsten, tech., powder	lb.	2.60
Urea, dom., 46 + % N., bags, f. o. b. wks. or seaboard	ton	80.00
Vanillin, 25-lb. tins	lb.	2.35
Whiting, comm., dry-grd., bags, c/l., wks.	ton	18.00
Xylene, 10°, tanks	gal.	.30
Xylidine, drums	lb.	.35
Zinc ammonium chloride, bbls.	lb.	.0565
Chloride, tech., fused, drums	lb.	.05
Dust, bbls., c/l.	lb.	.1035
Metal slabs, at N. Y.	lb.	.0865
Oxide, Amer., bags	lb.	.0725
Stearate, tech., bbls.	lb.	.30
Sulfate, cryst., bgs., c/l., wks.	100 lbs.	3.60

* Nominal.

EMPLOYMENT INFORMATION

RATES to be paid in advance. Standard setting 5c a word, minimum charge $2.00 each; include 8 words for box address. Exceptions see ⟶ Display, $10.00 per column inch. 2 inches maximum, larger units at regular display unit rates. No discounts or allowances.
SEND advertisements with remittance to INDUSTRIAL AND ENGINEERING CHEMISTRY, 332 West 42nd St., New York, N. Y., to reach there not later than 10:00 A.M. on the 5th and 20th, closing dates for editions of CHEMICAL and ENGINEERING NEWS of the 25th and 10th, respectively. Insertions made in order of receipt provided necessary remittances are complete. EMPLOYERS are requested to mention in their announcements the section of the country in which the open position is located to ensure replies only from those who are geographically available.
In printing these advertisements the SOCIETY assumes no obligations as to qualifications of prospective employees or responsibility of employers.

UNEMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking employment for themselves are allowed in one calendar year 3 announcements free (one per issue) set in standard style and limited to 50 words each, including 8-word box address, and 3 additional standard announcements at 50% of regular rate. Further announcements and excess words at full rate.

EMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking new positions are permitted 3 standard announcements during the calendar year at 50% of the regular rate—include 8 words for box address.

EMPLOYERS seeking chemists and chemical engineers are permitted 3 standard announcements, not to exceed 50 words each including box address and not more than one per issue, during the calendar year without charge, provided they agree in writing to acknowledge all replies (excess words 5c each), otherwise full rate applies.

The AMERICAN CHEMICAL SOCIETY is vitally interested in the welfare of its members and in seeing that the chemical industry is manned with competent chemists and chemical engineers. These pages are part of our service in that connection. In addition most of the larger sections of the AMERICAN CHEMICAL SOCIETY and several of the smaller ones have active employment committees. Local section secretaries in your area will inform you as to any employment aids that may be available locally.

An Employment Clearinghouse is operated at each national meeting of the SOCIETY for the purpose of bringing together representatives of industry looking for chemists and members and student affiliates in attendance wishing to make such contracts. For further details, consult the preliminary and final programs as printed in the NEWS EDITION prior to each meeting.

In the New York area, special employment facilities are offered by the Employment Bureau of the Chemist's Club, 52 East 41st St., New York, N. Y. In the Chicago area, the Chicago Section maintains an employment service at 505 N. Michigan Avenue, Chicago, Ill.

Those replying to announcements should be careful to send copies and not original documents. Advertising circulars will not be forwarded and to that end all letters will be opened at the forwarding office.

SITUATIONS OPEN

Those announcements in which the letter "P" is part of the address key have paid in full and are not committed to acknowledge replies. The Society regards acknowledgment by employers of all applications as an act of common courtesy but can assume no responsibility for their failure to do so.

EXECUTIVES, CHEMICAL ENGINEERS AND CHEMISTS with exceptional backgrounds of experience should use our confidential and individual method of contacting responsible employers. No limit to territory. We negotiate all overtures. Established 1915. The National Business Bourse, 20 W. Jackson Blvd., Chicago, Ill.

CHEMIST with some petroleum experience. Needed in Chicago area for development of petroleum products and rust preventives. State age, draft status, degree, and salary desired in opening letter.
Box 79-TP-8, Ind. & Eng. Chem., Easton, Pa.

CHEMIST ABLE to conduct research work with minimum supervision wanted primarily for development of synthetic drying oils. Man with draft deferment because of physical impairment preferred. Send inexpensive photograph and give complete personal, professional and academic data in first letter. All letters acknowledged. Address P.O. Box 377, Dayton, Ohio.

BIOCHEMIST, hospital, expert in use of clinico-chemical methods, with some administrative ability. Permanent position. Opportunity for research. Salary $2200 with maintenance. Graduate degree or equivalent experience required. Submit reprints, references, photograph, list of relevant courses and grades to John G. Reinhold, Biochemical Laboratory, Philadelphia General Hospital.

ORGANIC CHEMIST Ph.D.—wanted for Newark, N. J., industry. Recent graduate or with a few years' experience preferred. For individual research involving synthetic resins. Sound training in synthetic organic, physical organic, and physical chemistry essential. Give experience, education, and salary expected.
Box 23-TP-10, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER—Recent Ph.D. from accredited university to handle development research in synthetic resins. Permanent responsible position in Newark, N. J., industry. Give experience, education, and salary expected.
Box 24-TP-10, Ind. & Eng. Chem., Easton, Pa.

WOMEN CHEMISTS: Applications invited from women chemists for positions in a growing industry where few technically trained women have been employed. Openings in analytical, research and development, with probability of continuation after war. Location East.
Box 44-TP-10, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST—Graduate within past 5–10 years. Background organic chemistry, synthetic resins. Wanted for technical sales correspondence, preparing technical bulletins, library work, reports, etc. Excellent and unusual opportunity for right person. Location small New York State town. Give complete information, salary expected, recent photograph.
Box 49-TP-10, Ind. & Eng. Chem., Easton, Pa.

RESEARCH and PLANT Chemist with Ph.D. degree desired by progressive Tobacco Company. Training and experience in Plant Biochemistry necessary. Must be qualified to plan and conduct research. Give training, experience, draft status, personal data, salary expected and recent photo in first letter.
Box 68-T-10, Ind. & Eng. Chem., Easton, Pa.

CHEMIST for research and development who has had varied practical experience in coatings such as lacquers, synthetics and enamels. One having had experience with paper products preferred but not essential. Splendid opportunity and permanent position with a company now engaged in war work. State technical education, experience, age, and draft status. Correspondence strictly confidential.
Box 71-TP-10, Ind. & Eng. Chem., Easton, Pa.

GRADUATE FELLOWSHIP at $720–840 per year and Technical assistant at $1200 per year at Medical School for investigations in endocrinology, enzymes and metabolism.
Box 10-N-11, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST—A large paper manufacturer located near Philadelphia has a splendid opportunity for a graduate chemist or chemical engineer in its research department. Education, past experience, training and the ability to see a project through are major qualifications. As this is a permanent position we are interested in age, marital and selective service status. Reply by letter only giving full details with salary requirements and recent snapshot. Replies will be kept in strictest confidence.
Box 13-NP-11, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST: Research, organic. Work on preservatives, disinfectants, etc. Some Bacteriological experience desirable. Small laboratory, pleasant surroundings. Connecticut, one hour from New York. Send full record, salary required.
Box 17-NP-11, Ind. & Eng. Chem., Easton, Pa.

CHEMIST WITH some petroleum experience. Needed in Chicago area for development of petroleum products and rust preventives. State age, draft status, degree, and salary desired in opening letter.
Box 18-NP-11, Ind. & Eng. Chem., Easton, Pa.

GLASSBLOWER WANTED, familiar with Pyrex, capable of making all types of glass equipment for research and development organisation. Permanent position, large company, southern Louisiana. Give personal data, experience, salary expected, references, draft status, recent informal photograph.
Box 19-NP-11, Ind. & Eng. Chem., Easton, Pa.

LABORATORY ASSISTANT for organic research laboratory in New York City. B.S. in chemistry or equivalent required. State in detail experience, references, age, date when available and send inexpensive photograph.
Box 21-NP-11, Ind. & Eng. Chem., Easton, Pa.

WANTED: for organic research laboratory in New York City. Experienced organic research chemist, Ph.D., with several years' experience in organic synthesis, preferably dyestuffs or pharmaceuticals. State age, academic, professional and draft data, when available, salary expected.
Box 22-NP-11, Ind. & Eng. Chem., Easton, Pa.

CHEMIST for analytical work. Man or Woman. Excellent opportunity with large chemical pigment manufacturing company near New York City. Right person can soon become head of analytical laboratory.
Box 32-N-11, Ind. & Eng. Chem., Easton, Pa.

INORGANIC or PHYSICAL chemist—B.S. with several years' research experience or M.S. or recent Ph.D.—for long range pigment project in New York vicinity. Exceptional opportunity. Research ability and initiative essential. State training, experience, draft status and salary desired. Include photograph.
Box 36-NP-11, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, ENERGETIC, versatile, for independent research work in interesting and important new field. Experimental ingenuity and good fundamental background in physical and organic chemistry required. Must be interested in doing laboratory experimental work. Will be provided with assistant and located at an eastern research institution where best of facilities and contacts exist. Please give complete details in first letter, including training, experience, photograph if available, salary expected, etc.
Box 35-NP-11, Ind. & Eng. Chem., Easton, Pa.

INORGANIC or PHYSICAL chemist—B.S. with one or two years of research experience or recent M.S.—for essential war research in New York vicinity. Give age, draft status, academic background, industrial experience, salary expected and photograph.
Box 37-NP-11, Ind. & Eng. Chem., Easton, Pa.

WOMAN MICRO-ANALYST with some experience in microanalysis for vacancy in industrial research laboratory in New York area. Please give academic training, experience and salary expected. Include small photograph.
Box 38-NP-11, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST—M.S. with some experience or recent Ph.D.—for synthetic organic chemical research in industrial laboratory on mid-eastern seaboard. Capable chemist with good academic foundation and well developed laboratory technique. Give age, draft status, training and experience, salary expected and photograph.
Box 39-NP-11, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER—Raw material development work in large manufacturing concern. Advanced degree and knowledge of organic insulating materials desirable but not essential. In reply submit snapshot and give age, details of qualifications, experience and salary expected.
Box 40-N-11, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL ANALYTICAL chemist for research laboratory. Essential industry specializing in metal products. Man or woman to develop new analytical methods and do physical-chemical research. Location in New Jersey near New York City.
Box 41-NP-11, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST WANTED—Instructorship or Assistant Professorship in Southern Medical School for the duration. Give details concerning training, experience, personal history, references, and date of availability.
Box 42-N-11, Ind. & Eng. Chem., Easton, Pa.

GRADUATE ASSISTANTS—For semester beginning February first—Fifty dollars per month with free tuition and fees—Stipend increases annually—Minimal requirements: inorganic, analytical, organic, physical chemistry, calculus and one year of college physics—B.S. or M.S. degree—Submit small photograph and official transcripts of college courses—If satisfactory, application blank will be sent—Department of Chemistry, University of Pittsburgh, Pittsburgh, Pa.

AN ENGINEERING Construction Company, with long experience in Spanish America, is starting an Export Department and needs an experienced Chemical Engineer familiar with the design and operation of heavy chemical plants, particularly caustic soda and cyanide. Headquarters in New York City and to also spend considerable time in South America. Most advisable that he speak Spanish.
Box 55-NP-11, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 1494)

Address communications to the box number indicated and Mail to Easton, Penna.

The American Chemical Society has no information concerning the position advertised, or in regard to those seeking employment.

WANTED

A Man with an Outstanding Reputation of Accomplishments in Plant Management

We require a man to take complete charge of one of our important plants located in Chicago. He will be responsible for selecting and buying raw materials, production and production analysis in all its phases and he will also be responsible for a laboratory engaged in development and experimental research.

The position is a permanent one in an essential industry. The initial compensation offered is commensurate with the responsibilities of the position and future compensation will depend upon ability to contribute to profits.

To qualify, an established and outstanding record in a similar capacity is essential. He should be thoroughly grounded in physical and colloidal chemistry.

The man we have in mind will also be a "perfectionist", who to achieve perfection in finished product, has a flair for pioneering in developing better raw material, improved manufacturing processes and rigid inspection procedures. To this end, he will receive encouragement and assistance from his employer.

He will be a man of sound judgment and a realist concerning production costs. By leadership, he will have the proven ability to get the fullest cooperation from his associates and the respect of his plant personnel.

If you feel that you are qualified to meet these requirements please write us in detail giving personal and business background. To help us judge what you may be able to do for us, tell us in specific terms what you have accomplished for others. We shall not require the name of your present employer until we have established a mutual interest.

Please address your letter to:

Executive Vice President
Box 20-NP-11, Ind. &. Eng. Chem.
Easton, Pa.

DIRECTOR OF RESEARCH

One of the outstanding Engineering Companies in the East, now engaged almost wholly in war work, is enlarging research and development organization, and has opening for Chemist or Chemical Engineer as Director of Research. Field chiefly petroleum and manufacture of chemical derivatives therefrom, and will include direction of laboratory and semi-commercial pilot plant work. This is a responsible position calling for initiative and foresight as well as the proper technical qualifications. Starting salary will be very attractive and future limited only by individual's capabilities.

Box 54-NP-11, Ind. & Eng. Chem., Easton, Pa.

CHIEF ANALYTICAL chemist to head the control laboratory for large producer of pharmaceuticals; must have broad experience in analysis and quality control; do not desire research chemist; must have executive experience and ability.
Box 45-N-11, Ind. & Eng. Chem., Easton, Pa.

COMPETENT PHARMACEUTICAL chemical executive to supervise analytical and control work. Must have adequate analytical training and experience as well as proven executive experience and capacity, preferably in the pharmaceutical field. Submit full personal history, training and experience record and salary requirement in first letter—please.
Box 56-N-11, Ind. & Eng. Chem., Easton, Pa.

OIL CHEMIST experienced in lubrication problems of all types for laboratory and sales development work in the field of oil additives. Please give past experience in detail. Confidential.
Box 61-NP-11, Ind. & Eng. Chem., Easton, Pa.

CONTINUOUS OPENINGS for college graduates in 5-day week positions within commuting distance New York City. MAN OR WOMAN—PHARMACOLOGIST, old established pharmaceutical manufacturer, $3000–$5000; ORGANIC chemist, $3000–$5000: WOMEN—ANALYTICAL chemistry major, no experience required, research and development department, oils, fats, soaps, to $150: CONTROL, manufacturer biologicals, to $40: ASSISTANT Control chemist, Physical & Quantitative Inorganic Analysis to $40: ANIMAL technician, college laboratory, $1500: PHARMACEUTICAL chemists, major drug house, to $45: MEDICAL DIRECTOR, old established pharmaceutical manufacturer, must be accomplished promotion writer familiar with ethical copy requirements, and conduct of clinical research. To $8000. MEN—VITAMIN assayist and analyst by chemical and physical methods. Organic and inorganic training. Microbiological experience, to $3500. M.S. or Ph.D. for Pharmaceutical and control laboratory, with experience in physical and colloid chemistry. Must have organic pharmaceutical training, to work on vitamin specialties $3600–$6000: ORGANIC CHEMIST to be No. one man in Vitamin laboratory. Special emphasis on vitamin and sterol fields, for highly technical operations on fundamental research, $3600–$6000: ORGANIC synthesis, to $225: SANITARY engineer, make atmospheric contamination factory inspections nationally, $2400–$3000 plus all expenses: PILOT plant experience for pharmaceutical production, to $4160: PHARMACEUTICAL plant experienced chemical engineers preferred, to $3300: SALESMEN, dry cleaning trade, sell filter powder, make plant demonstrations, Illinois, Indiana, Detroit, headquarters Chicago, $200–$250 and expenses: SALES TRAINEES, chemistry or allied science graduates, nationally known manufacturers, chemicals and pharmaceuticals, some cars furnished, expenses and $175–$250: TABLET coaters and ampule sterilising experience, to $55. APPLICATIONS ACCEPTED IN THE STRICTEST CONFIDENCE. Everett Brown Agency, 17 John Street, (branch) 331 Madison Avenue, New York City.

WANTED: Junior Analyst, Woman. College Graduate preferably trained in chemistry and pharmacy. Location metropolitan area.
Box 71-NP-11, Ind. & Eng. Chem., Easton, Pa.

BACTERIOLOGIST, M.S.—permanent position with well known, long established, eastern pharmaceutical manufacturer. Woman with one or two years' practical experience, and knowledge of mycology preferred. Reply should include information on educational training, industrial experience, personal data, salary expected and picture.
Box 74-NP-11, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(A.C.S. MEMBERS)

WOMAN CHEMIST: M.S. in chemistry 1939, University of Pennsylvania. Organic major, analytical minor. Desires preferably research position with company having war contracts. 3 years' college teaching experience. Available immediately for position in Philadelphia and vicinity. Protestant. Married.
Box 26-N-10, Ind. & Eng. Chem., Easton, Pa.

PHARMACEUTICAL CHEMIST, B.S., Phar.D., Columbia University. Three years of graduate research, one year of product development work. Age 28, draft deferred, member Sigma Xi. Desires position to do research, product development, testing or other.
Box 29-N-10, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, available for spare time work. Broad training and experience, including catalysis, petroleum and fuels technology, explosion processing, pharmaceutical synthesis, metallurgical chemistry. Specialist in new process development and plant design. Currently employed, with contract permitting outside work of practically unlimited scope. Central eastern U. S. war work only.
Box 63-N-10, Ind. & Eng. Chem., Easton, Pa.

SYNTHETIC ORGANIC chemist. M.S. research and development experience in plastics. Desires organic research position (plastics or other industry) contributing directly to war effort. Young, married, responsible. Presently employed. Metropolitan location preferred.
Box 36-N-10, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, Ph.D., now in class 2-A, in charge of small laboratory for pharmaceutical manufacturer, seeks position in closer connection with defense work. Experience in drug analysis and research.
Box 66-N-10, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST—Ph.D. February 1943 from an eastern university. Well grounded in organic synthesis. Single, 24, 2-A in draft. Physical chemistry minor. Eastern location preferred.
Box 15-T-10, Ind. & Eng. Chem., Easton, Pa.

RESEARCH DIRECTOR, Ph.D., assistant at two world renowned universities. 12 years' research experience in organic synthesis and biochemistry (hypnotics, analeptics, vasoconstrictors, antiseptics, vitamins, hormones). 5 years' research director of French industrial laboratory, one year research director of American industrial laboratory. Desires similar position in large industrial research laboratory or university. Age 36, first citizenship papers, draft status 2-B.
Box 31-T-10, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST. M.S. from leading eastern university. Excellent organic background. 6 years' experience in research and analysis. Research or development desired but will consider any exceptional opportunity. East or Midwest. Age 30, single, 3-A, Christian, employed, available short notice.
Box 38-T-10, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST: 16 years' broad experience in research, development, production and consultation; technical director of research for western division of large chemical industry; special research on magnesium products, slats and refractories; patents; publication; good background in mathematics, physics, engineering, bacteriology and crystallography; M.S. degree University of California; desires position on West Coast; age 39; married; one child; available immediately.
Box 42-T-10, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, M.A. 1939. Two years with major petroleum corporation and one with well-known research institute. Most of course work for doctorate at large mid-western university. Thermodynamics, colloid chemistry, electrochemistry, advanced organic, physics, mathematics. Research. Sigma Pi Sigma. Read German, French, Russian. Age 28, married, draft deferred.
Box 45-T-10, Ind. & Eng. Chem., Easton, Pa.

BIO-ORGANIC CHEMIST Ph.D. May, 1942. Research experience in organic, enzyme, vitamin (pyridoxine and pantothenic acid chemistry). Formerly employed on vast industrial vitamin project. Papers being published. Member Phi Beta Kappa, Phi Lambda Upsilon, Sigma Xi. Interested in research vital to war effort in above fields. East only.
Box 53-T-10, Ind. & Eng. Chem., Easton, Pa.

FOOD CHEMIST, Ph.D., many years of research and aggressive development experience. Has a thorough knowledge of the technical and consumer problems of the shortening and margarine industries. Capable of directing laboratory findings to successful plant operation. Draft deferred.
Box 12-N-11, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S., 3 years' analytical experience, some graduate work. Desires position in organic control or synthesis. Age 28, draft 4-F. Prefer New York or New Jersey.
Box 23-N-11, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST. M.S. Six years' industrial experience embracing research and development in petroleum, pigments, organic preparations including soaps; also college teaching. Desires college teaching with opportunity for research in spare time, but will consider industrial position. Southwestern location preferred. Draft deferment guaranteed. Available after 30 days notice. Age 28.
Box 30-N-11, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, Ch.E. Broad training, experience in food chemistry and technology, metallurgical chemistry. Desire more essential position, preferably research or development. Now employed midwest, but location immaterial. Age, 27. Married. Draft, 3-B.
Box 31-N-11, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL CHEMIST, Ph.D., 15 years' experience with law degree recently added. Desires position requiring technical-legal understanding.
Box 33-N-11, Ind. & Eng. Chem., Easton, Pa.

ORGANIC RESEARCH Chemist; development engineer, B.Ch.E., M.Sc., eleven years' unusual experience on research and development of hydrocarbons, resins, dyestuffs and intermediates. Excellent scholastic record. Sigma Xi, patents. Practical, versatile. Age 33, married, one child, 3-A. Employed. Desires permanent and responsible position in above-mentioned fields. Available on reasonable notice.
Box 34-N-11, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 1495)

(Situations Wanted Continued)

CELLULOSE-LIGNIN—Pulp and Paper-Plastic Ph.D. Research Chemist. Now employed. Permanently deferred. Experienced both as a research chemist, in plant practice, and as Director of Research. Desires position as Technical adviser to President, or as Junior Technical Sales and/or Field Executive. Only employers needing such a man should reply.
Box 44-N-11, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER and chemist 20 years' experience in research, process development and production of chemicals, design of chemical equipment, seeks responsible position where services will contribute more to the winning of the war. Qualified to undertake technical investigations; sound business judgment and administrative ability; expert knowledge of oils, fats and their derivatives, glycerine and other chemicals. Good character, sound health, married, Protestant, American citizen with draft status 3-B.
Box 46-N-11, Ind. & Eng. Chem., Easton, Pa.

RESEARCH and DEVELOPMENT chemist, Doctorate training, seven years' petroleum and natural gas hydrocarbon experience. Fuel technology, catalytic syntheses, process development. Capable of responsible position in petroleum or allied industry
Box 49-N-11, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL PATENT attorney seeks responsible position with chemical corporation. Age 36. At present employed in patent department of Midwestern organic chemical corporation. Available December 1st. Excellent qualifications. Could organize patent department.
Box 52-N-11, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, Ph.D., with training in electrochemistry and metallography, desires position in research or production with opportunity to assist directly in the war effort. Five years' experience in semi-pilot plant work. Now employed. Age 32, married, draft classification 3-A. Prefers east or northeast.
Box 53-N-11, Ind. & Eng. Chem., Easton, Pa.

CAN YOU use me? 8 years' experience research, development and high spot trouble shooting in non-ferrous and pigment fields. I have cut analytical methods from hours to minutes, devised instruments to replace scarce personnel, stepped up production, and gotten to the root of all evils. My personal [illegible] must be a quicker way." Have numerous publications, patents, and two books. Thousands of ideas. Protestant, married, deferred, excellent references. Desire a position of responsibility where initiative and imagination are prime attributes. Not employed in defense.
Box 57-N-11, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, B.S. (Ch.E.) 3½ years' experience in photographic chemicals, photography, and salesmanship. 22 years old, single, draft status 2-A. Not particular what field of Chemical Engineering work is in. Available after Dec. 1, 1942.
Box 59-N-11, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST—13 years' experience as supervisor in analytical laboratory of large rayon plant. Employed at present. Married, one child, age 39, draft 3-A. Desire permanent position with greater chance for advancement than present position.
Box 60-N-11, Ind. & Eng. Chem., Easton, Pa.

TEACHER—INORGANIC and Physical, Administrator. Ph.D. In present position sixteen years. Primarily a teacher but want opportunity for research. Here is a 48 year old who can vitalize chemistry to his students.
Box 62-N-11, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, Ph.D., Yale. Wants research or teaching in middle west or east. Fourteen years' experience teaching and industrial work. Thermodynamics, Electrochemistry, Alumina Extraction. Twenty publications. Employed, but climate unsuitable to family. Gentile, active, successful, executive ability, class 3-B draft.
Box 72-N-11, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED (NONMEMBERS)

RESEARCH LIBRARIAN. College woman; experienced in literature and patent searches in organic chemistry and synthetics; languages. Library administrator; can assume responsibility. Not interested in abstracting or typing. Location immaterial.
Box 82-T-10, Ind. & Eng. Chem., Easton, Pa.

MECHANICAL ENGINEER. Five years' development work, large chemical company. Experience includes many types chemical plant equipment. Honor graduate leading Eastern university, A.B., B.S. and M.E., age 28, member A.S.M.E., married, class 3-A, native U.S. citizen. Location East of Rockies.
Box 26-N-11, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., desires consulting work in the New York City area.
Box 28-N-11, Ind. & Eng. Chem., Easton, Pa.

SAFETY Engineering position desired by woman chemist, M.A., 1934, organic major, safety engineering and first aid training. Prefer company manufacturing organic chemicals.
Box 48-N-11, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, B.S., 1937, inexperienced, desires opportunity in control, production, or development, New England, East.
Box 51-N-11, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST. B.A. 1942. Honors in chemistry. 44 hours. Desires position organic field. Knowledge French, German, Shorthand, Typewriting. Prefer west or middle west near university. Age 20. Single, Protestant. Employed, but available short notice.
Box 58-N-11, Ind. & Eng. Chem., Easton, Pa.

Industrial News

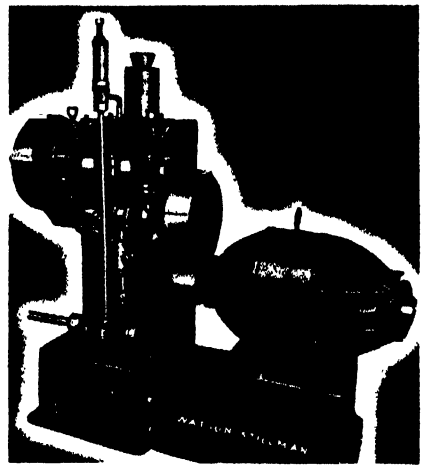
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War Emergency Pipe Line to Carry Crude

THE new 24-inch war emergency pipe line, now being constructed from Longview, Tex., to Salem, Ill., is the largest-diameter line carrying crude oil ever built and will establish records, both for size and for speed of construction.

The pipe is wrapped with a special asbestos felt, manufactured by The Philip Carey Mfg. Co., Cincinnati, Ohio, by a machine which first applies a waterproofing coating as the pipe revolves.

Motor-Driven Starting Pump



A NEW motor-driven starting pump for high pressures has been developed by the Watson-Stillman Co., Roselle, N. J. This compact unit is designed for primary or auxiliary service. It may be used with marine Diesel engines as well as stationary Diesel engines in power plants, commercial buildings, and water works.

Synthetic Rubber Plant

A SUBCONTRACT, at less than $3,000,000, for the erection of 35 concrete structures for a synthetic rubber plant in an east central state has been awarded to The Rust Engineering Co., Pittsburgh, Penna. The structures will include administrative buildings, warehouses, service and processing buildings. The subcontract was awarded by the Koppers Co., which will also operate the plant on lease. The plant will convert grain alcohol to butadiene and will also produce styrene.

Thermoplastic Lining for Steel and Concrete Tanks

AMERCOAT, a plastic-base coating composed of thermoplastic resins, makes it possible to use concrete as well as steel for tanks and vats for storage of fluids which ordinarily would cause severe corrosion or costly seepage.

Concrete tanks are now being used to store millions of barrels of Diesel fuel at strategic points. Amercoat adheres tightly to the concrete surface and is impervious. It produces a smooth, inert surface which is plastic enough not to check, crack, or fracture when subjected to vibration and moderate expansion and contraction.

Amercoat is manufactured by the American Pipe and Construction Co., P. O. Box 3428, Terminal Annex, Los Angeles, Calif.

New Surface Coating Resin

THE Plastics Division of Carbide and Carbon Chemicals Corp., 30 East 42nd St., New York, N. Y., announces a new and improved type of vinyl resin for corrosion-resistant maintenance finishes and other coating applications. The new resin, identified as vinylite resin VMCH, is characterized by improved adhesion to a wide variety of surfaces, making possible the formulation of air-dry or low-bake coatings, which possess outstanding resistance to corrosion chemicals, to moisture, and to extreme weathering.

The new resin is similar to the vinyl chloride-acetate resins in most of its properties and differs only in containing a small amount of an additional ingredient that promotes the development of adhesion. It is completely compatible with the other grades, and may be blended with them in actual use.

Explosive Rivets

EXPLOSIVE rivets, introduced a year ago to break one bottleneck in aircraft production, now are speeding field repairs of damaged planes at military depots, E. I. du Pont de Nemours & Co. has announced.

A bomber or pursuit plane with a gash in its wing or bullet holes in its fuselage can be patched quickly without any dismantling by using these rivets. Repairs which formerly required days now are completed in hours.

Scrap

MORE than 3,700,000 pounds of scrap materials have been collected and sold for use in war production by the American plants of Monsanto Chemical Co.

Monsanto's salvage department has reported that 3,200,000 pounds of scrap iron alone have been collected in the campaign which was started last spring. This is enough scrap iron to make steel for one hundred fourteen 26-ton medium tanks or almost a million Garand rifles.

Light-Weight Dust Respirator

THE new Willson No. 10 respirator is one of the lightest weight respirators ever to receive U. S. Bureau of Mines approval.

It is practical for long periods of time without impairing workers' efficiency. Unusual breathing freedom is provided through specially designed inhalation and exhalation valves. The manufacturer is Willson Products, Inc., 220 Thorn St., Reading, Penna.

Scrap from Office Equipment

TONS of scrap rubber and metal, in obsolete or unused office equipment, represent an untapped reservoir for the Nation's salvage drive, Ralph B. McKinney, in charge of the Hercules Powder Co. salvage campaign, said. A survey within the company's main offices turned up about 2 tons of valuable scrap metals.

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The Economic Status of the Members of the American Chemical Society (Continued[1])

Approved Report of the Committee on Economic Status

George Calingaert, Walter A. Schmidt, Walter G. Whitman, Frank C. Whitmore, L. W. Bass[2], Chairman

Prepared for the Committee by Andrew Fraser, Jr., Washington, D. C.

General Characteristics of Sections 4 to 8 Inclusive

In the ensuing five sections, analyses are made of the information furnished by the membership with respect to annual income, monthly salary rate, occupational status, source of employment, and field of specialization.

The mode of analysis is exactly the same. The first part of each section contains a discussion of the membership as a whole without regard to the years in which the members reported they had entered the profession. This is followed by a treatment of the same information in relation to year of entering the profession, which, in the text, is used interchangeably with years of professional experience.

The number of responses to each of the five topics is probably the best measure of the cooperation of the membership. The extent of the response in the period 1926 to 1934 exceeded the most sanguine hopes of the committee. Actually, in each of the four years in this period for which data were requested, at least 90 per cent of the replies were usable. For the five years subsequent to 1934, which cover the period 1937 to 1941, the usable returns averaged as high as 95 per cent.

The fact that such a high percentage of the membership cooperated made it possible to extend the scope of the report far beyond what was originally planned. This extension has reference particularly to monthly salary rates. Following Section 8 these rates are discussed in relation to each variable in the questionnaire.

In the analyses of annual incomes and monthly salary rates, variation in the text is made possible by interchangeability of terms; for example, both incomes and rates are sometimes referred to as earnings. Furthermore, the comparisons of income and rates are generally made among five levels of earnings, designated, respectively, "median", "upper and lower quartiles", and "upper and lower deciles". In the text the median level is sometimes referred to as the 50 per cent earnings level. Above and below this point, in a particular year, 50 per cent of the membership earned more than and 50 per cent earned less than the specified amount.

The upper quartile, or the 25 per cent earnings level, denotes that 25 per cent of the membership earned more than and 75 per cent earned less than a specified amount, whereas the lower quartile, or 75 per cent earnings level, denotes that 75 per cent earned more than and 25 per cent earned less than the designated income or rate. The upper and lower decile are referred to, respectively, as the 10 and 90 per cent earnings levels. The first measure means that 10 per cent of the members in a particular year earned more than and 90 per cent earned less than the specified amount. In contrast, reference to the latter measure indicates that 90 per cent earned more than and 10 per cent earned less than the specified amount.

It should also be noted that the measures for the median earnings were computed only if 10 or more members reported. The computation of the earnings measures for the upper and lower quartiles required that data be reported by 50 or more members. In the case of the upper and lower deciles the requisite measures were not computed unless 100 members furnished reports on either annual incomes or monthly salary rates.

Those who are interested in translating the findings to an age basis need merely add 23 years to the number of years of professional experience. This relationship was established by correlating the year of birth and the year of entering the profession reported by a substantial number of male regular members and computing the median age for the group. This was found to be 23 years. The five age groups used in this particular test ranged from under 19 years of age at entrance into the profession to 35 years of age and over, but no less than 80 per cent of the group were found in the class 20 to 24 years of age.

Section 4. Annual Incomes of the Membership

The data collected in this survey for the period 1926 to 1941, particularly with regard to annual incomes and monthly salary rates of the membership, are unprecedented in one important respect. For the first time information has been obtained which makes it possible to trace the earning capacities of a professional group of workers over a period of cataclysmic changes in the economic activities

[1] Chem. Eng. News, 20, 1289 (Oct. 25, 1942).
[2] Communications regarding this report should be addressed to L. W. Bass, Director, New England Industrial Research Foundation, 137 Newbury St., Boston, Mass.

TABLE 6.—COMPARISON OF 5 LEVELS OF ANNUAL INCOMES IN PERIOD 1926 TO 1941 OF ALL MEMBERS REPORTING

PERCENTAGE OF MEMBERS AT SPECIFIED INCOME LEVEL	ANNUAL EARNINGS OF MORE THAN SPECIFIED AMOUNT IN —								
	1941	1940	1939	1938	1937	1934	1932	1929	1926
10 PERCENT	$7,978	$7,757	$7,481	$7,254	$7,098	$6,594	$6,802	$7,859	$7,435
25 PERCENT	4,943	4,740	4,537	4,402	4,287	4,136	4,237	4,735	4,467
50 PERCENT	3,364	3,186	3,060	2,946	2,825	2,693	2,836	3,125	2,972
75 PERCENT	2,498	2,222	2,072	1,973	1,873	1,682	1,813	2,100	2,034
90 PERCENT	1,932	1,611	1,389	1,228	(1)	(1)	(1)	1,348	1,336
	PERCENTAGE (RELATIVE TO 1941)								
10 PERCENT	100.0	97.2	93.8	90.9	89.0	82.7	85.3	98.5	93.2
25 PERCENT	100.0	95.9	91.8	89.1	86.7	83.7	85.7	95.6	90.4
50 PERCENT	100.0	94.7	91.0	87.6	84.0	80.1	84.3	92.9	88.3
75 PERCENT	100.0	89.0	82.9	79.0	75.0	67.3	72.6	84.3	81.4
90 PERCENT	100.0	83.4	71.9	63.6	(2)	(2)	(2)	69.8	69.2

1 UNDER $1,200 2 LESS THAN 62.1 PERCENT

of the United States. The figures reflect, for example, the effects of the boom period 1926 to 1929. They also reveal how the earnings capacity of the membership was affected by the great depression, the influence of which was essentially operative in the period 1929 to 1934. The data reported for the years 1937 and 1938 are an indication of the uncertainties of economic activity during that time. On the other hand, the information furnished for the most recent years of 1939, 1940, and 1941 reflects the increasing tempo of industrial production that stemmed from prewar preparedness and eventual participation in the conflict.

Considered without regard to years of professional experience, the median annual income (Table 6), including salary, fees, and bonuses of all members reporting in 1941, was $3,364. This means in that year 50 per cent of the membership earned more than this amount and 50 per cent earned less. In this same year, while 25 per cent of the membership had annual incomes in excess of $4,943, 10 per cent had earned more than $7,978. By contrast, annual incomes of less than $1,932 and $2,498 were reported by, respectively, one tenth and one quarter of the membership.

Over the period 1926 to 1941 the fluctuations in earnings followed a consistent pattern. This situation is exemplified by considering the 50 per cent levels of the membership reported for each of the nine years.

Between 1926 and 1929, while the median incomes of the membership increased by $153 from $2,972 a year to $3,125 a year, from 1929 to 1932 they declined by $289. By 1934, however, annual incomes had declined by another $143. In that year, the actual median earnings reported were $2,693 a year.

Subsequent to 1934 the annual incomes of the membership began to rise. Over

TABLE 7.—COMPARISON OF 5 LEVELS OF ANNUAL INCOMES IN PERIOD 1926 TO 1941 OF ALL MEMBERS REPORTING, BY YEAR OF ENTERING PROFESSION

YEAR OF AND YEARS AFTER ENTERING PROFESSION		PROPORTION WITH ANNUAL INCOMES OF MORE THAN SPECIFIED AMOUNT				
		10 PER-CENT	25 PER-CENT	50 PER-CENT	75 PER-CENT	90 PER-CENT
		1941				
(1)	42+	(2)	$9,150	$4,850	$2,950	[illegible]
1900–04	37–41	(3)	9,694	5,752	3,923	$3,077
1905–09	32–36	$15,549	9,150	5,818	4,017	3,162
1910–14	27–31	17,143	9,164	5,802	3,869	2,969
1915–19	22–26	12,544	8,130	5,163	3,751	2,955
1920–23	18–21	9,994	6,484	4,592	3,438	2,687
1924–27	14–17	7,154	5,315	4,058	3,134	2,440
1928–31	10–13	5,411	4,235	3,393	2,740	2,241
1932–34	7–9	4,167	3,407	2,959	2,438	2,008
1935–36	5–6	3,406	3,075	2,582	2,154	1,807
1937	4	3,169	2,715	2,267	1,917	1,581
1938	3	2,958	2,452	2,097	1,778	1,445
1939	2	2,629	2,266	1,980	1,668	1,367
1940	1	2,404	2,125	1,881	1,505	1,304
1941	½	2,267	1,907	1,600	(4)	(4)
		1938				
(1)	39+	(2)	$9,900	$5,850	$3,850	(2)
1900–04	34–38	(3)	9,880	5,645	3,920	$3,025
1905–09	29–33	$15,076	9,407	5,339	3,806	3,006
1910–14	24–28	14,979	8,340	5,151	3,634	2,753
1915–19	19–23	9,968	6,745	4,534	3,371	2,652
1920–23	15–18	8,253	5,497	4,024	3,101	2,465
1924–27	11–14	5,477	4,247	3,380	2,626	2,050
1928–30	8–10	4,123	3,378	2,756	2,234	1,789
1931–32	6–7	3,454	2,932	2,404	1,908	1,427
1933	5	2,957	2,574	2,062	1,653	(4)
1934	4	2,860	2,385	1,923	1,409	(4)
1935	3	2,494	2,103	1,712	(4)	(4)
1936	2	2,148	1,864	1,462	(4)	(4)
1937	1	2,047	1,721	1,377	(4)	(4)
1938	½	1,930	1,480	(4)	(4)	(4)
		1932				
(1)	33+	(2)	$9,300	$6,000	$3,857	(2)
1900–04	28–32	(3)	9,245	5,400	3,731	$2,825
1905–09	23–27	$13,966	7,773	4,970	3,470	2,697
1910–13	19–22	11,978	7,074	4,743	3,315	2,491
1914–17	15–18	8,809	5,977	4,269	3,177	2,462
1918–20	12–14	6,378	4,589	3,518	2,768	2,142
1921–23	9–11	5,234	4,013	3,190	2,504	1,934
1924–25	7–8	4,003	3,248	2,639	2,106	1,494
1926–27	5–6	3,330	2,844	2,257	1,720	(4)
1928	4	2,925	2,365	1,903	1,305	(4)
1929	3	2,470	2,011	1,566	(4)	(4)
1930	2	2,190	1,824	1,346	(4)	(4)
1931	1	1,939	1,545	(4)	(4)	(4)
1932	½	1,750	1,315	(4)	(4)	(4)
		1940				
(1)	41+	(2)	$9,750	$5,520	$3,833	(2)
1900–04	36–40	(3)	10,131	5,850	3,986	$3,077
1905–09	31–35	$16,481	9,176	5,623	3,879	3,098
1910–14	26–30	16,386	8,823	5,451	3,779	2,876
1915–19	21–25	11,971	7,767	4,904	3,600	2,860
1920–23	17–20	9,480	6,203	4,402	3,306	2,590
1924–27	13–16	6,783	4,950	3,796	2,945	2,285
1928–30	10–12	5,050	3,990	3,213	2,563	2,084
1931–33	7–9	4,016	3,318	2,739	2,219	1,829
1934–35	5–6	3,318	2,857	2,392	1,964	1,483
1936	4	2,918	2,486	2,255	1,632	(4)
1937	3	2,625	2,182	1,878	1,495	(4)
1938	2	2,361	2,028	1,726	1,354	(4)
1939	1	2,171	1,881	1,589	1,366	(4)
1940	½	2,091	1,720	1,348	(4)	(4)
		1937				
(1)	38+	(2)	$9,938	$6,900	$3,983	(2)
1900–04	33–37	(3)	9,840	5,591	3,875	$2,932
1905–09	28–32	$15,375	8,396	5,367	3,749	2,959
1910–14	23–27	14,559	8,173	5,041	3,585	2,698
1915–19	18–22	9,771	6,530	4,402	3,295	2,550
1920–23	14–17	7,665	5,256	3,861	3,009	2,370
1924–27	10–13	5,187	3,971	3,184	2,486	1,976
1928–30	7–9	3,761	3,124	2,531	2,056	1,634
1931–32	5–6	3,131	2,589	2,105	1,670	1,212
1933	4	2,712	2,197	1,820	1,353	(4)
1934	3	2,488	2,031	1,635	(4)	(4)
1935	2	2,178	1,897	1,496	(4)	(4)
1936	1	1,952	1,643	1,245	(4)	(4)
1937	½	1,901	1,509	(4)	(4)	(4)
		1929				
(1)	30+	(2)	$10,650	$6,600	$4,040	(2)
1900–04	25–29	(3)	9,831	5,647	4,015	$3,070
1905–09	20–24	$14,967	8,808	5,329	4,143	3,021
1910–13	16–19	13,190	7,658	5,033	3,468	2,657
1914–17	12–15	9,213	6,141	4,332	3,215	2,569
1918–20	9–11	6,278	4,464	3,473	2,788	2,264
1921–23	6–8	5,010	3,842	3,090	2,476	1,963
1924–25	4–5	3,689	3,054	2,440	1,925	1,290
1926	3	3,221	2,582	2,048	1,450	(4)
1927	2	2,804	2,329	1,902	1,260	(4)
1928	1	2,446	2,029	1,681	(4)	(4)
1929	½	2,159	1,891	1,436	(4)	(4)
		1939				
(1)	40+	(2)	$9,975	$5,625	$3,917	(2)
1900–04	35–39	(3)	10,261	5,805	3,978	$3,035
1905–09	30–34	$15,537	8,750	5,389	3,858	3,078
1910–14	25–29	15,463	8,544	5,285	3,729	2,832
1915–19	20–24	11,161	7,216	4,698	3,476	2,765
1920–23	16–19	8,902	5,880	4,185	3,202	2,523
1924–27	12–15	6,672	4,565	3,572	2,777	2,138
1928–30	9–11	4,552	3,668	3,003	2,421	1,926
1931–32	7–8	3,815	3,180	2,575	2,088	1,687
1933–34	5–6	3,241	2,763	2,244	1,826	1,269
1935	4	2,810	2,415	1,982	1,500	(4)
1936	3	2,480	2,098	1,755	(4)	(4)
1937	2	2,213	1,924	1,547	(4)	(4)
1938	1	2,090	1,805	1,434	(4)	(4)
1939	½	1,909	1,582	(4)	(4)	(4)
		1934				
(1)	35+	(2)	$9,800	$6,000	$4,029	(2)
1900–04	30–34	(3)	9,382	5,320	3,745	$2,849
1905–09	25–29	$14,052	7,790	5,000	3,468	2,680
1910–14	20–24	13,080	7,091	4,719	3,336	2,486
1915–18	16–19	8,143	5,899	4,100	3,115	2,418
1919–22	12–15	6,351	4,615	3,496	2,701	2,106
1923–25	9–11	4,767	3,620	2,944	2,312	1,755
1926–27	7–8	3,740	3,081	2,461	1,923	1,336
1928–29	5–6	3,065	2,498	2,005	1,521	(4)
1930	4	2,567	2,126	1,694	(4)	(4)
1931	3	2,327	1,862	1,335	(4)	(4)
1932	2	2,037	1,683	1,254	(4)	(4)
1933	1	1,912	1,491	(4)	(4)	(4)
1934	½	1,795	1,367	(4)	(4)	(4)
		1926				
(1)	27+	(2)	$9,600	$6,000	$3,800	(2)
1900–04	22–26	(3)	9,540	5,907	3,805	$2,940
1905–09	17–21	$12,789	7,596	4,889	3,466	2,780
1910–13	13–16	10,101	6,525	4,363	3,208	2,499
1914–17	9–12	7,234	5,007	3,618	2,839	2,399
1918–20	6–8	4,804	3,616	2,892	2,390	1,915
1921–23	3–5	3,664	2,903	2,393	1,865	1,218
1924	2	2,929	2,344	1,894	1,388	(4)
1925	1	2,372	1,954	1,659	(4)	(4)
1926	½	2,164	1,779	1,353	(4)	(4)

1 PRIOR TO 1900 2 FEWER THAN 100 MEMBERS REPORTED 3 OVER $19,200 4 UNDER $1,200

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the period 1934 to 1941 the increases occurred at varying rates. From 1934 to 1937, for example, median incomes rose on the average at the rate of $44 a year. Between 1937 and 1940, on the other hand, the yearly rate of increase in earnings was $120. Over this period the incomes actually reported rose from $2,825 a year in 1937 to $3,186 a year in 1940. From 1940 to 1941, however, annual incomes of the membership increased almost one and one-half times as fast as in the preceding period, rising from $3,186 a year in 1940 to $3,364 in 1941, or an increase of $178.

This pattern of fluctuation in earning capacity was common to each of the other four earnings levels. Furthermore, at all corresponding levels in earlier years the annual incomes reported were without exception less than those for 1941.

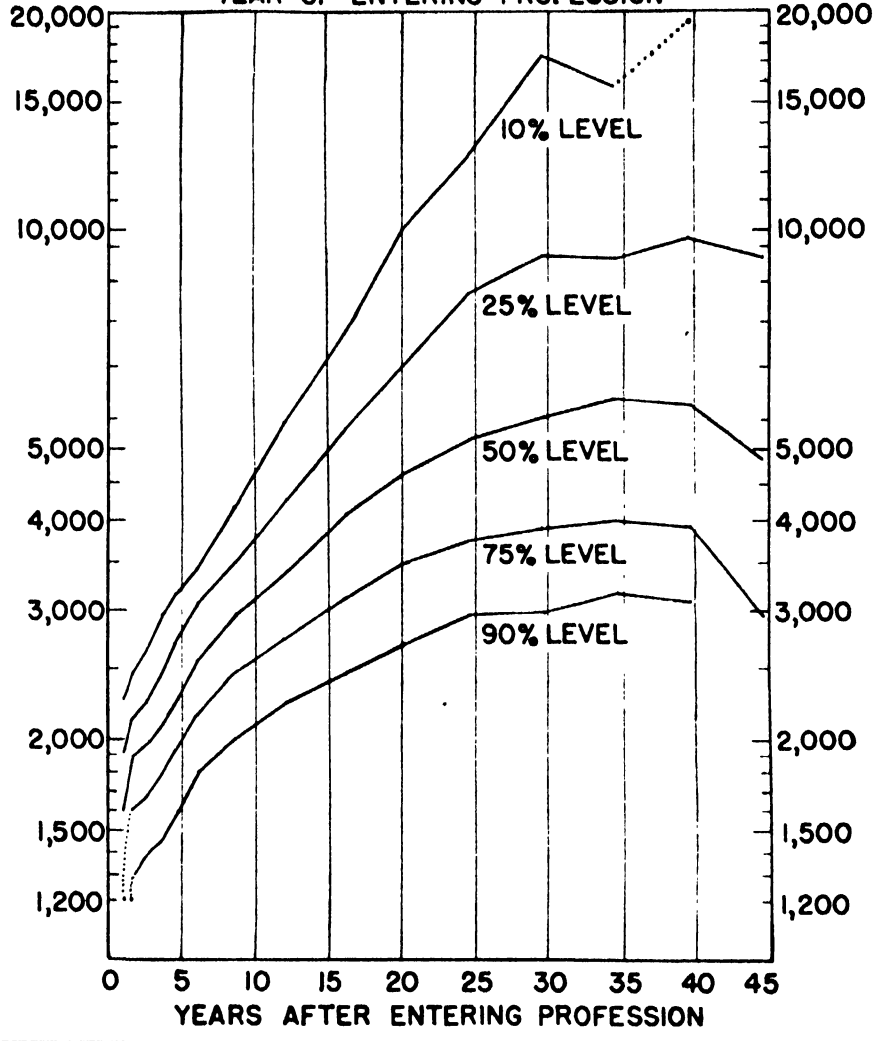
In 1926, for example, the median annual income of $2,972 a year was 11.7 per cent less than the median earnings of $3,364 a year reported for 1941. At this same level, but in 1934, the difference relative to 1941 was 19.9 per cent. Similar comparisons for these two periods show that at the 10 per cent earnings level the differences were 6.8 per cent and 17.3 per cent. At the 90 per cent level the annual income in 1926 was 30.8 per cent less than that reported for 1941. In 1926, while one tenth of the membership earned more than $7,435 a year, one tenth earned less than $1,336 a year. The annual income reported at the upper 10 per cent level in 1934 was $6,594 a year. At the upper and lower quartile levels in 1926 the annual incomes were less, respectively, by 9.6 per cent and 18.6 per cent than those reported in 1941. At these same two levels in 1934 the earnings differences relative to 1941 were 17.3 per cent and 32.7 per cent. Over the period 1934 to 1940 these differences in annual incomes relative to 1941 progressively declined at all five earnings levels.

Analysis of the data in Table 6 shows also that, over the period 1926 to 1941, the relationships that existed between the median annual income levels and the two upper and two lower income levels remained fairly constant. In each of the nine years the upper decile and upper quartile incomes of the membership reporting were, on the average, respectively, 2.4 and 1.5 times greater than the median incomes. The lower quartile and lower decile incomes, on the other hand, were less than their respective median incomes by approximately one third and one half.

To evaluate properly this broad picture of changes in the economic status of the membership with respect to annual incomes it is necessary that the data be analyzed in relation to years of professional experience (Table 7).

These data show that, in each of the nine years in the period 1926 to 1941 and at all five income levels, the earnings capacity of the membership increased with experience, and at any point in a particular experience span the spreads in earnings were considerable. These characteristics are exemplified by considering the incomes reported for 1941 in Table 7 as well as those plotted in Chart 1.

CHART 1- ANNUAL INCOMES IN 1941, INCLUDING SALARIES, FEES AND BONUSES, OF ALL REPORTING MEMBERS ACCORDING TO YEAR OF ENTERING PROFESSION

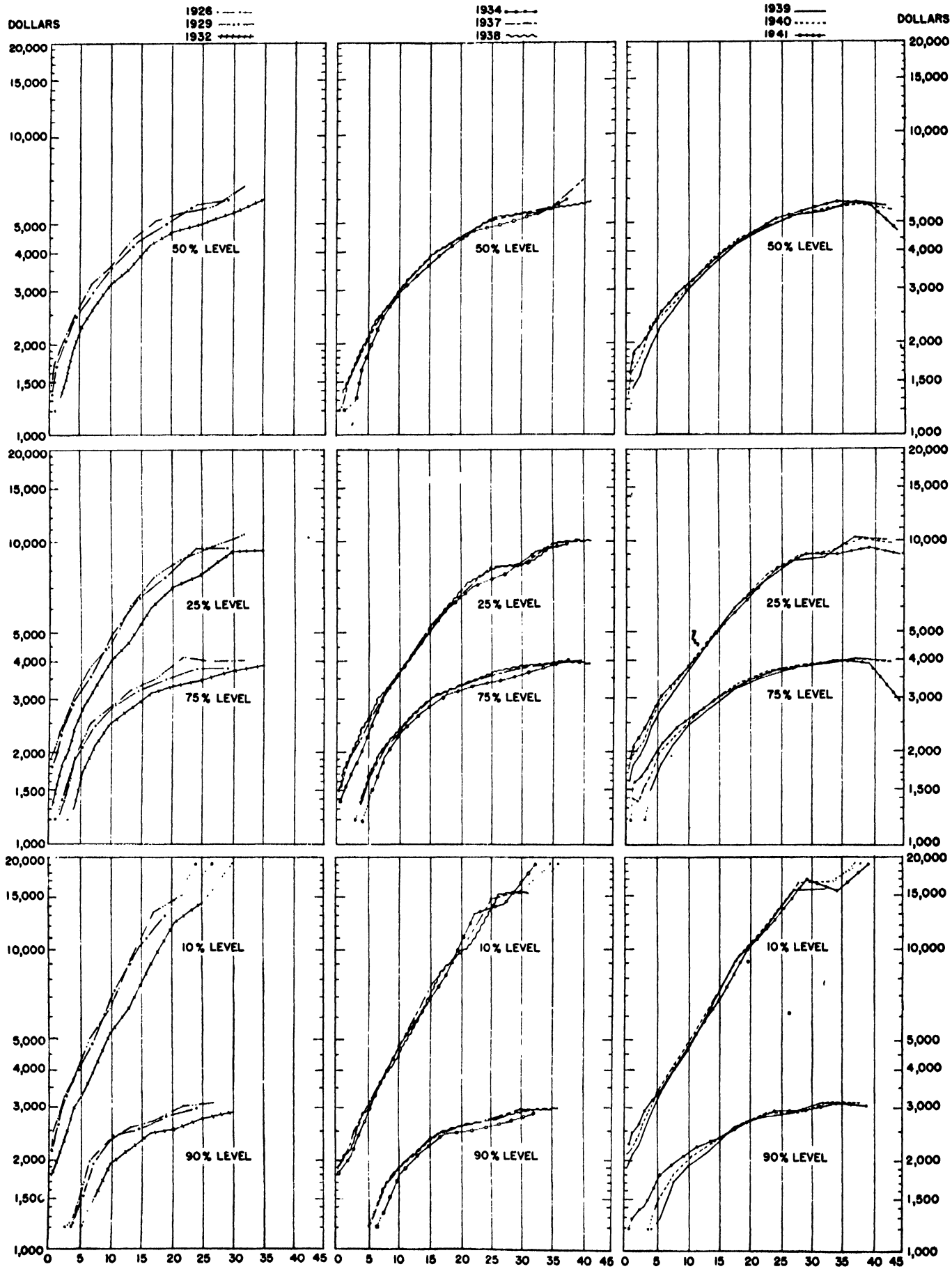


In 1941 the median income of those members who had just begun their professional careers was $1,600 a year. At succeeding levels of experience annual incomes at this same level steadily increased and reached a maximum of $5,818 a year for those members who in 1941 had been professionally active for 35 years. At approximately five and nine years beyond this point the median incomes had declined to $5,500 a year and $4,800 a year, respectively. The steady advance in earning capacity to a maximum after 35 years of professional experience was common to the lower quartile and the lower decile levels. At the former earnings level the range in annual incomes over the 35 years' experience span was from under $1,200 to $4,017, whereas at the latter level, while beginning annual incomes were also under $1,200, the maximum annual earnings reached after the same number of years of experience was only $3,162.

In contrast to this situation, annual incomes reported in 1941 at the upper decile and upper quartile levels reached maxima five years later, or after members had been professionally active for approximately 40 years. In 1941 the annual incomes of 10 per cent of the members with 40 years' experience exceeded $19,200; 25 per cent earned more than $9,694.

The spreads in earnings in 1941 at particular years of professional experience are more readily interpreted by referring to Chart 1. The data in this form clearly indicate that, up to five years after entering the profession, the spreads in earnings remained fairly constant. After five years of professional experience 50 per cent of the membership in 1941 was earning over $2,450 a year and 50 per cent was earning less. The annual incomes of one fourth of this same group of members were $450 greater than the median, or $2,900 a year; and one fourth earned $400 less than the median, or $2,050 a year. At the decile levels the earnings of 10 per cent

CHART 2 - ANNUAL INCOMES IN PERIOD 1926 TO 1941, INCLUDING SALARIES, FEES AND BONUSES, OF ALL REPORTING MEMBERS ACCORDING TO YEAR OF ENTERING PROFESSION



exceeded the median income by $850 or more, or $3,300 a year, while 10 per cent were lower than the median by $750 or more, or $1,700 a year.

With lengthening experience, the spreads in annual incomes reported in 1941 became accentuated, especially at the upper 10 per cent and the upper 25 per cent earnings levels. Thus, after 10, 20, and 30 years of professional experience, while the incomes of the upper one fourth of the membership were greater than the median of their groups by, respectively, 20, 42, and 65 per cent, the corresponding differences for the upper one tenth of the membership were 40, 120, and 206 per cent. By contrast, at the 75 per cent earnings level the differences relative to the median were of the order of 18, 25, and 30 per cent, and at the 90 per cent earnings level they were of the order of 33, 42, and 46 per cent.

After 10 years' professional experience, Chart 1 shows also that the median annual income reported in 1941 was $3,180 a year. One quarter of this same group earned more than $3,800 a year, one quarter less than $2,600, one tenth more than $4,400, and one tenth earned less than $2,130 a year. The median annual income of members with 20 years' experience in 1941 was $4,650, and of those with 30 years' experience was $5,550. In other words, relative to the 50 per cent earnings level of $3,180 a year reported by members who had been in the profession for 10 years, the earnings capacity with 20 and 30 years of experience were, respectively, 1.5 and 1.8 times as great.

At the upper 10 per cent earnings level, however, members with 30 years' experience were earning more than $17,000 a year, or nearly four times as much as members at this level with only 10 years' experience. The corresponding difference at the lower 10 per cent earnings level was only 1.4. At this level members who had been professionally active for 30 years reported annual incomes of $3,000.

Similar comparisons of the incomes at the upper and lower quartile levels show that at the former level the earnings of $9,200 a year for members with 30 years' experience were 2.4 times as great as the earnings of $3,800 a year reported by members who had been professionally active for 10 years. At the lower quartile level members with 30 years' experience were earning $3,900 a year, or 1.5 times as much as the annual income of $2,600 a year of members with only 10 years' experience.

In each of the eight years prior to 1941 that cover the period 1926 to 1940, Chart 2 makes evident that the spreads and rates of growth in the annual incomes of the membership did not differ materially from those noted above for 1941. From this chart, general comparisons readily can be made among the earnings reported for comparable years of experience to illustrate the changes which occurred over the whole period 1926 to 1941. It should be emphasized, however, that since annual incomes do not measure rates of earnings, conclusions derived from Chart 2 must be used with caution as measures of economic status. This qualification is important because the basic data, which include salaries, fees, and bonuses, are affected by the volume of employment.

With the exception of the lower decile earnings level after five years of experience, Chart 2 shows that, for comparable years of experience, the annual incomes of the membership at all five income levels were consistently lower in 1941 than the incomes reported for 1926 and 1929; and in general the lowest incomes reported were those for the year 1934.

For example, after five years of professional experience, the range in median annual incomes over the period 1926 to 1941 was $775. The lower extreme of this range included annual earnings of $1,875 reported for 1934, while the upper extreme refers to earnings of $2,650 a year reported for 1926. The latter earnings were, however, $250 a year greater than the median annual income of $2,400 earned by members who in 1941 had had five years of professional experience. For the same experience span, the range in incomes at the lower quartile level was $750. At this level the lowest income reported was $1,400 a year in 1934; the highest, $2,150 a year in 1926. Again these 1926 earnings were more than those of $2,050 a year reported for 1941. At the two higher earnings levels, the ranges in incomes over the period 1926 to 1941 each exceeded $1,000. Thus, after five years of professional experience in 1934, while one quarter of the membership was earning $2,350, members with a similar experience span in 1929 were able to earn $3,380 a year, but in 1941 they were earning approximately 13 per cent less than this amount, or $2,950 a year. At the upper 10 per cent level, the earnings in 1941 were nearly 23 per cent less than those reported for 1926; the range in earnings over the 15-year period was also greater. Actually, at this level, annual incomes ranged from $2,850 in 1934 to $4,200 in 1926, but in 1941 the incomes of one tenth of the membership with five years of professional experience only exceeded $3,250 a year.

Similar comparisons of the data reported by members who had been professionally active for 20 years show that, over the period 1926 to 1941, median annual incomes in 1941 were $4,550 in contrast to $5,300 in 1926 and $4,350 in 1934. These figures show that over the 15-year period the range in annual incomes was $950, and that the median income reported for 1941 was approximately $750, or 14 per cent less than that of members with similar years of experience in 1926. At the two lower income levels, on the other hand, while annual earnings in 1941 were less than those reported for 1926 by approximately 10 and 7 per cent, the corresponding differences at the upper quartile and upper decile levels were, respectively, 21 and 30 per cent. To illustrate this, the movements in earnings at the upper and lower 10 per cent income levels are contrasted. At the latter level, the actual range in earnings between those of $2,660 a year in 1941 and $2,850 in 1926 was $190, whereas at the former level the actual range was as great as $4,100 and is derived from annual incomes of $14,000 and $9,900 reported, respectively, for 1926 and 1941.

From the preceding comparisons of incomes reported for corresponding years after entering the profession it seems to be indicated that members with few years of professional experience in 1941 were moving away from the low levels of earnings in 1934 and approaching the high earnings levels of 1926 and 1929 at a relatively much faster rate than the members with long years of experience. To establish this situation more precisely it is necessary next to consider the monthly salary rates also reported by the membership.

Section 5. Monthly Salary Rates of the Membership

The monthly salary rates presented in Table 8 without regard to years of professional experience for each of the nine years in the period 1926 to 1941 are, according to the instructions of the

TABLE 8.—COMPARISON OF 5 LEVELS OF MONTHLY SALARY RATES IN PERIOD 1926 TO 1941 OF ALL MEMBERS REPORTING

PERCENTAGE OF MEMBERS AT SPECIFIED INCOME LEVEL	MONTHLY SALARY RATES OF MORE THAN SPECIFIED AMOUNT IN —								
	1941	1940	1939	1938	1937	1934	1932	1929	1926
10 PERCENT	$558	$527	$515	$504	$497	$486	$499	$556	$518
25 PERCENT	383	358	345	335	327	320	330	362	342
50 PERCENT	271	252	243	234	224	216	227	249	238
75 PERCENT	205	180	168	160	153	135	147	173	166
90 PERCENT	159	134	117	104	(1)	(1)	(1)	113	109
	PERCENTAGE (RELATIVE TO 1941)								
10 PERCENT	100.0	94.4	92.3	90.3	89.1	87.1	89.4	99.6	92.8
25 PERCENT	100.0	93.5	90.1	87.5	85.4	83.6	86.2	94.5	89.3
50 PERCENT	100.0	93.0	89.7	86.3	82.7	79.7	83.8	91.9	87.8
75 PERCENT	100.0	87.8	82.0	78.0	74.6	65.9	71.7	84.4	81.0
90 PERCENT	100.0	84.3	73.6	65.4	(2)	(2)	(2)	71.1	68.6

1 UNDER $100 2 LESS THAN 62.9 PERCENT

questionnaire, the rates received by the membership for the time they were actually employed in their major fields, and are exclusive of fees and bonuses.

In 1941 the median salary rate of the membership was $271. Above this level, one quarter had earnings in excess of $383 a month, and one tenth earned more than $558 a month. On the other hand, while one tenth earned less than $159 a month, one quarter earned less than $205 a month.

The fluctuations in monthly salary rates of the membership over the period 1926 to 1941 were exactly similar in pattern to those previously noted in the similar discussion of annual incomes without regard to age. Thus, earnings rose from 1926 to 1929, declined over the period 1929 to 1934, and steadily increased from 1937 to 1941.

Over these periods the rates of increase in median monthly salaries varied. This is evidenced by noting that while monthly earnings rose by $11 from $238 in 1926 to $249 in 1929, in the succeeding five-year period they declined by $33 to reach $216 in 1934, but rose again by $8.00 to reach $224 by 1937. In each of the years in the period 1937 to 1940, however, the rate of increase in median monthly salary rates was as great as it had been over the whole period 1934 to 1937. In 1940, 50 per cent of the membership was earning more than $252 a month and 50 per cent was earning less. From 1940 to 1941 the rate of increase in median monthly earnings was nearly twice as great, in that they increased by $19 from $252 a month to $271 a month.

Relative to 1941, the differences in median monthly earnings in each of the prior years were less by amounts that ranged from 8.1 per cent in 1929 to as high as 20.3 per cent in 1934. A similar situation also prevailed at the two upper and the two lower earnings levels.

Also in each of the nine years while the upper decile and upper quartile monthly incomes of the membership reporting were on the average, respectively, 2.1 and 1.4 times greater than the median monthly incomes, the lower quartile and lower decile earnings were less than the median earnings by approximately one third and one half.

The fact that these average relationships differ from those previously noted for annual incomes only at the two upper income levels would seem to indicate that the earnings capacity of the membership at the median and two lower income levels is primarily dependent upon salary, and salary only. This statement is partially substantiated by considering the ratios of annual incomes to monthly salary rates (Table 8).

For each of the nine years in the period 1926 to 1941, median annual incomes of

TABLE 9.—RATIOS OF 5 LEVELS OF ANNUAL INCOMES TO MONTHLY SALARY RATES IN PERIOD 1926 TO 1941 OF ALL MEMBERS REPORTING

EARNINGS LEVEL	RATIOS IN —								
	1941	1940	1939	1938	1937	1934	1932	1929	1926
10 PERCENT	14.3	14.7	14.5	14.4	14.3	13.6	13.6	14.1	14.4
25 PERCENT	12.9	13.2	13.2	13.1	13.1	12.9	12.8	13.1	13.1
50 PERCENT	12.4	12.6	12.6	12.6	12.6	12.5	12.5	12.6	12.5
75 PERCENT	12.2	12.3	12.3	12.3	12.2	12.5	12.3	12.2	12.3
90 PERCENT	12.2	12.0	11.9	11.8	(1)	(1)	(1)	11.9	12.3

1 FIGURES NOT AVAILABLE

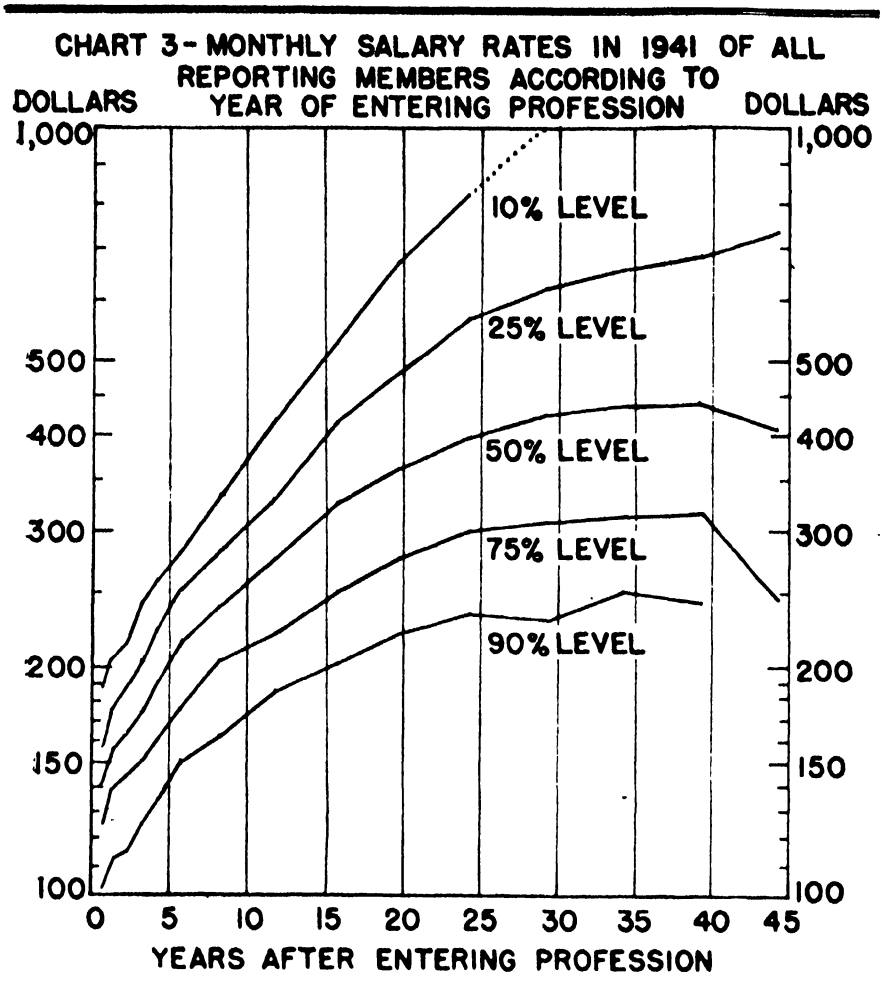
TABLE 10.—COMPARISON OF 5 LEVELS OF MONTHLY SALARY RATES IN PERIOD 1926 TO 1941 OF ALL MEMBERS REPORTING, BY YEAR OF ENTERING PROFESSION

YEAR OF ENTERING PROFESSION	AND YEARS AFTER	PROPORTION WITH MONTHLY SALARY RATES OF MORE THAN SPECIFIED AMOUNT				
		10 PER CENT	25 PER CENT	50 PER CENT	75 PER CENT	90 PER CENT
		1941				
(1)	42+	(2)	$741	$405	$246	(2)
1900–04	37–41	(3)	684	445	317	$242
1905–09	32–36	(3)	659	439	313	251
1910–14	27–31	(3)	626	423	307	231
1915–19	22–26	$826	567	393	300	234
1920–23	18–21	666	490	361	276	219
1924–27	14–17	517	414	323	251	201
1928–31	10–13	417	327	275	221	185
1932–34	7–9	332	280	238	202	162
1935–36	5–6	278	248	213	175	150
1937	4	257	222	189	161	133
1938	3	241	203	174	151	124
1939	2	214	187	164	144	115
1940	1	203	175	156	136	112
1941	½	187	156	140	125	102
		1938				
(1)	39+	(2)	$698	$435	$307	(2)
1900–04	34–38	(3)	675	429	308	$242
1905–09	29–33	(3)	631	420	300	233
1910–14	24–28	(3)	596	401	288	220
1915–19	19–23	$695	489	358	273	212
1920–23	15–18	555	419	315	247	199
1924–27	11–14	422	336	273	216	168
1928–30	8–10	323	270	223	181	150
1931–32	6–7	276	238	197	158	120
1933	5	241	213	173	141	100
1934	4	231	193	159	117	(4)
1935	3	204	171	141	(4)	(4)
1936	2	172	154	123	(4)	(4)
1937	1	165	140	118	(4)	(4)
1938	½	157	131	107	(4)	(4)
		1932				
(1)	33+	(2)	$689	$470	$314	(2)
1900–04	28–32	(3)	652	423	301	$228
1905–09	23–27	$945	581	393	288	218
1910–13	19–22	869	529	367	267	202
1914–17	15–18	651	495	337	255	201
1918–20	12–14	464	359	286	227	172
1921–23	9–11	407	319	256	203	158
1924–25	7–8	319	259	218	181	127
1926–27	5–6	273	232	189	145	(4)
1928	4	236	196	155	109	(4)
1929	3	208	165	130	(4)	(4)
1930	2	178	149	112	(4)	(4)
1931	1	158	127	(4)	(4)	(4)
1932	½	141	107	(4)	(4)	(4)

YEAR OF ENTERING PROFESSION	AND YEARS AFTER	PROPORTION WITH MONTHLY SALARY RATES OF MORE THAN SPECIFIED AMOUNT				
		10 PER CENT	25 PER CENT	50 PER CENT	75 PER CENT	90 PER CENT
		1940				
(1)	41+	(2)	$715	$427	$310	(2)
1900–04	36–40	(3)	683	436	310	$241
1905–09	31–35	(3)	647	432	307	245
1910–14	26–30	(3)	618	419	304	228
1915–19	21–25	$803	530	383	290	226
1920–23	17–20	625	452	339	264	211
1924–27	13–16	490	381	308	240	186
1928–30	10–12	386	316	259	210	172
1931–33	7–9	319	267	222	183	151
1934–35	5–6	265	232	198	162	126
1936	4	236	208	170	136	(4)
1937	3	214	180	155	127	(4)
1938	2	190	167	145	118	(4)
1939	1	176	156	134	113	(4)
1940	½	171	146	127	109	(4)
		1937				
(1)	38+	(2)	$665	$460	$320	(2)
1900–04	33–37	(3)	677	430	308	$236
1905–09	28–32	(3)	622	416	299	233
1910–14	23–27	(3)	587	395	284	215
1915–19	18–22	$662	471	343	265	207
1920–23	14–17	515	404	306	239	192
1924–27	10–13	398	317	257	207	160
1928–30	7–9	303	250	207	168	136
1931–32	5–6	250	200	175	133	102
1933	4	222	183	151	110	(4)
1934	3	209	168	136	(4)	(4)
1935	2	177	156	124	(4)	(4)
1936	1	160	136	107	(4)	(4)
1937	½	155	130	109	(4)	(4)
		1929				
(1)	30+	(2)	$674	$493	$355	(2)
1900–04	25–29	(3)	691	431	313	$244
1905–09	20–24	(3)	623	413	304	241
1910–13	16–19	$844	551	389	284	216
1914–17	12–15	651	453	338	258	209
1918–20	9–11	451	350	282	229	185
1921–23	6–8	397	313	249	202	160
1924–25	4–5	302	248	208	162	109
1926	3	255	218	171	125	(4)
1927	2	224	197	158	106	(4)
1928	1	201	166	142	(4)	(4)
1929	½	179	157	130	(4)	(4)

YEAR OF ENTERING PROFESSION	AND YEARS AFTER	PROPORTION WITH MONTHLY SALARY RATES OF MORE THAN SPECIFIED AMOUNT				
		10 PER CENT	25 PER CENT	50 PER CENT	75 PER CENT	90 PER CENT
		1939				
(1)	40+	(2)	$733	$447	$308	(2)
1900–04	35–39	(3)	677	434	311	$241
1905–09	30–34	(3)	641	427	306	240
1910–14	25–29	(3)	607	413	301	224
1915–19	20–24	$751	510	372	281	219
1920–23	16–19	599	437	327	255	205
1924–27	12–15	448	355	293	227	176
1928–30	9–11	354	299	243	197	160
1931–32	7–8	308	254	212	172	140
1933–34	5–6	257	226	185	153	105
1935	4	227	197	162	125	(4)
1936	3	205	173	146	(4)	(4)
1937	2	179	158	130	(4)	(4)
1938	1	168	150	124	(4)	(4)
1939	½	159	135	119	(4)	(4)
		1934				
(1)	35+	(2)	$660	$467	$320	(2)
1900–04	30–34	(3)	653	422	303	$226
1905–09	25–29	$958	589	391	283	216
1910–14	20–24	896	523	370	267	200
1915–18	16–19	614	438	325	252	197
1919–22	12–15	468	360	279	220	171
1923–25	9–11	363	297	238	192	146
1926–27	7–8	306	249	205	159	111
1928–29	5–6	246	206	164	127	(4)
1930	4	213	173	142	(4)	(4)
1931	3	190	153	111	(4)	(4)
1932	2	163	138	104	(4)	(4)
1933	1	155	125	(4)	(4)	(4)
1934	½	144	116	(4)	(4)	(4)
		1926				
(1)	27+	(2)	$643	$436	$317	(2)
1900–04	22–26	(3)	640	413	303	$230
1905–09	17–21	$840	534	385	288	221
1910–13	13–16	754	493	339	257	204
1914–17	9–12	519	394	293	230	192
1918–20	6–8	368	300	235	198	159
1921–23	3–5	302	242	199	155	103
1924	2	231	193	158	117	(4)
1925	1	198	164	140	(4)	(4)
1926	½	179	152	121	(4)	(4)

1 PRIOR TO 1900 2 FEWER THAN 100 MEMBERS REPORTED 3 OVER $1,000 4 UNDER $100



the membership averaged 12.5 times the corresponding median monthly salary rates. This means that over the period 1926 to 1941, the median annual incomes were on the average only 4 per cent greater than 12 times the median monthly earnings. At the two lower earnings levels, the margins were less even than that noted for the median level, averaging 2 per cent. By contrast, members located at the upper quartile level of earnings were averaging 10 per cent more income than 12 times the monthly rate which they reported for their regular professional work. At the upper 10 per cent earnings level, however, the corresponding differential was as great as 20 per cent.

When related to years of professional experience, however, these differentials show considerable variation. Thus in 1941 after three years of professional experience, the annual incomes (Table 7) were approximately equal to 12 times the monthly salary rates (Table 10) at all five earnings levels. After 24 years of professional experience, on the other hand, reported annual incomes at the upper decile level in 1941 exceeded 12 times the monthly salary rate reported at the same earnings and experience level by as much as 26 per cent. The corresponding differentials at the upper quartile, the median, and the lower quartile earnings levels were, respectively, 20, 8, and 4 per cent.

Essentially, the preceding comparisons also reflect the spreads in both annual incomes and monthly salary rates of the membership which occurred with advancing years of experience. In the case of monthly salary rates the median earnings in 1941, for example (Chart 3), advanced steadily from $140 a month for members just beginning their professional work to $445 a month for members who had been professionally active for 39 years. At the upper and lower quartile levels of earnings, entrance rates for the membership were, respectively, 16 per cent greater and 16 per cent less than the median entrance rates. After 39 years of experience, the upper quartile monthly salary rate had advanced from $156 a month to $684 a month, and the lower quartile rate had advanced from $125 a month to $317 a month. At this level of experience, while the upper quartile monthly salary exceeded the median salary rate of the group by 54 per cent, the lower quartile rate was 16 per cent less.

This situation was common to all years prior to 1941 for which the membership furnished information on monthly salary rates (Chart 4). In each of these eight years it is evident, too, that the spreads in earnings became more accentuated at the two upper earnings levels after five years of professional experience. From the data in Chart 4 figures have been derived whereby comparisons can be made of monthly salary rates for corresponding years after entering the profession (Table 11). These data are also plotted in Chart 5.

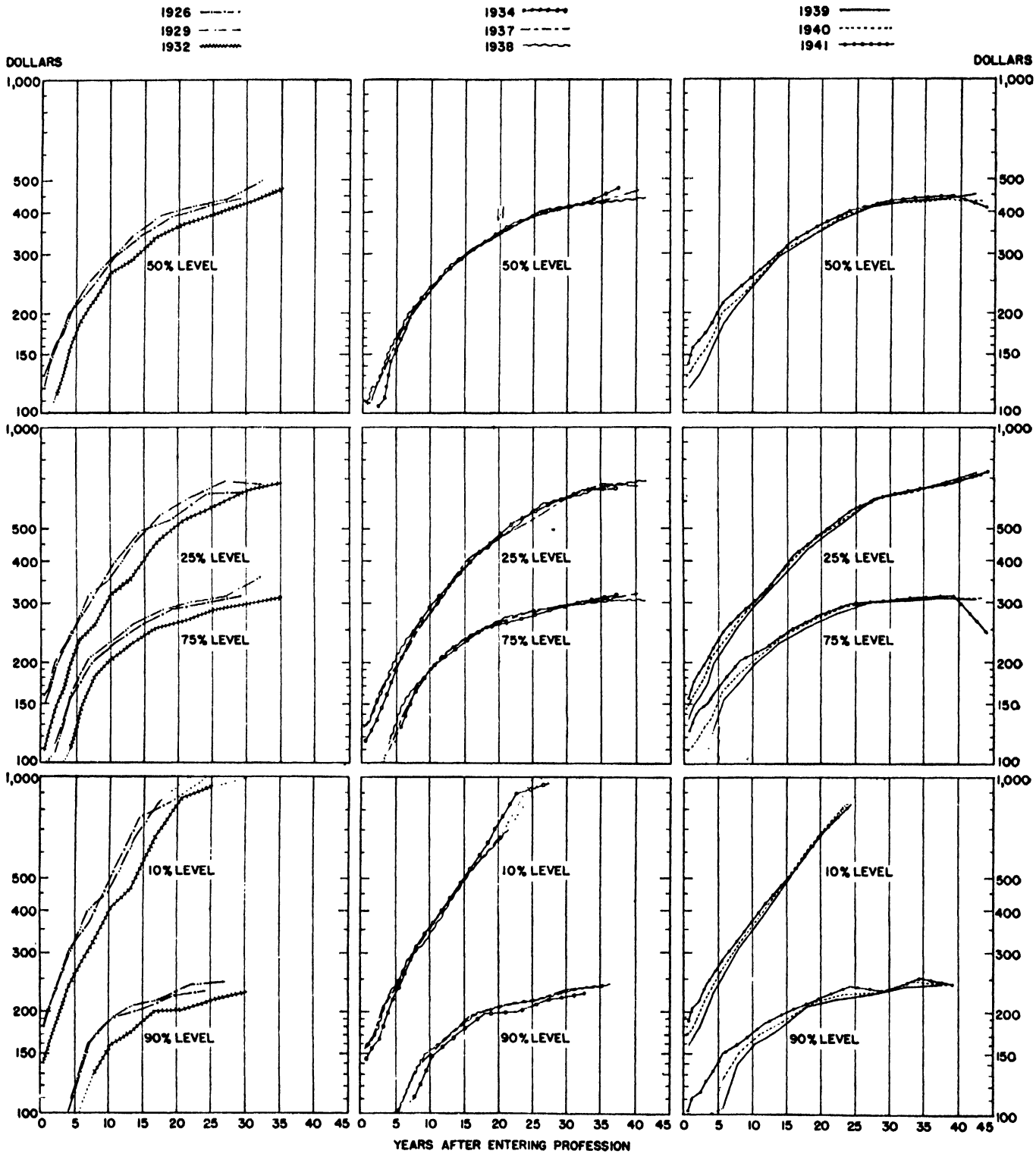
The data in Chart 5 substantiate the earlier statement that members with few years of professional experience in 1941 were moving away from the low levels of earnings of prior years and approaching the high levels of earnings of 1926 and 1929 at a relatively much faster rate than the members who had had longer years of experience. These data show also that at no level of earnings or experience in 1941 had the membership reached the monthly salary rates which obtained in

TABLE 11.—COMPARISON OF 5 LEVELS OF MONTHLY SALARY RATES IN PERIOD 1926 TO 1941 OF ALL MEMBERS REPORTING, FOR CORRESPONDING YEARS AFTER ENTERING PROFESSION

PERCENTAGE OF MEMBERS AT SPECIFIED INCOME LEVEL	YEAR 1941	1940	1939	1938	1937	1934	1932	1929	1926
	FIVE YEARS AFTER ENTERING PROFESSION								
10 PERCENT	$274	$258	$243	$240	$236	$228	$256	$321	$321
25 PERCENT	234	221	210	208	194	188	221	260	260
50 PERCENT	200	187	170	167	165	154	173	209	215
75 PERCENT	167	153	138	135	124	123	129	175	167
90 PERCENT	144	116	103	(1)	(1)	(1)	(1)	118	115
	TEN YEARS AFTER ENTERING PROFESSION								
10 PERCENT	$371	$360	$350	$338	$351	$354	$392	$458	$488
25 PERCENT	300	298	290	278	278	290	312	357	380
50 PERCENT	257	243	238	233	233	236	259	287	278
75 PERCENT	211	201	194	188	188	188	201	230	221
90 PERCENT	174	170	158	154	149	141	154	181	181
	TWENTY YEARS AFTER ENTERING PROFESSION								
10 PERCENT	$670	$675	$660	$645	$652	$720	$825	$930	$860
25 PERCENT	483	478	468	467	467	475	510	585	548
50 PERCENT	365	350	350	342	340	348	358	400	388
75 PERCENT	278	274	268	264	262	258	261	293	288
90 PERCENT	213	217	221	206	208	198	201	230	223
	THIRTY YEARS AFTER ENTERING PROFESSION								
10 PERCENT	(2)	(2)	(2)	(2)	(2)	$980	(2)	(3)	(4)
25 PERCENT	$628	$628	$628	$620	$620	620	$645	$680	(4)
50 PERCENT	427	418	418	410	410	410	420	463	(4)
75 PERCENT	306	306	306	296	296	296	298	340	(4)
90 PERCENT	235	236	233	230	233	222	229	(3)	(4)

1 UNDER $100 2 OVER $1,000 3 FEWER THAN 100 MEMBERS REPORTED 4 DATA NOT AVAILABLE

CHART 4-MONTHLY SALARY RATES IN PERIOD 1926 TO 1941 OF ALL REPORTING MEMBERS ACCORDING TO YEAR OF ENTERING PROFESSION

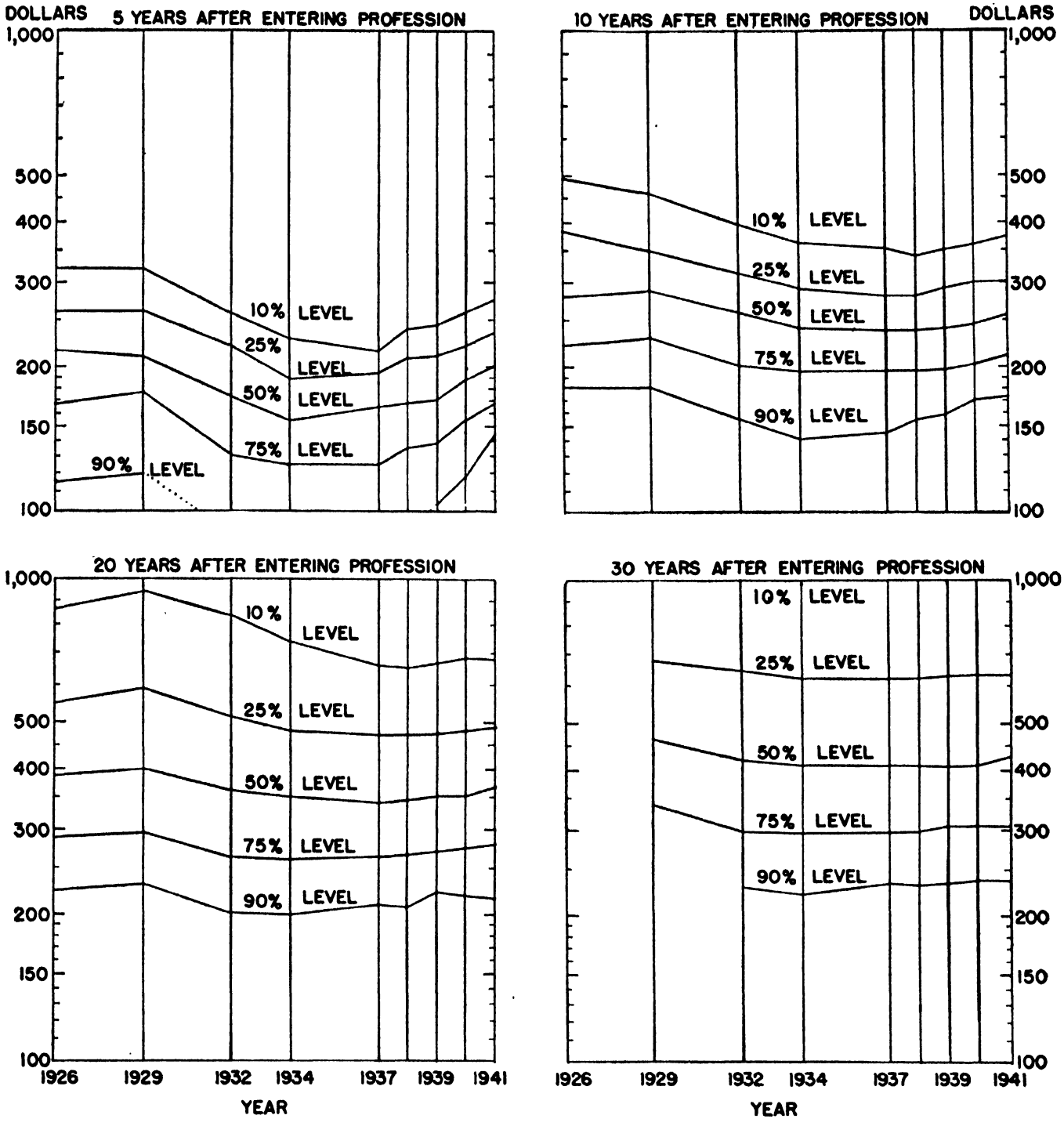


1929, except in the case of the 90 per cent earnings level after five years of professional experience. Despite the lack of data it is reasonable to assume that this movement was even more pronounced for members with experience spans of less than five years.

Another feature of the monthly salary rates shown in Chart 5 is that they clearly indicate how the low point of monthly salary rates of the membership varied with both the experience level and the earnings level. For example, for members with five years of professional experience both the decline and rise in earnings over the period 1926 to 1941 were quite sharp. The low point of median earnings of $154 a month for this experience level was reported in 1934. By 1941 the monthly rate had advanced to $200. These earnings, however, were less by $9.00 and $15 a month than those of members similarly situated in 1926 and 1929, respectively.

For members whose experience spans covered 10 years, the lowest median earnings reported were in 1937; they remained at this level through 1938 and rose to $257 a month in 1941. Again in 1926 and 1929 it will be noted that the earnings of

CHART 5 - MONTHLY SALARY RATES IN PERIOD 1926 TO 1941 OF ALL REPORTING MEMBERS FOR CORRESPONDING YEARS AFTER ENTERING PROFESSION



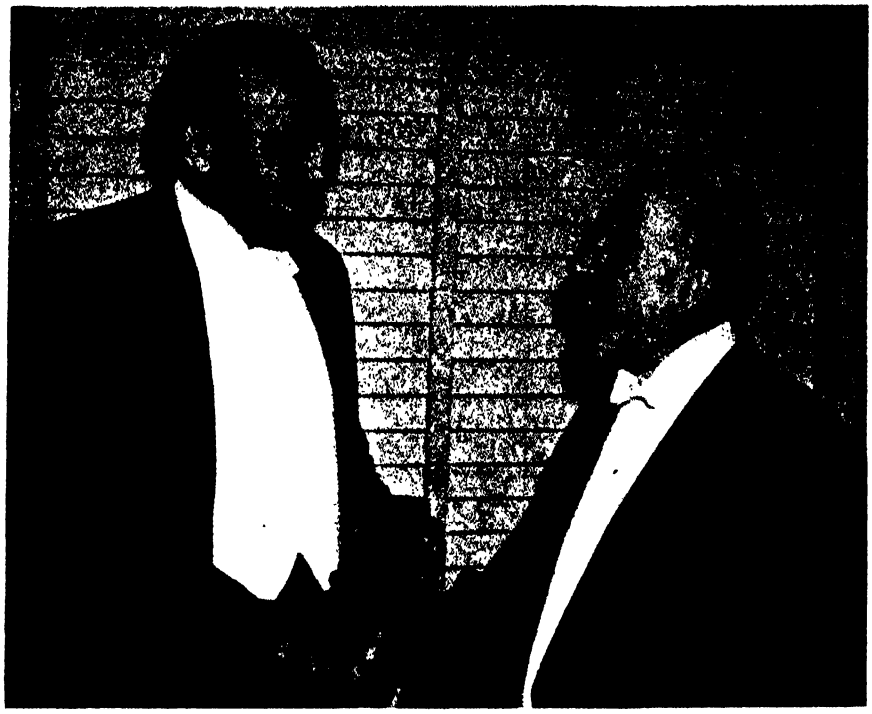
members with 10 years' professional experience exceeded those reported in 1941 by $30 and $21 a month, respectively.

At the 20 years' experience level the lowest point of median earnings was reached also in 1937. But in the case of members with 30 years of professional experience median monthly earnings remained stationary at $410 a month over the period 1934 to 1938. At neither of these experience levels did median monthly earnings exceed those reported by members with similar years of experience in 1926 to 1929.

In general, the preceding patterns of movements noted for median monthly earnings of the membership were paralleled at the two upper and the two lower earnings levels.

(To be continued in December 10 edition)





Chemical Industry Medal Presented to Howe

THE Chemical Industry Medal, one of the highest honors within the gift of chemical science, was presented to Harrison E. Howe, for more than twenty years editor of *Industrial and Engineering Chemistry* at a joint meeting of the New York Sections of the Society of Chemical Industry, the AMERICAN CHEMICAL SOCIETY, and the American Institute of Chemical Engineers held at The Chemists' Club in New York on November 6. Foster D. Snell, chairman of the New York Section of the Society of Chemical Industry, presided at the medal presentation ceremonies, as well as at the dinner which preceded them.

After the presentation, which was made by Lincoln T. Work, research director of the Metal and Thermit Corp. and immediate past chairman of the New York Section, Society of Chemical Industry, Gustavus J. Esselen, consulting chemist of Boston, spoke on the personal side of the medalist and Watson Davis, director of Science Service, told of Dr. Howe's professional achievements. A feature of this part of the program was a motion picture film that showed views of the medalist, most of them taken at scientific meetings, and ended with reproductions of several of the New Year's cards which he had distributed during the past few years.

Dr. Howe discussed chemistry in international affairs, calling particular attention to the contributions of chemists in making America strong for war and prosperous in peace, and withal, a better place in which to live. He spoke of the chemist's part in perfecting new raw materials to replace those which are now scarce or inadequate. He cited the work in vitamin fortification of foods and in food dehydration, and recalled such chemical triumphs of the past as the breaking of the Japanese camphor monopoly through the development of synthetic camphor, the release from dependence on German potash deposits through the opening up of American potash resources, and the discovery of a cheap process for the production of toluene from crude oil.

Data Published on Selective Service

BECAUSE of the wide interest in this subject and the need for obtaining trained men for our Production Army, we give below references to information we have published on occupational deferments, including those of men in training, and the need for technically trained persons. Future developments will be brought to the attention of our readers.

Chemical and Engineering News

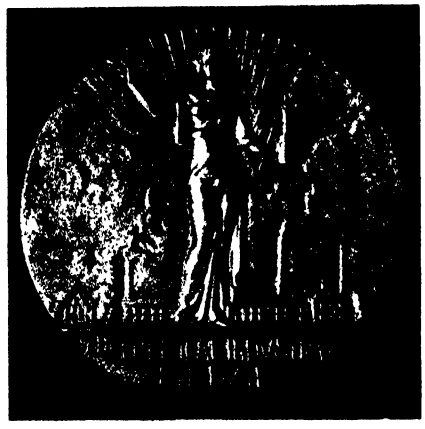
(NEWS EDITION previous to 1942)

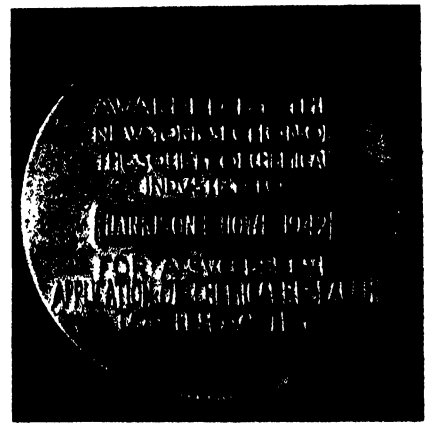
Vol. 18 (1940), pages 890, 1127
Vol. 19 (1941), pages 129, 311, 457, 459, 489, 520, 587, 681, 797, 1164, 1412, 1464
Vol. 20 (1942), pages 110, 157, 472, 579–80, 788, 812, 837–39, 985, 1099, 1100, 1219, 1294, 1370
Current issue, page 1514, 1536

Industrial and Engineering Chemistry

Vol. 33 (1941), pages 1, 135, 283, 561
Vol 34 (1942), pages 2, 131, 259, 648, 1134

Leopold Weil, previously research biochemist for the Biochemical Research Foundation, Franklin Institute, is now associate chemist at the Eastern Regional Research Laboratory, U. S. Department of Agriculture, Philadelphia, Penna.



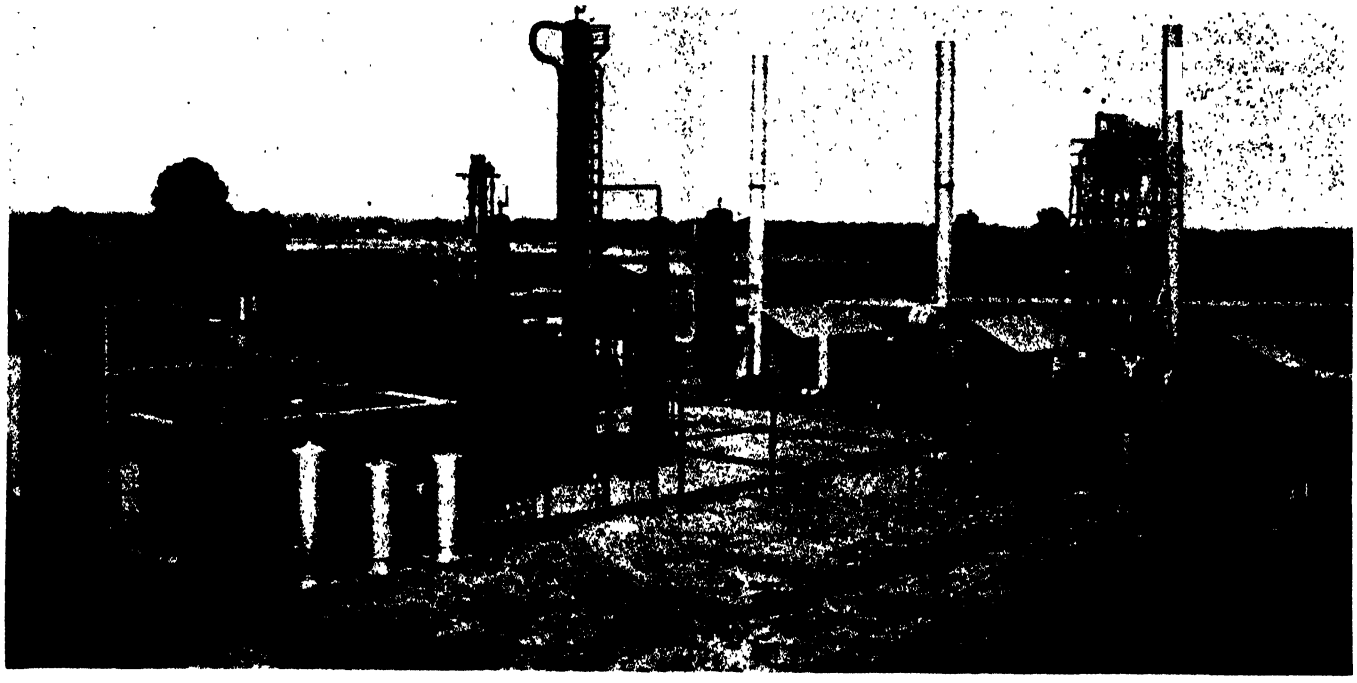


A. C. S. Student Membership Awards for 1942

DONOR	RECIPIENT
GAMMA SIGMA EPSILON FRATERNITY These memberships are awarded annually by the fraternity to the most outstanding student in each chapter.	
Delta Beta Chapter, University of Alabama.	James J. Dwyer
Mu Beta Chapter, University of Georgia.	James A. Johnson, Jr.
SILVERMAN, ALEXANDER Annual award to the student at the University of Pittsburgh who is a candidate for the B.S. degree in chemistry and who received the highest average rating for his first three years.	Ernest S. Elyash

ACTION ON THE AMERICAN CHEMICAL FRONT

[Continued]



Plant of the Velsicol Corp.

Petroleum Resins

C. A. THOMAS, Monsanto Chemical Co., Dayton, Ohio

UNSATURATED hydrocarbons, so abundant in the United States as the result of enormous cracking operations of petroleum, have long been visualized as an inexpensive and readily available raw material for the manufacture of synthetic resins. Research in this country has been active in this field since 1928. Those connected with the development of synthetic resins and resinoids from petroleum soon realized the desirability of having a controlled raw material. The production of uniformly unsaturated hydrocarbons from a heterogeneous cracked distillate presented many difficulties, and the preparation of commercial resins from a petroleum source at an attractive cost was not easy.

Distillates obtained from cracking a low molecular weight hydrocarbon such as propane, butane, and the like at high temperatures and low pressures have a high degree of unsaturation and offer one of the best sources of reactive hydrocarbons. Careful analyses of the hydrocarbons produced under various conditions have been made. It has been found that such distillates are for the most part a mixture of olefins, diolefins, and aromatics, mainly substituted aromatics. The amounts of each constituent depend on the conditions of the cracking operation. When anhydrous aluminum chloride is added to such a distillate under controlled operation, a combination of chemical reactions such as condensation and polymerization takes place, resulting in a resin which is hard, amber-colored, and melts around 100° C. Many types of resins or resinoids can be produced, depending on the proportion of diolefins, olefins, and aromatics maintained in the distillate. These resins are still quite unsaturated and are therefore reactive with various other compounds. They oxidize readily when exposed in a thin film, and this property accelerates the gelation of chinawood and other varnish oils. These resins can



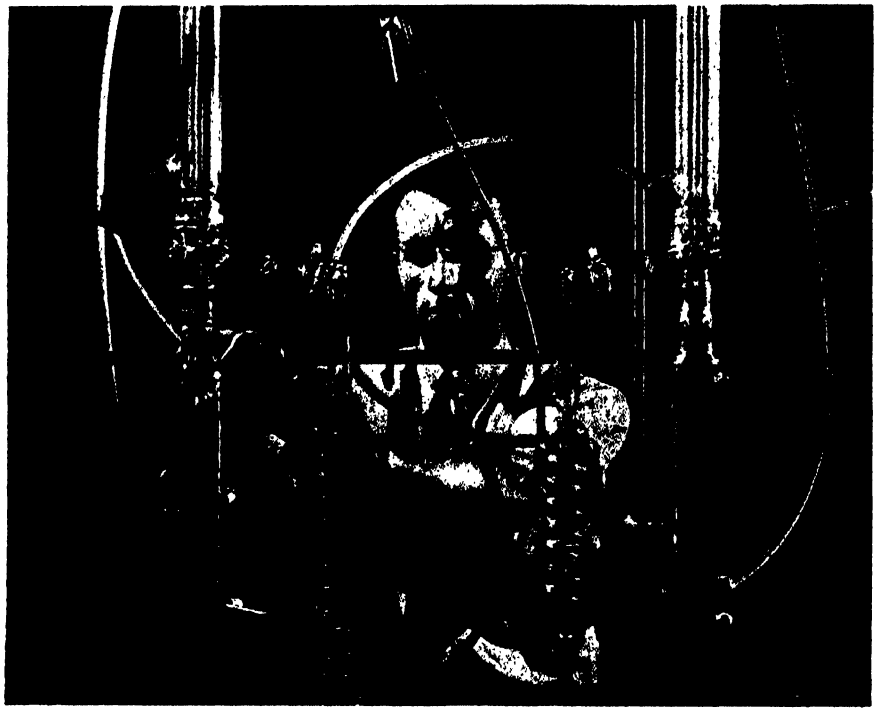
Santoresin 200 is a varnish resin which frequently finds application in many quick-drying varnishes and enamels.

be combined with drying or semi-drying oils for special purposes or used directly in a varnish kettle for producing quick-drying varnishes.

Other catalysts, such as sulfuric acid, activated clays, and boron trifluoride, may be employed. The resulting product varies according to the catalyst used. Several companies produce petroleum resins of these various types and their main outlet is in the paint and varnish industry. They are, however, finding uses in other fields, as constituents of printing ink, plastic tile, linoleum, laminates, and impregnated fibers.

The tendency in the past few years has been to employ pure or special mixtures of hydrocarbons to produce a certain resin. Ethylene itself can be polymerized under high pressure to produce a rubbery product reportedly having excellent electrical properties. Another hydrocarbon, isobutylene, when polymerized at sub-zero temperatures with boron trifluoride as a catalyst produces a substance very similar in appearance to rubber. Such polymers are added to lubricating oils to improve their viscosity index characteristics. When isobutylene is copolymerized with a small quantity of a diolefin, a synthetic rubber is produced which may become more important in the very near future. Styrene itself, which is being manufactured in increasingly large amounts as a constituent for synthetic rubber, is truly a petroleum resin. Both ethylene and benzene, raw materials for styrene, can be produced from petroleum. Styrene is also found in the distillates when low molecular weight hydrocarbons are pyrolyzed.

Resins from petroleum are distinctly an American development. We have a wealth of petroleum and the American chemists and physicists have made good use of this abundance as the starting point for many interesting syntheses—resins from petroleum being one of the many.



The flexibility of Saran tubing, together with its toughness and durability, makes it especially adaptable as a replacement for the rubber tubing formerly used in laboratories.

Saran Pipe and Tubing

DOW CHEMICAL CO.,

Midland, Mich.

TODAY, more than ever before, the eyes of America are looking to plastics for the solution to the stringent metal situation. The chemical industry has accepted the responsibility of producing much-needed products that will replace strategic materials, such as metals and rubber, and release them for the production of essential war goods.

Several plastics are commercially available, each possessing marked characteristics that make it best fitted for specific applications. Outstanding among them is Saran. This product of the Dow Chemical Co. is commercially available as pipe and tubing and in other forms.

Saran pipe is one of the Dow Chemical Co.'s most recent plastic contributions to the victory program. This revolutionary pipe is made of a chemically resistant thermoplastic resin that has proved its practicability in numerous difficult applications to which it has been subjected.

Chemical Resistance of Saran Pipe[a]

(At room temperature)

Reagent	Stability Rating[b]	Reagent	Stability Rating[b]
98% (conc.) H_2SO_4	Good	Carbon tetrachloride	Good
60% H_2SO_4	Excellent	Ethylene dichloride	Poor
10% H_2SO_4	Excellent	Diethyl ether	Poor
35% (conc.) HCl	Excellent	Dioxane	Unsuitable
30% H_2SO_4	Excellent	Benzene	Fair
10% HCl	Excellent	*o*-Dichlorobenzene	Poor
65% (conc.) HNO_3	Excellent	Ethyl gasoline	Excellent
10% HNO_3	Excellent	Turpentine	Excellent
Glacial acetic	Excellent	Triethanolamine	Excellent
10% Acetic	Excellent	Lubricating oil	Excellent
5% H_2SO_3	Excellent	Linseed oil	Excellent
Conc. oleic	Excellent	Bromine water	Unsuitable
50% NaOH	Fair	Chlorine water	Unsuitable
10% NaOH	Good	Bleaching solution	Excellent
28% NH_3	Unsuitable	10% Duponol	Excellent
10% NH_3	Poor	10% Zinc hydrosulfite	Excellent
Ethyl alcohol	Excellent	15% $CaCl_2$	Excellent
Ethyl acetate	Fair	15% $FeSO_4$	Good
Acetone	Fair	Water	Excellent
Methyl isobutyl ketone	Fair	Air	Excellent

[a] Three months of continuous exposure.

[b] The stability rating given is based upon observed changes in color, weight, dimension, tensile strength, and hardness of the samples tested.

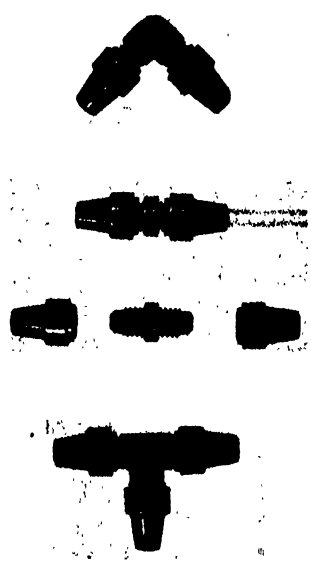


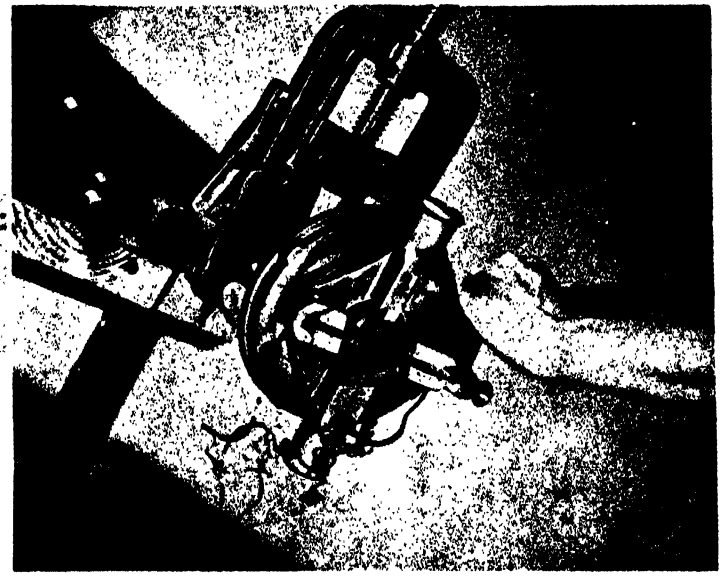
Welding operations with Saran pipe are simple, rapid, and can be accomplished in less than 1 minute. Two lengths of pipe are placed on a hot plate (temperature 350° to 400° F.) and held long enough to form a small inventory of molten material. The bead or molten material inventory is visible at the outside surfaces of the two pieces. Then the two ends are pressed together and allowed to cool for a few seconds. Within 24 hours the welded joint has strength equal to any other portion of the pipe.

Direct heating methods are ideal for welding in the field. Saran pipe lends itself, under adverse conditions, to this method. It can be easily welded with use of a gas flame or torch-heated unit, against which two pieces of pipe are placed. The general rules of hot-plate welding should be observed, and care must be taken not to overheat the material as this will substantially weaken the joint.

In the same field, Dow offers American industry another equally useful plastic innovation—Saran tubing. Here is a tubing that replaces metal piping in homes, industrial plants, and machines that require the piping of gas, air, water, and a wide variety of corrosive liquids.







Above. **In a simplified method for welding Saran pipe in the field gas flame heat is applied to a hot disk. Special care is taken here not to overheat the material.** ***Left.*** **The pipe and tubing application shows both tee and elbow weld. Standard welded fittings may now be easily fabricated with this new Saran pipe.** ***Left below.*** **Injection-molded fittings, made from the same plastic material used in the extrusion of tubing are likewise adaptable to threaded precision parts.** ***Right below.*** **The operation of threading Saran pipe on standard pipe threading equipment is clearly shown. It is easy to handle, but it is suggested that sharp pipe dies be used.**

It was designed principally to play an outstanding role wherever service requirements would be too severe for other materials. Because of its unusual properties, it offers almost unlimited possibilities to chemical processing plants, oil, gas, and water companies, and innumerable general industries.

Saran pipe and tubing are tough, durable, flexible, and nonscaling. Other unique properties are its amazing resistance to the abrasive and corrosive action of soaps, oils, chemicals, and moisture. It resists freezing and is heat-resistant to 170° F. Listed are the results of wide range chemical resistance tests conducted over a three-month exposure period:

Production of Saran pipe by a modified extrusion process assures a smooth, round material with dimensions identical to those of extra strong iron pipe. At present, sizes are $^1/_2$, $^3/_4$, 1 inch, and $1^1/_4$, $1^1/_2$, and 2 inches. Larger sizes are promised in the near future.

Sharp standard pipe dies can be used to thread Saran pipe, an operation which exactly parallels cutting of standard pipe threads on metallic pipe and makes it practical to install Saran pipe with either metallic or Saran fittings.

Standard flanges of Saran are available in sizes from $^1/_2$ inch through 2 inches. These are standard iron pipe companion flanges that conform to present size specifications. Other fittings such as couplings, reducers, nipples, ells, bushings, and plugs, will be available as rapidly as molds can be constructed.

An important factor in shipping, general handling, and suspension is Saran's weight—less than one quarter that of iron.

Some astounding facts about this tough but flexible tubing are that it withstands freezing and continuous heat up to 170° F.,

accommodates high and low pressures, is noncorrosive and nonscaling. Saran tubing, already in use in many commercial installations, is fabricated in a wide range of sizes and wall thicknesses. It can be secured from 1/8 inch to as large as 3/4 inch in diameter with the promise of even larger sizes soon.

Saran is well adapted to the molding of threaded precision parts, and fittings are injection-molded of the same plastic material used so successfully in extruded tubing. It is important that they be tough, durable, and accurate so that they will stand up under extremely difficult applications formerly requiring metal. Saran tubing may be installed with most flare or compression type metal fittings or with special fittings molded of Saran.

The properties of Saran speak for themselves. Saran pipe and tubing give excellent service with a nominal maintenance cost. By using plastic materials, a great saving can often be accomplished by dispensing with so-called necessary production repairs and attendant losses in man-hours and money.

Saran pipe, tubing, and fittings give industry new tools to keep America producing for the war program.

Phenol

DOW CHEMICAL CO., Midland, Mich.

SYNTHETIC PHENOL was first produced in 1924 by the reaction of chlorobenzene and caustic soda at a temperature of 350° to 400° C. and a pressure of 5,000 pounds per square inch. The reaction takes place in a tubular reactor through which the mixture is continually pumped. This reactor was featured in the original Aylsworth patent under which Dow has a license. The Aylsworth process for producing phenol did not succeed because of the accumulation of diphenyl oxide which at that time was a useless chemical by-product. The Dow process, however, is unique in that the diphenyl oxide is returned to the reaction mixture forming an equilibrium mixture. In other words, when diphenyl oxide is returned to the chlorobenzene-caustic soda mixture, no more diphenyl oxide is produced than the original 15 per cent of reaction by-product.

Dow now, of course, finds use for most of its diphenyl oxide in its Dowtherm, the low-pressure, high-temperature, heat-transfer medium, but any that is left over is returned to the phenol process.

There are also two more by-products of the reaction of chlorobenzene with caustic soda. These are *o*-phenyl phenol (sold as Dowicide I, a mildew mold-proofing agent), and *p*-phenyl phenol, which is used in varnish.

Five years ago a new discovery was made at Dow which again revolutionized the process of phenol manufacture by eliminating the external heat formerly necessary to the reaction.

By introducing heat exchange coils whereby the ingoing liquid is heated by the outgoing liquor, it was found that the heat of reaction was sufficient to raise the mixture to the required temperature of 350° to 400° C. without need for any outside heat.



Welding operations with Saran pipe are both simple and rapid and can be accomplished in less than a minute. Shown here is the first step in hot plate welding. Two pieces of Saran pipe are held on a plate that is heated to 350° to 400° F. until a molten material inventory appears.

Soybean Plastics

GEORGE H. BROTHER[1]

U. S. Regional Soybean Industrial Products Laboratory[2], Bureau of Agricultural Chemistry and Engineering, Agricultural Research Administration
U. S. Department of Agriculture

New candidates in the field of commercial plastics during the past five years have had to meet stiff competition with those already established. The phenolics, for example, are low-cost plastics, strong, water-resistant, and of good electrical properties. The ureas have infinite color possibilities, durability, and ease of fabrication. The cellulose plastics are even better than the ureas in range of color, and of these cellulose acetate is adaptable to injection molding. The methacrylate and polystyrene plastics have optical clarity, insulating properties, and ease of fabrication. All have set high standards, and the newcomer must show real merit in order to find a place among them.

In such a field, in spite of high requirements and standards, soybean plastics have established themselves. In combination with phenolic resins, as will be shown, they produce plastics with a wider color range than the regular phenolic molding plastics. During the present emergency, soybean meal may play an important part as an extender for high-priority phenolic resin.

Soybean plastics belong to the industrial protein group, the principal member of which is casein derived from milk. Protein plastics are characterized by good color possibilities, good strength, and low cost, but also by poor water resistance and by lack of permanence if subjected to moisture. This weakness has restricted casein, the established protein plastic, to the manufacture of buttons and other small decorative objects.

The first serious attempt to develop plastics from soybeans was made by Satow, in Japan, around 1920. His product, prepared by "glutenizing" the soybean protein with aqueous caustic solutions, is so unstable that it fractures spontaneously on drying. The next important development was the much publicized soybean plastic of a prominent American automobile manufacturer. This was a regular phenolic molding compound in which 50 per cent or less of the usual wood flour filler was replaced with soybean meal. The advantages of this product over the regular phenolic molding compound were slightly better plastic flow characteristics and chemurgic implications; the disadvantage was reduced water resistance. Distributor parts, accelerator pedals, and knobs were molded from this plastic on production scale, but not steering wheels, as is popularly believed.

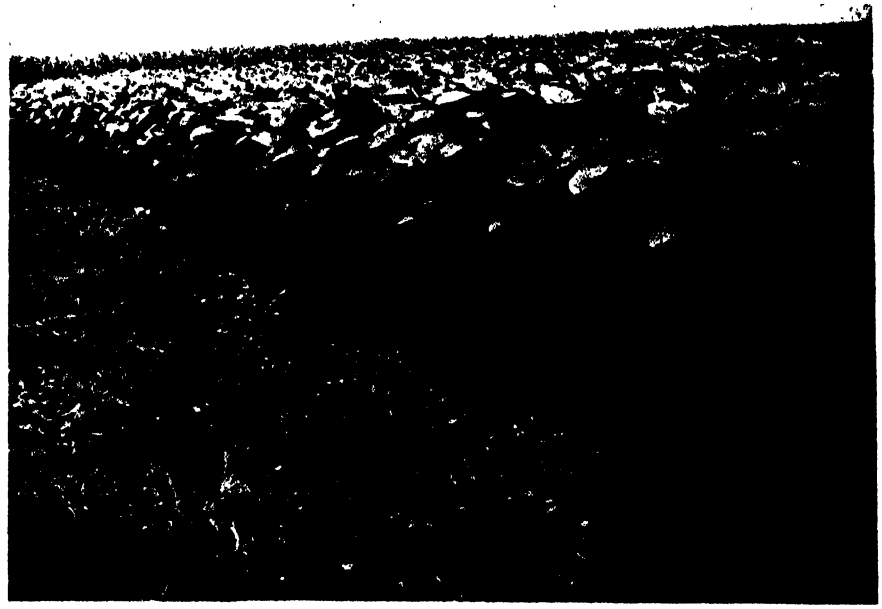
The publicity given to this development proved of considerable value in attracting public attention to the possibilities of soybeans in plastics. In consequence, upon the establishment of the Regional Soybean Industrial Products Laboratory by the United States Department of Agriculture at Urbana, Ill., plastics research was made one of the major projects for investigation.

This investigation opened up two possible lines of application: refinements on the development mentioned above and an entirely new application. In the first place it was found possible to prepare formaldehyde-hardened or tanned soybean protein which is completely thermoplastic. This development is of considerable fundamental importance because previously all protein materials had to be formed to shape in the unhardened condition and then treated with formaldehyde to render them as water resistant and permanent as possible. That process was time-consuming and expensive, and of course made the preparation of a protein molding material impossible. The soybean protein-formaldehyde thermoplastic material is a molding plastic which comes finished from the die.

This material alone does not completely meet the industrial plastics needs, because it is not suitable for injection molding. However, it was found to be perfectly compatible with phenolic resin, with which it formed a new type of plastic material. This material, in comparison with the regular phenolic wood-flour molding plastic, has greater color possibilities (since protein is a good dye base), greater plastic flow, about the same strength, and similar thermosetting characteristics (thus fitting it into the same molding cycle), but with somewhat less water resistance.

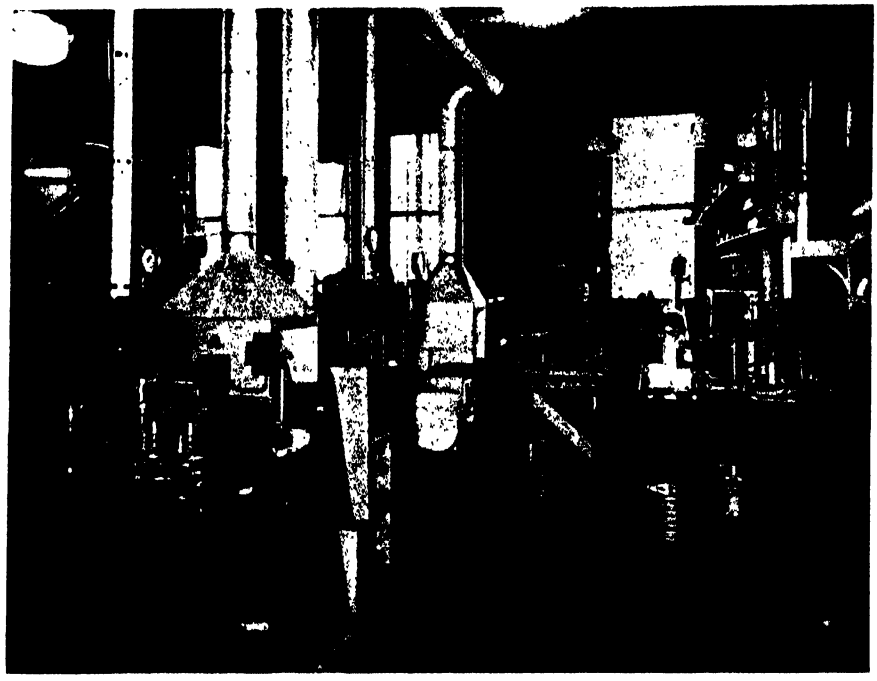
More recent developments have shown that it is possible to treat the solvent-extracted soybean meal so that it can be mixed unhardened with the phenol and formaldehyde before the condensation reaction starts. The resulting product shows advantages in properties of plastic flow and water resistance over the earlier mixtures. This treatment consists in leaching out the solubles with water at the pH of the protein (4.0 to 4.6), and then heating the residue to denature the protein and dry it to 3 per cent moisture content or less.

Some mixtures of the foregoing type have been put on the market by several companies, in colors ranging from red to blue. White and light pastel shades are not possible. The shades produced are not so bright as those of urea or cellulose plastics, but they are much better than



Soybeans in range 400 at Agronomy Farm, Illinois Agricultural Experiment Station. In foreground appears a wild soybean selection; in background is a Peking variety.

[1] Present address, Western Regional Research Laboratory, Albany, Calif.
[2] Now combined with the Northern Regional Research Laboratory, Peoria, Ill.



Shown here is the equipment used in making plastics. Beginning at left (clockwise around room): compounding rolls, hydraulic press, mixes, and plastics flow tester.

anything previously produced with phenolics. In the present emergency, with phenolformaldehyde resin among our seriously restricted materials, this soybean meal extender may prove of real assistance.

The other line of plastic development followed at the Soybean Laboratory was the preparation of laminated plastic material from soybean protein. It was found possible to prepare a water solution of soybean protein in formaldehyde, which upon drying is a thermoplastic formaldehyde-hardened protein. Fibrous material, such as sheets of unsized kraft paper, impregnated with this solution and dried, may be stacked between the heated platens of a press and united into a laminated board with sufficient heat and pressure. The board has about the same flexural and impact strengths as phenolic laminated material, but of course less water resistance. However, if single sheets of phenolic impregnated paper are placed on the top and bottom of the stack of soybean-protein-impregnated sheets when they are introduced into the press, the resulting laminated board will have exposed phenolic faces and consequently the water resistance of phenolic plastic, except on the edges. This is not serious, because it is necessary to protect the edges of phenolic laminated board for maximum water resistance.

So far as is known, there has been no application of this soybean laminated material. This might be a good time to extend considerably our limited supply of phenolic resins. The substitution of the formaldehyde-soybean protein for the phenolic resin not only would reduce very considerably the quantity of the latter necessary for laminated material, but the time of the pressing cycle could be shortened by about 20 to 30 minutes for the all-phenolic laminated to about 5 minutes for the soybean protein-phenolic material, thus also speeding production. Little or no change in present equipment would be necessary.

Other emergency applications are possible for soybean protein, such as replacement of casein in part of the button production, as an extender for phenolic resins in plywood adhesives, and the like; but in these uses soybean protein remains inherently a protein, with all its recognized virtues and shortcomings. In the field of industrial protein technology the outstanding need is for better knowledge and application of those fundamental protein characteristics—structural and otherwise—that are primarily responsible for such properties as water absorption, plasticity, etc. With such information available, it is hoped that protein structures and properties may be amenable to modifications that will correct weaknesses and make available an abundance of new material with interesting plastic possibilities. This material might no longer be considered strictly as soybean protein, but it would be derived from soybean meal by economical and practical processes. The hope of large-scale commercial nonfood application of soybean meal lies in the success of this type of investigation.

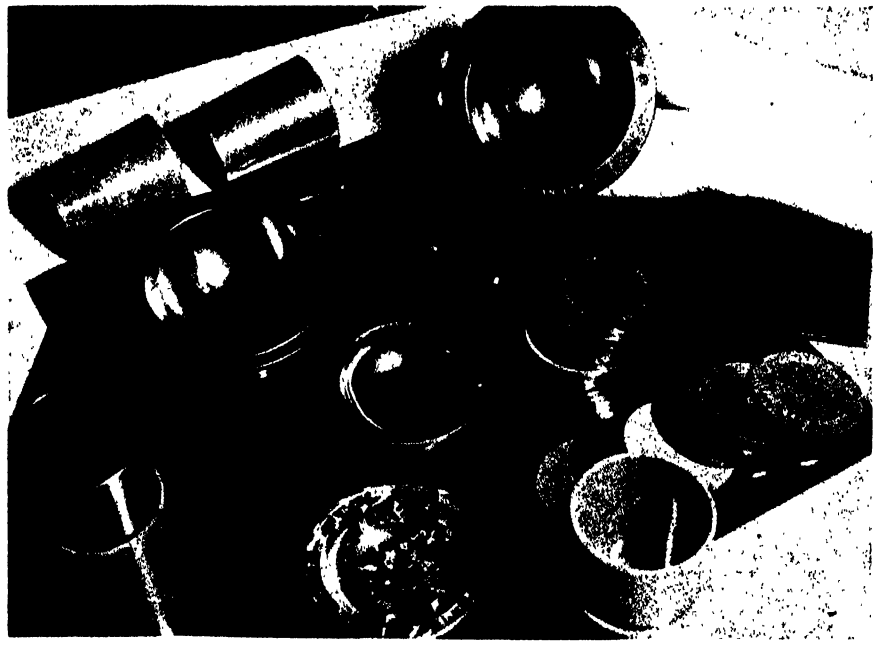
Army-Navy Production Awards

THE Texas Gulf Sulphur Co. received the Army-Navy E flag for outstanding accomplishments in the production of war materials in a ceremony November 2 at Newgulf, Tex. Brigadier General Ray O. Avery, Commanding Officer, Edgewood Arsenal, and Commandant, Chemical Warfare School, and Rear Admiral P. W. Foote, United States Navy, delivered addresses.

The Clarostat Mfg. Co., Brooklyn, N. Y., received the Army-Navy E on November 13. The company is on a 100 per cent war basis, with many of its products standard equipment in our fighting planes.

The Indium Corp. of America, Utica, N. Y., received the Army-Navy production award on November 12, for excellence in war production.

The Armstrong Cork Co., Lancaster, Penna., is scheduled to receive the award on November 30.



Representative plastic pieces which were molded from soybean phenolic molding powder.

American Chemical Society

Progress Report No. 7 of the Committee on the Professional Training of Chemists

The most recent meeting of the committee, September 4 and 5, 1942, was immediately previous to the Buffalo meeting of the American Chemical Society.

There follows a list of institutions the committee deems to be qualified to offer professional training for chemists:

Agricultural and Mechanical College of Texas, College Station, Tex.
Allegheny College, Meadville, Penna.
Amherst College, Amherst, Mass.
Armour College of Engineering of Illinois Institute of Technology, Chicago, Ill.
Boston College, Chestnut Hill, Mass.
Bowdoin College, Brunswick, Maine.
Brigham Young University, Provo, Utah.
Brown University, Providence, R. I.
Bryn Mawr College, Bryn Mawr, Penna.
Bucknell University, Lewisburg, Penna.
California Institute of Technology, Pasadena, Calif.
Carnegie Institute of Technology, Pittsburgh, Penna.
Case School of Applied Science, Cleveland, Ohio.
Catholic University of America, Washington, D. C.
City College, College of the City of New York, New York, N. Y.
Columbia University, New York, N. Y.
Cornell University, Ithaca, N. Y.
Dartmouth College, Hanover, N. H.
DePauw University, Greencastle, Ind.
Drexel Institute of Technology, Philadelphia, Penna.
Duke University, Durham, N. C.
Emory University, Emory University, Ga.
Fordham University, New York, N. Y.
Harvard University, Cambridge, Mass.
Haverford College, Haverford, Penna.
Howard University, Washington, D. C.
Indiana University, Bloomington, Ind.
Iowa State College, Ames, Iowa.
Johns Hopkins University, Baltimore, Md.
Juniata College, Huntingdon, Penna.
Kansas State College, Manhattan, Kans.
Lafayette College, Easton, Penna.
Lawrence College, Appleton, Wis.
Lehigh University, Bethlehem, Penna.
Louisiana State University, University, La.
Massachusetts Institute of Technology, Cambridge, Mass.
Massachusetts State College, Amherst, Mass.
Miami University, Oxford, Ohio.
Michigan College of Mining and Technology, Houghton, Mich.
Middlebury College, Middlebury, Vt.
Mississippi State College, State College, Miss.
Missouri School of Mines, Rolla, Mo.
Montana State College, Boseman, Mont.
Mount Holyoke College, South Hadley, Mass.
New York University (University Heights and Washington Square College), New York, N. Y.
Newcomb Memorial College, H. Sophie, New Orleans, La.
Northeastern University, Boston, Mass.
Northwestern University, Evanston, Ill.
Oberlin College, Oberlin, Ohio.
Ohio State University, Columbus, Ohio.
Oklahoma Agricultural and Mechanical College, Stillwater, Okla.
Oregon State College, Corvallis, Ore.
Pennsylvania State College, State College, Penna.
Philadelphia College of Pharmacy and Science, Philadelphia, Penna.
Polytechnic Institute of Brooklyn, Brooklyn, N. Y.
Pomona College, Claremont, Calif.
Princeton University, Princeton, N. J.
Purdue University, Lafayette, Ind.
Reed College, Portland, Ore.
Rensselaer Polytechnic Institute, Troy, N. Y.
Rice Institute, Houston, Tex.
St. Louis University, St. Louis, Mo.
Stanford University, Stanford University, Calif.
State College of Washington, Pullman, Wash.
State University of Iowa, Iowa City, Iowa.
Swarthmore College, Swarthmore, Penna.
Syracuse University, Syracuse, N. Y.
Trinity College, Hartford, Conn.
Tufts College, Medford, Mass.
Tulane University, New Orleans, La.
Union College, Schenectady, N. Y.
University of Akron, Akron, Ohio.
University of Arizona, Tucson, Ariz.
University of Arkansas, Fayetteville, Ark.
University of Buffalo, Buffalo, N. Y.
University of California, Berkeley, Calif.
University of California, Los Angeles, Calif.
University of Chicago, Chicago, Ill.
University of Cincinnati, Cincinnati, Ohio.
University of Colorado, Boulder, Colo.
University of Delaware, Newark, Del.
University of Denver, Denver, Colo.
University of Detroit, Detroit, Mich.
University of Florida, Gainesville, Fla.
University of Idaho, Moscow, Idaho.
University of Illinois, Urbana, Ill.
University of Kansas, Lawrence, Kans.
University of Maine, Orono, Maine.
University of Maryland, College Park, Md.
University of Michigan, Ann Arbor, Mich.
University of Minnesota, Minneapolis, Minn.
University of Missouri, Columbia, Mo.
University of Nebraska, Lincoln, Nebr.
University of Nevada, Reno, Nev.
University of New Hampshire, Durham, N. H.
University of North Carolina, Chapel Hill, N. C.
University of Notre Dame, Notre Dame, Ind.
University of Pennsylvania, Philadelphia, Penna.
University of Pittsburgh, Pittsburgh, Penna.
University of Rochester, Rochester, N. Y.
University of the South, Sewanee, Tenn.
University of South Dakota, Vermillion, S. Dak.
University of Southern California, Los Angeles, Calif.
University of Tennessee, Knoxville, Tenn.
University of Texas, Austin, Tex.
University of Utah, Salt Lake City, Utah.
University of Vermont, Burlington, Vt.
University of Virginia, Charlottesville, Va.
University of Washington, Seattle, Wash.
University of Wichita, Wichita, Kans.
University of Wisconsin, Madison, Wis.
Vanderbilt University, Nashville, Tenn.
Vassar College, Poughkeepsie, N. Y.
Villanova College, Villanova, Penna.
Virginia Polytechnic Institute, Blacksburg, Va.
Wabash College, Crawfordsville, Ind.
Washington University, St. Louis, Mo.
Washington and Lee University, Lexington, Va.
Wayne University, Detroit, Mich.
Wesleyan University, Middletown, Conn.
West Virginia University, Morgantown, W. Va.
Western Reserve University, Cleveland, Ohio.
Williams College, Williamstown, Mass.
Worcester Polytechnic Institute, Worcester, Mass.
Yale University, New Haven, Conn.

The Council Policy Committee recommended the following motion to the Council at the Detroit meeting, September 1940, and it was unanimously passed:

Moved, that the American Chemical Society accredit for chemical engineering instruction those institutions as and when accredited by the American Institute of Chemical Engineers.

In accordance with this action, the list of institutions whose chemical engineering curricula are approved by the American Institute of Chemical Engineers as of October 18, 1942, follows:

Bucknell University, Lewisburg, Penna.
California Institute of Technology (five-year course), Pasadena, Calif.
Carnegie Institute of Technology, Pittsburgh, Penna.
Case School of Applied Science, Cleveland, Ohio.
Clarkson College of Technology, Potsdam, N. Y.
Columbia University, New York, N. Y.
Cornell University, Ithaca, N. Y.
Drexel Institute, Philadelphia, Penna.
Georgia School of Technology (including cooperative curriculum), Atlanta, Ga.
Illinois Institute of Technology (Armour College of Engineering), Chicago, Ill.
Iowa State College, Ames, Iowa.
Johns Hopkins University, Baltimore, Md.
Lehigh University, Bethlehem, Penna.
Louisiana State University, University, La.
Massachusetts Institute of Technology, Cambridge, Mass.
New York University (day and seven-year evening), New York, N. Y.
Northeastern University, Boston, Mass.
Ohio State University, Columbus, Ohio.
Oregon State College, Corvallis, Ore.
Pennsylvania State College, State College, Penna.
Polytechnic Institute of Brooklyn (day and eight-year evening), Brooklyn, N. Y.
Princeton University, Princeton, N. J.
Purdue University, Lafayette, Ind.
Rensselaer Polytechnic Institute, Troy, N. Y.
Rice Institute, Houston, Tex.
State University of Iowa, Iowa City, Iowa.
Syracuse University, Syracuse, N. Y.
The Cooper Union School of Engineering (day course and evening course), New York, N. Y.
University of Cincinnati, Cincinnati, Ohio.
University of Delaware, Newark, Del.
University of Detroit, Detroit, Mich.
University of Florida, Gainesville, Fla.
University of Illinois, Urbana, Ill.

University of Louisville, Louisville, Ky.
University of Maryland, College Park, Md.
University of Michigan, Ann Arbor, Mich.
University of Minnesota, Minneapolis, Minn.
University of Missouri, Columbia, Mo.
University of Oklahoma, Norman, Okla.
University of Pennsylvania, Philadelphia, Penna.
University of Pittsburgh, Pittsburgh, Penna.
University of Rochester, Rochester, N. Y.
University of Tennessee, Knoxville, Tenn.
University of Washington, Seattle, Wash.
University of Wisconsin, Madison, Wis.
Virginia Polytechnic Institute, Blacksburg, Va.
Worcester Polytechnic Institute, Worcester, Mass.
Yale University, New Haven, Conn.

S. C. LIND
H. B. WEISER
W. G. YOUNG
W. A. NOYES, JR., *Chairman*
E. M. BILLINGS, *Secretary*

June 19, 1942.

Do We Need 10,000,000 Fighters Now?[1]

"THE Army," an observant soldier friend of ours proudly said the other day, "is always totalitarian. It always wants to take everything in sight, simply to be on the safe side."

It begins to look as if the Army has been getting too much—not of everything, but of our available manpower—for us to stay on the safe side as regards winning the war with reasonable speed and efficiency.

There is no argument about the proposition that we ought to arm and train as many men as will be necessary to lick what somebody called our two and one-half enemies—Germany, Japan, and Italy—and that we should not waste time about it.

But how fast do we have to build up the Army of 10,000,000 to 13,000,000 men of which General Lewis B. Hershey of Selective Service talks so copiously? Even more to the point: How fast can we build up this Army and keep our war plants producing the necessary war materials and our farms producing the necessary food for the Army and the rest of us?

We now have an Army of 4,000,000-plus, and a Navy and Air Forces which are growing fast in both personnel and matériel. The draft is hauling men into the Army at a terrific clip, with little regard for the war plants' imperative needs of skilled supervisors and trained workers, or for the farmers' needs of farm labor.

As one result, food rationing is coming on us apace; has already begun with various meats.

As another, more and more war-plant managements are complaining that they cannot keep skilled workers and supervisors because of the draft boards' indiscriminate and, in some cases, arrogant demands.

"Recently, for instance," says President Harvey N. Davis of the Stevens Institute of Technology, "a small company working overtime on parts and accessories for fighting airplanes lost its assistant production manager to the draft. When last heard from, he was a private building barracks at a cantonment.

Plainly, the only winners in this transaction were Hirohito, Hitler, and Mussolini.

In our anxiety to build up a huge fighting force almost overnight, we seem to be losing sight of the fact that this force must be backed by millions of producers of fighting gear of all kinds, and by millions of farmers capable of feeding the fighters and the civilian population, plus the beneficiaries of our Lend-Lease food shipments to other lands.

Lopsided development of this three-ply war machine is bound to have dangerous effects. Keep it up long enough and let it go far enough, and those effects can be fatal to our hopes of winning the war. Britain found that out earlier in the war. Britain drafted more men than the home front, with the best will in the world, could equip or feed. Presently, Britain found itself forced to return a lot of soldiers to industry and the farms.

At this writing, we are on the way toward finding ourselves some day with a gigantic Army that (1) has no place to go (2) has not enough ships to go in, (3) is short on vital war supplies and equipment, and (4) is getting hungry while civilians get hungrier.

Chairman Paul V. McNutt of the Manpower Allocation Board had better be given more power; the draft boards' indiscriminate zeal had better be curbed somehow; and both of these things had better be done in a hurry. As things look to us, there is no time to lose in putting into practice the principle recently laid down by Secretary of War Stimson himself:

The Army is greatly in need of men of specialized training, particularly in physics, chemistry, engineering, and medicine. We are equally interested in having adequate numbers of men of such training available to war-production industries and civilian-research agencies of the Government.

In short, the home front needs help, and the home front can't wait much longer for that help.

[1] Reprinted from *Collier's*, the National Weekly, 110, No. 18 (Oct. 31, 1942).

Who Makes It?

THE following chemicals are wanted by The National Registry of Rare Chemicals, Armour Research Foundation, 35 West 33rd St., Chicago, Ill.: sodium hyposulfate, esculin, glyoxylic acid, *N*-vinylphthalimide, adonitol, phosphoglyceric aldehyde, glycolic aldehyde, hydroxypyruvic acid, glycerophosphate, and quinic acid.



Mechanical Smoker Gets the Once-Over

Harry N. Holmes (*right*), President of the ACS, who recently addressed the Virginia Section of the SOCIETY at the University of Richmond, goes over the mechanical smoker of the American Tobacco Co.'s research laboratories with W. C. Jones, chief chemist, Virginia Department of Agriculture and president-elect, Virginia Academy of Science.



The Chemical Bakers—Ross Allen and Philip Schaffner

This sketch in the series of father-son articles on well-known chemists might equally well be called a "son-grandson" contribution, for the father in the pair is himself the son of a distinguished teacher of chemistry. **Ross Allen Baker** was born in Greencastle, Ind., November 1886, to Luemma Allen and Philip Schaffner Baker, who for 25 years was professor of chemistry at DePauw University. Originally minded to become a famous violinist, he apparently realized by his junior year the bald fact that the flowing locks necessary for such a career were not to be his much longer, so he took his A.B. in chemistry from DePauw in 1906 and the M.A. a year later, became head of the chemistry department at Baker University, and in 1910 went on to the University of Wisconsin, receiving his doctorate in 1914. With these degrees went membership in Phi Beta Kappa, Sigma Xi, and Alpha Chi Sigma, as well as about all the scholastic honors open to a student in his field. World War I found him an assistant professor at the University of Minnesota, but left him a Major in the Chemical Warfare Service. When, in October 1918 the writer of this article, as a mere "shavetail" in the CWS, had the privilege of demonstrating a new-type gas mask to Major Baker, dynamic commandant of the U. S. Gas School at Camp Kendrick, N. J., neither lieutenant nor major had any idea that a few more months would see them beginning a 10-year association in the teaching of freshman chemists at Syracuse University. In 1930 Dr. Baker went to the City College of New York, where he is now professor of chemistry in charge of the Divisional Department in the School of Business and Civic Administration.

An attempt to set down even a part of the bewildering number of Dr. Baker's interests, activities, and accomplishments within the limitations of a few hundred words should fall in the same class with trying to engrave the Declaration of Independence on the head of a pin. Fortunately, he is so well known to all A. C. S. members that we need make only passing mention of his constant and continuing services to the Society in all capacities from chairman of a Local Section through Division Chairman (Chemical Education) to national Councilor and Chairman of the Board of Publications of the Division of Chemical Education. For the rest, an imposing list of memberships in learned and professional societies, civic organizations, and the like must be merely suggested by quoting two of his guiding principles: "Never too busy", and "Try anything once". The willing horse has been handed a load of chairmanships, managerial duties, presidencies, and trusteeships that only one of spring-steel constitution further toughened by varsity athletics and a lifelong interest in all outdoor sports could expect to carry. Possibly he found the antidote to so much administrative and desk work in helping to train three Eagle Scouts out of a family of five husky sons (only 20 per cent of whom, he reports with admirable scientific accuracy, seem destined to follow him in his profession. At this writing three of the five are in the service). In his teaching, the "try-anything-once" principle has been applied with two of his numerous hobbies—devising ingenious new apparatus and glass blowing—to make his clear-cut lectures still clearer with simple but striking demonstrations; but most appreciated by the students is his willingness to answer their questions by dropping other business and making the test to settle the matter there and then. Next in order of appreciation would probably come his abundant patience and irrepressible sense of humor.

Our subject was once described as "one of the most effective positive catalysts known, a compound of barium, potassium, and erbium, of formula BaKEr"; and while opinions may differ as to the exact make-up of the agent, all who know him are in complete agreement that his addition to any group results in an immediate acceleration of the thought processes and physical activities of everybody concerned. Accomplished musician, able raconteur, inveterate punster, and hair-trigger analyst of situations, he goes into action at the drop of a remark, and thereafter things keep moving. And that, with new acquaintances and old friends alike, will always be their outstanding impression of Ross Baker—where he is, things keep moving.

Louis C. Jordy, *Captain, ASC*

Philip Schaffner Baker was born in Minneapolis, Minn., November 30, 1916. After a forced march of nearly two years in the wake of the Chemical Warfare Service, he found himself in the shadow of Syracuse University where he lived for the next 11 years. During this period "The Bakery", as he calls his family, began a series of auto and bicycle trips which have taken him and his four brothers into every state of the Union and through several foreign countries. These experiences gave Phil his love of travel which eventuated in his learning to fly.

Phil took his first year of college chemistry at Occidental and his next two years at Antioch, where his "co-op" assignment was in the laboratories of the Dow Chemical Co. His chemistry major was completed at DePauw University. After obtaining the M.A. at the University of Arkansas, he entered the University of Illinois, where he is now a graduate assistant and a candidate for the Ph.D. He has spent the past three summers as a research assistant at the Institute of Paper Chemistry.

When Phil graduated from the Baldwin, N. Y., high school he was already an Eagle Scout, a member of the Hi Y and of the National Honor Society. Four seasons in an Adirondack woodcraft camp had made him proficient in most land and water sports. From both sides of his family he inherited a love of music; he plays the violin and sings in the choir. His hobbies include tennis, golf, ping-pong, sailing, and glass blowing.

Phil is an energetic worker, has a sunny disposition, and enjoys the respect of all who know him—even the victims of his practical jokes. He has been a student member of the American Chemical Society since 1936 and is a member of the American Association for the Advancement of Science, Sigma Xi and Phi Lambda Upsilon. He is now serving a second year as steward of the Illinois Chapter of Alpha Chi Sigma. In planning for the future Phil hopes to be teaching chemistry some day. In this he will be following the tradition which began with his maternal great grandfather, Charles G. Downey, who held the first chair of chemistry at DePauw University just 100 years ago; was continued by his

grandfather, Philip Schaffner Baker, professor of chemistry at DePauw and the Medical College of Indiana until 1901, and is being carried on by his father.

ROBERT S. VORIS

Hawley Products Fellowship in Mellon Institute

HAWLEY PRODUCTS CO., St. Charles, Ill., manufacturer of molded cellulosic and allied plastic products, has founded an Industrial Fellowship in Mellon Institute, Pittsburgh, for the purpose of conducting an investigational program of importance to our armed forces.

J. C. Williams, a specialist in cellulose chemistry and plastics technology, has been appointed to the incumbency of this fellowship. He will be assisted by Peter Shanta, a chemical engineer from the University of Pittsburgh, and will have the constant cooperative aid of experts in the institute and in the donor's organization.

Teaching Fellowships Available at New York University

SEVERAL teaching fellowships are available, beginning in February 1943 in the Chemistry Department of the Washington Square College of Arts and Science, New York University. Applicants must have a recent bachelor's degree and be ready to begin work toward the doctorate in the Graduate School. The duties include 16 hours of laboratory instruction per week and the paper grading connected therewith. The stipend for two semesters is $700 and three full courses of graduate work. Application forms may be secured from Professor W. C. MacTavish, Washington Square College of Arts and Science, Washington Square, New York, N. Y.

Training in X-Ray Technique

AT THE request of the Government and under the auspices of the Engineering, Science, and Management War Training Program, the University of Illinois will give a short course, which will be repeated as many times as necessary, on the techniques and applications of x-ray testing methods, including radiography, microradiography, and x-ray diffraction. This is for the benefit of war industries and government laboratories which have had to develop x-ray methods in the emergency and in many cases with technical employees who have not had specialized training.

The course will last for one week, full time. No charge will be made for the course. It is open to anyone who is actually engaged in x-ray testing or is about to begin this work for any industry or laboratory. Those interested should apply at once to G. L. Clark, 315 Noyes Chemical Laboratory, University of Illinois, Urbana, Ill. Each session is limited to 10 persons, and the first course is planned for early in December.

Rubber Relief

ANOTHER candidate for the job of our former standby, rubber, has been announced. This time it is ethyl cellulose compounded with oil and chemical plasticizers in the range of 40 to 60 per cent ethyl cellulose and 60 to 40 per cent plasticizer. The result is "Ethyl Rubber" in forms which are tough, pliable, flexible, and thermoplastic. They can be made without solvent and have been found stable to many conditions of exposure in preliminary tests conducted by the manufacturer, the Hercules Powder Co., Wilmington, Del. Data collected on a few of the many soft, rubberlike ethyl cellulose compositions possible indicated that the better ones are comparable to white rubber (as used in rubber gloves and similar articles) in stability in water. They also showed greatly improved abrasion resistance over rubber samples (both white and black as used in inner tubes), although the "bounce" of natural rubber could not be equaled. Tensile strength in one case was found to be nine times greater than for rubber, though elongation of the better formulations was only one fifth to one fourth that of rubber. At −78° C. the ethyl compositions could be considered comparable to rubber in flexibility, although at −20° C. white rubber showed far greater flexibility. However, several of the synthetic formulations possessed this valuable property in high degree.

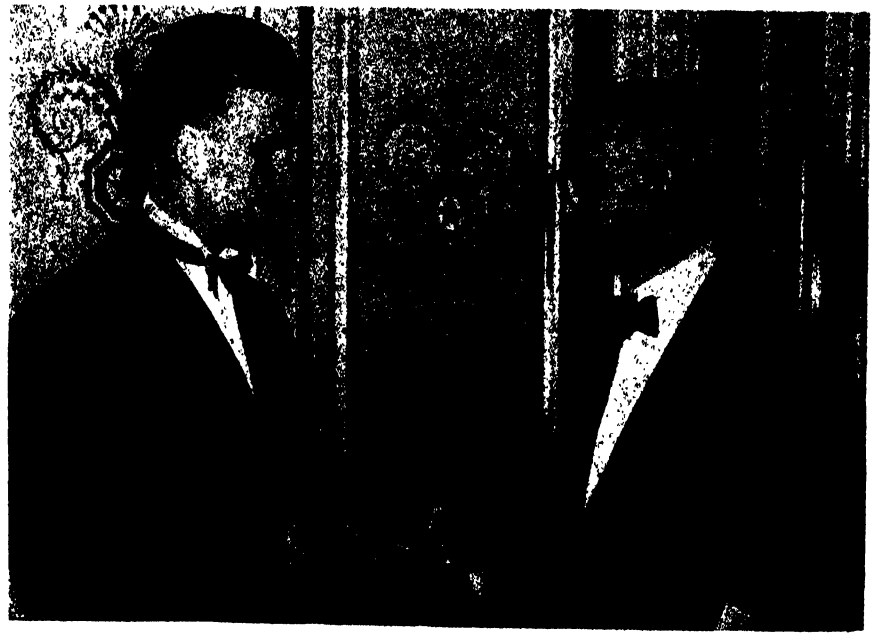
The new "rubber" can be formulated to show superior properties in connection with exposure to gasoline, motor oil, and butter, and in its resistance to oxidation by ozone.

It has been shown that formulation plays an important part in determining the quality of ethyl rubber, but even before there is time to perfect and thoroughly test formulas, it is likely that many uses will be found for this welcome addition to the growing family of man-made elastomers.

John Wesley Hyatt Award to D. S. Frederick

THE first annual John Wesley Hyatt Award, for an outstanding contribution in 1941 to the plastics industry, was conferred on Donald S. Frederick of Röhm & Haas Co., in New York, October 30. Dr. Frederick was honored for his work in adapting transparent, colorless acrylic plastics to the needs of American military aircraft. Plexiglas, the methyl methacrylate plastic used in the development work of Dr. Frederick and associates, forms cockpit enclosures, gun turrets, broad windows, domes, and other key parts as well as bomber noses.

The award, established by the Hercules Powder Co. last year, was named for John Wesley Hyatt, who is credited with having been the inventor in 1867 of the first plastic, a mixture of nitrocellulose and camphor, out of which came the present-day celluloid. In winning this award, Dr. Frederick received the Hyatt Gold Medal, designed by Paul Manship, and one thousand dollars.



Donald S. Frederick receives the John Wesley Hyatt Award for outstanding contribution to the plastics industry in 1941 from Lyman J. Briggs, Director, National Bureau of Standards, at the presentation dinner held at Hotel Waldorf-Astoria in New York on October 30.

POTOMAC POSTSCRIPTS

WPB Activities

Drums. New steel drum containers and parts in the hands of manufacturers have been put under complete allocation control by the Director General for Operations in order that delivery of the drums may be channeled to supply the most essential requirements of the production program. Sheet steel allotted for the manufacture of steel drums has been found insufficient to satisfy all outstanding orders rated AA-1 or higher, making it necessary to exercise tighter control over sale and delivery of the containers. The order, M-255, prohibits manufacturers from selling or delivering new steel drums and parts (excepting flanges, plugs, and cap seals) after November 16 without specific authorization of the Director General for Operations. Likewise persons manufacturing drums for their own use are prohibited from using any drums which were not completely manufactured before November 16 unless they have similar authorization. Authorization must be applied for by addressing a letter in duplicate to the Containers Branch, War Production Board, Washington, D. C., marked Ref.: M-255. The letter should have a copy of the purchase order attached and should state what the drums are to be used for, what products are to be shipped in them, where they are to be shipped, and the use to which their contents are to be put.

Glycerol. Domestic production of glycerol will be increased 6,000,000 to 7,000,000 pounds per year by Order M-193, effective December 1, 1942, which sets up certain standards of production efficiency in glycerol recovery for the soap, fat splitting, and glycerol refining industries. Production standards are now in effect on coconut oil (M-60) and palm oil (M-59), though the standards now announced on glycerol are more severe than either of these two.

In order to obtain permission to saponify or hydrolyze any fat or oil in a process in which glycerol is produced, the producer must not permit more than 1 per cent of glycerol to remain in the finished product, and must recover 92 per cent of the glycerol product of the spent lyes. In the case of fat splitting, not less than 94 per cent shall be recovered. An exception is the manufacture of liquid, potash, cold-made, and half-boiled soap, where not more than 2.75 per cent glycerol may remain in the product. A producer covered by this exemption may use in any quarter not more than 90 per cent of his average quarterly consumption in the two-year period ending December 31, 1941. Refiners of crude glycerol are required to recover not less than 96 per cent of the glycerol content.

Because of certain technical conditions, exceptions to this order are made for persons consuming less than 10,000 pounds of fats, oil, or fatty acids per month, because they represent a small part of the industry and because compliance would be technologically difficult.

Magnesium. To continue control over the country's magnesium supply, the magnesium order, M-2-b, has been extended until December 31, 1942, by an amendment issued by the Director General for Operations. Originally, it was to have expired on October 31, 1942.

Molybdenum. Permission to deliver small amounts of molybdenum without applying for an allocation under Order M-110 was formalized today by Supplementary Order M-110-a. Under certain conditions, deliveries up to 500 pounds of contained molybdenum may be made in any one month without applying for an allocation. Melters, other than large producers of iron and steel products, may use up to 500 pounds monthly without submitting melting schedules to WPB.

Phenol. Allocation of phenol has been extended to include certain substituted phenols and phenol-bearing materials by General Preference Order M-27, as amended November 3. The amended order provides that after December 1, 1942, no person may sell, deliver, accept delivery of, or use any of the materials covered by the order unless he has specific authorization by WPB to do so. Until December 1, 1942, the present order will operate.

Chemicals brought under control of the amended order include: tar acid oil (any coal tar distillate containing 5 per cent or more of phenols), carbolates (any aqueous solution of an alkali metal sale containing 10 per cent or more of phenols), phenols (including phenol, cresols, and xylenols), their homologs and mixtures, *p*-phenyl-phenol, *o*-phenyl-phenol, butyl phenol, amyl phenol, and *bis*-phenol.

The standard chemical allocation forms PD-600 and PD-601, which may be obtained at WPB field offices, are to be used in applying for authorization under this order.

Reagent Chemicals. Research laboratories have been given assistance to secure a continuing supply of reagent chemicals, laboratory equipment, and other materials by the revision of existing Preference Rating Order P-43 and the issuance of a new Preference Rating Order, P-135, by the Director General for Operations. Order P-43, as revised, is expanded to cover qualified production control as well as research laboratories, and assigns to all laboratories holding a serial number under P-43, a rating of AA-2X for the purchase of equipment, reagent chemicals, and other materials. For material costing more than $50, except reagent chemicals, specific authorization by the WPB is required to apply the rating. Such authorization is to be applied for on Form PD-620, and all holders of serial numbers must file Form PD-93 by the 15th of each month. The order also assigns a rating of AA-4 to deliveries of laboratory equipment to a laboratory not assigned a serial number. Deliveries under this provision must be authorized by WPB.

Order P-135 enables laboratories not holding serial numbers under P-43 to use a rating of AA-2X for chemicals used for analytical, testing, control, educational, or research purposes. Laboratories, other than those specifically approved under P-43, may use this rating to buy from supply houses, to purchase from manufacturers, and manufacturers to buy raw materials for the production of reagent chemicals.

The rating assigned by P-135 may be applied without prior granting of a serial number as under P-43.

Resins. Phenolic resins and phenolic resin molding compounds will be put under complete allocation and use control, effective December 1, 1942, by General Preference Order M-246, issued by the Director General for Operations. The new order, barring delivery or use of phenolic resins or phenolic resin molding compounds without specific authorization by WPB, will guarantee that the output of the phenolic materials industry will be channeled into essential needs. Certain exceptions to these restrictions are made, including orders under 55 gallons per month.

Because the number of vital end-products made from these materials is so great, it is not practicable to restrict rigidly in advance all end-products in which these resins may be used. Therefore, persons seeking resins and compounds for use in certain end-products (such as plywood, protective coatings, laminates, molded products, and the items on List A of the order) are required to file certificates with their suppliers specifying end-use in considerable detail. This will enable the producer to indicate to WPB the end-use of the product for which he seeks phenolic materials, and enable WPB to allocate so that the most essential needs will be met. The standard chemical allocation forms, PD-600 and PD-601 are to be used in applying for authorization to sell, deliver, accept delivery of, and use.

Rubbing Alcohol. The unrestricted sale of rubbing alcohol and rubbing alcohol compounds has been forbidden by Amendment 2 to General Preference Order M-30, issued by the Director General for Operations. The amendment forbids the delivery of any ethyl alcohol or any compound containing it for use as rubbing alcohol except to licensed physicians, dentists, and veterinarians; holders of written doctor's prescription or orders; wholesalers, retailers, and manufacturers for resale in accordance with the terms of this order; and to certain Government agencies.

Sodium Sulfate. Inventory restrictions on sodium sulfate (salt cake) are removed by Amendment 7 to General Inventory Order M-161, issued by the Director General for Operations. This order was set up for the purpose of providing necessary exemptions to inventory restrictions and contains a list of such commodities so exempted.

Terneplate and Tinplate. Use of terneplate containers after November 30 for packing varnish removers, liquid lacquers, lacquer thinners, lacquer stains, and shellac has been prohibited by the Director General for Operations. After November 30 containers for these products will be made of substitute materials such as glass or fibers. Amendment 5 to Order M-81 also provides that terneplate used for packing these products this year cannot exceed 90 per cent of the 1940 consumption. In addition, the amendment prohibits packing of edible liquid oils in tinplate or terneplate containers of less than 5-gallon capacity. For November and December the quota for terneplate and tinplate for such containers is established at 10 per cent of the total 1940 consumption for smaller containers of 5-gallon and higher capacity.

Thermoplastics. Effective date of scheduling production and delivery under the thermoplastics order, M-154, has been postponed from November 1 to January 1 by Amendment 4, issued by the Director General for Operations. The order, which controls the delivery and use of thermoplastics, will continue to operate as in the past. The scheduling provision, requiring producers of raw material to schedule their deliveries, has not yet been made operative. Extension of effective date is for the purpose of providing time to set up scheduling procedures.



Price Regulations

Cadmium. Maximum prices at which the Metals Reserve Company, government procurement agency, may buy idle or frozen stocks of cadmium for its war stock pile have been established by the Office of Price Administration, f. o. b. plant of the Udylite Corp., Detroit, Mich.

Metals Reserve Company has appointed Udylite Corp. as its agent to assist in its cadmium stockpiling and allocation program.

Ferro-Alloys. Dollars-and-cents maximum prices for chrome ores, designed to stabilize ore costs for producers of ferrochromium, chromium chemicals, and chrome refractory products, have been announced by the OPA.

These ceiling prices are provided in Maximum Price Regulation 258 (Chrome Ores), effective November 9, 1942.

Furfural is freed from price control to the extent sold or delivered for use in the manufacture of synthetic rubber, the OPA has announced. The exception is that granted earlier to other ingredients of synthetic rubber, and is contained in the action taken in Amendment 37 to Supplementary Regulation 1, effective October 29.

Vegetable Waxes. The OPA has set specific dollars-and-cents ceilings for imported vegetable waxes, produced mainly in Brazil and northern Mexico, and for domestic and imported beeswax. The new ceilings, effective November 13, hold quotations for most of the important types sold in the United States at levels prevailing in October 1941 and are contained in Maximum Price Regulation 264. (Industrial Waxes). They apply to importers, shippers, and all other sellers.

Controlled Materials Plan Announced by WPB

A LONG-RANGE plan for controlling the flow of critical materials into war production, the Controlled Materials Plan, has been announced by Donald M. Nelson, chairman of the WPB. Evolved from existing distribution systems and from experience gained through their operation, the CMP has the approval of all governmental agencies participating in it. It was drafted after lengthy conferences with the Army, Navy, Maritime Commission, and Office of Civilian Supply, as well as representative consumers and producers of materials, who contributed many suggestions incorporated in the final version.

The main purpose of the plan is to make certain that production schedules are adjusted within material supply so that production requirements are met. This will be accomplished by adjusting requirements for critical materials to the supply and making the quantity and type of materials needed available at the time required to meet approved programs. Allotments of critical materials will be made through seven claimant agencies, such as Army, Navy, Office of Civilian Supply, etc., to prime contractors producing essential goods. Prime contractors, in turn, will divide the allotments with their subcontractors and suppliers.

Carbon and alloy steel, copper, and aluminum are the first controlled materials to be allotted directly under the plan, which becomes effective in its transitory stage in the second quarter of 1943, and will be in full operation by July 1.

This method of distributing materials is, in effect, "vertical allotment". So far as controlled materials are concerned, it will gradually replace the present priority system, including the Production Requirements Plan, which is on a horizontal basis. Under PRP each firm, large or small, prime contractor or subcontractor, submits his own requirements to WPB for approval, and receives an individual authorization to obtain materials. Under the new CMP, prime contractors will prepare and submit a breakdown of all materials required for the approved end-products on which they are working. The breakdown will comprise a bill of materials, specifying not only what materials are required, but when they must be received to carry out the authorized program. In making up his bill of materials, each prime contractor will include both the materials he puts into production himself and those needed by his subcontractors and their suppliers. The bill of materials will cover requirements not only for controlled materials but also for other scarce materials listed in the outline of the plan.

WPB Industry Branches to Be Strengthened

REORGANIZATION of industry branches of the WPB, giving them greater strength, is being undertaken by the Office of Program Determination under the direction of Ferdinand Eberstadt, vice chairman of WPB, and Ernest Kanzler, director general for operations. One of the major reasons for strengthening branches is to enable them to handle the additional burdens to be placed on them by the new controlled materials plan, announced November 2.

To as great an extent as possible, each industry branch will follow a similar pattern. Many of the functions of the Office of the Director General for Operations, not including the Bureau of Priorities Control, will be decentralized and assigned to branches, making them responsible for all operating phases such as the execution of programs, policies, and procedures established for the resources assigned to branches. Branches will not, however, be

responsible for policy, planning, coordination, and supervision phases. Permanent connection with industry will be maintained through active industry advisory committees assigned to each branch. Claimant agencies (Army, Navy, Maritime Commission, Office of Civilian Supply, Lend-Lease, etc.) will assign permanent representatives to each branch. Permanent connection with labor also will be maintained through representatives assigned to each branch. The pattern will apply to all material, product, facility, or industry branches, although the detailed composition will depend on the individual branch.

Foreign Patent Applications Made Available

DRAWINGS and specifications of foreign-owned patent applications seized by his office will be printed and made available to American industry at a nominal price, Leo T. Crowley, Alien Property Custodian, has announced. These applications ordinarily cover latest developments in patentable fields.

Publication of the printed copies of patent applications will begin during December. Applications will be listed as they are printed, in classified order, in the *Official Gazette of the United States Patent Office.* Announcement of the cost of copies and of the method of purchase will be made in the same publication.

Meanwhile the Alien Property Custodian will make the information contained in the files of these applications available, in so far as is practical, to any person residing in the United States having a genuine legitimate interest therein. Any registered patent attorney may obtain permission to inspect and make copies of the file of a vested application (other than an application which stands under secrecy order) upon filing with the Patent Prosecution Section, Office of the Alien Property Custodian, Washington, D. C., a request upon a form which will be furnished upon request by the Custodian's Washington, Chicago, or New York offices.

Office of Production Research and Development, WPB

AN OFFICE OF PRODUCTION RESEARCH AND DEVELOPMENT has been set up within the War Production Board, and Harvey N. Davis, president of the Stevens Institute of Technology, has been named its director. The office will parallel in the production field the work being done in regard to instruments of war by the Office of Scientific Research and Development, and was set up after consultation with Vannevar Bush, head of that agency. Except for contracts connected with the rubber program, which will be handled by William N. Jeffers, the new agency will make all WPB contracts for research and development work to be done by other governmental agencies, colleges, and universities, commercial laboratories, and corporations.

Its four principal functions are:

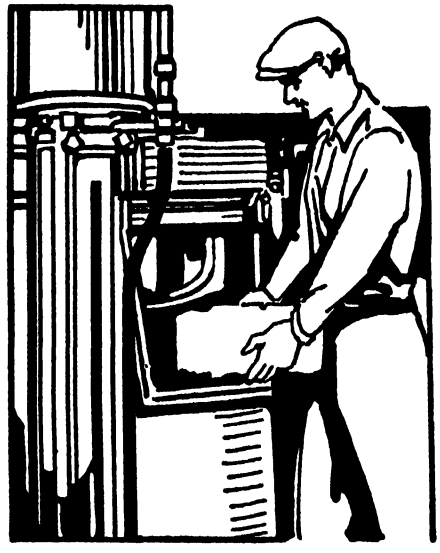
1. To provide technical information on problems with which Mr. Nelson is directly concerned and on research and development work now in progress in WPB, and to provide WPB divisions and branches with research information and findings on work which they have in progress.
2. To initiate evaluation of specific scientific or technological proposals through the establishment of expert committees or reference to existing research groups.
3. To get needed research accomplished, by contracting with outside laboratories or agencies for experimental work.
4. To bring about development of projects or processes that merit it, through contracting for the construction of prototypes or the erection of pilot plants.

Dr. Davis will serve as technical adviser to Mr. Nelson on engineering and scientific matters.

Commodity Credit Corporation to Purchase Rotenone

A GOVERNMENT program for the purchase and importation of rotenone from Brazil and Peru to be carried out by Commodity Credit Corporation has been announced jointly by the U. S. Department of Agriculture and the Board of Economic Warfare. Officials hope to import at least 4,500,000 pounds of the insecticide during the next 12 months to help make up for the reduction in imports resulting from Japanese invasion of Singapore and to facilitate increased truck crop and livestock production.

Under the plan, the CCC is the exclusive purchaser of all rotenone-bearing roots having a rotenone content of not less than 3 per cent. Purchases will be made through existing commercial companies acting as agents for the CCC, so as not to disturb normal business channels. Sales of stocks acquired under the program will be made upon approval of the WPB at prices not in excess of those established by the OPA.



Containers Industry Assists WPB

SEVERAL technical committees have been organized in the containers industry to assist in the development of substitutes for tin, steel, and other critical materials used in the industry, William W. Fitzhugh, deputy chief of WPB's Containers Branch, has announced. The committees, set up voluntarily by the industry, have offered their assistance to the Containers Branch in solving difficult problems surrounding the development and use of substitute materials. The branch has asked packers to submit their problems together with a description of what efforts have been made to develop substitutes, and data will be forwarded to the proper committee with a request for practical assistance in perfecting a substitute container.

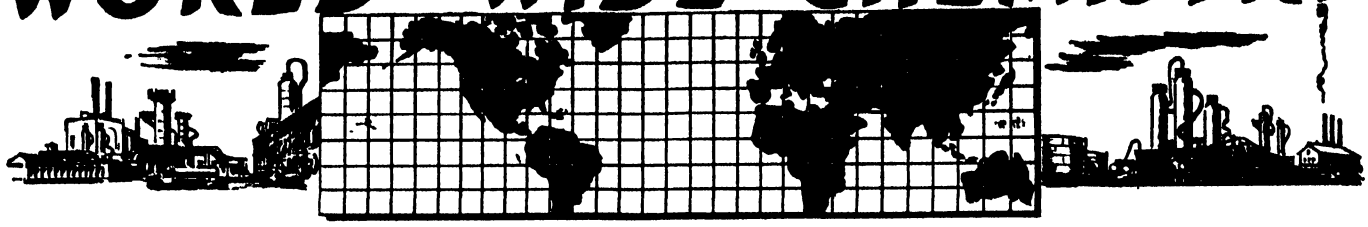
Industrial Alcohol Program Gains Momentum

THE American Distilling Co., aided by the engineering staff of WPB's Chemical Branch, will save the Government more than $20,000 per month on the cost of alcohol furnished to war production. With great pressure put on distilleries for increasing output, a combination of increased volume and technical achievements has made it possible for this company to drop its price to the Government from the OPA ceiling price of 50 cents per gallon to 46 and 47 cents per gallon, John Boyer, chief of WPB's Alcohol Section has announced. At the present time all beverage distilleries which can make industrial alcohol are doing so. Those which cannot are making high wines for further conversion to alcohol. Conversion of beverage distilleries is part of a program undertaken by the Alcohol Section of WPB's Chemical Branch to provide the alcohol needed for production of smokeless powder, synthetic rubber, and other vital war products.

CROSS-HAULING must be eliminated voluntarily from the nonmetallic minerals industry in order to avoid serious impairments of supply through inadequate transportation facilities, R. J. Lund, chief of the Miscellaneous Minerals Branch of WPB, told a recent meeting of the Nonmetallic Minerals Transportation Industry Advisory Committee.

At this first meeting of the newly formed committee, industry members said that opportunities existed for them to conserve transportation facilities, though certain problems would require considerable study.

WORLD-WIDE CHEMISTRY



Since 1934 the planting of tung trees in the State of São Paulo has increased sharply and production of seeds averages from 15 to 35 kg., although specially selected trees furnish up to 50 kg. per year. It is expected that during the current year about 200,000 trees will give 1,600 metric tons of nuts from which about 200 metric tons of oil will be obtained. It is also estimated that with the increase in the producing trees the amount of oil obtained in 1944 will be 600 metric tons and in 1946 about 1,200 metric tons.

More than 300 metric tons of tung oil nuts were obtained during the past year in the State of Paraná, and the seeds were sent to mills in São Paulo for the production of tung oil. Assuming that production of tung seeds in Paraná will be greatly increased in the coming years, construction of two mills is planned. Prices for tung seeds and oils correspond to 7 and 90 cents per kg., respectively.

American Concerns Propose Nickel and Aluminum Production

The American Smelting and Refining Co. recently presented a proposal to the federal government for the exploitation of the nickel deposits located at São José do Tocantins in the State of Goiás. The reserves of these deposits were estimated to be more than 10,000,000 metric tons with a nickel content as high as 5 per cent. Disadvantages in exploiting these mines are lack of fuel and difficulties in transportation because they are located 300 km. from the terminal of the Goiás Railway.

The Reynolds Metal Co., interested in aluminum production, sent three technicians to Brazil to study the feasibility of installing one or more plants for production of aluminum from the bauxite ore deposits located in Minas Geraes and São Paulo. Transport facilities and electric power are easily obtained on a large scale. It was revealed that a plant for the production of aluminum by the Bayer process has been in operation several months in the city of Ouro Preto under the control of the Cia. Eletro Química de Minas Geraes. The capital for the installation of the plant was loaned by the Bank of Brazil.

Ramie Cultivation Shows Interesting Results

The Ministry of Agriculture recently released information concerning the 1941 crop of ramie (*Bohemeria nivea*). More than 3,000 hectares of ramie were planted. Three metric tons of pure fiber, corresponding to 6 tons of ramie with bark, are obtained from each four hectares planted. One kilogram of the fiber with the bark sells in São Paulo for 5 to 6.5 mil reis (about 25 to 32.50 U. S. cents). This gives the farmer a net profit of about three times the amount invested in the cultivation of the fiber.

Gasogene Increase Expected to Relieve Gasoline Imports

On account of the difficulty in transporting gasoline to Brazil, the federal government is taking steps to stimulate the use of gas producer vehicles in trucks, lorries, busses, and, in a minor scale, passenger cars. According to figures recently released by the Comissão Nacional do Gasogenio, about 3,500 vehicles are equipped with gas generators. In order to guarantee to the manufacturers of gas producers the necessary material for their production, the federal government through the National Committee placed orders in the United States for 500 metric tons of steel black sheets. Power was given to the Metallurgy Committee, created some months ago, to establish priorities for the purchase and sale of metallic materials useful for national defense and the safety of Brazil. All importers and resellers were forced to declare the stocks of metallic materials appropriate for the construction of gas producers and no commercial transaction involving such materials will be permitted without the previous approval of the Metallurgy Committee. Such transactions are confined not only to new, but to used materials. The São Paulo State Government is intensifying the use of gas generator apparatus and expects that by the end of the current year more than 4,000 gasogene vehicles will be running in the State of São Paulo alone.

American-Brazilian Treaties Are Controlled by Commission

Following the return of the Brazilian Minister of Finance from a trip to the United States and Canada where several treaties were signed, the federal government created a commission for the control of those treaties. More recently a technical committee was nominated, headed by Minister João Alberto, former Brazilian Ambassador to Canada, to study, with the United States Industrial Mission to Brazil, the possibilities of installing new industries which would use Brazilian resources as raw materials. The United States Industrial Mission will suggest, whenever convenient, the transfer of American industrial equipment and material from factories now out of operation in the United States. Several industrial problems are being studied by the American Mission in collaboration with the technical local committees.

An agreement for the purchase of 200,000 metric tons of castor seeds or its equivalent in oil per year by the United States has recently been signed by the Brazilian and American Governments. Prices and conditions for this sale were also fixed. The United States Government will supply the necessary maritime transportation facilities, and if total quantity bought cannot be shipped it, will warehouse the unshipped balance at its own risk and account.

Exports and Export Regulations Decreed

Several decrees were recently signed by the President of Brazil regulating the export of Brazilian products. Classification and standardization of tobacco leaf grown in Bafa were approved in August. Specifications and tables for the classification and fiscal control of essential oils produced from citrus fruits were approved in July.

EDITOR'S NOTE. Those interested in further details should address the correspondent whose name and address appear for each country, and enclose sufficient international coupons to prepay the reply. United States stamps should not be sent.

Rubber and rubber products destined for the United States must be accompanied by a certificate of approval.

Exports of iron ore during 1941 amounted to 420,756 metric tons destined for Great Britain, the United States, and Canada. These countries received the 255,548 metric tons exported during 1940, with the United States occupying first place. In 1940 Great Britain remained as the sole market for iron ore in Europe. During 1939 Brazilian exports of iron ore, amounting to 396,938 metric tons, went to eight countries in Europe and only two on the American Continent, with approximately 75 per cent of the total going to Germany and Dansig.

Exports of pine from Brazil during the first five months of the current year totaled 154,370 metric tons, an increase of 37,095 metric tons over the same period in 1941. Shipments of pine made in May 1942 represented 29.3 per cent of total export value during that month, with Argentina and Uruguay as the best purchasers. Owing to transport difficulties, exports to South Africa decreased during the first five months of 1942 in comparison with the same period of last year. Total Brazilian exports to the Union of South Africa amounted to 33,368 metric tons against 22,492 in 1940 and only 12,727 in 1939. Pine wood, coffee, cotton textiles, carbaúba and licurí waxes, cocoa butter, preserved meat, and cotton yarns constituted the principal products exported by Brazil to the Union of South Africa during 1941.

Advanced Notices on Chemical Meetings

The Fourth South American Chemical Congress, which was to be held January 5 to 12, 1943, has been postponed again on account of transportation difficulties, the Executive Committee reports. No definite date for the meeting has been set.

In January 1943 the Associação Química do Brasil will hold its annual meeting in the City of Curitiba, the capital of the State of Paraná. At that time the Council of the Brazilian Chemical Society will count the votes for the vice president of the society and the present viee president will become president.

C. E. Nabuco de Araujo, Jr.

Caixa Postal 970
Rio de Janeiro
October 30, 1942

Soap imports into Haiti during the eight months ended May 1942 amounted to 1,319,300 kg. valued at 917,500 gourdes, according to a report to the Commerce Department. Receipts of perfumeries and toiletries during these months were valued at 345,300 gourdes.

In May of the current year soap imports were valued at 75,000 and perfumery and toiletries at 8,000 gourdes.

Continental Europe



The German low-temperature carbonization industry has undergone expansion during the war. Low-temperature carbonization plants require comparatively small amounts of essential metals, can be erected much more rapidly than hydrogenation works, and yield large quantities of valuable products to take the place of other materials which are now scarce. Low-temperature carbonization coke did not meet with great interest on the part of potential consumers in the early days when qualities were not always satisfactory, but it is reported that prejudice is being overcome, and this coke is used for many new purposes. It may be burnt on the fire-grate in the place of gas coal, is suitable as a gas producer fuel, and is used in the manufacture of water gas. It also replaces ordinary coke in the production of ferro-silicon. Grades of low-temperature carbonization coke with low ash contents are also being used for making calcium carbide, and small-grained material is added to coke and gas coals to improve the resulting coke.

Recently experiments have been carried out with low-temperature carbonization coke as a fuel for mobile gas producers, but the main outlet is still as a fuel for household fire-grates and steam boilers. Though more expensive than coal, it is reputedly more effective and cleaner. Low-temperature carbonization gasoline and gas are used as a motor fuel for road vehicles but require further treatment before they can be used, either by purification in the case of gasoline or by moderate concentration in the case of gases. The low-temperature carbonization gas may be used for blending with water gas and ordinary town gas if there is no opportunity for chemical treatment in the vicinity of the carbonization plant.

Low-Temperature Carbonization Tar Is Produced from Lignite in Germany

Most important among the low-temperature carbonization products is tar. Different qualities are produced, varying according to the process used. Low-temperature carbonization tar fills a very important gap in the production of phenols for which a new process has been developed, but more interest is paid now to the possibility of using the tar for the manufacture of motor fuels and fuel oil for the navy.

Very substantial quantities of low-temperature carbonization tar have been produced for a number of years from lignite in central Germany, and the principal outlet of lignite tar still seems to be hydrogenation works. Lignite low-temperature carbonization tar is treated by the catalytic high-pressure hydrogenation process of I. G. Farbenindustrie A.-G. at temperatures of 450° or 350° C. and yields, apart from motor fuel, colorless paraffin wax, lubricating oils, and Diesel fuels. Another process used on a limited scale only involves cracking the lignite tar under pressures of about 5 atmospheres and more, which yields about 60 per cent of cracking oils in addition to 11 per cent of gas and 25 per cent of cracking pitch. The oils consist of about one third of cracking gasoline Good Diesel fuels may be obtained by cracking lignite tar under pressures of 1 to 3 atmospheres. Use of selective solvents has been tried out in a large experimental plant, and several more plants of similar dimensions are said to be under construction. There are several possible processes for the use of selective solvents. They supply substantial quantities of a good Diesel fuel and of fuel oil, but one of these processes which uses phenol yields gasoline, Diesel fuel (after further cracking), fuel oil, asphalt, and coke for electrodes. More important than these different processes is distillation, which is carried out in various ways. One distillation process yields 5.5 per cent of gasoline, 27 of Diesel fuel, 25 of paraffin oil, 10 of fuel oil, 10 of paraffin wax, 2.5 of coke, and 10 per cent of gas. Other lignite low-temperature carbonization tars, however, may yield different amounts of these products.

Coal Assumes Importance as Source of Low-Temperature Carbonization Tar

Whereas low-temperature carbonization tar from lignite has been used for hydrogenation and other chemical processes for many years, it is only now that the treatment of low-temperature carbonization tar from coal is assuming industrial importance. It is claimed that the experimental phase has been concluded and that no fundamental problems remain unsolved. The authorities have, therefore, ordered the installation of big plants for the treatment of coal low-temperature carbonization tar. There are various ways of treating the material. Hydrogenation of tar carbonized with circulating gases is said to be possible but has not attained any quantitative significance. Treatment with selective solvents supposedly yields as good Diesel oil, paraffin wax, and fuel oil as are obtained from lignite tar but requires preparatory distillation. Cracking, on the other hand, is not considered to be feasible unless carried out in a hydrogen atmosphere at low pressure. The precipitation of the coal tar with benzene, propane, or butane with a view to the removal of asphalt and phenol has been proposed and may yield satisfactory results. The distillation of low-temperature carbonization coal tar, how-

ever, still seems to be in an experimental stage and is said to yield inadequate quantities of fuel oil. It may prove useful in connection with hydrogenation. Although carbonization tar and other products of low-temperature carbonization of lignite or coal are especially valuable to Germany, certain raw materials used in production are scarce. German low-temperature carbonization plants must get along with nonbaking wet coal, and since the treatment of low-temperature carbonization tar has so far been tried out only experimentally, considerable delays will probably occur when the results are put into industrial practice.

Heavy Road Vehicles Converted to Producer Gas

The Generator Staff, the central authority responsible for the conversion of road vehicles to producer gas, has assembled a register of all heavy lorries and tractors to be called up for conversion with a time limit of 90 days, and subsidies varying between 600 and 1,000 marks will be paid for the conversion. All solid fuels suitable for use in producer gas plants are bought centrally by the Generatorkraft company which is the sole distributor. The supply of gas producer fuels, however, is not sufficiently large to provide for all vehicles, and omnibuses, tractors, and certain lorries will be converted to the use of compressed town gas as a fuel if a source of supply is available within 3 km. of the normal radius of the vehicle. Low-pressure town gas will be used as a fuel for omnibuses if at all possible. The central office decides which fuel must be used for any particular gas producer vehicle, and the conversion is omitted only in special cases for constructional reasons.

Committee Studies Use of Coal Dust Motor

Manufacturers of coal dust motors, aided by Reich and party organizations, have formed a committee to investigate the possibilities of the coal dust engine, and special stress has been laid on the early development of commercially useful designs.

Process for Manufacture of Potash Proves Successful

A new process for the manufacture of potassium carbonate has been used by Salzbergwerk Neustassfurt, a subsidiary of Kali-Chemie A.-G., for several years. Among the advantages claimed are comparatively small apparatus, continuity of operations owing to the speedy course of chemical reactions, good output quantities, and small cost of energy. Raw materials used are potassium sulfate, lime, and coke. The process may be divided into two parts, the former of which results in the production of potassium formiate. Potassium sulfate and milk of lime are treated in autoclaves at temperatures above 200° C., and at high pressures with gas containing 30 to 32 per cent carbon monoxide produced from coke, so that a concentrated solution of potassium formiate is obtained. Calcium sulfate is produced as a by-product, and by selection of suitable operating conditions the inclination of calcium sulfate to bind potassium is overcome. Small quantities of potassium sulfate and soluble calcium salts still present in the formiate lye are removed by precipitation with potassium carbonate and evaporation. The second part consists of a calcination process. The primary product is potassium oxalate, and the final product is 99.5 per cent K_2CO_3. The oxygen required for the oxidation of the formiate is supplied by the surplus combustion air.

New Glass Wool Company Is Formed

The Faser-Industrie G. m. b. H. has been formed with a capital of 100,000 marks at Coburg by Glasfabrik Wernerhütte, a company which has been interested in the manufacture of glass wool through another subsidiary. It is reported that the new company is to undertake production of glass wool in other European countries.

Vegetable Oils Replaced in Paint

Linseed, rapeseed, and other vegetable oils used in the paint industry are being partly replaced by high viscous products obtained by a new process of combining with halides of fatty acids and consequent treatment with alkali. Unsaturated fatty acids, their glycerides, or other esters (or saponifiable derivatives or mixtures of these which consist mainly of unsaturated fatty acids or their esters) are saturated with chlorine or bromine. The reaction products are then heated with alkali in the presence of little water to 150° to 250° C. The free acids are separated and the reaction products converted into salts or esters. Hardened whale oil, technical oil acid, waste from the purification of sulfur olive oil, and other low-grade materials are reported used for the production and improvement of lacquers, leather, artificial leather, textiles, and synthetic resins.

Plastic Materials for Resin-Lacquered Food Cans

Synthetic resins have been used in Germany for a long time for the protection of food cans against corrosion, and although the results have not always been entirely satisfactory owing to the necessity of using resin-lacquered steel sheets for all purposes, the merits of different resin materials have been determined. The most important condensation lacquers are provided by resins obtained from phenyl-aldehyde condensates, especially those soluble in benzene hydrocarbons. These give a film of great elasticity and adhesive power. Plastified resols, alkyd-phenol resins, modified phenol resins, and resins from the condensates of polybasic acids and polyvalent alcohols and urea-formaldehyde condensation resins are also being used. Among polymerizates, coumaron resins are of little importance, but vinyl polymerizates are used on a large scale. Chlorinated polyvinyl chloride gives good films, although they are somewhat sensitive to temperature changes. Vinyl ether polymerizates, acrylic acid ester resins, styrol polymerizates and polyamides are also being used. In order to increase the adhesive power of the lacquer a short preparatory treatment of the iron surface with an aqueous phosphate solution is recommended.

Alsatian Potash Industry Increases Capital

Elsässische Kaliwerke G. m. b. H., Mulhouse, the company formed in 1941 by the state-owned Preussische Bergwerks- und Hütten-Gesellschaft to operate the potash mines taken over from French owners, has now increased its capital from 50,000 marks to 15,000,000 marks.

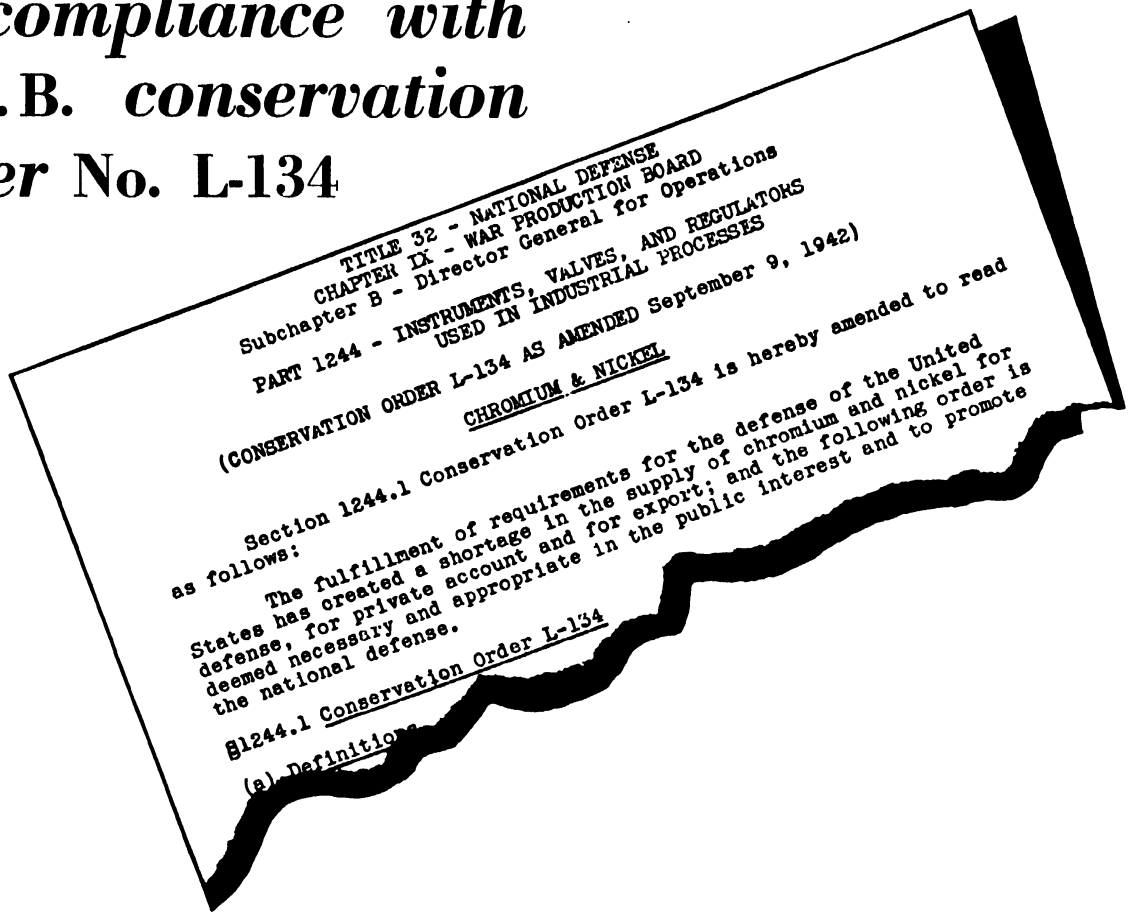
New Institutes Formed at Munich and Franzensbad

An Institute for Artificial Fiber Research has been opened at the Technical College of Munich. Necessary funds are being provided by Süddeutsche Zellwolle A.-G., Kelheim, one of the leading producers of staple fiber. A Mud Research Institute has been set up by the association of German spas at Franzensbad, Czechoslovakia. The institute is to act as a central organization for investigations, advice, and control.

India Plans Increased Production of Quinine

A POLICY of encouraging cinchona cultivation in India to attain self-sufficiency in quinine was urged at a recent meeting between chemical and drug manufacturers and a representative of the Indian Government, according to reports received by the Department of Commerce. It is believed that quinine requirements for the next several years can be met with a larger Bengal production, prudent use of available stocks, and cooperation of middlemen.

How to CONSERVE . . .
ESSENTIAL INSTRUMENT MATERIALS
in compliance with W.P.B. *conservation order* No. L-134

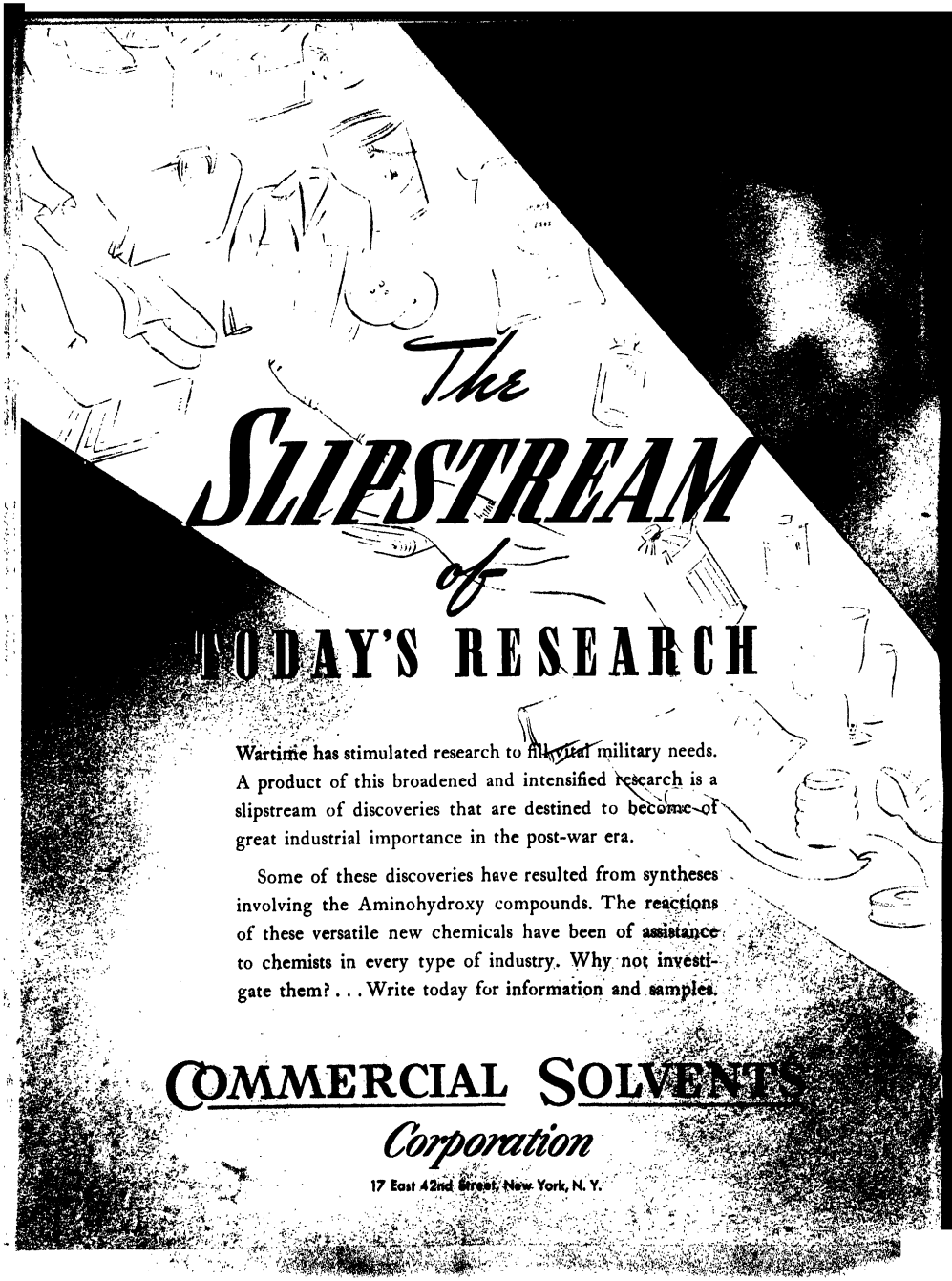

TITLE 32 - NATIONAL DEFENSE
CHAPTER IX - WAR PRODUCTION BOARD
Subchapter B - Director General for Operations
PART 1244 - INSTRUMENTS, VALVES, AND REGULATORS USED IN INDUSTRIAL PROCESSES
(CONSERVATION ORDER L-134 AS AMENDED September 9, 1942)
CHROMIUM & NICKEL
Section 1244.1 Conservation Order L-134 is hereby amended to read as follows:
The fulfillment of requirements for the defense of the United States has created a shortage in the supply of chromium and nickel for defense, for private account and for export; and the following order is deemed necessary and appropriate in the public interest and to promote the national defense.
§1244.1 Conservation Order L-134
(a) Definitions.

Many valuable solutions to problems arising from the new WPB Conservation Order L-134, which drastically limits the use of various materials for thermocouples, lead wire, thermometer bulbs, protecting tubes, etc., are given in the recently published Wheelco Supplement to Thermocouple Bulletin S2-3. The Supplement S2-3 is the result of an extensive analysis of the WPB Order L-134 by Wheelco Engineers and is published for the benefit of those who will be affected by this order. The Supplement also contains a partial summary of the L-134 Order; the complete L-134 Order as amended September 9, 1942, additions and revisions applying to various items in the Wheelco S2-3 Bulletin and a complete list of Wheelco Sales and Service Engineers who can help you with your instrument problems.

Write for your FREE copy of Supplement to Bulletin S2-3 and the issue of Wheelco Comments which deals with Thermocouple construction and maintenance. Also request copy of Bulletin S2-3 if you do not have a copy.

Wheelco Instruments Co.

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The SLIPSTREAM of TODAY'S RESEARCH

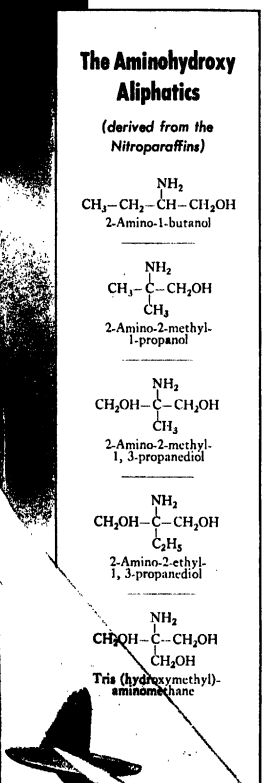
Wartime has stimulated research to fill vital military needs. A product of this broadened and intensified research is a slipstream of discoveries that are destined to become of great industrial importance in the post-war era.

Some of these discoveries have resulted from syntheses involving the Aminohydroxy compounds. The reactions of these versatile new chemicals have been of assistance to chemists in every type of industry. Why not investigate them? . . . Write today for information and samples.

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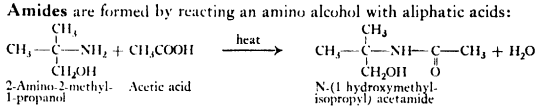
The Aminohydroxy Aliphatics

(derived from the Nitroparaffins)



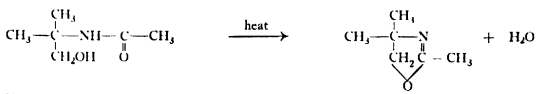
VERSATILITY of the Aminohydroxy Compounds is indicated by these *Typical Reactions:*

Amides are formed by reacting an amino alcohol with aliphatic acids:



2-Amino-2-methyl-1-propanol — Acetic acid — N-(1 hydroxymethyl-isopropyl) acetamide

Substituted Oxazolines are derived from the aliphatic or fatty acid amides:



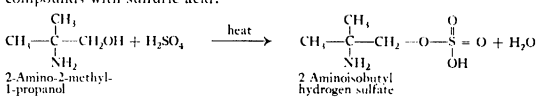
N (1-hydroxymethyl-isopropyl) acetamide — 2, 4, 4-Trimethyl-2-oxazoline

Substituted Oxazolidines are made by condensing aminohydroxy compounds with aldehydes:



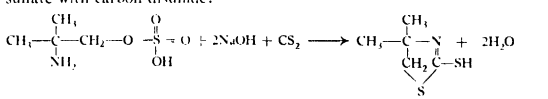
2-Amino-2-methyl-1-propanol — Acetaldehyde — 2, 4, 4-Trimethyl-oxazolidine

Aminoalkyl Hydrogen Sulfates are obtained on treating aminohydroxy compounds with sulfuric acid:



2-Amino-2-methyl-1-propanol — 2 Aminoisobutyl hydrogen sulfate

Mercapto Thiazolines are made by condensing aminoalkyl hydrogen sulfate with carbon disulfide:



2-Aminoisobutyl hydrogen sulfate — 2-Mercapto-4, 4-dimethyl-2-thiazoline

The Nitroparaffins at Work will be featured in our exhibit at the National Chemical Exposition in Chicago, November 24th to 29th. You are cordially invited to visit our Booth.

Chemists are finding many helpful suggestions in the Data Book, "The Nitroparaffins—New Worlds for Chemical Exploration." A copy will gladly be mailed you on request.





American Chemical Society[1]

105TH MEETING. Detroit, Mich., April 12 to 16, 1943.

106TH MEETING. Minneapolis, Minn., September 6 to 10, 1943.

CHEMICAL ENGINEERING SYMPOSIUM. Palmer House, Chicago, Ill., December 28 and 29, 1942. "The Application of Kinetics to Design and Operation of Chemical Engineering Equipment." Ninth Annual Symposium.

NATIONAL CHEMICAL EXPOSITION AND NATIONAL INDUSTRIAL CHEMICAL CONFERENCE. Sherman Hotel, Chicago, Ill., November 24 to 29, 1942.

ORGANIC CHEMISTRY SYMPOSIUM. Boston, Mass., December 28 to 30, 1943. Tenth National Symposium.

Other Scientific Societies

AMERICAN SCIENCE TEACHERS ASSOCIATION. Hotel Pennsylvania, New York, N. Y., December 29 and 30.

ELECTROCHEMICAL SOCIETY. Hotel Roosevelt, Pittsburgh, Penna., April 7 to 10, 1943.

[1] The list of the SOCIETY'S National Officers and Directors, Editors, members of Council, Divisional and Local Section Officers, Committees, and Chapters of Student Affiliates appears in CHEMICAL AND ENGINEERING NEWS three times a year—usually February 10, May 10, and October 10. The latest list is printed on page 1239 of the October 10 issue.

Metal Mine War Conference Program

STIMULATION of production of critical metals for the war effort and means of overcoming increasing labor shortages in the mines were subjected to thorough consideration of metal mine operators when they gathered at a two-day war conference sponsored by the Western Division, American Mining Congress, at Salt Lake City, Utah, on November 16 and 17. Sessions were highlighted by addresses by Major General Lewis B. Hershey of the Selective Service System and Brigadier General Frank J. McSherry, operations director of the War Manpower Commission, on the all-important topic of "Manpower for the Mines".

Local Sections

SECTION AND PLACE	DEC.	SPEAKER	SUBJECT
Akron, Women's City Club	15	**G. Stafford Whitby**	Chemotherapy
Alabama, Tutwiler Hotel, Birmingham	5	**I. M. Kolthoff**	
Cincinnati, Old Auditorium, Chemistry Building, University of Cincinnati	9	**O. K. Behrens**	The Nature of Enzymes and Enzymatic Reactions
Dallas–Fort Worth, Fondren Library Auditorium, Southern Methodist University, Dallas	15	**John H. Yoe**	Inorganic Analysis with Organic Reagents
Dayton, Engineers' Club	8	**O. K. Behrens**	Enzymes
Delaware, Auditorium, Y. M. C. A., Wilmington	9	**Harold Hibbert**	Lignin Chemistry
East Tennessee, Dabney Hall, University of Tennessee, Knoxville	3	**I. M. Kolthoff**	Polarography and Amperometric Titrations
Georgia, Brittain Dining Hall, Georgia School of Technology, Atlanta	7	**I. M. Kolthoff**	
Indiana, Severin Hotel, Indianapolis	4	**Symposium**	The Chemist's Role in Civilian Defense
Kalamazoo, Walwood Hall, Western Michigan College	15	**H. S. Adams**	Some Recent Trends in Technical Chemistry (Ladies' Night)
Kanawha Valley, Charleston, W. Va.	10	**O. K. Behrens**	The Nature of Enzymes and Enzymatic Reactions
Kansas City, University of Kansas City	8	**John H. Yoe**	Some Recent Advances in Colorimetric Analysis
Kansas State College, Chemistry Building, Manhattan	9	**John H. Yoe**	Some Recent Advances in Colorimetric Analysis
Lexington, Room 201, Kastle Hall, University of Kentucky	3	**L. L. Quill**	Some Properties and Uses of the Rare Earths
Louisville, Auditorium, Public Library	2	**M. E. Krahl**	Chemistry of Cell Metabolism
Michigan State College, Kedzie Chemical Laboratory, East Lansing	8	**H. E. Robinson**	Nutrition and the Meat Packing Industry
New York, The Chemists' Club, 52 East 41st St.	11	**Harold Hibbert**	The Structure of Lignin
North Carolina, Chapel Hill	10	**I. M. Kolthoff**	Polarography and Amperometric Titrations
North Jersey, Athletic Club, 16 Park Place, Newark	14	**Lee I. Smith**	Vitamin E
Northeast Tennessee, Kingsport	2	**I. M. Kolthoff**	Polarography and Amperometric Titrations
Northeastern, Huntington Hall, M. I. T., Cambridge, Mass.	10	**R. L. Shriner**	The Chemistry of Isoflavones (Student Night)
Oklahoma, Tulsa	12	**John H. Yoe**	
Panhandle Plains, Amarillo, Tex.	14	**John H. Yoe**	
Purdue, Lafayette, Ind.	7	**O. K. Behrens**	Enzymes
Rhode Island, Metcalf Auditorium, Brown University, Providence	11	**R. L. Shriner**	The Chemistry of Isoflavones
Rochester, Cutler Union, Prince Street Campus, University of Rochester	7	**Vincent du Vigneaud**	Transmethylation as a Metabolic Reaction
St. Louis, Lecture Room A, First Floor, St. Louis University School of Medicine	7	**John H. Yoe**	Some Recent Advances in Colorimetric Analysis
South Carolina, Chemistry Building, Wofford College, Spartanburg	8	**I. M. Kolthoff**	Aging of Crystalline Precipitates
South Jersey, Du Pont-Penns Grove Country Club, Penns Grove	15	**W. H. Sebrell**	Nutrition
Southeast Kansas, Room 210, Science Hall, Kansas State Teachers College, Pittsburg	11	**John H. Yoe**	Some Recent Advances in Colorimetric Analysis
Southeast Tennessee, Chattanooga	4	**I. M. Kolthoff**	Polarography and Amperometric Titrations
Toledo, University of Toledo	3	**Charles A. Thomas**	
Virginia, Richmond	11	**I. M. Kolthoff**	Polarography and Amperometric Titrations
Washington, D. C., Cosmos Club	10	**Gustav Egloff**	Substitute Fuels in a World at War
Western Maryland, Fort Cumberland Hotel, Cumberland	9	**Milton Harris**	Properties of Fibers as Related to their Chemical Structures
Wichita, University of Wichita Science Hall, Room 306	10	**John H. Yoe**	

SHARPLES IN THE WAR



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We had a great story to tell . . . and one of which we were very proud. But it has been silenced for the duration.

This story concerned Sharples' part in the preparation of a perfected blood plasma, the modern miracle that is saving and will save thousands of lives on America's fighting fronts.

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Pure Mercury

OTTO H. MÜLLER

Cornell University Medical College, New York, N. Y.

IN A recent article on this subject (*1*), E. Wichers, of the National Bureau of Standards, has pointed out that the condition of the surface of mercury is a sensitive measure of chemical purity. The presence of base metals in a concentration of 1 part in 1,000,000 is indicated by either the formation of a film or "tailing" of the mercury when it is shaken in a glass flask after having been dried. The following procedure, of equal simplicity and based on the same principles, might be used instead of, or in conjunction with, the above. It serves to indicate the degree of progress during the purification of the mercury. The writer learned of this test in the laboratory of J. Heyrovsky in Prague but is not sure that it originated there.

Many may be surprised to learn that pure mercury shaken with distilled water forms a fairly stable foam which disappears gradually in from 5 to 15 seconds. In contrast to this, very "dirty" mercury does not foam at all. Mercury which contains mere traces of impurities does foam when shaken with water, but the foam is stable for 1 or 2 seconds only and then collapses suddenly. Experiments performed in this laboratory have shown that the sensitivity of the foam test is of the same order as the procedure described by E. Wichers (*1*). For instance, an amalgam of 1 mg. of copper in 1 kg. of mercury will fail to give a stable foam when shaken with distilled water. It should be pointed out that the distilled water must not contain any organic material and that the flasks used must be scrupulously clean. A strip of litmus paper dipped for a few seconds into the water to determine its acidity will contaminate it sufficiently to prevent a stable foam with pure mercury. Whenever impurities are present, a film is clearly visible on the surface of the mercury. While pure mercury in contact with water has a mirror-like surface, prolonged shaking usually produces a slight film, probably on account of the presence of carbonate.

The foam test has proved of value in the following procedure for purifying mercury for polarographic studies. The used mercury is first shaken with water in a heavy-walled separatory funnel. [If the mercury is very "dirty", air is sucked through the separatory funnel as described by E. Wichers (*1*)]. The lowest, cleanest portion of the mercury is then allowed to fall through the ungreased stopcock in a fine stream of small drops into a heavy-walled flask or separatory funnel partially filled with a solution of nitric acid and mercurous nitrate. Next, the mercury is shaken with the acid for several minutes and drained through a separatory funnel, again in a fine stream of small drops, into a flask partially filled with distilled water. If some acid has come along with the mercury, a second washing with distilled water is necessary before a stable foam results when the mercury and water are shaken together. If no stable foam appears, further purification with nitric acid is indicated. The scum retained in the funnel after each separation is collected in a special flask for further treatment.

The mercury which produces a good foam with water is poured through a pinhole in a cone of filter paper and can be completely squeezed through this pinhole without leaving any residue on the paper. Such mercury, when dry, satisfies the purity test described by E. Wichers (*1*), and can be used directly for "pool" mercury anodes in polarography. Before the mercury is used for the dropping mercury electrode, however, it is usually purified further by vacuum distillation to remove any noble metals which might lower the very high hydrogen overvoltage observed on pure mercury.

Literature Cited

(1) Wichers, E., CHEM. ENG. NEWS, 20, 1111 (Sept. 10, 1942).

Drawback Provisions of 1942 Revenue Act

THE drawback provisions of the 1942 Revenue Act relate to "distilled spirits" generally (whisky, brandy, rum, gin, etc.) and not "alcohol" exclusively. Such drawback privilege was conferred by an amendment to Section 3250 of the Internal Revenue Code relating to special taxes. This does not give the Bureau of Internal Revenue much power to regulate business conducted by the new class of manufacturers of the products mentioned in the new subdivision L of this section. Any manufacturer can pay the new special tax and, if he is able to procure the taxpaid distilled spirits, will be entitled to the drawback of $3.75 per proof gallon. Had the privilege been restricted to "alcohol" and conferred by an amendment of subchapter C of the code relating to "industrial alcohol", there would be abundant authority to regulate the manufacturers who could obtain the drawback and their business.

Sulfur Trends in September

ALTHOUGH production of sulfur in September 1942 declined 1 per cent from the preceding month, the output in the first nine months of 1942 was 21 per cent greater than in the corresponding period of 1941, according to a statement released by the Bureau of Mines, U. S. Department of the Interior. Mine shipments of sulfur decreased 11 per cent in September compared with August. Producers' stocks were increased 1 per cent during September.

Flash of Genius

IF YOU still have space to devote to the "Flash of Genius" (*1*) discussion, I think your readers will be interested in the following extract from page 491 of the "Report of the Commissioner of Patents for the Year 1849".

Errors Entertained Respecting Inventors

IT IS a prevalent opinion that both ordinary and extraordinary inventions cost their authors little labor and thought to develop: nothing is more erroneous. It is an essential element of man's being and of the constitution of things under which he exists that all truths, mechanical or philosophical, can only be realised by strenuous and continued effort. Our perceptive faculties are too obtuse, and happily for us it is so, to apprehend them at a glance. In that case, they would be held too cheap to be looked for and deemed worthless when seen. If inventions required no exertion to discover, where would be their value? If virtue cost nothing, it would cease to be virtue. No fact is clearer than that man's destinies are in his own hands and that he alone can exalt and debase them. To rouse him to be faithful to himself is Nature's ceaseless care. With powers dormant in him and equal to every exigence, she leaves him to exert them or not. She does naught for him that he can do for himself and has taken care that he shall know nothing, have nothing, that he does not strive for.

It is common to hear ingenious men disparaged by ascribing their best things to lucky or random suggestions—whereas, though appearing fortuitous, they may always be traced to previous reasonings or reflections: sprouting seeds whose transient plantings had been little noticed and forgotten. They had never sprung up had they not fallen on soils prepared by previous culture to receive them. Sparks set not sand on fire, nor do fruitful ideas germinate in barren minds. Flashes of thought, like those of the electric fluid, may dart suddenly and unexpectedly, but they are not less the regular effects of inducing causes. Inspiration descends not in its highest or its lowest forms, but on those who seek to be inspired.

It is not given to man to perfect aught without toil, and seldom without long-continued toil. The smith forges not a ploughshare with a blow, nor is any new device, however simple, matured save by repercussions of thought. "Nul bien sans peine" is a universal truth.

C. L. PERKINS

CHASE BRASS & COPPER CO.
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October 13, 1942

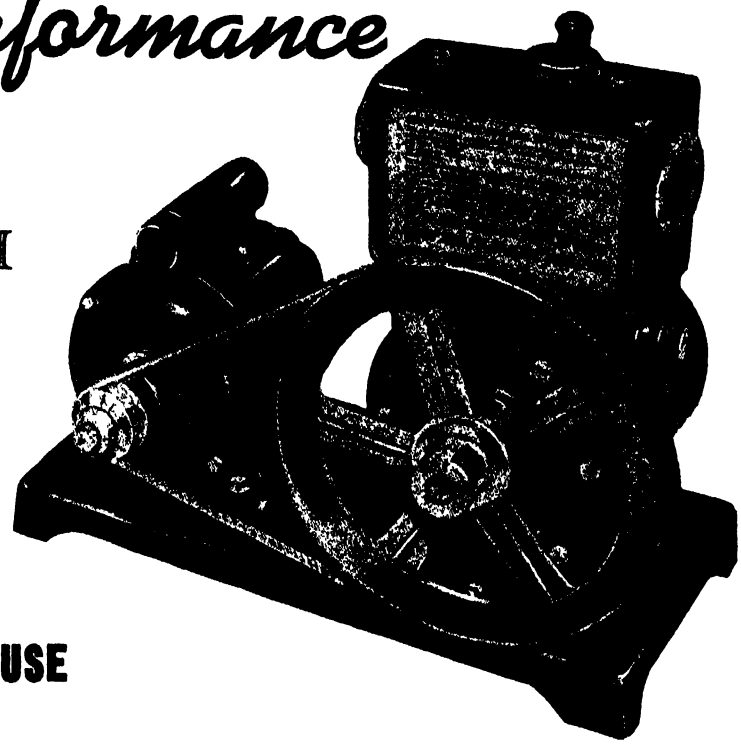
(1) CHEM. ENG. NEWS, 20, 523 (April 25, 1942); 806 (June 25, 1942); 1234 (Oct. 10, 1942).

Adam Piret, formerly advertising manager of the Winthrop Chemical Co., has been made advertising and sales promotion manager of Rare Chemicals, Inc., Flemington, N. J. Erik K. Pfau has been appointed sales and export manager. Rare Chemicals was acquired recently by the National Oil Products Co., and is being operated as a wholly owned subsidiary.

"Tops" in Performance

Versatile for HIGH VACUUM

— **DISTILLATIONS**
— **FREEZING**
— **DRYING**
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— **EVACUATIONS**
— **GENERAL LABORATORY USE**



MOTOR DRIVEN "Duo-Seal" HIGH VACUUM PUMPS — Mounted on Iron Base

	Guaranteed Vacuum	CAPACITY: Evacuation Speed Free Air per Minute	CAPACITY: When Operated	Number of Pump Stages	Duo-Seal Oil Required	Size of Motor	Motor Characteristics	Each
Highest Vacuum								
Large Capacity								
A72-701-H	0.05 Micron	33.4 Liters	300 r.p.m.	2	650 ml.	⅓ H.P.	110 Volts A.C.—60 Cycles	$140.00
A72-701-J	0.05 Micron	33.4 Liters	300 r.p.m.	2	650 ml.	⅓ H.P.	220 Volts A.C.—60 Cycles	140.00
A72-701-F	0.05 Micron	33.4 Liters	300 r.p.m.	2	650 ml.	⅓ H.P.	110 Volts D.C.	140.00
High Vacuum								
Larger Capacity								
A72-702-B	0.10 Micron	58 Liters	525 r.p.m.	2	650 ml.	½ H.P.	110 Volts A.C.—60 Cycles	$155.00
A72-702-C	0.10 Micron	58 Liters	525 r.p.m.	2	650 ml.	½ H.P.	220 Volts A.C.—60 Cycles	155.00
A72-702-D	0.10 Micron	58 Liters	525 r.p.m.	2	650 ml.	½ H.P.	110 Volts D.C.	155.00
High Vacuum								
Smaller Capacity								
A72-703-B	0.10 Micron	21 Liters	450 r.p.m.	2	550 ml.	¼ H.P.	110 Volts A.C.—60 Cycles	$75.00
A72-703-C	0.10 Micron	21 Liters	450 r.p.m.	2	550 ml.	¼ H.P.	220 Volts A.C.—60 Cycles	77.50
A72-703-D	0.10 Micron	21 Liters	450 r.p.m.	2	550 ml.	¼ H.P.	110 Volts D.C.	80.00

SEE BULLETIN 42-1011

for full discussion of the merits of Duo-Seal Pumps

UNMOUNTED "Duo-Seal" HIGH VACUUM PUMPS

Catalog	CAPACITY: Free Air per Min.	CAPACITY: When Operated	Stages	Each
A72-701	33.4 Liters	300 r.p.m.	2	$110.00
A72-702	58 Liters	525 r.p.m.	2	110.00
A72-703	21 Liters	450 r.p.m.	2	50.00

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OF DE-IONIZING WATER

REPLACES DISTILLED WATER AT A FRACTION OF THE COST

IN WAR PLANTS today, Illco-Way units are providing de-ionized water for improving *quality*, increasing *output*, and *cutting costs*. Until the development of de-ionizing equipment, the use of purified water was in many cases impractical due to high original and operating costs of distilling equipment.

De-ionized water produced by Illco-Way units contains from two to ten parts per million of dissolved solids, which is comparable to single-distilled water and which meets the requirements for almost all chemical or industrial purposes. Illco-Way units assure *reproducibility* of your laboratory results in factory operation, regardless of the quality of your water supply. The water produced is *uniform* at all times.

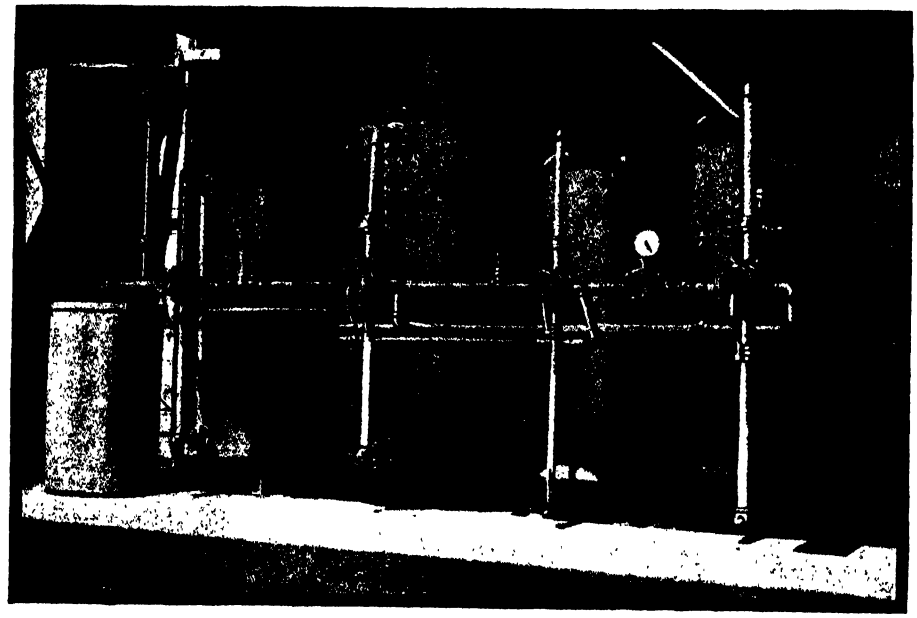
This modern, economical method replaces distilled water in *aircraft factories, synthetic rubber plants, pharmaceutical houses, mirror and ceramic plants, distilleries, process industries.* Write today for details regarding Illco-Way applications in *your* plant! Find out how Illco-Way equipment can speed production and help cut costs!

1000 GALLONS FOR LESS THAN A DOLLAR! On the average water supply, the cost of the water is less than a dollar per thousand gallons — *including depreciation and maintenance!* And when the supply is low in dissolved solids, the cost may be considerably less — even as low as 20,000 gallons for one dollar.

HIGH FLOW RATES Where large quantities of pure water must be supplied in a short space of time, the high flow rates of the Illco-Way units are particularly advantageous. The smallest unit has a permissible flow of 100 gallons an hour, with the output of larger units increasing up to 50,000 gallons per hour.

AUTOMATIC Operation is completely automatic until capacity is reached, when unit is regenerated in much the same way as a water softener. A conductivity meter indicates the purity of the treated water. Units will not lime up because *no heat is used.*

SMALL FLOOR SPACE The Illco-Way unit is compact. A unit delivering 300 gallons per hour occupies a space roughly 4 feet by 8 feet, and a unit delivering an uninterrupted flow of 30,000 gallons per hour occupies a floor space approximately 11 feet by 70 feet.



Typical Illco-Way unit installed in an aircraft factory. Capacity: 2,000 gallons an hour. No heat is used — this means an important saving in fuel!

OPERATION *Amberlite synthetic resins* are employed exclusively because of their high capacity, high exchange velocity and extreme durability. In operation, the water passes through two beds of Amberlite resins in series, which remove first the positive, then the negative, ions.

TESTED IN THE LABORATORY — ILLCO-WAY — PROVED IN THE FIELD

Feed Water Treatment Plants • Zeolite Softeners • Filters • Treatment Equipment for Water and Non-aqueous Chemicals

Manufactured and Guaranteed by

ILLINOIS WATER TREATMENT CO.

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WATER TREATMENT ENGINEERS

Amberlite

ION EXCHANGE RESINS

For large scale production OF DE-IONIZED WATER *at low cost*

THE production of "De-ionized" water -- water comparable in degree of purity to distilled—was made possible for the first time by the introduction of the AMBERLITE Synthetic Ion Exchange Resins in 1940.

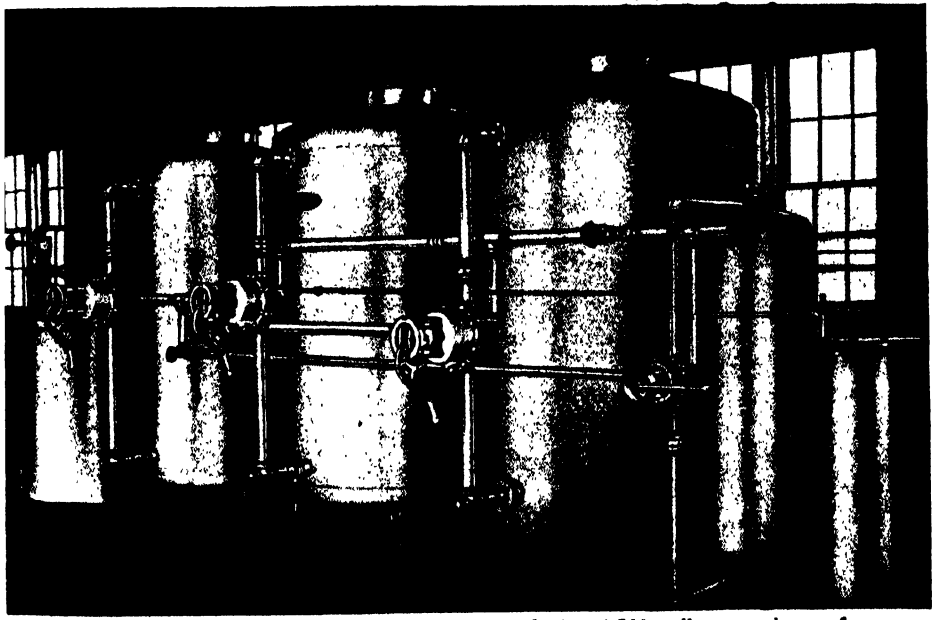
Commercial installations of these Ion Exchange Resins De-ionizer units are in operation in a wide variety of industries where the use of very pure water in quantity is of vital importance. De-ionized water, being completely salt-free, is playing an important part in the synthetic rubber, pharmaceutical, distilling, mirror and other process industries.

Water conditioning represents but one of the possible fields of application for these unique products. The de-ionizing of sugar solutions and of gelatine, the removal of injurious heavy metals from a variety of chemicals, the de-acidification of formaldehyde, represent but a few of the many special applications now possible. Because of the inherent flexibility of the AMBERLITE Ion Exchange Resins, the possible range of applications is almost unlimited.

Have you considered this unique process in your own industry where problems of increased supplies of distilled water, condensate substitution, or other special water conditioning processes are involved?

For further data on AMBERLITE Ion Exchange Resins write the Resinous Products & Chemical Company, the sole producer of these resins in the United States.

Courtesy of Illinois Water Treatment Company



Typical AMBERLITE Ion Exchange unit producing 4,500 gallons per hour of De-ionized water—comparable to distilled water—in a synthetic rubber plant.

THE RESINOUS PRODUCTS & CHEMICAL COMPANY

WASHINGTON SQUARE, PHILADELPHIA, PA.

Chemistry Comes of Age

THE half century it took the natural rubber industry to reach an annual production of 600,000 tons will be duplicated in one-twenty fifth the time by the chemical industry in providing 1,100,000 tons of synthetic rubber by 1944, Charles Allen Thomas of Dayton, Ohio, director of the Central Research laboratories of Monsanto Chemical Co., said November 12 at a meeting in St. Louis of 1,800 sales executives representing a cross section of American industry.

"Under wartime urgency, the chemical industry has been called upon to supply, in less than two years, enormous quantities of synthetic rubber raw materials. The goal is 1,106,000 tons by January 1944, and the job will be done", Dr. Thomas told his audience. Other points brought out in his interesting address follow:

After the war, instead of natural rubber alone, we shall have numerous chemical elastomers to fit specific needs. * * *

* * * In laboratories throughout the country investigations are going on behind closely guarded doors which may at any instant revolutionize the course of the war. * * *

The development of tetraethyl lead and other anti-knock chemicals has revolutionized motor fuels and motor design. * * *

The infant plastics industry has already invaded fields previously sacred to products such as metals, wood, and stone. The mechanical engineer and the plastics engineer will get together and make tougher and more durable plastics that will be used in home building as well as for the structural parts of motor cars and planes.

* * * Many of the raw materials of our chemical industry are being obtained and will be obtained in still larger quantities from our farms. * * *

The field of medicine is a striking example of what can be accomplished by a better knowledge of chemistry. It has been said that the sulfa drugs mark one of the greatest advances in medical science in the past 50 years. * * *

Even food itself is being revised. A continuous stream of new foods is emerging from the chemical laboratories—concentrated, enriched, dehydrated, precooked, quick-frozen, synthetic as well as new plant and animal varieties.

Dr. Thomas further commented on some of the ways in which the living habits of the nation may be changed in the not too distant future.

Ipatieff Honored



VLADIMIR NIKOLAEVICH IPATIEFF and his wife were guests of honor at a banquet tendered by the Chicago chapter of the American Institute of Chemists, on November 20 in Chicago.

Three important phases in the lives of this distinguished couple were celebrated; his 75th birthday, the golden jubilee of his career in chemistry, and their golden wedding anniversary.

Gustav Egloff presided and introduced the chairman, Vanderveer Voorhees.

Frank C. Whitmore spoke on "Ipatieff—His Influence on World Chemistry", Professor Ipatieff discussed, "My Twelve Years in the U. S. A.", Dr. Egloff spoke on "Ipatieff's Influence on Industry", and Ward V. Evans paid tribute to "Ipatieff, the Scholar".

Metal Cleaning

THE first of a series of reports on the use of Dresinate in specific industries has been made in a booklet just issued by Hercules Powder Co., Wilmington, Del., for metal cleaning. Dresinate, the neutral sodium salt of selected rosins, is a dry, free-flowing powder, with each particle water-soluble.

Dresinate, in its various types, produces rapid wetting of surfaces, emulsifies oils, greases, and other types of dirt removable with alkaline cleaners, and maintains the soil in suspension to assure a thorough rinsing action. It also makes possible a replacement of solvent baths by alkaline baths.

Manufacturers' War Posters to Be Shown during War Congress

AN EXHIBIT of representative war production posters designed for and used by manufacturers since last December 7 will be one of the feature attractions of the War Congress of American Industry that convenes in New York, December 2, 3, and 4.

The posters, to be selected by a jury of three experts in the field of personnel management, advertising, and poster art, will be examples of what have done outstanding jobs in building employee morale or combatting industrial problems that threatened to impede production.

The exhibit is arranged by the War Committee of the National Association of Manufacturers to give the industrialists who will attend the congress ideas and suggestions for use in their own plants.

Fertilizer Supply Ample for Next Year

AMERICAN farmers will be able to get most of the fertilizer they need to meet crop production goals next year, Frank W. Parker of the U. S. Department of Agriculture, said November 12, in a talk before the American Society of Agronomy meeting in St. Louis.

Dr. Parker, who is in charge of soil and fertilizer investigations in the department, indicated there would be a record demand for fertilizers owing to the great increase in farm cash income for 1942. He predicted there would not be enough nitrogen to meet this demand but said there would be enough for essential requirements and to enable American farmers to meet crop production goals. Adequate supplies of both phosphate and potash were predicted.

Testimonial Dinner of Ralph L. Evans Associates

IN APPRECIATION of their efforts and accomplishments during the year, Ralph L. Evans Associates, 250 East 43rd St., New York, N. Y., reversing the usual practice, gave a testimonial dinner for its own staff on October 30 at the Hotel Biltmore. Sixty-eight attended.



Hydrogenation Apparatus for the Investigation of EXPLOSIVE REACTIONS

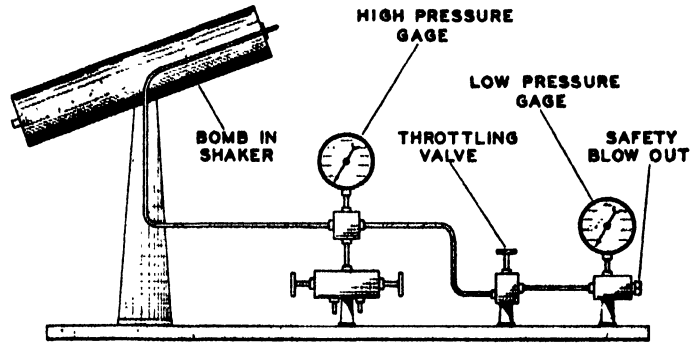
AMINCO now offers a solution of the otherwise hazardous problem of investigating chemical reactions liable to explode, by introducing apparatus for ascertaining the safe limit of operation without the hazard of explosion. This apparatus is one of the many offered by the Aminco Superpressure Division which keeps abreast of the latest developments in the modern field of superpressure technique.

AMINCO

AMINCO engineers have specialized in Superpressure and Catalytic Hydrogenation Apparatus ever since the inception of this modern technique, and they have maintained a leading position in this field. Much of the synthetic organic chemicals now in use in the fields of science and general commerce was first produced in Aminco apparatus, and hundreds of laboratories are now using Aminco apparatus for further extension of these studies.

★

Write for New Catalog NP406



Schematic Diagram of Aminco Apparatus for the Study of Explosive Reactions

This apparatus differs from the standard Aminco Hydrogenation Apparatus in that: (1) a special bomb is used, which may be tested for pressures up to 100,000 lb. per sq. in., depending on conditions; (2) a high-pressure gage is connected to the bomb, and a pressure gage is mounted in parallel with it (a novel arrangement prevents the latter gage from bursting should an explosion occur within the bomb).

AMERICAN INSTRUMENT CO.
8010 GEORGIA AVENUE · SILVER SPRING, MARYLAND

ACETONITRILE
CH_3CN

A new chemical already very important in vitamin synthesis. It is a stable, clear, colorless liquid miscible with water, alcohol, acetate esters, acetone, fatty acids, and cellulose acetate and nitrate. Its insolubility in oils, fats and hydrocarbons suggests its use as an extraction agent to purify lubricating oils, waxes, etc. Its low boiling point of 82°C. makes it easily recoverable. Its constant boiling mixture with water boils at 76°C. and consists of 84% Acetonitrile and 16% water.

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GREEN'S
HAND FOLDED FILTER PAPERS
"FOR THE BEST"
No. 788 or No. 488
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"HAVE NO EQUAL"
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NECROLOGY

William Hussey Adams

WILLIAM HUSSEY ADAMS died in Newark, Del., on October 26. He took his technical training in chemistry at the Massachusetts Institute of Technology, from which he was graduated in 1891. He became connected with the Silver Springs Bleachery, Providence, R. I., as chemist, and held this position for several years. For over 40 years he served the Wm. L. Barrell Co., New York and Boston, first as chemist, later as vice president and general manager of the Eastern Finishing Works, a subsidiary organization, and finally as technical adviser to the New York office, a position that he held until his retirement in 1939.

Mr. Adams' work lay largely in the field of heavy cotton fabrics and he made many contributions, especially in the art of waterproofing and mildew-proofing such fabrics. He had numerous patents and publications in this and related fields.

Mr. Adams had been a member of the AMERICAN CHEMICAL SOCIETY since 1917.

Albert L. Barrows

ALBERT L. BARROWS, executive secretary of the National Research Council, died in Washington, D. C., November 7, at the age of 59.

Dr. Barrows received the M.S. and Ph.D. degrees from the University of California, taught for three years at the Science High School, Cavite, Philippine Islands, and later served as instructor at the University of California. During World War I he entered the Army as lieutenant and was promoted to captain while in France with the 347th Machine Gun Battalion. He was later lieutenant colonel in the 320th Infantry Reserve. He went to Washington in 1919 as assistant secretary of the National Research Council, and became executive secretary in 1934.

He was a member of the American Association for the Advancement of Science, the California Academy of Science, the Paleontological Society, the Biological Society of Washington, and the Cosmos Club. He was a member of the Advisory Committee to the State Department for Exchange Fellowships and Professorships.

David W. Haering



DAVID W. HAERING, an authority on corrosion by water, died October 30, in Chicago, Ill., at the age of 34. Mr. Haering was born in Chicago and received his Ph.C. degree from the University of Illinois in 1929. He was the president and technical director of D. W. Haering & Co., Inc. Under his direction the research laboratories developed 28 different organic glucosides for the control of scale and corrosion in aqueous systems.

Mr. Haering served as consultant for the Government on war camp sites and was the author of "Organic Methods of Scale and Corrosion Control". He was a member of fourteen chemical and engineering societies, including the AMERICAN CHEMICAL SOCIETY, which he joined in 1934, and formerly served as president of the American Society of Refrigerating Engineers.

John Helfrich

JOHN HELFRICH, chief chemist of the publishing laboratories of William Randolph Hearst, died November 10 at Ridgewood, N. J., at the age of 61. Mr. Helfrich was born in New York, was employed for some time by the Chemical Catalog Co., and for 10 years had been chief chemist for Hearst. In 1924 he became a member of the AMERICAN CHEMICAL SOCIETY.

Louis Krumbhaar

LOUIS KRUMBHAAR, formerly secretary of the Solvay Process Co., died November 5 at the age of 81. He was born in Paris, France, and spent his early years in Philadelphia. He was a graduate of Harvard University.

Stanislas Pilat

STANISLAS PILAT, noted Polish chemist, died recently in Lvow. Until the outbreak of the war he was connected with the Polish State Refineries. He was a prolific writer, specializing in the chemistry of naphthenic acids and their derivatives, and was particularly interested in the synthesis of compounds that simulated or excelled the properties of natural hydrocarbons. He had been a member of the AMERICAN CHEMICAL SOCIETY since 1927.

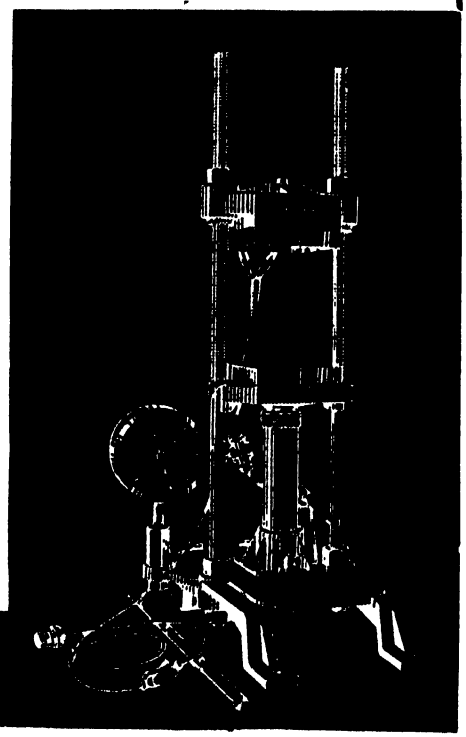
THE CARVER LABORATORY PRESS

Standard Equipment for experiments in oils, wax, fibrous materials, plastics and many other substances which require a press that is accurate, simple in operation, powerful, small and compact — complete accessories.

The characteristic design of The Carver Laboratory Press is well known. The press and certain of its accessories are patented.

Load 0 to 20,000 lbs.
Height 36"
Weight 125 lbs.

Catalog on Request.



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HYDRAULIC EQUIPMENT
[illegible] HUDSON ST. NEW YORK

Louis J. Plumb

LOUIS J. PLUMB, president of the United States Rubber Reclaiming Co., died in Bronxville, N. Y., on November 7 at the age of 58.

Mr. Plumb entered the employ of the United States Rubber Reclaiming Co. in 1905 as chemist, a year after graduation from Princeton University. The company was the second in the business to employ a chemist, and Mr. Plumb was credited with important work in introducing the scientific method in the industry. He obtained the master's degree from Princeton in 1907, with a thesis on the chemistry of rubber. He became chief chemist of the company in 1910, later sales manager, and vice president, and in 1925 was made president and treasurer, positions which he held until his death. He was also president of the D. S. Plumb Co., manufacturer of clock works and intricate machinery, a firm founded by his father.

Mr. Plumb was chairman of the executive committee of the Rubber Reclaimers' Association, where he acted as a liaison expert between the entire industry and the War Production Board. He had been president of the association. In 1910 he joined the AMERICAN CHEMICAL SOCIETY, and was active in the formation of the Division of Rubber Chemistry.

Leopold Singer

LEOPOLD SINGER, well-known petroleum chemist, died in London on June 10 in his 73rd year.

Dr. Singer was a native of Vienna, and a graduate of the University of Vienna and the Zurich Polytechnic Institute. He started his practical career in his father's refinery at Orsova, and began to replace empirical methods by more scientific methods. The sweetening of gasoline, the use of fuller's earth, and the recovery of low-boiling point gasoline from distillation gas were his inventions. In 1903 he took charge of the Fanto A. G. in Czechoslovakia, and held the position until 1912, developing it until it became one of the biggest and best equipped refineries in Europe. In 1914 he took charge of the completion and management of the lubricating oil plant of the Rhenania Refinery in Düsseldorf. In 1918 he was appointed consultant to the Allgemeine Depositenbank in Vienna, and in 1926 joined the staff of the Universal Oil Co. as chemical consultant and was connected with this company until the time of his death.

Dr. Singer had taken out many patents, especially on fractionating columns, high-vacuum distillation plants, production of lubricating oil and paraffin wax, etc. He was the author of numerous books and scientific articles. Since 1927 he had been a member of the AMERICAN CHEMICAL SOCIETY and since 1925 had been actively associated with the Institute of Petroleum.



One plate of stainless steel if rolled into a plate of Jessop Silver-Ply Stainless-Clad Steel (20%) cladding, will make available 5 *times* more stainless surface.

Use of 5% to 50% Silver-Ply Stainless-Clad Steel conserves strategic alloys for the war effort . . . and you still have the desired protection of stainless steel on the clad side, strength from the mild steel backing and better thermal conductivity. It also economizes on material costs with savings up to 45% as compared to solid stainless.

If your operations involve processes where corrosion of equipment must be avoided and product purity must be maintained, Silver-Ply Stainless-Clad may solve your problems, for it is corrosion resisting, stain-free and easy to clean.

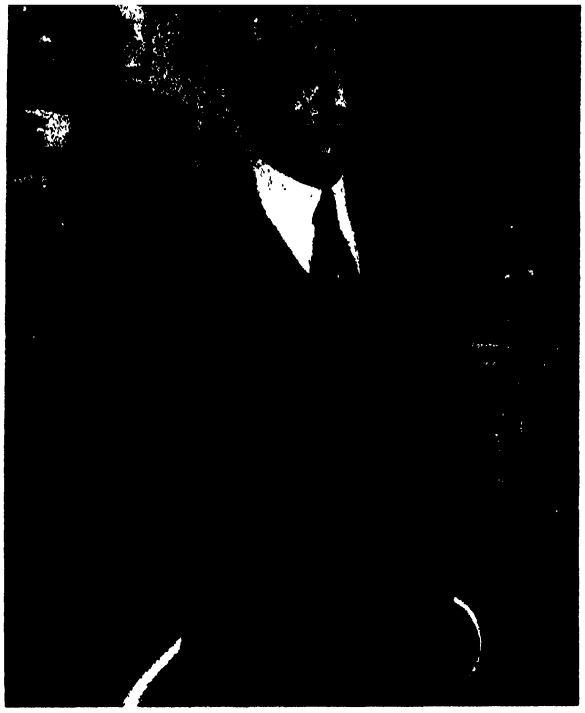
Write for descriptive booklet listing applications for processing and storage equipment for use in your specific industry.

*Manufactured under U. S. Pat. Nos. 1,997,538 and 2,044,742

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WASHINGTON, PENNA., U. S. A.

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Presentation of Memorial Portrait

Portrait of Alexander Lowy, painted by N. MacGilvary, Department of Painting and Design, Carnegie Institute of Technology, presented to the University of Pittsburgh recently by the chemistry alumni, faculty, and students. W. L. Baldwin, assistant professor of chemistry, presided as chairman of the Memorial Committee.

From a Patriotic Professor to One of His Star Students

Dear John:

I WAS certainly shocked to get yours of the 12th and to learn that you are considering the peculiar kind of patriotism represented by giving up your years of training and experience in chemistry at a time when that type of training and experience is so badly needed in the war effort. Apparently you have gotten out of touch with things to the extent that you do not realize that chemistry is needed primarily in the production army and not in the combat forces.

Have you kept up with the situation as given in CHEMICAL AND ENGINEERING NEWS? For instance, in the October 10, 1942, issue on page 1219, there is a column about you and men like you who think that this is still the Battle of Lexington.

Most certainly, I shall not write a letter of recommendation for you to join the Reserve. First of all, I do not believe in the move from the point of view of winning the war, and secondly, if I were honest about it, I would have to certify that something has happened to your mind which I cannot pretend to understand.

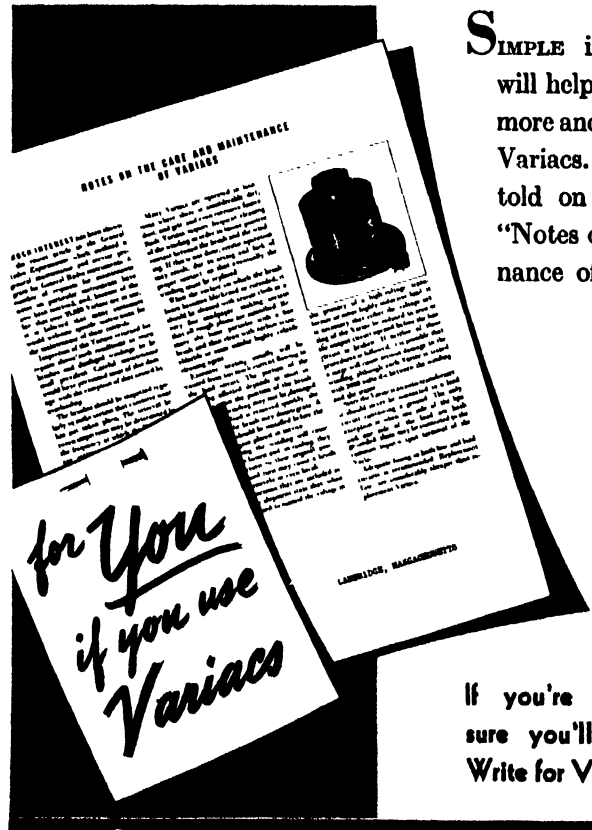
Try to wake up and do your bit.

Perhaps you feel that you are not now doing the most you can by means of your chemistry for the winning of the war. You should stop and realize that as an entire nation, we are probably not yet over 10 per cent into total war. When we really go all the way, we shall be in a desperate position for chemical talent. The only chemical reserve which we have consists of men who are not *yet* in full war work.

I have scores of letters from chemists in the Army and the Navy in the U. S. A., England, and Australia, who are completely upset because the work they are doing could be done exactly as well by any liberal arts graduate, either with or without freshman chemistry. I sincerely hope you will not swell the ranks of these misplaced chemists.

If you can't get straightened out on the facts, please write me again and freely. I have only one interest, namely, to win the war.

RICHARD ROE



SIMPLE inspection and cleaning will help you get longer life plus more and better service from your Variacs. What to do is concisely told on a single sheet entitled "Notes on the Care and Maintenance of Variacs." The simple procedures described will save hours that would otherwise be lost in making repairs or replacements and will help conserve materials vital to the war effort.

If you're using Variacs, we are sure you'll find this sheet useful. Write for VARIAC SHEET No. 811.

GENERAL RADIO COMPANY
Cambridge, Massachusetts

War Training Evening Courses in Industrial Chemistry

THREE war training evening courses in industrial chemistry have been inaugurated by the Case School of Applied Science, Cleveland, Ohio, free of charge. These cover industrial materials analysis, chemical engineering for production supervision, and explosives. Classes began November 16, 1942.

Scrap Campaign Sound Film

AN INDUSTRIAL film, "Let's Get in the Scrap", is being widely used as a means of educating executive personnel on how to organize and successfully conduct an in-the-plant metal salvage campaign.

Prepared by the National Association of Manufacturers, New York, N. Y., with the approval of the War Production Board's Conservation Division, the film, released in early September, is being used by upwards of 350 industrial plants, institutions, and associations.

The 20-minute sound-slide film can be shown on standard 35-mm. projector equipment.

NEWS-MAKERS

Captain James B. Cordiner, Jr., completed the nine weeks' general staff course at the Command and General Staff School, Fort Leavenworth, Kans., in September, and is now assistant supply officer at the antiaircraft training center at Camp Stewart, Ga.



W. L. Faith

W. L. Faith, formerly head of the Division of Chemical Engineering, Kansas State College, is beginning his duties as professor and head of chemical engineering at the State University of Iowa, Iowa City, Iowa.



Pieter Honig

Pieter Honig, former director of the Experimental Station of the Java Sugar Industry at Pasoeroean and during the past year director of the Rubber Research Institute at Buitensorg, Java, left Java just before the surrender of the Netherlands-Indies to the Japs and came to the United States. He has been appointed commissioner of the Board for the Netherlands-Indies, Surinam, and Curacao, New York, N. Y., and will direct postwar reconstruction problems in relation to the agricultural industries of the Netherlands-Indies.

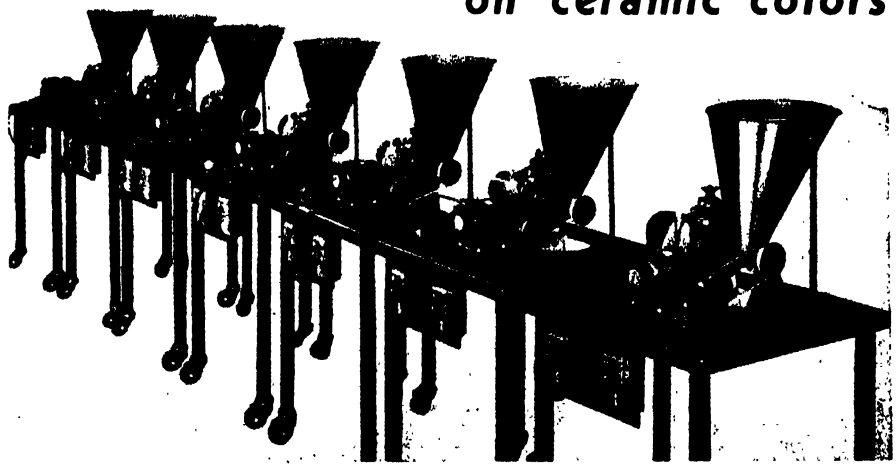
H. J. Mandernach has been appointed sales manager of the Replacement Tube Section, General Electric Radio, Television, and Electronics Department, Bridgeport, Conn.

Lieutenant Frederick A. Meier is now serving as special service officer in the Troop Carrier Command of the U. S. Army Air Corps. He was previously instructor in general and organic chemistry at the Bridgewater Teachers College, Bridgewater, Mass. He is located at the Florence Air Base in South Carolina.

John C. Mertz has resigned as assistant professor at the University of Connecticut to accept a position as metallurgist at the Pratt and Whitney Division of the United Aircraft Corp., East Hartford, Conn.

Geo. W. Muhleman, who was retired from Hamline University in June 1941, has

Battery of "Lab" Mills used on ceramic colors



Raymond Laboratory Units



(Interior view) Cover removed from grinding chamber, showing rotor with swing hammers and screen in base of the mill.

are specially adapted for product development work, for preparing test samples and for experimental research in connection with powdered materials.

The Laboratory Mill is a small capacity grinding unit, capable of handling a few pounds at a time. It produces the *same character* of finished material as the commercial size pulverizers. Driven by a motor mounted on rotor shaft, and equipped with a hand-operated feeder on standard mill. Also furnished with power driven feeder, as shown above.

The Laboratory Air Separator is a 10-inch diameter motor-driven unit for classifying small quantities of dry powdered materials or for separating the grind of laboratory size mills. Set of interchangeable whizzers and fans furnished with it for regulating the fineness.

Write for Bulletin #48

RAYMOND PULVERIZER DIVISION
COMBUSTION ENGINEERING COMPANY, INC.
1316 North Branch Street, CHICAGO
Sales Offices in Principal Cities
Canada: Combustion Engineering Corp., Ltd., Montreal

become acting associate professor of chemistry and head of the Department of Inorganic Chemistry of the North Dakota Agricultural College, Fargo, N. Dak., for the duration. For the year 1941–42 he was visiting professor at Alma College, Alma, Mich.

Robert T. Olsen has completed requirements for the degree of Ph.D. in organic chemistry at the Massachusetts Institute of Technology and is now employed as research chemist at the Grasselli plant of the General Aniline & Film Corp., Maplewood, N. J.

F. W. Parker, E. I. du Pont de Nemours & Co., Inc., has accepted appointment for the duration of the war as chief, Division of Fertilizer Research, Bureau of Plant Industry, U. S. Department of Agriculture, succeeding **R. M. Salter**, who has been made chief of the bureau.

Harold L. Parks has been transferred from the Eastern Laboratories to the Wabash River Ordnance Works, in Indiana, where he will serve as laboratory consultant, supervising the construction and setting up of four laboratories in the high explosives section.

D. E. Pierce resigned his position with the Röhm & Haas Co. in May to become engineering assistant to **J. S. Bates**, vice president in charge of manufacturing, General Aniline Works Division, General Aniline & Film Corp. He has just been transferred to the position of chief engineer of the division, with headquarters at Grasselli, N. J.

Milton W. Powell, Jr., recently resigned as chief, Crown Cap Section, Manufacturing Division, Research Department, Continental Can Co., to take charge of the Connellsville, Penna., laboratory of the Anchor Hocking Glass Corp.

W. J. Reagan has been appointed melt shop research metallurgist with the



W. J. Reagan

Copperweld Steel Co., Warren, Ohio. He was previously connected with the Edgewater Steel Co.

Wm. B. Reynolds has accepted a position as assistant professor of applied science, College of Engineering and Commerce, University of Cincinnati. He was formerly instructor in chemistry at the University of Chicago.

Merrill L. Riehl has resigned his position as civil engineer, Division of Water, Columbus, Ohio, to accept the position of associate sanitary engineer, U. S. Army Corps of Engineers, with headquarters at Columbus.

Charles W. Rippie, formerly petroleum technologist for the Solvay Sales Corp., has joined the Petroleum Chemicals Department, Organic Chemicals Division, Monsanto Chemical Co., St. Louis, Mo., where he will handle technical sales work.

Joseph Robitschek has been engaged by The United States Stoneware Co. to take charge of its ceramic research program, with headquarters at Tallmadge, Ohio. Dr. Robitschek has had much experience in the production of chemical stoneware and refractory materials in Czechoslovakia, Belgium, France, and Germany.

Howard F. Shenton, formerly a consulting chemical engineer for the Design Department, Tennessee Valley Authority, has accepted a position as chemical engineering assistant to the production manager of the Agfa Ansco Division, General Aniline & Film Corp., Binghamton, N. Y.

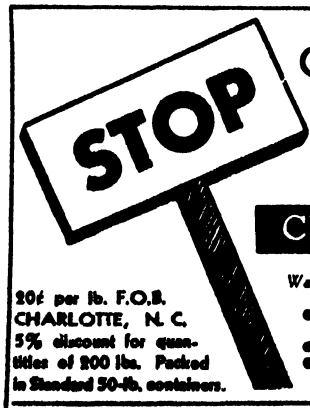
Jack Sherman has been granted a leave of absence from the research laboratories of the Texas Co. and is in Washington, D. C., engaged in defense work as physical chemist for the National Defense Research Council, Office of Scientific Research and Development.

J. A. Stekol, assistant professor of biochemistry at the Vanderbilt University Medical School, Nashville, Tenn., has joined the U. S. Army and is stationed at the Station Hospital, Camp Blanding, Fla.

Hutton W. Theller has been granted a research fellowship in cellulose chemistry by The Sylvania Industrial Corp., Fredericksburg, Va. Mr. Theller is a candidate for the Ph.D. degree in the Department of Pulp and Paper Manufacture, New York State College of Forestry, Syracuse University, and will continue his research at this institution.

Virgil Tweedie has recently joined the research staff of the Commercial Solvents Corp., Terre Haute, Ind. He was previously at the University of Missouri, where he was doing graduate work.

Edward A. White, formerly analytical research chemist with the Calco Chemical Division, American Cyanamid Co., is now in Washington, D. C., as sales representative of the Winthrop Chemical Co., New York, N. Y.



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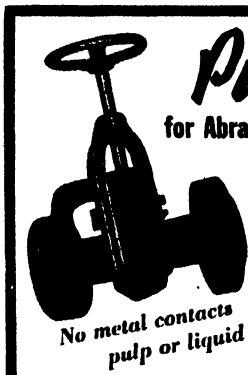
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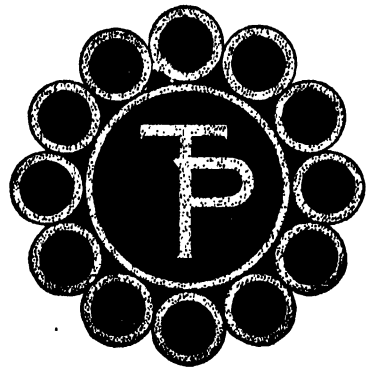
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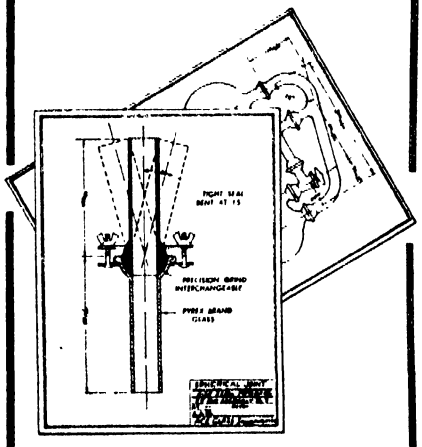
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Beilstein's Handbook Is to Be Reprinted

THE Alien Property Custodian has seized the copyright rights to the fourth edition of "Beilstein's Handbuch der organischen Chemie", the "bible" of the organic chemist. This work was originally published by Julius Springer, who issued Volume I of the main series in 1919. Subsequently, additional parts were released at irregular intervals until there are now 29 volumes of the Hauptwerk, plus a subject and formula index. There are also 27 volumes of the first and one of the second supplements, a total of 59 in 49 covers since more than one volume of the first supplement has in several instances been put in one binding. The cost of this set has been about $1800.

Because of the importance of this reference work in the war effort and because many of the earlier volumes need replacement, arrangements have been made by the Alien Property Custodian with Edwards Bros., Inc., lithoprinters, Ann Arbor, Mich., to copy photographically and reprint the entire series by the offset process.

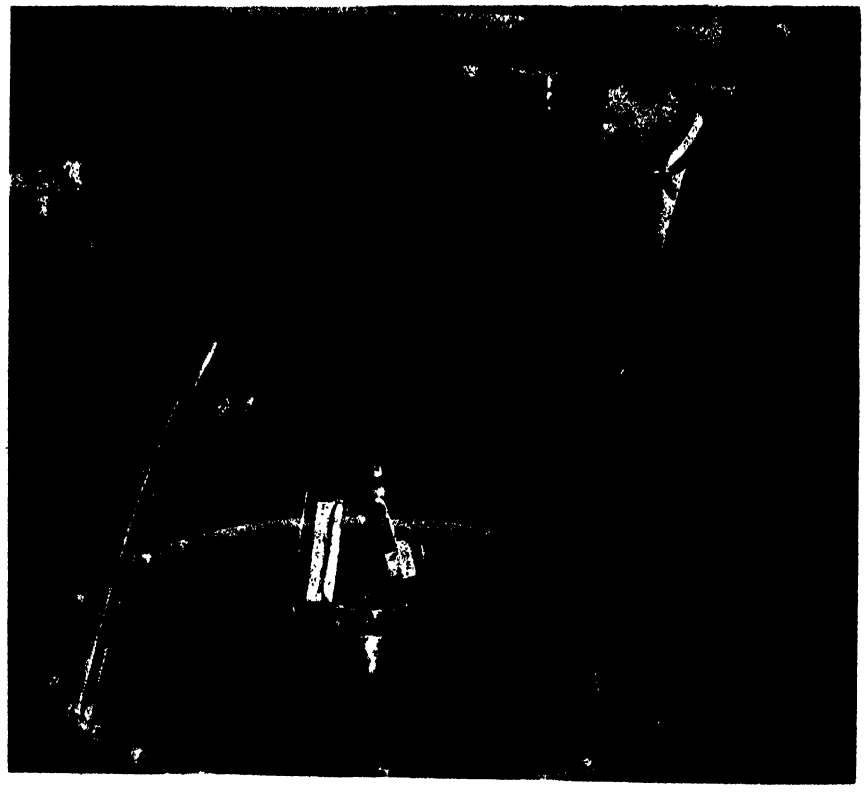
The only noticeable difference between the new and the original printing will be in the paper and binding. The former will be heavier and more durable, the latter standard library buckram.

The printing schedule calls for delivery of the first volume in December, completion of the work before next March. Whole sets are to be sold for $400. Individual bindings will cost $12.50 each. Many libraries have already ordered a second set to decrease the wear and tear on the one now in use.

First Three Volumes of Chemical Abstracts Reissued

INCOMPLETE sets of *Chemical Abstracts* have been accumulated by many libraries. It appears in a majority of cases that the shortages are Volumes 1, 2, and 3. Consequently, arrangements have been made with Edwards Bros., Inc., lithoprinters, Ann Arbor, Mich., to reproduce these three volumes with the full approval of the AMERICAN CHEMICAL SOCIETY and sell them, unbound, at $25 each. Owing to mechanical difficulties the page size (5.5 × 8.5) will be slightly smaller than the original but the paper will be a little heavier. The printing will be finished in December. Since this work is undertaken solely to meet current demands very few extra copies of any issue will be made beyond those actually ordered.

Should sufficient interest be shown, this project may be extended to include the first Decennial Index. All orders and correspondence should be sent to Edwards Bros. direct.



Plastic for Bomber Nose

Donald S. Frederick, recipient of the John Wesley Hyatt Award, examines the "nose" of an American bomber molded from large transparent sheets of methyl methacrylate plastic. The sections are accurately curved to conform to the contours of a plane. New fabricating methods were developed to form dome sections to meet the high optical standards required.



The Amateur Scientist. *W. Stephen Thomas.* 291 pages. W. W. Norton & Co., Inc., 70 Fifth Ave., New York, N. Y., 1942. Price $3.00.

SCIENTIFIC pursuits in amazing variety provide satisfying and stimulating avocations for a growing number of intelligent people. The appeal of science extends to persons in all walks of life and of all ages. The present book is primarily a survey of amateur science and an attempt to evaluate its social significance. Its author is executive secretary of the Committee on Education and Participation in Science of the American Philosophical Society. He is well qualified for the task and his book demonstrates this.

But the discussion of amateur scientists, their projects, their methods, and their organizations goes further than one would expect of a mere sociological survey. The accounts of the activities of individuals and groups suggest avenues by which others similarly inclined may share in the enjoyment of scientific pursuits. Indeed, the projects described and the methods employed in them proved fascinating to this reviewer. Naturally the subjects discussed fall largely into the category of nature study as being the most easily accessible field for the amateur.

National Formulary, VII. *American Pharmaceutical Association.* 960 pages + index. Mack Printing Co., Easton, Penna., 1942. Price, $6.00.

THE first edition of the National Formulary was published in 1888 to bring uniformity in medicinal preparations not recognized by the U. S. Pharmacopoeia. The Food and Drug Act of 1906 gave the National Formulary equal recognition with the U. S. Pharmacopoeia, and this was followed by the Food, Drug, and Cosmetic Act, thereby making the preparations used by physicians uniform all over the United States.

To comply with the requirements of the Food and Drug Administration all physiological titles have been eliminated. Preparations deleted from the Pharmacopoeia have been added, and many proposed for the National Formulary have been included in the new Pharmacopoeia.

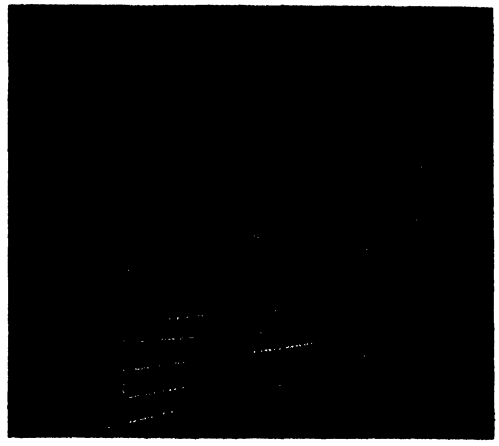
Directions for storage of drugs, alcoholic content of alcoholic preparations and average doses have been given. Uniform colors for drugs and chemicals are stated, tests for identification and strength are given wherever possible, thus providing standards for quality and purity, and where possible assays, both chemical and physiological, are included. A most complete list of reagents and tests, and also stains for bacteriological work, are included.

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vance of the previous edition, and it should be in the hands of every chemist, physician, and pharmacist. Great credit should be given to E. N. Gathercoal, chairman, his successor Justin A. Powers, and the members of the Revision Committee for the fine piece of work they have performed.

The Mack Printing Co., Easton, Penna., printers and distributors of this volume, have performed a fine piece of work. The text and binding show that they used great care in the make up and headings, which are exceedingly clear.

S. L. HILTON

A Manual for Explosives Laboratories. *G. D. Clift* and *B. T. Fedoroff.* 2nd ed. 202 pages. Lefax, Inc., Philadelphia, Penna., 1942. Price, $2.00.

THIS little volume is made up of pages similar to the well known "Lefax" data sheets, bound together in loose leaf form, in order to allow for future revisions and additions, as well as for personal notes. The authors state in the foreword that it is intended to facilitate the task of those responsible for the training of personnel to work in the laboratories of the many new explosives plants now being built.

The material is grouped in eighteen chapters, of which the first ten are largely devoted to methods suitable for the laboratory control of TNT manufacture. Twenty-three pages are concerned with methods of analysis of mixed acids, oleum, and spent acids, as used in the explosives industry. There are fourteen pages dealing with the preparation and standardization of volumetric solutions. The ultimate standard recommended for alkalimetry and acidimetry is potassium acid phthalate, which seems a bit surprising for a laboratory which will be concerned almost entirely with the titration of strong acids. However, other methods of standardization are mentioned.

Three chapters are concerned with the nitration of toluene, the purification of crude TNT, and the separation and identification of the impurities.

There is a chapter on nitroglycerine, and nitroglycerine explosives, as well as one on nitrocellulose and smokeless powders. The remainder of the book contains very brief chapters on amatol, picric acid, nitrostarches, tetryl, and black powder. The final chapter deals in a rather inadequate manner with initiating substances and primers. A bibliography of 49 titles is appended. There is a table of contents but no index.

There is no doubt that this book will prove useful to the many persons now making their first contact with the explosives industries, since often the literature on the analytical chemistry of explosives is widely scattered, and more comprehensive texts are perhaps not readily available. The book is illustrated with 29 figures and diagrams.

FRANK WILCOXON

Reports of the Process of Applied Chemistry, 1941. Volume XXVI. Edited by *T. F. Burton.* 550 pages. Society of Chemical Industry, London, England, 1941.

THIS volume contains reports on the following subjects, written by British specialists: General, Plant, and Machinery; Fuel; Gas, Destructive Distillation, Tar, and Tar Products; Mineral Oils; Intermediates and Colouring Matters; Fibres, Textiles, and Cellulose—The Protein Fibres and Cellulose Textile Chemistry; Pulp and Paper; Acids, Alkalies, Salts, Etc.; Glass; Ceramics, Refractories, and Cements; Iron and Steel; Non-Ferrous Metals; Electrochemical and Electrometallurgical Industries; Fats, Fatty Oils, and Detergents; Plastics; Resins, Drying Oils, Varnishes, and Paints; Rubber; Leather; Soils and Fertilizers; Sugars and Starches; The Fermentation Industries; Foods; Fine Chemicals and Medicinal Substances; Essential Oils, Isolates, Derivatives, and Synthetics; Photographic Materials and Processes; Sanitation and Water Purification.

The book is well documented and indexed.

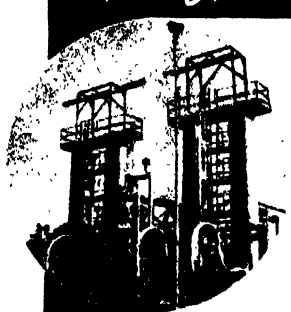
Without Fame. *Otto Eisenschiml.* 368 pages. Alliance Book Corp., 540 North Michigan Ave., Chicago, Ill., 1942. Price, $3.50.

OTTO EISENSCHIML has become well known for his pioneer work in the chemistry of vegetable oils and for his frequent contributions to literature, both chemical and otherwise. Earlier this year his discussion on "The Chemist's Chance" reprinted from the *Chemical Bulletin* in CHEMICAL AND ENGINEERING NEWS (March 25, page 368) aroused much interest and resulted in publication of several letters of comment.

Now, in an autobiographical account entitled "Without Fame", Dr. Eisenschiml describes in absorbing fashion the experiences which have been his in a life whose beginnings take the reader to the then-little-known Vienna of the early eighties. There is a vivid picture of the prospective chemist's early days and an equally clear portrayal of the manner in which he made his way in America, endeavoring always to make the most of opportunities to be found in his chosen profession.

The account is in a style so readable that even those who know nothing of chemical technology and little, if anything, of its terminology will have difficulty in laying the book aside until the last page is read. It is the story of one who found little that was easy in life, either in early school days when he first determined to become a chemist or after he had become well established in one branch of the chemical industry. It tells of uncertainties and of chances taken, of experiences which helped improve judgment, and of problems faced in endeavoring to adhere to high principles. There are many incidents which show the author's deter-

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mination to make the most of what fate offered at strange moments and his willingness to adjust and readjust the trend of his career in order to accomplish his purpose and reach the difficult goal.

Although Dr. Eisenschiml does not find the chemical profession above criticism, he seems never to regret having chosen chemistry as his field and his reminiscences give ample evidence that he has derived much satisfaction from his work. He has also found many opportunities to contribute to the progress of chemistry and to foster principles in which he believes.

"Without Fame" is unique in both organization and presentation, providing the reader with a great deal of informative material which interferes in no way with the fascinating story. But it scarcely warrants the modest title which the author has chosen.

H. E. Howe

Handbook of Industrial Safety Standards. 1942 ed. rev. 224 pages. National Conservation Bureau, New York, N. Y. Price, paper, $0.55; leatherette, $0.75; quantity prices on request.

This handbook was revised after American entry into the war to include the most recent accident-prevention standards. A 32-page supplement on wartime protection of industrial plants, including details of setting up and maintaining an organization to protect the plant and its employees against sabotage and air raids, has been added.

The handbook has the approval of the U. S. Department of Labor and is recommended by the U. S. Office of Education as supplemental reading in the engineering, science, and management defense training courses.

Most of the material is based upon the safety codes of the American Standards Association, American Society of Mechanical Engineers, fire underwriters, governmental agencies, and recommendations of engineering and other organizations recognized as national authorities on accident prevention. A list of safety codes is included in an appendix. Reference lists of codes applying to the particular subject discussed also are furnished.

Rationed Rubber and What to Do about It. *Williams Haynes and Ernst A. Hauser* 181 pages. Alfred A. Knopf, 501 Madison Ave., New York, N. Y., 1942. Price $1.85.

The title of this book is obviously a misnomer since there is little that the average person can do about rationed rubber except to ask his ration board for another tire and to pray. The book is entertainingly written for the general public and not for the rubber chemist. It tells of the present rubber emergency of which we all should be, and probably are, conscious. The wide and varied uses, the history, and properties of rubber are recounted at length, although this has all been told before. Advice similar to that appearing in rubber company advertisements on the care of rubber articles is given.

There are a number of statements with which rubber chemists generally would disagree. For example, it is stated that rubber cannot be processed with Vistanex. The reviewer has never heard the wildest guesser claim that there are a *billion* tons of scrap rubber in the country. Although it is stated that we should have available about 75,000 tons of rubber annually with our supply from the Far East cut off, the same paragraph says that *98 per cent* of our rubber came from the Far East. These two values do not agree with the figures for even the extraordinary consumption of rubber in 1941. Polysulfides do not react with hydrocarbons to yield Thiokol, but with halogenated hydrocarbons and other halogenated materials. There is some discussion of the political aspects of the synthetic rubber situation, but little that has not already appeared in the daily press.

John T. Blake

WANTED

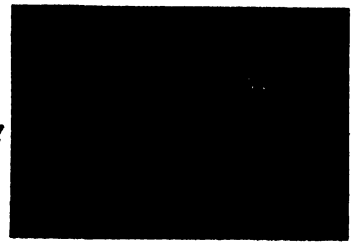
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No Section. John F. Baker, Rudolph A. Bender, Jr., Lester S. Berman[1], John A. Coil[1], Maxwell R. Collins, Lorne R. Duncan[1], Pierre Dutoit, Charles A. Funk, John E. Garrett[1], Lyman H. Hitchcock, Werner Kurz, Agnes Lothian[1], William C. Peck, Julius C. Scharmer[1], Immanuel J. Wilk[1].

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The L. S. O. G. Exchange

Edited by A. A. Ashdown, Ed. F. Degering, J. E. Hawkins, and S. L. Redman

Send items to Ed. F. Degering, Department of Chemistry, Purdue University, Lafayette, Ind.

THE Panhandle Plains area is not a highly industrialized section of the State. Within the boundaries of our local section there are perhaps 100 chemists eligible for membership in the A. C. S. The bulk of our membership is drawn from three localities, Pampa, Borger-Phillips, and Amarillo, Tex. The balance is scattered over the seven counties that are represented in our local section.

One of the prime objectives of this section, therefore, has been to provide a program that will overcome the feeling of isolation that develops when a man is cut off from association with others of his profession. We have made it a practice since the organization of this section to have one meeting a month from September through May or June. These are always dinner meetings and have been held in Amarillo, Pampa, Borger, or Canyon. They offer a social contact with other chemists that would otherwise be lacking.

As this is a small section we must utilize local talent in most of our meetings. We try to have three or four of the A. C. S.-sponsored speakers during the year.

In this particular section all nonmember chemists are known and their names are on the prospective membership list. Every member is on the Membership Committee. When a member of the A. C. S. moves into the Panhandle he is invited to attend our meetings and to participate in the affairs of the organization.

The A. C. S. is filling an important place in the Texas Panhandle. Interest is shown by the fact that, while our membership is only slightly over 50 and the average number of miles driven in order to attend a meeting is well over 100 (round trip), the average attendance is over 30.—ROY E. KING, *Panhandle Plains Section.*

THE WALL STREET OF CHEMISTRY

	Twelve Months' Earnings		Per Common Share	
	1941	*1942*	*1941*	*1942*
Koppers Co.	$ 5,343,712	$ 5,649,280	$ 4.14	$4.45
Pennsylvania Salt Mfg. Co.	1,649,949	1,417,024	11.00	9.45
Sherwin-Williams Co.	5,611,185	5,329,256	7.83	7.43
United Gas Improvement Co.	24,144,289	17,823,827	0.87	0.60
	Nine Months Earnings			
Abbott Laboratories	1,733,025	1,419,763	2.24	1.76
Air Reduction Co.	5,234,801	4,994,436	1.93	1.84
Atlas Powder Co.	1,326,097	1,111,216	4.24	3.35
Barber Asphalt Co.	194,816	195,527 (loss)	0.50	..
Catalin Corp.	164,887	117,933	0.31	0.22
Celanese Corp.	5,116,361	5,651,238	2.80	2.80
Commercial Solvents Corp.	1,637,486	1,670,927	0.62	0.63
Continental-Diamond Fibre Co.	592,934	334,653	1.32	0.74
Monsanto Chemical Co.	4,974,189	3,978,435	3.57	2.65
Parke, Davis & Co.	5,660,274	5,128,627	1.16	1.05
Chas. Pfizer & Co.	....	772,323	..	1.54
A. E. Staley Mfg. Co.	1,598,551	1,492,699	..	..
Sterling Drug, Inc.	6,444,171	5,283,574	3.70	3.01
Sylvania Industrial Corp.	829,446	689,554	1.98	1.67
United Chemicals, Inc.	174,697	164,681	..	..
Victor Chemical Works	897,769	701,410	1.29	0.93
Westinghouse Electric & Mfg. Co.	15,860,252	9,615,728	5.93	3.00
	Three Months Earnings			
Air Reduction Co.	1,897,045	2,176,013	0.70	0.80
American Viscose Corp.	2,090,464	1,516,723	1.03	0.70
Atlas Powder Co.	....	853,977	..	3.35
Barber Asphalt Co.	220,861	5,359	0.56	0.01
Climax Molybdenum Co.	2,569,627	3,143,800	1.02	1.25
Commercial Solvents Corp.	732,504	527,016	0.28	0.20
Davison Chemical Corp.	157,480	282,224	0.30	0.55
E. I. du Pont de Nemours & Co.	24,491,867	16,476,651	2.09	1.47
Freeport Sulphur Co.	706,608	641,619	0.89	0.80
General Foods Corp.	3,156,677	3,302,173	0.57	0.60
General Refractories Co.	329,268	243,957	0.70	0.52
Harbison-Walker Refractories Co.	574,400	538,900	0.39	0.37
Hasel-Atlas Glass Co.	1,264,398	663,502	2.91	1.53
Hercules Powder Co.	....	2,749,761	..	2.09
International Nickel Co.	8,380,331	8,368,510	0.54	0.54
Lambert Co.	494,517	606,872	0.66	0.81
Newport Industries	....	83,169	..	0.13
Oliver United Filters	66,758	47,668	0.19	0.09
Procter & Gamble Co.	6,974,603	4,515,649	1.06	0.68
Ruberoid Co.	489,494	177,285	1.23	0.45
Sharp & Dohme	571,496	534,285	0.48	0.43
Union Carbide & Carbon Corp.	10,916,770	8,941,245	1.18	0.96

The Brown Co. reports net profit of $906,190 for the first 44 weeks of the first fiscal year following reorganization under the Bankruptcy Act, after providing $1,200,000 for estimated federal income and excess profits taxes. The company's working capital, after repaying $1,878,836 on its long-term Reconstruction Finance Corp. loan and the transfer of $1,284,930 bond interest from long-term debt to current liabilities, was $5,567,976 on October 3, 1942.

The Champion Paper & Fibre Co. has sold privately to institutional investors an aggregate of $11,000,000, 3.75 per cent first mortgage bonds due in 1957. Proceeds will be used to retire 4.75 per cent debentures due in 1950, which were outstanding in the amount of $8,020,000 on November 1, 1942, and for general corporate purposes.

According to the Division of Industrial Economics, National Industrial Conference Board, profit margins in the metal products, automotive, and chemical industries, all heavily engaged in the production of armament, were much lower in 1941 than in 1940. Margins were also lower in the paper and allied products, stone, clay, and glass products industries, but higher in forest products, petroleum, and coal products industries. In 1941 the United States factories handled about $30,000,000,000 more in dollar volume and 30 per cent more in physical volume than in 1940. Earnings on sales, after taxes, dropped to 5.4 per cent from 6.1 per cent in 1940 and 4.5 per cent in 1936. In 1940 manufacturers earned 8.0 per cent before taxes per dollar of sales, and 6.1 per cent after taxes.

According to a survey of American corporations made by the Securities and Exchange Commission, net sales of a group of 38 corporations engaged primarily in the manufacture of chemicals totaled $1,755,000,000 in 1941 against $1,253,000,000 in 1940. Net profit from operations in 1941 totaled $431,000,000 against $275,000,000 in 1940, and net profit after all charges was $223,000,000 and $210,000,000, respectively.

Through its sale of stock of Basic Magnesium, Inc., $525,000 was received by Basic Refractories, Inc., according to a report filed with the Securities and Exchange Commission. The transaction covered all the stock of Basic Magnesium owned by Basic Refractories.

Alien Property Custodian Aquisition of American Potash & Chemical Stock

On October 29 the Alien Property Custodian announced that he had taken over 480,000 shares of American Potash & Chemical Corp. stock owned by foreign nationals, stating that the action implied no criticism of the present officers and directors of the company.

A statement by F. Cecil Baker, president of the company, explains that the stock in question was sold by Consolidated Gold Fields of South Africa, Ltd., a British company which had been responsible for the financing and development of the Trona enterprise since its inception in 1913, to Hope & Co., of Amsterdam, one of the most respected banking houses in the Netherlands. This sale took place in 1929. Since that time the officials of American Potash & Chemical had been assured many times by Hope & Co. that none of the stock was being held for the benefit of German interests.

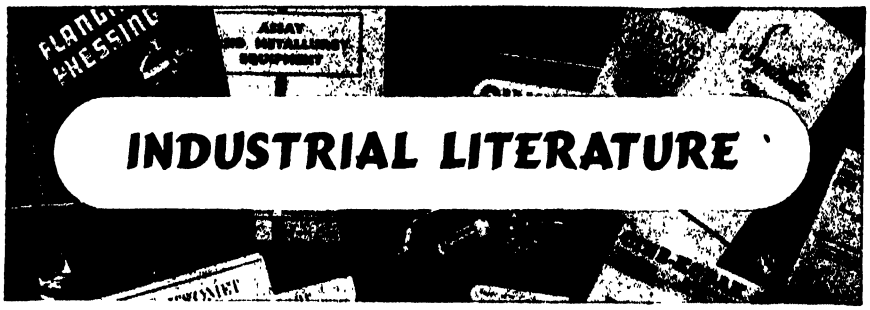
Movie on Fabrication of Aluminum

A new series of instruction films on the fabrication of aluminum has been released by the Bureau of Mines, U. S. Department of the Interior, 4800 Forbes St., Pittsburgh, Penna. In cooperation with a large industrial firm three films—"Machining Aluminum", "Riveting Aluminum", and "Welding Aluminum"—have been made in 16-mm. sound, and are available for industrial defense training classes, schools, and similar groups.

Correction

An error was made in the September 25 issue of Chemical and Engineering News. In captioning picture 3, page 1165, the person on the left was identified as J. De Bell. We now have information that the photograph is of H. R. Johnston, Pratt & Lambert, Inc.





Listed publications should be requested directly from the company concerned. Use business stationery, mention bulletin numbers, and refer to this journal. Publications will be sent free unless otherwise noted.

Alloy Steel Data Sheet. A new, compact chart showing analyses, physical characteristics, and applications of 19 different stainless steel, Monel, and nickel alloys has just been published. This also contains a handy cross reference of designations and type numbers of the Alloy Casting Institute, the American Iron and Steel Institute, American Society for Testing Materials, Society of Automotive Engineers, U. S Navy, and others. This reference chart is standard letter size and can be conveniently filed. *Booklet CEN.* THE COOPER ALLOY FOUNDRY Co., Hillside, N. J.

Anhydrous Hydrofluoric Acid. A 28-page illustrated booklet gives a compilation of published work on the properties and uses of anhydrous hydrofluoric acid. *Booklet CEN.* THE HARSHAW CHEMICAL Co., 1945 East 97th St., Cleveland, Ohio.

Belt Conveyor Pulley. This pamphlet describes a boot and a tail pulley claimed to save vital materials, time, shut-downs, and maintenance costs, and applicable to bucket elevators as well as belt conveyors. Damage to belts from materials getting between the pulley and the belt is eliminated. Photographs and a table of specifications are included. *Bulletin 3001 CEN.* SPROUT, WALDRON & Co., 100 Sherman St., Muncy, Penna.

Branch Pipe Outlets. This bulletin describes a line of WeldOlets, ThredOlets, and socket-end WeldOlets which, it claims, are three different types of fittings, each designed for a particular application and all designed for making the strongest possible right-angle, welded branch pipe in the least amount of time at the lowest cost. Photographs, line drawings of installations, and dimension, size, weight, and price tables are given. *Bulletin WT-31 CEN.* BONNEY FORGE AND TOOL WORKS, FORGED FITTINGS DIV., Allentown, Penna.

Chemical Porcelain. A well-illustrated catalog on glazed, wet process porcelain includes pipes and fittings, cast iron flanges, Y-type and angle valves, spacers, and Raschig rings. Dimension tables and line drawings of each product give complete information. *Catalog C-1 CEN.* ILLINOIS ELECTRIC PORCELAIN Co., Macomb, Ill.

Dehydration. A bulletin on tube and spray drying of foods gives data on this comparatively new industry. A discussion of dehydrating with inert atmosphere is followed by a description of a tube and a spray dryer. Dimensions and flow charts are included, as are foods which can be treated by each type of unit. *Bulletin CEN.* BOWEN RESEARCH CORP., Garwood, N. J.

Equipment Manufacturers. Under the title "Koven Men and Machines for War Work", this well-illustrated brochure tells the story behind the manufacture of materials for industry and armament. It gives a comprehensive idea of the facilities, experience, and trained workers offered to expedite production for plants with prime and subcontracts. A double-spread shows some of the equipment made. *Brochure CEN.* L. O. KOVEN & BRO., INC., 154 Ogden Ave., Jersey City, N. J.

Extruded Plastic Shapes. An 8-page leaflet gives information and specifications

NOW AVAILABLE

CHEMICAL ABSTRACTS
Volumes I, II, and III

This printing was authorized by the American Chemical Society to fill the existing shortage of these volumes.

The original issues have been reproduced in facsimile by photography. The finished copies are reduced slightly in size to 5½ x 8½, are printed on slightly heavier paper, and are bound in light weight paper covers as were the originals, twenty-five issues per volume.

✦

Price per Volume (F. O. B. Ann Arbor, Michigan) . . $25.00.

EDWARDS BROTHERS, INC. *Lithoprinters*
ANN ARBOR *Established 1893* **MICHIGAN**

regarding extruded plastic shapes carried in stock. *Bile 55-C-12 CEN.* JULIUS BLUM & Co., INC., 532 West 22nd St., New York, N. Y.

High Vacuum Gages. This bulletin illustrates improved gages for use either as portable instruments or on a fixed mounting. It also explains how these gages are used to check a vacuum system at various points in order to determine whether there is any fall in pressure, whether the pipe lines are of adequate size or may have leaks, whether pumps are drawing the desired vacuum, how the efficiency of pumps or vacuum equipment compares, etc. The ease and quickness of readings around the plant and illustrations of the units themselves are also described. *Bulletin 42-G CEN.* F. J. STOKES MACHINE Co., Olney P. O., Philadelphia, Penna.

Laminated Solenoids. This is the title of a bulletin describing two new units of the pull and push-pull type. Particularly designed for specification by engineer-designers for hydraulic valves and general industrial purposes, maximum magnetic force for given electrical input is effected by design, laminated frame and plunger, and other features. Coils may be paper-section wound, or cloth-taped and treated. *Bulletin CEN.* DEAN W. DAVIS & Co., INC., 549 West Fulton St., Chicago, Ill.

"Mercuryless" Manometer. This bulletin describes a new aneroid flowmeter and liquid level manometer for handling highly volatile and corrosive liquids such as butadiene, styrene, alcohol, and acids. A torque tube is used in place of a stuffing box, thus eliminating troublesome leakage and need for lubrication and cutting maintenance cost to a minimum. Details on the application and operation of this unit are fully described. *Bulletin 98160 CEN.* TAYLOR INSTRUMENT Cos. Rochester, N. Y.

Micromax Resistance Thermometers. This 45-page catalog describes how operators of air-conditioning systems, chemical processes, refrigerating systems, oil refineries, etc., are able to see the small differences between temperatures at related points in their processes. It describes how a method for measuring laboratory temperatures at highest known precision has been opened up for plant work by the development of rugged Thermohm temperature detectors and machine-like Micromax measuring instruments. *Catalog N-33C CEN.* THE LEEDS & NORTHRUP Co., 4934 Stenton Ave., Philadelphia, Penna.

Motorelay. A bulletin and catalog on this unit for use with any floating contact device in applications where the control current exceeds the contact rating of the control instrument completely describe this unit, with photographs. *Bulletin A-20 or Catalog F-1753 CEN.* BARBER-COLMAN Co., Rockford, Ill.

Oil Fuse Cut-out Assemblies. This pamphlet describes a new line of metal-enclosed units, type D & W, particularly adapted for industrial plants (indoors or outdoors) to provide economical short-circuit protection and switching of feeder and branch circuits, individual transformers or banks, motors and control apparatus, electric-heating, and other types of equipment. They can be supplied with openings for conduit, cable, or pod-head connections. *Pamphlet 5254 CEN.* GENERAL ELECTRIC Co., Schenectady, N. Y.

Petroleum Naphthas. A 4-page leaflet on industrial petroleum naphthas includes a chart of evaporation rates of various solvents and Amsco petroleum solvents. *Leaflet CEN.* AMERICAN MINERAL SPIRITS Co., 230 North Michigan Ave., Chicago, Ill.

Precision Control. Under the title "Technique of Precision Control in Industrial Processes" this 64-page booklet presents applications of automatic control to industrial processes. The text is divided into chapters featuring precision measurement, fundamentals of control, types of controls, control valves, and typical applications. The illustrations are taken from current practice in varied industries and include schematic diagrams of basic control systems and illustrations of control apparatus. *Booklet 80-1 CEN.* BROWN INSTRUMENT Co., Wayne & Roberts Aves., Philadelphia, Penna.

Pumps. A 12-page illustrated bulletin, "Pacific Keeps Pace with Industrial Progress", tells the story of the company's part in the pump industry. *Bulletin CEN.* PACIFIC PUMP WORKS, Huntington Park, Calif.

CONTINUED ON PAGE 1552

ANNOUNCING PUBLICATION

of **BEILSTEIN'S *Handbook of Organic Chemistry, 4th Edition***

(complete Hauptwerk with indexes, first Supplement, and Volume I of the second supplement—as issued by the German Chemical Society).

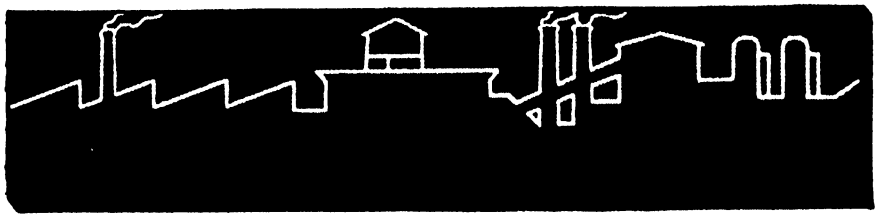
A very limited edition of these books is being photographically reproduced by authority of the Alien Property Custodian.

Printing will start November 16, 1942, and the entire set (59 volumes—49 books, totalling approximately 40,000 pages) will be completed by February 9, 1943.

The paper used will be heavier than that of the original publication, the page size will be identical to that of the original, and the binding will be Library Buckram superior to that of the original books.

Complete sets (F. O. B. Ann Arbor, Michigan) $400.00
Single Books (F. O. B. Ann Arbor, Michigan) ..... $ 12.50
(A 2% discount may be taken if remittance accompanies your order.)

EDWARDS BROTHERS, INC., *Lithoprinters*
ANN ARBOR ***Established 1893*** **MICHIGAN**



Control of Air Temperature and Movement

THE importance of precise control of air temperature and air movement in photographic research and developing was emphasized when discussions of air distribution in the projected Photo Laboratory of the U. S. Naval Air Station at Anacostia, D. C., began.

Eastman Kodak engineers and Charles Leopold, who acted in an advisory capacity, conducted exhaustive tests with high velocity, ceiling type, air diffusers. Their selection based upon the result of these tests was the Kno-Draft air diffuser manufactured by the W. B. Connor Engineering Corp., New York, N. Y.

The importance of air to photographic chemistry was further demonstrated when adsorbers filled with highly activated coconut shell carbon, were installed at a du Pont film plant in New Jersey. This was done when slight traces of gases, originating in a refinery miles away, were found potent enough to result in batches of substandard film. The adsorbers eliminated this condition completely.

Nylon Tapered Paint Brush Bristles

TO SYNTHESIZE a paint brush material with the taper, resiliency, and toughness of natural bristle has been a goal of chemists for a quarter of a century. It became a national necessity to achieve that goal quickly after Pearl Harbor, for virtually all bristle had been imported from China and Russia.

Nylon paint brush bristles not only have the required taper but also resiliency, toughness, length, and inertness to paint ingredients. Moreover, they wear at least three times longer than natural bristles. The achievement of this tapered synthetic culminates five years of intensive research in du Pont laboratories.

Today the Government is preempting for military uses the entire output of a busy pilot-scale plant. Early next year two full-scale units are expected to be in production, but their entire output will be required by the military. Nylon paint brushes for civilian use must await the end of the war.

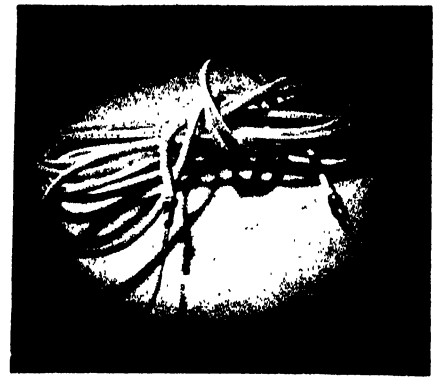
An effort is being made to develop natural bristle production in the United States, but domestic pigs do not yield long, quality bristles for paint brushes. Some few thousand pounds of bristle can be had from South America. They are too short for large paint brushes and not nearly equal in quality to those of the Orient. Manufacturers tried to use other materials—vegetable fibers, horsehair, and the like—but with limited success.

It was a comparatively easy job to spin a level filament of tough, resilient nylon. To spin a tapered filament was something else. Finally a taper was achieved by pulling a continuous nylon filament from a special spinneret at a controlled variable speed. That is, the size of the filament varies with the speed of pulling—thick diameters resulting at slow speeds, and thin diameters at fast.

Nylon filaments after being spun have to be drawn to several times their original length; that gives them their strength and resiliency.

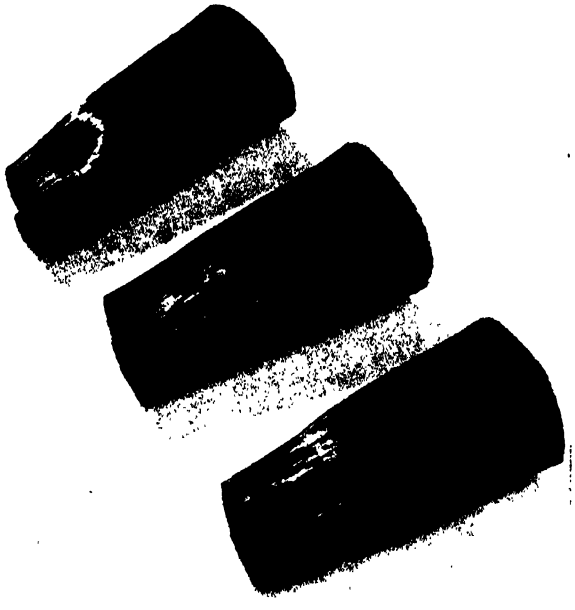
Means of conditioning the filaments so they would not curl, and of automatically cutting them to ordered size, had to be figured out before a plant could start operating.

Glass-Insulated Flexible Heating Element

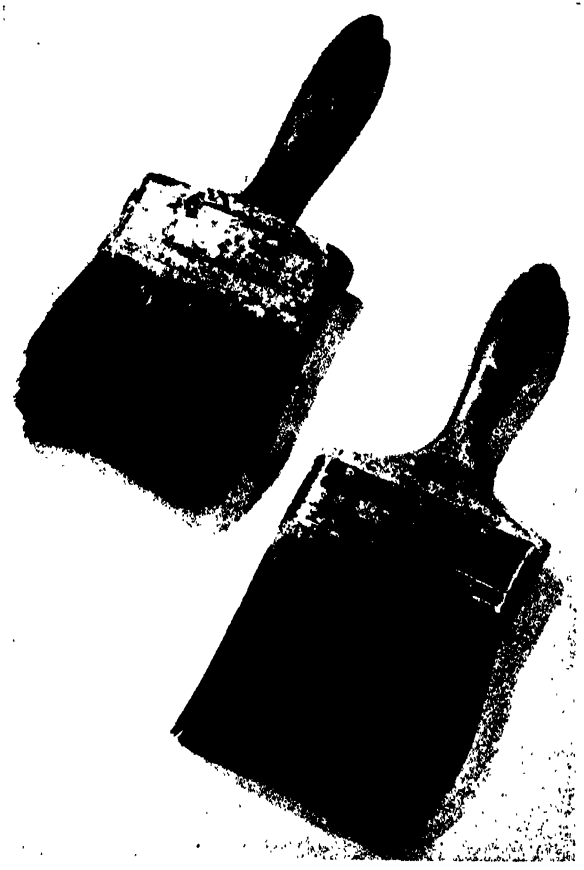


AVAILABLE in any length, a low-power flexible heating element now finds many uses, particularly in very limited space. Known as the Glasohm, and also widely used as a flexible power resistor, this prod-

CONTINUED ON PAGE 1551



Good paint brush bristles must be tapered, tough, and resilient. These new tapered nylon paint brush bristles in the bundles are superior replacements for long, lithe pig bristles which formerly came from China and Russia.



The paint brush with natural bristle, left, and the one with new tapered nylon bristle, right, have been used the same length of time. The natural bristle brush is virtually worn out, while the tough, resilient nylon bristle brush shows very little wear, and will last three times longer.

EMPLOYMENT INFORMATION

RATES to be paid in advance. Standard setting 5c a word, minimum charge $2.00 each; include 8 words for box address. Exceptions see ⟶ Display, $10.00 per column inch. 2 inches maximum, larger units at regular display unit rates. No discounts or allowances.
SEND advertisements with remittance to INDUSTRIAL AND ENGINEERING CHEMISTRY, 332 West 42nd St., New York, N. Y., to reach there not later than 10:00 A.M. on the 5th and 20th, closing dates for editions of CHEMICAL and ENGINEERING NEWS of the 25th and 10th, respectively. Insertions made in order of receipt provided necessary remittances are complete. EMPLOYERS are requested to mention in their announcements the section of the country in which the open position is located to ensure replies only from those who are geographically available.
In printing these advertisements the SOCIETY assumes no obligations as to qualifications of prospective employees or responsibility of employers.

UNEMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking employment for themselves are allowed in one calendar year 3 announcements free (one per issue) set in standard style and limited to 50 words each, including 8-word box address, and 3 additional standard announcements at 50% of regular rate. Further announcements and excess words at full rate.

EMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking new positions are permitted 3 standard announcements during the calendar year at 50% of the regular rate—include 8 words for box address.

EMPLOYERS seeking chemists and chemical engineers are permitted 3 standard announcements, not to exceed 50 words each including box address and not more than one per issue, during the calendar year without charge, provided they agree in writing to acknowledge all replies (excess words 5c each), otherwise full rate applies.

The AMERICAN CHEMICAL SOCIETY is vitally interested in the welfare of its members and in seeing that the chemical industry is manned with competent chemists and chemical engineers. These pages are part of our service in that connection. In addition most of the larger sections of the AMERICAN CHEMICAL SOCIETY and several of the smaller ones have active employment committees. Local section secretaries in your area will inform you as to any employment aids that may be available locally.

An Employment Clearinghouse is operated at each national meeting of the SOCIETY for the purpose of bringing together representatives of industry looking for chemists and members and student affiliates in attendance wishing to make such contracts. For further details, consult the preliminary and final programs as printed in the NEWS EDITION prior to each meeting.

In the New York area, special employment facilities are offered by the Employment Bureau of the Chemist's Club, 52 East 41st St., New York, N. Y. In the Chicago area, the Chicago Section maintains an employment service at 505 N. Michigan Avenue, Chicago, Ill.

Those replying to announcements should be careful to send copies and not original documents. Advertising circulars will not be forwarded and to that end all letters will be opened at the forwarding office.

SITUATIONS OPEN

Those announcements in which the letter "P" is part of the address key have paid in full and are not committed to acknowledge replies. The Society regards acknowledgment by employers of all applications as an act of common courtesy but can assume no responsibility for their failure to do so.

GRADUATE FELLOWSHIP at $720–840 per year and Technical assistant at $1200 per year at Medical School for investigations in endocrinology, enzymes and metabolism.
Box 10-N-11, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST—A large paper manufacturer located near Philadelphia has a splendid opportunity for a graduate chemist or chemical engineer in its research department. Education, past experience, training and the ability to see a project through are major qualifications. As this is a permanent position we are interested in age, marital and selective service status. Reply by letter only giving full details with salary requirements and recent snapshot. Replies will be kept in strictest confidence.
Box 13-NP-11, Ind. & Eng. Chem., Easton, Pa.

CHEMIST WITH some petroleum experience. Needed in Chicago area for development of petroleum products and rust preventives. State age, draft status, degree, and salary desired in opening letter.
Box 18-NP-11, Ind. & Eng. Chem., Easton, Pa.

LABORATORY ASSISTANT for organic research laboratory in New York City. B.S. in chemistry or equivalent required. State in detail experience, references, age, date when available and send inexpensive photograph.
Box 21-NP-11, Ind. & Eng. Chem., Easton, Pa.

WANTED: for organic research laboratory in New York City. Experienced organic research chemist, Ph.D., with several years' experience in organic synthesis, preferably dyestuffs or pharmaceuticals. State age, academic, professional and draft data, when available, salary expected.
Box 22-NP-11, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST WANTED—Instructorship or Assistant Professorship in Southern Medical School for the duration. Give details concerning training, experience, personal history, references, and date of availability.
Box 42-N-11, Ind. & Eng. Chem., Easton, Pa.

GRADUATE ASSISTANTS—For semester beginning February first—Fifty dollars per month with free tuition and fees—Stipend increases annually—Minimal requirements: inorganic, analytical, organic, physical chemistry, calculus and one year of college physics—B.S. or M.S. degree—Submit small photograph and official transcripts of college courses—If satisfactory, application blank will be sent—Department of Chemistry, University of Pittsburgh, Pittsburgh, Pa.

AN ENGINEERING Construction Company, with long experience in Spanish America, is starting an Export Department and needs an experienced Chemical Engineer familiar with the design and operation of heavy chemical plants, particularly caustic soda and cyanide. Headquarters in New York City and to also spend considerable time in South America. Most advisable that he speak Spanish.
Box 55-NP-11, Ind. & Eng. Chem., Easton, Pa.

WANTED: Junior Analyst, Woman. College Graduate preferably trained in chemistry and pharmacy. Location metropolitan area.
Box 71-NP-11, Ind. & Eng. Chem., Easton, Pa.

FOOD TECHNOLOGIST—Applications will be welcomed from men with outstanding records to serve as junior chemists in eastern research laboratories, engaged in essential work. Prospects for advancement excellent for men of right qualifications. Please submit record of training and experience, personal history and recent photo.
Box 10-TP-11, Ind. & Eng. Chem., Easton, Pa.

CHEMISTS

with Bachelor or Master degrees for positions in laboratories of Analytical Chemistry, Biochemistry, Organic Chemistry and Physical Chemistry in eastern organisation engaged in essential activities. Opportunities for qualified men. Submit details concerning training, experience, personal history, and small photo.
Box 12-TP-11, Ind. & Eng. Chem., Easton, Pa.

EXPERIENCED CHEMICAL ENGINEER

Excellent opportunity for man of outstanding qualifications in research laboratories located in the East, occupied with essential activities. Please submit college record, experience, accomplishments, and small photo.
Box 11-TP-11, Ind. & Eng. Chem., Easton, Pa.

A LARGE EASTERN manufacturer of white and colored pigments has a permanent position for an experienced paint chemist on the staff of its Technical Service Laboratory. In reply give complete data regarding education, experience, draft status, salary desired, and other pertinent facts. Enclose photograph.
Box 14-T-11, Ind. & Eng. Chem., Easton, Pa.

CHEMIST—For Technical Sales Work. Capable man with experience in field of coatings, adhesives, synthetic resins. Chemical engineer preferred. Must be able to understand new processes quickly, make plant demonstrations. About half of time to be spent in field. Give full particulars, inexpensive photograph, salary expected in application. Eastern manufacturer.
Box 15-TP-11, Ind. & Eng. Chem., Easton, Pa.

NEW RESEARCH fellowship available at once on production of new synthetic fiber. Fifteen hours' course work can be taken per year toward Ph.D. Stipend $70 per month for 11 months. Applicants should have M.S. or equivalent. Preference will be given to candidates not eligible under selective service because of physical disabilities, sex, or other reasons.
Box 23-T-11, Ind. & Eng. Chem., Easton, Pa.

WANTED IMMEDIATELY Chemist with good knowledge of essential oils and flavoring materials; must be very practical man; take charge management of manufacturing and analytical department of progressive essential oil firm, New York City. State in first letter qualifications, salary, draft status; enclose recent photograph.
Box 24-T-11, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 1550)

FOOD TECHNOLOGIST

(MAN OR WOMAN)
Permanent Position with Security and Future

Graduate in chemistry preferred, for service laboratory and food kitchen, with New York company manufacturing food starches, specializing in products supplied to bakers and manufacturers of salad dressings, soups, confections, puddings, and miscellaneous food products.

Work includes adaptation of new products to commercial uses, development of formulas and recipes, and preparation of technical sales information.

Submit complete record of training, education, and positions held. Enclose recent photo, not returnable unless requested.

48-TP-11, Ind. & Eng. Chem., Easton, Pa.

WANTED TO BUY

Used porcelain-lined, 33-pound capacity, preferably motor driven Ball Mill; laboratory Turret Bowl Classifier, 3′-0″ bowl diameter preferred; Bowl Thickener; Blunging Tanks, 5 cubic feet capacity. Equipment must be in good working condition.

Box 13-T-11, Ind. & Eng. Chem., Easton, Pa.

Address communications to the box number indicated and Mail to Easton, Penna.

The American Chemical Society has no information concerning the position advertised, or in regard to those seeking employment.

(Situations Open Continued)

LACQUER CHEMIST with several years' experience in lacquer formulation or application for development work on protective coatings applied to metals. Eastern Pennsylvania location. In reply, state salary desired, draft status, etc.
Box 32-TP-11, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST with library training to care for chemical and pharmacological library and do literature searching and abstracting. Knowledge of German and typing necessary. Give educational background and experience. New York State location.
Box 38-T-11, Ind. & Eng. Chem., Easton, Pa.

FIRE PROTECTION Engineer and Inspector. Permanent positions open in New York, Pennsylvania, or the Middle West with large industrial fire insurance organization. Previous knowledge in this work not necessary. Applicant must be a technical graduate with manufacturing or engineering experience, and possess a good personality. Several months' training with full pay will be given Send photo with letter.
45-T-11, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL AND ORGANIC Chemists: Large Ohio manufacturer interested in securing services of first class organic chemist with Ph.D. degree. This is not a duration job, and we are interested only in men who have personality to work with others on major chemical problems. We can also use an analytical chemist for regular laboratory work. Salary open.
57-TP-11, Ind. & Eng. Chem., Easton, Pa.

RESEARCH LIBRARIAN, female, Ph.D., well trained in organic and physical chemistry, good reading knowledge of German and French, capable of thoroughly searching literature and writing clear reports.
70-TP-11, Ind. & Eng. Chem., Easton, Pa.

WANTED: Chemical technician, preferably college trained. Opportunity for graduate study.
71-T-11, Ind. & Eng. Chem., Easton, Pa.

CHEMIST WANTED for development and production work in chemical pigments. Permanent position for man with ability and initiative. Only men in 3-A draft classification need apply.
76-T-11, Ind. & Eng. Chem., Easton, Pa.

GOOD OPENING for Research Chemist to improve present products and lead old established manufacturing concern into new fields. Graduate organic chemist with research experience in organics and with proven creative ability desired. Give full particulars of education, experience and accomplishments.
77-TP-11, Ind. & Eng. Chem., Easton, Pa.

AMERICAN WOMAN Chemist wanted for abstracting and literature work in organic and biochemistry; should be able to type. Excellent library facilities, New York area. Give full particulars.
81-TP-11, Ind. & Eng. Chem., Easton, Pa.

WOMAN TECHNICIAN for laboratory engaged in routine feed analysis and applied research for a large New England Feed Manufacturing Concern. An opportunity to become familiar with vitamin assay technique. Location—Greater Boston. Wanted immediately. Give full particulars in first letter, including minimum salary, experience, and a recent photograph.
Box 80-T-11, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(A.C.S. MEMBERS)

SYNTHETIC ORGANIC chemist. M.S. research and development experience in plastics. Desires organic research position (plastics or other industry) contributing directly to war effort. Young, married, responsible. Presently employed. Metropolitan location preferred.
Box 36-N-10, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, available for spare time work. Broad training and experience, including catalysis, petroleum and fuels technology, explosion processing, pharmaceutical synthesis, metallurgical chemistry. Specialist in new process development and plant design. Currently employed, with contract permitting outside work of practically unlimited scope. Central eastern U. S. war work only.
Box 63-N-10, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST—Ph.D. February 1943 from an eastern university. Well grounded in organic synthesis. Single, 24, 2-A in draft. Physical chemistry minor. Eastern location preferred.
Box 15-T-10, Ind. & Eng. Chem., Easton, Pa.

RESEARCH DIRECTOR, Ph.D., assistant at two world renowned universities. 12 years' research experience in organic synthesis and biochemistry (hypnotics, analeptics, vasoconstrictors, antiseptics, vitamins, hormones). 5 years' research director of French industrial laboratory, one year research director of American industrial laboratory. Desires similar position in large industrial research laboratory or university. Age 36, first citizenship papers, draft status 2-B.
Box 31-T-10, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, M.A. 1939. Two years with major petroleum corporation and one with well-known research institute. Most of course work for doctorate at large mid-western university. Thermodynamics, colloid chemistry, electrochemistry, advanced organic, physics, mathematics. Research. Sigma Pi Sigma. Read German, French, Russian. Age 28, married, draft deferred.
Box 45-T-10, Ind. & Eng. Chem., Easton, Pa.

BIO-ORGANIC CHEMIST Ph.D. May, 1942. Research experience in organic, enzyme, vitamin (pyridoxine and pantothenic acid) chemistry. Formerly employed on vast industrial vitamin project. Papers being published. Member Phi Beta Kappa, Phi Lambda Upsilon, Sigma Xi. Interested in research vital to war effort in above fields. East only.
Box 53-T-10, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER and chemist 20 years' experience in research, process development and production of chemicals, design of chemical equipment, seeks responsible position where services will contribute more to the winning of the war. Qualified to undertake technical investigations; sound business judgment and administrative ability; expert knowledge of oils, fats and their derivatives, glycerine and other chemicals. Good character, sound health, married, Protestant, American citizen with draft status 3-B.
Box 46-N-11, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, B.S. (Ch.E.) 3½ years' experience in photographic chemicals, photography, and salesmanship. 22 years old, single, draft status 2-A. Not particular what field of Chemical Engineering work is in. Available after Dec. 1, 1942.
Box 59-N-11, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST—13 years' experience as supervisor in analytical laboratory of large rayon plant. Employed at present. Married, one child, age 39, draft 3-A. Desire permanent position with greater chance for advancement than present position.
Box 60-N-11, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL CHEMIST Ph.D. 25 years' experience synthetic organic chemistry, process development, plant management, research direction, plant design, experienced in synthetic chemicals, plastics, protective coatings. Capable of directing plant producing organic substances or taking charge of research program.
Box 17-T-11, Ind. & Eng. Chem., Easton, Pa.

SALES DEVELOPMENT & Research Engineer. Ph.D. in Chemistry; 15 years' experience in Rubber and allied chemical products development; U. S. citizen; married; age 46; draft exempt; thoroughly familiar with recent developments in synthetics and government activities. Available on sixty days' notice.
Box 18-T-11, Ind. & Eng. Chem., Easton, Pa.

TECHNICAL PRODUCTS research and development chemist. Wide experience in the development and production of corrosion preventive compounds, low temperature lubricants, gear lubricants, and petroleum specialties. Capable of assuming charge of product research and production in these and allied fields. Age 39. Now employed but would like to relocate in the Central Texas area.
Box 19-T-11, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Ph.D. Seven years' Industrial research with starch and starch products, 3 years' teaching experience. Thorough training in colloid chemistry and bacteriology. Capable of working independently or directing work. Employed. Married, age 34, Class 3A. Academic position or Industrial research desired.
Box 20-T-11, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. 1941, now employed but desires advantageous change. Experienced in basic organic, especially pharmaceutical, dyestuffs, and photographic chemistry. Industrial or academic position considered.
Box 25-T-11, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST with minor in organic chemistry, M.S. 1937. Five years' experience in laboratory and production work, three and half of which were in petroleum and related industry. Now engaged in engineering work and desire change. Prefer production work or research work. Excellent references. Age 29. Married. No children.
Box 27-T-11, Ind. & Eng Chem., Easton, Pa.

RUBBER TECHNOLOGIST, (Ch.E.). Six years' laboratory and plant experience. Specialist on compounding and processing of Buna-S and Butyl, thorough knowledge of all synthetics. Married, age 30, two dependents, draft 3-B. Imaginative, inventive, mechanically inclined.
Box 28-T-11, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. (1941), minor in biochemistry. Six years' experience including one year on post-doctorate fellowship. Research on sterols, alkyl-aromatics and pharmaceuticals. Extensive training in analytical and biochemistry. Nine publications. Desires position in research, teaching or research and development. Age 26. Single. Sigma Xi and Phi Lambda Upsilon.
Box 29-T-11, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. Thoroughly experienced planning and supervising research, process development and production on drug and chemical specialties. Understand fully coordination of laboratory and plant problems. Excellent reputation; publications; patents. Employed. 47 years old. Minimum salary $6000.
Box 33-T-11, Ind. & Eng. Chem., Easton, Pa.

VAPOR PHASE catalytic chemist and chemical engineer with ten years' experience, mostly in research and development work with a little plant control. Also some general organic and inorganic experience. Location immaterial. Available immediately.
Box 36-T-11, Ind. & Eng. Chem., Easton, Pa.

TRANSLATIONS, TYPING. Woman Chemist: Many years' experience in Industrial chemistry, a well qualified Russian translator and an expert typist, desires translations and/or typing which can be done at home.
Box 37-T-11, Ind. & Eng. Chem., Easton, Pa.

BACTERIOLOGIST, CHEMICAL Engineer first papers, age 45. Married, one child, 3A. 20 years Industrial experience as bacteriologist and plant manager in fermentation—food and chemical industries, laboratory experience, available short notice. Replies.
Box 39-T-11, Ind. & Eng. Chem., Easton, Pa.

RESEARCH AND DEVELOPMENT Chemist, Ph.D. At present in charge of production, control and inspection laboratory but would like change. Three years' research in Physical Chemistry. 1½ years' as supervisor in explosives. Familiar with government specification work, Prefer war research work. Married, Draft 3-A. Sigma Xi, Publications.
Box 42-T-11, Ind. & Eng. Chem., Easton, Pa.

EXECUTIVE CHEMIST, Ph.D. and LL.B. 16 years of diversified industrial experience. Consultant on chemical-legal problems such as chemical patents, infringement suits, contracts involving chemicals.
Box 43-T-11, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Ph.D. Desires research or teaching position. Author over fifty papers, chiefly enzymes, vitamins, clinical chemistry. Holder fellowships including Rockefeller. Immediately available. Age 34, American, married, draft 3B. Good references.
46-T-11, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL CHEMIST, Ph.D. Physical Chemistry. At present Chief Chemist of explosives inspection laboratory. 3 years' research on methods. Desire supervision work in defense plant. Married, Draft 3-A, publications, Sigma Xi.
Box 47-T-11, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER. Nine years' production supervisor in fine and organic chemicals; some heavy chemicals. Married, 35, draft 3-B.
49-T-11, Ind. & Eng. Chem., Easton, Pa.

ORGANIC-BIOCHEMIST, Ph.D., 1937, Age 29, Draft exempt. 3½ years' research midwestern medical school, vitamins and neuro-pharmacology. 1½ years' supervisory and research work explosives laboratory. Desire essential research or supervisory position in war industry. Release obtainable on two weeks' notice.
51-T-11, Ind. & Eng. Chem., Easton, Pa.

RUBBER AND PLASTICS Chemist, M.S. Fifteen years' research and development experience in rubber and associated industries. Experienced in field contacts, laboratory management. Physics and mathematics training. Age 42, with family. Place of responsibility desired.
52-T-11, Ind. & Eng. Chem., Easton, Pa.

PLANT SUPERINTENDENT: Chemical Engineer, five years' experience all phases of alcoholic fermentation and distillation; whiskey and alcohol; plant operation and laboratory control. Seeks position as superintendent of production in fermentation industry. Available reasonable notice. Native American, married, age 31, draft 3-A.
53-T-11, Ind. & Eng. Chem., Easton, Pa.

SPECTROSCOPIST—M.S. Experienced in spectrochemical analysis of inorganic chemicals for trace elements and applications in research, development, and control problems. Familiar with X-ray diffraction for identification purposes. Capable of setting up new laboratory and establishing analytical methods. Now employed as a spectroscopist in chemical plant but desire opening with less routine work. Married, 24, draft status 2-B, Methodist, location immaterial. Sigma Xi, Sigma Pi Sigma. Available on short notice.
54-T-11, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST—Eastern University. Ten years' diversified chemical experience in petroleum and rubber development and research. Thorough background and experience in organic synthesis, surface active agents and emulsifiers, emulsion polymerization and related work. Desires change to a position of greater responsibility and advancement. Available on reasonable notice. Married. Dependents, Draft 3-A.
55-T-11, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 1551)

(Situations Wanted Continued)

RESEARCH CHEMIST, M.S., six years' experience in coal research, several publications, capable of handling men, employed in large research institution. Desire position more closely connected with war work, salary $3600 up, prefer midwestern location. Draft 3-A, married, one child.
58-T-11, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, PHARMACEUTICAL, Phm.B. (pharmacy); B.Sc. and M.Sc. (Chemistry); wishes to change to progressive firm offering responsible position requiring a knowledge of pharmacy, pharmaceutical chemistry, manufacturing procedures and control, as well as ability to do investigating work with new products and with formula changes in existing products; administrative ability; two years' experience as chief chemist of small pharmaceutical house. Age 31, 2-A deferment, Canadian, first papers for U. S. citizenship, excellent references.
62-T-11, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, European training, 10 years' diversified industrial experience, inorganic, organic, now employed, desires position with better opportunities. Age 35, married with children; friendly alien, first papers. Eastern location preferred.
63-T-11, Ind. & Eng. Chem., Easton, Pa.

ESSENTIAL Employment desired by physical chemist Ph.D., 1941. Special training in colloidal and surface phenomena. Years' research and development experience in coatings, paper, proteins, adhesives. Sigma Xi, Phi Lambda Upsilon, six publications. Married, age 29, now employed.
65-T-11, Ind. & Eng. Chem., Easton, Pa.

SYNTHETIC RESIN Chemist, Ph.D. Six years' highly successful research and production of many types of resins, including Alkyds, High Polymers, Phenolics, etc. Excellent references. Resourceful and practical. Age 29, married.
66-T-11, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, M.S., 1941; Age 26. 2½ years' petroleum, two years' supervising large laboratory testing explosives. Desire essential research or supervisory position in war industry. Draft status 3-B; married, two dependents; Protestant. Release obtainable on two weeks' notice.
67-T-11, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER. (May 1942 B.S.). Wishes to be connected in active Defense work. Experience—one year in cellophane research and six months in petroleum refinery. Age 25, single, draft 2-A. Available immediately.
69-T-11, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER presently employed as Process Engineer in the design of an important war plant in the Far West will be free for new and similar employment about middle of January. Extensive experience in Petroleum Refining, age 31, single, 3-B, speak fluent Spanish. Prefer California, will consider Latin America.
72-T-11, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Ph.D. Eight years' wide research experience with large concern; food products, vitamin synthesis and assays, industrial fermentations. Publications, patents. Now employed, desires position progressive organization undertaking expansion of research or setting up new department. Age 34, married. Available, reasonable notice.
73-T-11, Ind. & Eng. Chem., Easton, Pa.

GRADUATE CHEMIST, M.S. Carnegie Tech. master mechanic desires position as research engineer. Twelve years' experience in textiles and resins, Mechanical design and construction. Married, four children, 3-B; salary must be sufficient to support family decently.
74-T-11, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, German Jewish, 31, single. Have first papers. M.S. Technical, University Berlin. Spectroscopic Defense Course, experienced in production of fertilizer, analysis of food and tuberculosis research. Speak, read, write English, German, French, Spanish. Now employed in Colorado. Will consider any offer. Good references.
78-T-11, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED (NONMEMBERS)

ADMINISTRATION: Graduate industrial chemist; thirty-nine, married; fifteen years' production, sales, management; costs, statistics, systems. Able organizer. Experienced writer and speaker. Desires post as executive or assistant in chemical industry. Salary $4000.
Box 21-T-11, Ind. & Eng. Chem., Easton, Pa.

CHEMIST: B.S.—A.C.S. accredited university. Good background in the four branches of chemistry, including explosives. One year experience with cement analytical chemistry, half year in laboratory of large eastern textile manufacturer. Employed, but desire position with company necessary to war, possessing post-war stability. Interested in development and/or research or job leading to same. East preferred.
Box 26-T-11, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ANALYST. Age 47. Twenty years' laboratory experience. I.C.S. graduate. Desires employment in Eastern or Central states for duration of war.
Box 30-T-11, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.A., 2 years' experience in commercial analytical control work. Desire to enter organic field. Single, age 37, 4F draft. Prefer to be located in Mountain or Pacific time belts.
Box 31-T-11, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST—Ph.D. from leading midwest university. Thirteen years' experience hormone research and teaching. Many publications. Capable investigator, alert constructive thinker, executive ability, agreeable personality and appearance. Member leading professional organizations. Employed (ninth year present position) but desire change to responsible research or teaching position not necessarily in endocrine field. Age 34, married, 2 children, U. S. Citizen, 3A.
Box 34-T-11, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, Inorganic, physical, colloid chem. Several years' experience. Patents. Friendly alien, first papers, wants permanent position for pilot plant development work or research, New York vicinity.
Box 40-T-11, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, Ph.D., 1942, Stanford University. Physical Chemistry major, mathematics minor. Desires research position. Available December 1, 1942. Location immaterial.
59 T 11, Ind. & Eng. Chem., Easton, Pa.

Industrial News

CONTINUED FROM PAGE 1548

uct is made by Clarostat Mfg. Co., Inc., 285-7 North 6th St., Brooklyn, N. Y.

The resistance wire is wound on a fiber-glass core and is protected by a fiber-glass braided covering. The unit can be readily bent and compacted to fit snugly about parts to be heated, or jammed into very tight spots, in either case providing an efficient heating means.

Anhydrous Sodium Metasilicate

THE manufacture of anhydrous sodium metasilicate at its Chester, Penna., and Anderson, Ind., plants has been announced by the Philadelphia Quartz Co., Philadelphia. This product is called "Metso anhydrous", latest member of their line of Metso cleaners. It is a technical grade of anhydrous sodium metasilicate without water of crystallization.

White and free-flowing, the anhydrous metasilicate is specially sized to reduce dustiness and to permit ready solubility.



Explosion-Proof Rotary Air Motors

ANNOUNCEMENT has been made by the Gast Mfg. Corp., Benton Harbor, Mich., that its rotary air motor is now available for new applications. This unit is especially suitable for locations where compressed air is available and where explosion-proof equipment is essential.

Extinguishing Alcohol Fires



Alcohol fire is burning in this test but flame is invisible to camera. Note no breakdown of foam in contact with burning alcohol.



This is the same fire, with flame visible due to a chemical coloring.

ALCOFOAM, a development of the American-LaFrance-Foamite Corp., Elmira, N. Y., forms a smothering blanket that snuffs out flames in alcohols, ketones, esters, ethers, and other flammable liquids. Poured into any single powder generator and carried through a water stream, Alcofoam powder generates a foam that floats on the lightest liquid surface, cutting off the supply of oxygen necessary to support combustion.

Protective Clothing for Women Welders

A COMPLETE line of tailored protective clothing for women welders, described as the first of its kind to be really styled according to accepted dressmaker patterns, is announced by American Optical Co., Southbridge, Mass. Made of specially selected chrome-tanned cowhide, the new clothing is light in weight, yet gives positive protection against dangerous flying sparks.

To protect hair and ears a special tailored cap is made of chrome-tanned leather, shaped somewhat like a bathing cap, with flaps extending over the ears.

Automatic Photoelectric CutOff

AN AUTOMATIC photoelectric cutoff has been developed for use on weighing machines, by the United Cinephone Corp., Torrington, Conn. Batch weighing, container filling, and other automatic weighing operations can be stepped up in speed and accuracy, and it can also be applied to measuring or indicating instruments.

THE Standard Oil Co. of New Jersey has purchased the one half interest of the National Distillers Corp. in the Standard Alcohol Co. This company was organized in 1932 jointly by Standard and National Distillers. The manufacturing plant is located at Linden, N. J., and another is under construction in the South.

BUSINESS OPPORTUNITIES • FOR SALE • WANTED • ETC.
MISCELLANEOUS

Five cents a word, minimum charge $2.00; display available at $7.50 per inch; in advance. No discounts or allowances

MICRO-ELEMENTARY ANALYSES: C, H, N, S, P, Halogens, Methoxyl, Mol. wt., etc., U.S.P. and other official tests, Purity tests, Microinorganic assays, Spot tests, Micro-distillations, Toxicological investigations, and typical micro-chemical research work. Dr. Carl Tiedcke, 366 Fifth Avenue, New York, N. Y.

WANTED: Journal of American Chemical Society, Vol. 1-25 inclusive or set of several volumes ending with Vol. 25.
Box 22-T-10, Ind. & Eng. Chem., Easton, Pa.

WANTED: Schwyzer, "Fabrikation der Technische und Pharmaceutisher Produkte." Want new or used copy.
Box 22-T-11, Ind. & Eng. Chem., Easton, Pa.

WANTED to BUY: Electric or Spring Drive Standard Kymograph and Drum. Approximate speeds preferred—one revolution per hour and one revolution per five or six hours.
Box 35-T-11, Ind. & Eng. Chem., Easton, Pa.

FOR SALE in part or whole, 1.5 kg. Melibiose (Hydrate), $(\alpha)_D^{20} = +129.5°$. Inquires for other sugars invited. Louis J. Cracas, Oradell, New Jersey.

FOR SALE: Following volumes inclusive: Chemical Abstracts, 23 to 30; Industrial Engineering Chemistry, 20 to 32; Analytical Edition, 1 to 12. Unbound, little used. Located Staten Island, N. Y. Will Ship C. O. D. for any reasonable sum.
44-T-11, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: British Chemical Abstracts, 1926-1940, index 1923-1932. Bound, Chemie et Industrie, 1918-1934, Bound. Color Trade Journal, 1-7, Bound. Metal and Alloys, 1-9, Bound. American Society for Heating & Ventilating, Vol. 3-14, 24-36. Friedlander Fortschritte der Teerfabrikationen, Band 1-12. Only the Pharmaceutical chapters bound. Any reasonable offer accepted.
50-T-11, Ind. & Eng. Chem., Easton, Pa.

WANTED: Helvetica Chimica Acta, v. 1-12, Journal Praktische Chemie, 1-124, Chemisches Zentrallblatt v. 1-59, Journal Chemical Society, v. 1-20, Chemical Industries, v. 1-24, ASTM. Bulletin Nos. 1-19, Recueil Travaux Chimiques des Pays-Bas, v. 1-33, Proceedings Royal Society of London, v. 1-34, Proceedings Society Experimental Biology and Medecine, v. 1-7, Journal Textile Institute, v. 1-11, Zeitschrift Anorganische Chemise, v. 6-47. Please state condition and price.
60-T-11, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Industrial & Engineering Chemistry, Complete (32 Vols.); Chemical & Engineering News Edition, Complete; Industrial & Engineering Chemistry, Analytical Edition, Complete (11 Vols.); Chemical Abstracts, Complete (113 Vols.); Journal American Chemical Society, Vol. 24-63 (81 Vols.); Journal Society Chemical Industry, Vol. 2-60 (60 Vols.); Chemistry & Industry Review, Complete (18 Vols.); British Chemical Abstracts 1926-1940 (18 Vols.); International Sugar Journal, Vol. 5-43 (37 Vols.); All above (except year 1941) handsomely and durably bound in ¾ leather, and in perfect condition. Year 1941 unbound. Make offer. F. Gay, 825 West 179th St., N. Y. C.

FOR SALE: National Geographic Magazines, 1916-1941 inclusive, unbound, complete, fine condition, $60. Also, any other issue of the Geographic, 1888-1942. Reader's Digests 1930-1941 inclusive, $18.00; Fortune, 1930-1941 inclusive, $90; Time, Life, Scientific Periodicals, chemical, medical, physical, send want list, no obligation.
Periodical Service, Box 327, Swarthmore, Pa.

FOR SALE: 40 pounds Tellurous Acid CP, 100 pounds Boron Trichloride, Galacturonic and Levulinic Acid, Digitonin, Tryptophane, Histamine & Histidine Salts, d-Ribose, All Caesium and Rubidium Salts, All Cacodylates, 100 pounds Scrap Sheet Molybdenum, 10 pounds Gem Topaz uncut.
Box 82-T-11, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Typewritten abstracts of United States patents on the manufacture of Synthetic Rubbers and Elastoplastics, the latter including plastics with rubbery properties. Also intermediates used in the manufacture of the above products, together with such allied products as chlorinated rubber, rubber hydrochloride, isomerised rubber, rubber derivatives, polymerization products, especially of the olefins and diolefins & etc. These abstracts have been made by a rubber chemist from a chemical viewpoint, and contain ten to five hundred words each. The period covered is from 1909 through 1930, and contain over five hundred patents. The period will be completed through 1942 if the demand warrants it. Index lists have been prepared and arranged in numerical order & etc., containing assignees, assignors, as well as a briefed statement of the subject of each. Legitimate inquiries solicited.
64-T-11, Ind. & Eng. Chem., Easton, Pa.

NEED EQUIPMENT? Then contact The Laboratory Exchange at New York. Write, wire or phone whatever your needs are in laboratory equipment. Your inquiry will receive immediate attention. We have served American chemistry for ten years with fine used guaranteed equipment. Reasonably priced. The Laboratory Exchange, 24 E. 21st St., New York City.

WANTED: Chemical Abstracts, Journal American Chemical Society, Berichte Chemische Gesellschaft, Biochemical Journal, Helvetica Chimica Acta, Beilstein Handbuch, Journal Praktische Chemie, International Critical Tables complete sets or parts.
75-T-11, Ind. & Eng. Chem., Easton, Pa.

WANTED: Chemical Abstracts 1936 to 1941 part or entire lot. Give price.
79-T-11, Ind. & Eng. Chem., Easton, Pa.

WANTED: Any salts of Dysprosium, Erbium, Hafnium, Gadolinium, Rhenium, Scandium, Terbium, Thallium; Boron Amorphous, Quartz Crystals, Iceland, Spar Crystals, Pollucite Mineral, Thortveitite Mineral, Scheelite, Carnotite, Tantalite.
Box 83-T-11, Ind. & Eng. Chem., Easton, Pa.

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Wheelco Instruments Co. 1523

Industrial Literature

CONTINUED FROM PAGE 1547

Respirators. This bulletin describes the Comfo Dust respirator which, in order to save metal, has been redesigned with filter cases of plastic. Better appearance plus less resistance to air flow are two of the advantages. The new filter container units are thinner, with rounded edges, permitting better sidewise and downward vision. The plastic used has high impact strength with no electrical conductivity and is not affected by perspiration. *Bulletin CR-9 CEN.* MINE SAFETY APPLIANCES Co., Braddock, Thomas, & Meade Sts., Pittsburgh, Penna.

Temperature Indicators. A pencil-type indicator of temperatures, called "Tempilstiks" is described, for low-temperature work, where a Seger pyrometric cone cannot be employed. With a range of from 125° F. to 700° F., these units are used for preventing cracks during metal processing, indicating the approach of safe temperature limits in the manufacture of costly castings, checking bearing, motor and insulation temperatures. Color identifies each temperature range, the pencil-like marking melting when the correct temperature is reached. They are accurate to within 1 per cent of the stated value. *The Laboratory, Vol. 13, No. 4 CEN.* FISHER SCIENTIFIC Co., Pittsburgh, Penna., and EIMER & AMEND New York, N. Y.

CHEMICAL AND ENGINEERING NEWS

HARRISON E. HOWE, Editor

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9th Annual Chemical Engineering Symposium

Division of Industrial and Engineering Chemistry, A. C. S.

Palmer House, Chicago, Ill., December 28 and 29, 1942

THE Ninth Annual Chemical Engineering Symposium of the Division of Industrial and Engineering Chemistry, AMERICAN CHEMICAL SOCIETY, will be held Monday and Tuesday, December 28 and 29, 1942, at the Palmer House, Chicago, Ill.

This Symposium on Industrial Reaction Rates is intended to deal primarily with the applications of chemical kinetics combined with transfer rates to the rational design of process equipment and the calculation of schedules of operation. Great strides have been made in the theoretical aspects of chemical kinetics through the media of statistical mechanics, but relatively little literature is available on the translation of such information into the terminology of the chemical engineer.

Registration. All persons attending the meeting must register. The registration fee is $1.00 for members of the AMERICAN CHEMICAL SOCIETY, students, and nonchemist visitors, and $2.00 for chemists and chemical engineers who are not members of the SOCIETY. Registration will be in the foyer of the fourth floor of the Palmer House.

Officers

R. N. Shreve, Purdue University, Chairman.
T. H. Chilton, E. I. du Pont de Nemours & Co., Inc., Vice Chairman.
Whitney Weinrich, Gulf Research & Development Co., Secretary-Treasurer.

Executive Committee

L. W. Bass, New England Industrial Research Foundation.
F. J. Curtis, Monsanto Chemical Co.
C. C. Furnas, Yale University.
H. E. Howe, Editor, *Industrial and Engineering Chemistry.*
H. F. Johnstone, University of Illinois.
T. K. Sherwood, Massachusetts Institute of Technology.
T. B. Drew, Columbia University.
P. D. V. Manning, International Minerals & Chemicals Corp.
K. M. Watson, University of Wisconsin.
O. A. Hougen, Chairman, University of Wisconsin.

Program of Papers. All papers will be presented in Room 17 of the Palmer House. Each paper is allotted 30 minutes for presentation followed by 15 minutes for discussion.

Local Committee

Harry McCormack, Chairman, Illinois Institute of Technology.
K. M. Watson.
R. J. Altpeter.
R. C. Kintner.
C. A. Herbst.

Symposium Committee

E. W. Comings, University of Illinois.
C. M. Cooper, E. I. du Pont de Nemours & Co., Inc.

Nominees for Offices in the A. C. S.

THE following members of the AMERICAN CHEMICAL SOCIETY have been nominated for the offices indicated, and balloting is now in progress:

President-Elect. T. A. Boyd, C. S. Marvel, Thomas Midgley, Jr., Linus Pauling, W. T. Read, E. H. Volwiler, Hobart H. Willard, Robert R. Williams; *Councilors-at-Large.* M. L. Crossley, Vincent du Vigneaud, George Glockler, W. N. Jones, O. E. May, W. Albert Noyes, Jr., George Scatchard, R. L. Shriner, Robert B. Sosman.

The committee which counted the vote for nominations consisted of H. L. Haller, Raymond M. Hann, W. Gordon Rose, E. R. Smith, and Charles L. Parsons.

Ballots must be received in the office of the Secretary of the SOCIETY on or before December 15, 1942.

Monday, December 28

Morning Session

E. W. COMINGS, *Chairman*

8:00 to 10:00 A. M.—Registration.
10:00 A.M.—HENRY EYRING, H. M. HULBERT, AND R. A. HARMAN. Theory of Absolute Reaction Rates.
11:00 A. M.—W. S. BONNELL AND WHITNEY WEINRICH. Isomerization of Normal Butane.

Afternoon Session

P. D. V. MANNING, *Chairman*

2:30 P. M.—P. H. EMMETT. Rate of Ammonia Synthesis.
3:15 P. M.—C. W. DEANE. Kinetics in Acid Media.
4:00 P. M.—H. F. HOERIG, DON HANSON, AND O. L. KOWALKE. Rates of Vapor Phase Esterification.

Evening

7:00 P. M.—Dinner, Room 17, Palmer House.

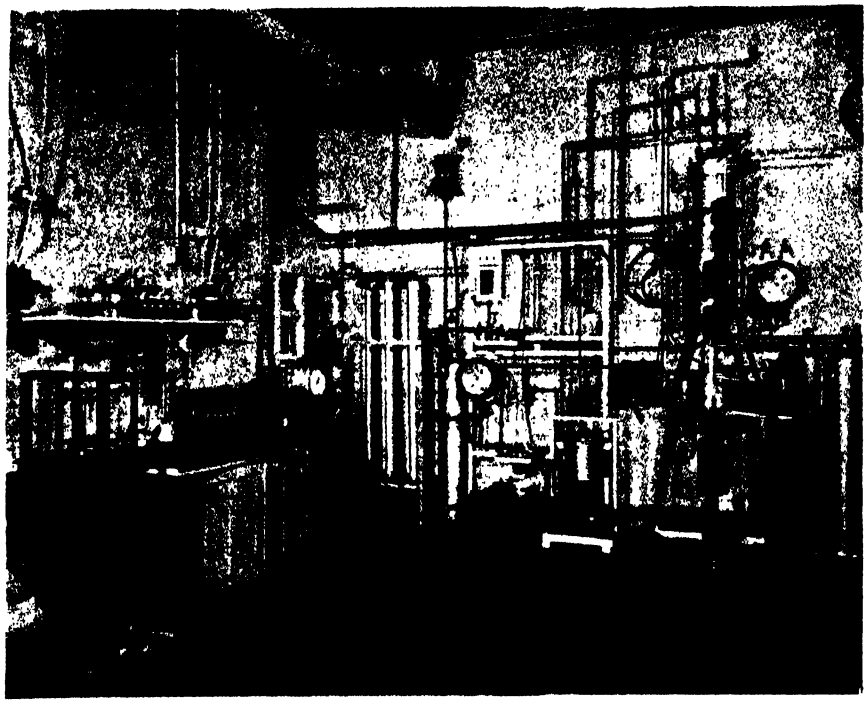
HARRY MCCORMACK, *Toastmaster*

Tuesday, December 29

Morning Session

C. M. COOPER, *Chairman*

9:00 A. M.—FARRINGTON DANIELS. Prediction of Reaction Rates.



Equipment for studying reaction rates, Chemical Engineering Dept., University of Wisconsin

9:45 A. M.—D. M. HURT. Principles of Reactor Design.

10:30 A. M.—C. C. DEWITT. Correlation of Rate Data.

11:15 A. M.—K. M. WATSON. Rate Equation for Heterogeneous Catalysis.

Afternoon Session

T. B. DREW, *Chairman*

2:00 P. M.—R. H. WILHELM, W. C. JOHNSON, F. S. ACTON, AND J. A. CAWLEY. Transverse Heat Transfer in Catalyst Beds.

2:45 P. M.—Rates of Catalytic Hydrogenation.

(*a*) N. K. ANDERSON AND C. A. ROWE. Experimental Equipment and Procedure.

(*b*) R. B. BECKMANN, A. E. PUFAHL, AND O. A. HOUGEN. Experimental Results.

3:30 P. M.—J. DUDOMAINE, R. L. Swain, AND O. A. HOUGEN. Rate of Base Exchange in Water Softeners.

A. E. Laurence, formerly chief chemist for the Solo Works Division, Perfect Mfg. Co., Cincinnati, Ohio, is now employed in the development department of the Thiokol Corp., Trenton, N. J., on the compounding of synthetic rubbers.

W. W. Skinner Appointed Chief, Chemistry and Engineering, USDA



WILLIAM W. SKINNER has been appointed chief of the Bureau of Agricultural Chemistry and Engineering, U. S. Department of Agriculture, to fill the vacancy left by the death of Henry G. Knight last July.

Born in Baltimore, Md., in 1874, Dr. Skinner has had 38 years of intimate association with the work of the bureau, which he has helped direct as associate chief since 1939. From 1935 to 1939 and from 1921 to 1927 he was assistant chief. In 1927 he was assigned to other duties in connection with chemical and technological research in the bureau.

Dr. Skinner joined the bureau in 1904 as a food inspection chemist and has seen many changes in the organization he helped to build. In the old days it was known simply as the Bureau of Chemistry. Later it took on soils work and became Chemistry and Soils. A few years ago it became Chemistry and Engineering, indicating another change in the scope of the work. Since Pearl Harbor the bureau has been engaged in many vital war projects as one of the seven scientific agencies brought together in the Agricultural Research Administration, under the direction of E. C. Auchter.

During his long career as a government chemist, Dr. Skinner has held office in various scientific organizations, and has served as chairman of the Maryland State Board of Agriculture and the Board of Regents of the University of Maryland.

Data Published on Selective Service

BECAUSE of the wide interest in this subject and the need for obtaining trained men for our Production Army, we give below references to information we have published on occupational deferments, including those of men in training, and the need for technically trained persons. Future developments will be brought to the attention of our readers.

Chemical and Engineering News

(NEWS EDITION previous to 1942)

Vol. **18** (1940), pages 890, 1127
Vol. **19** (1941), pages 129, 311, 457, 459, 489, 520, 587, 681, 797, 1164, 1412, 1464
Vol. **20** (1942), pages 110, 157, 472, 579–80, 788, 812, 837–39, 985, 1099, 1100, 1219, 1294, 1370, 1514, and 1536.

Industrial and Engineering Chemistry

Vol. **33** (1941), pages 1, 135, 283, 561
Vol. **34** (1942), pages 2, 131, 259, 648, 1134

Willis R. Whitney, vice president in charge of research of the General Electric Co., has been awarded the 1943 John Frits Medal "for distinguished research, both as an individual investigator and as an outstanding and inspiring administrator of pioneering enterprise, coordinating pure science with the service of society through industry".

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Annual subscription rate, $2.00. Foreign postage to countries not in the Pan American Union, $0.60; Canadian postage, $0.20. Single copies, $0.15. Special rates to members.
No claims can be allowed for copies of journals lost in the mails unless such claims are received within 60 days of the date of issue, and no claims will be allowed for issues lost as a result of insufficient notice of change of address. (Ten days' advance notice required.) "Missing from files" cannot be accepted as the reason for honoring a claim. Charles L. Parsons, Business Manager, 1155 16th St., N. W., Washington, D. C., U. S. A.

A. I. Ch. E. Streamlined for War

STREAMLINED for wartime efficiency, the 35th annual meeting of the American Institute of Chemical Engineers completed its business in two and a half days, without benefit of entertainment, at the Netherland Plaza, Cincinnati, November 15 to 17.

Operation and protection of plants in wartime and urgent problems of procuring and retaining trained manpower to keep industry at peak production under war conditions were the principal topics of discussion, in addition to two sessions devoted to papers on technical developments in chemical engineering. The business of the institute, consisting of reports of officers and committees, occupied a short business session.

J. L. Bennett, manager of chemical operations, Explosives Department, Hercules Powder Co., was elected president of the institute for 1943, succeeding S. D. Kirkpatrick. George Granger Brown, professor of chemical engineering, University of Michigan, was elected vice president. Stephen L. Tyler and C. R. DeLong were re-elected secretary and treasurer, respectively.

Four directors elected for three-year terms are: Lawrence W. Bass, director, New England Industrial Research Foundation; Barnett F. Dodge, head of the Department of Chemical Engineering, Yale University; Chester L. Knowles, chemical sales director, Dorr Co.; and Charles M. A. Stine, vice president, E. I. du Pont de Nemours & Co., Inc. Francis J. Curtis, Monsanto Chemical Co., was appointed as director by the institute's council to fill the unexpired term of Walter G. Whitman, resigned.

Seriousness of the problem of technically trained manpower was recognized by the institute in voting the passage of a resolution directed to competent governmental authorities, as follows:

As a part of the professional technical manpower of the Nation, the American Institute of Chemical Engineers, assembled at its annual meeting in Cincinnati, Ohio, on November 16, 1942, subscribes to the ensuing statements concerning the supply of engineering manpower and urges the adoption of the suggestions made therein looking toward the assurance of the necessary supply of men trained on a professional engineering level to perform engineering services in the armed forces and in the war industries.

The following are the significant facts:

1. The war industries are an essential part of the war effort.

2. The war industries now need and will continue to need a steady replacement supply of technically trained men both for the maintenance of mass production and for the continued improvement of military material.



J. L. Bennett, President-Elect

3. Information from many sources makes it clear that the supply of professional engineers of all kinds is wholly inadequate to meet the greatly increased requirements of the armed forces and of war production. The problem is made more acute by the increasing loss of men from industry to voluntary enlistment.

4. The engineering schools must continue to be the major source of supply of young engineers. Efforts to enroll women in engineering schools have not yet been successful to any significant extent.

5. The effect of the new draft law will be to throw a considerable proportion of all engineering students into officer training programs and a large proportion of those who cannot qualify physically for officers training into the draft. Neither group will be available for the war industries for the duration.

In view of these facts, we strongly recommend:

(*a*) That the loss of technically trained men from war production plants be stopped by cessation of voluntary enlistment or by a "freezing" order covering such personnel and plants.

(*b*) That selective service Occupational Bulletin No. 10 of last June [see CHEM. ENG. NEWS, 20, 837 (1942)] be reaffirmed in principle in its provisions for the deferment of men in engineering training.

(*c*) That this Directive be modified in the light of the lower draft age by providing for the deferment of engineering students in established colleges to the end of the term in which they reach the age of 18, and thereafter, on a term by term basis as long as their academic records remain satisfactory.

The present capacity of the engineering colleges for entering students is about 40,000 per year. The number of young men reaching age 18 is about 3,000 per day. Therefore, less than 2 weeks' supply of young men would be sufficient to ensure an output of the normal number of young engineers each year. On graduation the number will have been reduced to about 18,000 and the other 22,000 will have been unsuccessful and will have been inducted into the armed forces. Of the 18,000 trained men, approximately one half would meet the physical requirements for eventual commissioning and the rest would be available for war production industries.

As a final result, the armed forces would lose the direct services of only 3 days' supply of those reaching age 18 each year. This small number, insignificant in the total manpower situation, and, in the opinion of many, an absolute minimum for the vast production effort now contemplated, would go far toward ensuring the maintenance of an acceptable level of engineering competence in war production.

Reports of officers and committees showed the affairs of the institute to be in flourishing condition. Membership shows a net gain, as of November 1, of 500 over the figure of a year ago. Present membership was reported to total 3,352 of all classes.

Added during the year to the list of 44 courses in chemical engineering accredited by the institute were those of seven institutions:

University of Maryland
Northeastern University
University of Florida
Oregon State College
Worcester Polytechnic Institute
Bucknell University
Cooper Union School of Engineering (now including night course)

Despite the absence of plant visits and entertainment, which have usually featured meetings of the institute, attendance of members and chemical engineer guests reached a new high with a registration of 430. Although other meetings have shown higher figures for total registration, ladies previously welcomed have accounted for a large share of attendance.

Operating kinks in wartime provided a subject with which many had had experience during World War I. Troubles in converting pyrites burners to handle sulfur in sulfuric acid manufacture, commandeering of vitreous enameled bath tubs as nitrators in picric acid plants, and troubles with pumping systems designed for water but forced to handle volatile solvents were among the many topics of interest to plant operators discussed. Leading discussion were Fred. F. Chapman, Albert E. Marshall, and Albert B. Newman. Henry Howard and Frederic J. Le Maistre gave some of their experiences by letter. The problems of skilled manpower enter this discussion and remained a dominant topic throughout the meeting. Harvey N. Davis, newly appointed director of the Office of Production Research and Development, WPB, developed the subject further at the informal dinner Monday evening.

Seriousness of manpower questions was emphasized by the immensity of demands by both the armed forces (9,700,000 men) and producing industry. The ratio of World War I of 12 men in industry for each man in uniform can obviously not be met now. Also, it seems unlikely that General Hershey's ratio of 4 to 1 will

meet industry's needs. Present terrific drains probably will have grievous effects on our training programs with the continuance of war.

Protection of plants in wartime was the general topic of four papers forming Monday afternoon's program.

Good housekeeping in plants necessary for their protection at all times becomes an acute necessity in war with the added hazard of sabotage, according to Lieutenant-Colonel James C. Sawders, chief, Plant Protection and Safety Branch, C. W. S. In his paper (presented by Major Harry G. Baker, Jr.), Colonel Sawders pointed out the extreme necessity for seeing that all plant services are supervised and all employees identified at all times to ensure against breaks in production. To normal protection from fire, power failure, explosions, theft, and personal injury must be added safeguards against sabotage, efficient guards against strangers, measures to confine employees to specified areas of work, and provisions for continuing operation even in blackouts. Separation of power lines from lighting lines is essential for this purpose, as is a trained staff to supervise operations under blacked-out conditions.

Industrial plants can be made far less obvious targets for air attack by applying modern camouflage methods. This phase of the problem was discussed by Greville Rickard, camouflage specialist, Office of Civilian Defense. The objective, the speaker said, is primarily to confuse the bombardier for even a few seconds as he attempts to select his targets. This can be accomplished in a number of ways which tend to break up the large areas of plants and to blend them with surroundings. Selection of the original plant site, plantings of vegetation, painting, installation of nets to break up shadow patterns, and screening smokes are the preferred methods of destroying visually the patterns the bombardier expects to see. Necessarily the effective use of any of these means requires experience and imagination to prevent an effect opposite to that desired.

Screening smokes offer effective ways of hiding objects and areas. Modern production of these useful smokes was described by Major Frederick G. Schmitt, Office of the Chief Chemical Warfare Service. Effective smoke screens, which hide areas but need not interfere with activity within them, can be laid in 8 minutes by modern methods. Thickness of the smoke screen makes it effective at low density. Criteria in selecting a particular type of smoke are effectiveness of cover, low cost, and harmlessness. Three types are most commonly used: chemical smokes ($TiCl_4$, P_2O_5, etc.), carbonaceous smokes, and fogs of oil produced by vaporized oil in engine exhausts. Screens can be laid in many ways applicable under varying conditions and are among the most effective means of protection of civilian areas as well as troop movements.

Special safety precautions practiced in ordnance plants make them among the safest places to work according to Colonel Crosley Field, Safety Branch, Ordnance Department, in a paper read by Major R. C. Stratton. Tables based on experience of the Ordnance Department show safe distances between quantities of explosive materials to be observed in segregating units within a plant. In addition to this important factor, limitation of personnel and of quantity of explosive material in any particular location to that required for efficient operation is a cardinal principle of safety. Cooperation between operators, Ordnance Department, and the Surgeon General provides special safeguards to the health of workers. A new safety code covering ordnance plants is soon to be issued.



Left. Fred F. Chapman, E. I. du Pont de Nemours & Co., Inc.



Right. Albert B. Newman, College of the City of New York.



Left. Greville Rickard of the Office of Civilian Defense.



Right. J. L. Bennett, Hercules Powder Co. and newly elected president of the American Institute of Chemical Engineers.



Left. Albert E. Marshall, Agfa Ansco Division of General Aniline & Film Corp.

A. O. Snoddy, speaking on "Some Cincinnati Industries", traced the rise of Cincinnati from a village, originally called "Losantiville", to its present size and name, obtained from The Society of the Cincinnati.

The invention of the steamboat with its attendant power to proceed up the river from New Orleans to Cincinnati was one of the biggest contributions to the growth of the city. Before the advent of steam power early industries were based on agriculture and its products. Power, available as it was with these engines, made a difference in the industrial picture and soon factories were displacing the home industries. By 1819 the city had grown to an area of 3 square miles with 1,890 buildings, and 214 shops, 10 churches, and 17 taverns. There was also a tremendous (for the time) steam mill of 70 horsepower which furnished power for four millstones and a textile mill. It consumed 480 tons of coal a year and Mr. Snoddy compared it with modern Cincinnati power plants using about 600,000 tons per year. The Cincinnati soap industries were early playing a part in the city's prosperity. In 1837 William Procter and James Gamble pooled their savings of $7,500 and began the business which is today the massive Procter & Gamble Co. This firm grosses annually $282,000,000 and its Cincinnati plants occupy approximately 200 acres. Mr. Snoddy concluded his paper with examples of soap advertising from the years 1850 and 1937 and showed how little the advertising message has changed during that period.

F. J. Gradishar, W. L. Faith, and J. E. Hedrick reported on work done at Kansas State College on laminar flow of oil-coal suspensions. This investigation, part of a larger program on manufacture and cost of colloidal fuel, was made in order to determine friction losses in pipes carrying the colloidal fuel mixture.

It was found that suspensions of coal in fuel oil may exhibit either viscous or plastic flow depending on concentration. However, at a definite concentration of suspended matter the mechanism will be transformed into plastic flow and the fluid will possess a definite yield value which must be overcome before flow begins. The critical concentration was shown to correspond to the concentration at which the particles just touch each other to form an arch capable of resisting



Left to right: Top. S. C. Kirkpatrick, *Chemical & Metallurgical Engineering*, and retiring president of the American Institute of Chemical Engineers; O. R. Sweeney, Iowa State College, and J. Howard Arnold, University of Iowa; Henry N. Lyons, Cities Service, and A. E. Marshall, a past president of the Institute, with Harvey N. Davis, Office of Production Research and Development Center. C. R. De Long, treasurer, and R. P. Kite, Dorr Co.; Ernest M. Symmes, Hercules Powder Co. with Stephen L. Tyler, secretary; and Warren L. McCabe, Carnegie Institute of Technology, with J. L. Bennett, newly elected president of the Institute. *Bottom.* George G. Brown, newly elected vice president with J. L. Bennett, M. H. Ittner, Colgate-Palmolive-Peet Co. and George G. Brown, Gaston Du Bois, Monsanto Chemical Co., D. B. Keyes, WPB, Norman W. Krase, du Pont Co., and R. L. Murray, Hooker Electrochemical Co.

slight pressure. The concentration at which zero fluidity occurs as a fluidity-concentration plot was practically identical to the critical concentration. An equation was formulated for suspensions of 200-mesh coal in oil up to 40 per cent by weight which enables the prediction of friction losses.

H. P. Simons, Joseph H. Koffolt, James P. Withrow, and Richard J. Mitchell collaborated in a ponderous report on the drying of rayon—both cakes and skeins. The data presented were the results of 17 years of intermittent studies and experimental work on the effect of various drying conditions.

The first report covered rayon skeins and after a description of the dryer and technique used in obtaining the varied data, the authors summarised their results as follows: Suitably centrifuged rayon skeins were observed to dry solely under falling rate conditions and found to conform to the equation, $-dW/d\theta = 0.78G^{1.61}(\Delta H)W$, where $dW/d\theta$ = rate of drying, pounds of water evaporated per pound of bone-dry stock, G = mass velocity of air, pounds per minute per square foot, ΔH = humidity corresponding to the wet bulb temperature of the air, pounds of water per pound of bone-dry air, and W = free moisture content, pounds of water per pound bone-dry stock. The critical moisture content of 150 denier, 40 filament, spool processed yarn averaged 0.98 pound of water per pound of bone-dry stock. Drying at temperatures up to 200° F. and humidity conditions in line with industrial practice had no measurable effect upon the degradation properties of the yarn as evidenced by wet tensile strength, elongation, copper number, sodium hydroxide boil test, dye test, and cuprammonium disperse viscosity. Drying for prolonged periods at high temperatures, however, had a slightly degrading effect upon the yarn, but this was evidenced only after unnecessarily long drying periods. In conclusion the authors stated that the safe drying temperatures recorded in literature were probably too low and increased dryer production could probably be obtained by use of higher temperatures.

The work on drying rayon cakes was done on 150 denier, 40 filament rayon cakes of viscose pot production. A different equation was found to hold for drying viscose cakes:

$$-dW/d\theta = 0.88G^{1.05}(\Delta H)W$$

Again it was found that drying air temperatures and other conditions had no noticeable effect upon the rayon.

As part of a program to obtain more data for design purposes on liquid-liquid extraction, Olaf Bergelin, Frank J. Lockhart, and George Granger Brown presented a comprehensive report on data obtained from a study of the ternary system tetrachloroethylene–isopropyl alcohol–water.

Physical properties including equilibrium relationship of the liquid system at 77° F. were determined.

The effect of velocity of the phases upon the flow conditions was shown by photographs. It was found impossible to estimate the turbulent characteristics of flow by any orthodox use of Reynolds number, since the velocity distribution in one phase is determined by the flow properties of both phases. When mass velocities of

the phases are equal in magnitude the interfacial velocity approaches zero, which creates a stagnant film in each phase and aids in the accumulation of foreign materials at the interface and the transfer coefficient passes through a minimum point.

A process to remove 88 per cent of the lime in sugar manufacture formed by the addition of sulfuric acid to the molasses, was claimed by G. T. Reich of the Pennsylvania Sugar Co. The calcium sulfate contaminates the yeast, forms scale in the beer still and slop evaporators, and prevents profitable recovery of by-products from the slop. Mr. Reich's new method is said to give the first positive method of removing this unwanted material.

Briefly, the process consists of mixing molasses with a stream of hot water and then passing the mixture to a proportioner which regulates the ratio of molasses to sulfuric acid. This mixture enters the top of a reaction tank where it is heated; the molasses settles continuously and discharges into centrifugals. The clear molasses liquid discharges from the top of the centrifugals while the calcium sulfate and other organic materials are caught in the bottom of the centrifugal basket. This collected sludge is mixed with hot water, discharged into a receiving tank and then into a baffled settler. The separation of this sludge is said to give an increased quality and quantity to all the further sugar processes, especially in the yeast produced and the decreased amounts of calcium scale in the stills.

J. A. Gerster, of Tulane University, and J. H. Koffolt and J. R. Withrow collaborated in an investigation on the extension of Chilton and Colborn's *HTU* method to plate columns. The authors introduced a new concept, the $(PTU)_{OV}$ which is the number of plates equivalent to a transfer unit and similar to the *HTU* expression, inasmuch as it is expressed by

$$(PTU)_{OV} = NP \Big/ \int_{y_1}^{y_2} \frac{dy}{y^* - y}$$

where NP is number of plates, y_1 and y_2 composition of vapor entering and leaving columns, and y^* and y the mole fraction of volatile component in liquid and vapors.

A plot of *PTU* against the slope of the vapor-liquid equilibrium curve gave a simple correlation of results at constant vapor velocity. The authors claimed the existence of a liquid concentration gradient across the plate of a bubble cap and that this method is a logical basis for evaluating still performance, optimum plate spacing, optimum velocity, diameter, and number of bubble caps per plate. Further work is being done.

George Granger Brown and Frank J. Lockhart of the University of Michigan, reported on the effect of vapor load and efficiency in fractionating columns. This work was undertaken to relate available laboratory data to commercial operations. It was found that the over-all plate efficiency for laboratory columns is largely independent of the mass vapor velocity over a wide range of normal operation. At abnormally low vapor velocities the plate efficiency decreases very slowly in the laboratory columns and quite abruptly in the commercial columns.

The principles of stripping were investigated in a treatise by Harold J. Garver, of the University of Cincinnati, and Frank Lerman, of the Blaw Knox Co. Stripping operations, they said, possess the advantage over straight distillation of the volatile components from liquid solutions in that more complete separation can be obtained at lower temperatures for the same conditions of pressure or vacuum. In view of this and the number of uses of stripping operations in industry, the authors undertook to assemble the pertinent data now in the literature.

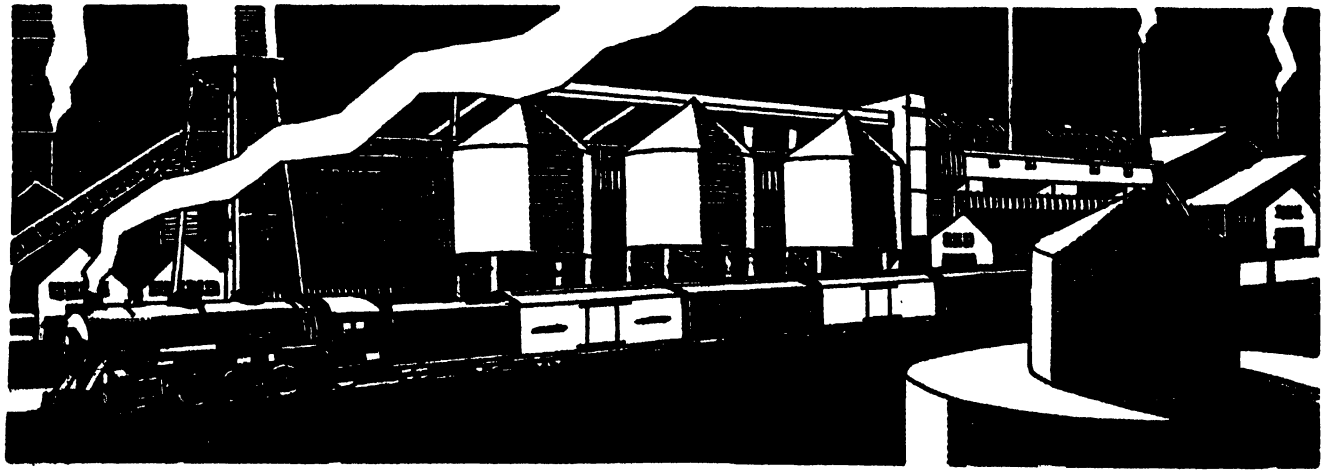
They compared batch and continuous stripping and showed theoretically that the same operating conditions, irrespective of the phase behavior, consumed more stripping medium in a batch process than in a continuous countercurrent system. A graphical method was given which allowed the easy determination of the number of actual plates required for a continuous plate stripping column.

A new type of rectifying column for use in conjunction with high vacuum stills was discussed by Robert M. Schaffner, of the Standard Oil Co. of Indiana, John R. Bowman, of Mellon Institute, and James Coull, head of the Department of Chemical Engineering at the University of Pittsburgh. The new column is a vertical tube having alternate heated and cooled segments. In operation the vapor from the still rises through the tube and mixes with the alternate zones of vapor created when the reflux flowing down the tube sides is vaporized by the heated segments. At each cooled segment, portions of vapor are condensed and join the main reflux stream. The column thus has an alternate action in stripping out light components and condensing heavy portions.

The still described in the paper was constructed of a glass tube 1 to 5 inches in diameter and 5 feet long. It was provided with 12 heated zones separated by 12 cooled zones. Each section of varied temperature was 2 inches long. Heat was supplied by power through Nichrome windings, the sections being covered on the outside with asbestos. Cooling was effected by jets of compressed air.

In operation, the column reflux rates were measured by an optical glass gage by estimating, through proportion, the thickness of the flowing reflux film. The film thickness could be read to 0.001 inch, and reflux flow rates, through the constant of proportionality between flow rate and the cube of film thickness, could be calculated to within 5 per cent. The column was run at 0.1 to 0.01 mm. of mercury and throughput was 250 ml. per hour.

As is to be expected, tests of the column indicated that an increase in vaporization condensation action increased the separating power of the column. The present column, however, is not so dependent on high reflux as the conventional types. As the reflux ratio was decreased from infinity the new column improved when compared to a column of theoretical plates operated at the same reflux. Efficiency increased rapidly as the volatility ratio of the materials separated decreased toward unity, indicative of a high suitability for rectifying mixtures difficult to separate.



ACTION ON THE AMERICAN CHEMICAL FRONT

[Continued]



Streamlined harvesting with light-weight, high-speed tractor carrying a sharp-bladed knife. From two to twenty acres of vines are mowed in ten hours. Speed is essential since peas for quick-freezing must be harvested the hour they reach the peak of perfection

Development of the Quick-Freezing Process

LEWIS W. WATERS[1], General Foods Corp., Postum Building, 250 Park Ave., New York, N. Y.

THE quick-frozen food business is one of the few industries strictly American in origin. In excellent condition at present and with a promising future, its growth and development constitute one of the most interesting sagas of the food world.

In 1931 when Birds Eye, our pioneer company in the field, was first organized, 10 stores sold frosted foods in the New England city of Springfield. Today 35,000 stores throughout the country feature frosted foods. This year it is estimated the quick-frozen foods business will handle some 400,000,000 pounds.

Although the industry in its early days confined itself exclusively to the quick-freezing of fish, many kinds of foods are quick-frozen today. Meats, poultry, fruits, and vegetables, for example, are now quick-frozen by the latest methods and are preserved in their pristine freshness the year round. In most instances modern equipment is set up in packing plants located near the fields where the crops were planted and, without loss of time or nutritious content, the newly ripened peaches, spinach, string beans, asparagus, strawberries, and other products are quick-frozen and packed for shipment to all parts of the country.



Packaged Birds Eye spinach is slipped into this portable quick-freezing machine by the white-coated operator. In a matter of minutes the shelves will be loaded with trays such as this and the insulated door shut on the intense cold that is developed inside.

Among the advantages of the process is the ability to preserve for year round use perishable fruits and vegetables that formerly could be had only in their regular seasons. Quick-freezing not only preserves the natural taste of the fish, poultry, meats, and vegetables, but retains their maximum vitamin values as well. And once the quick-freezing is done, the freshness of the food is retained indefinitely, and waste owing to spoilage of crops because of glutted markets is avoided.

One of the features of quick-freezing lies in its space-saving quality. A quick-frozen package is compact, sanitary, durable, and appetizing. It takes up only a small portion of the space the product would occupy in its natural state. A carload of Birds Eye spinach is equal to 11 carloads of spinach in its prefrozen state.

The key to the success of quick-freezing lies in minimizing crystal formation. When scientists mastered the problem of

[1] Vice president in charge of Research and Development.

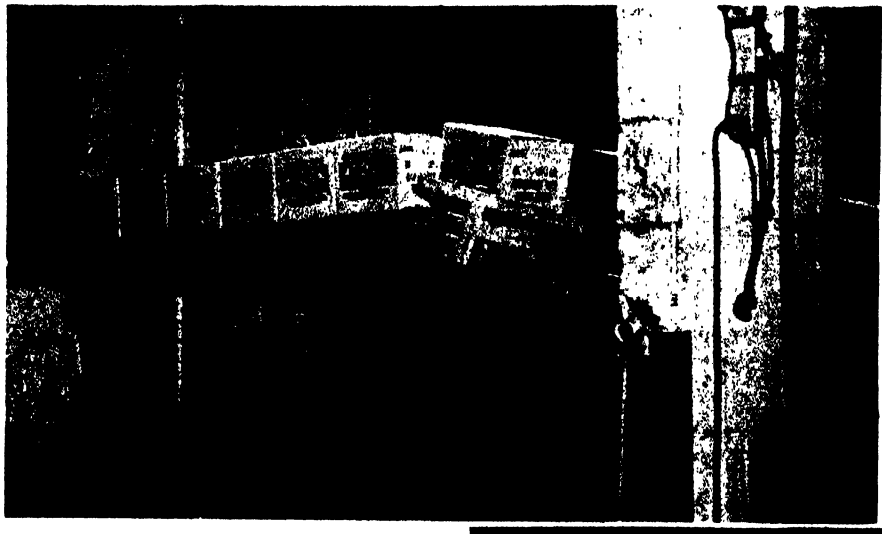


Left. Packages of spinach are assembled on trays and placed in this patented Birds Eye quick-freezer which seals with cold the garden freshness and the nutritional qualities of the choicest leaves of the spinach crop. *Below.* This tractor with a disker attached is being fueled from a gasoline tank wagon on the pea field, inasmuch as every minute counts in the high-speed harvest schedule.

assuring uniformly small crystallization, they opened the way to success for the industry. When solutions are allowed to crystallize, the size of the crystals is in inverse proportion to the time allowed for them to form. The longer the time of crystallization, the larger the individual crystals. This fact is basic in the freezing of food.

Under a microscope, animal tissues are made up of minute cells filled with a semi-liquid protein gel. This gel contains a certain percentage of water in which are dissolved salts containing such elements as sodium, calcium, potassium, and magnesium. Water in which these salts are dissolved does not freeze uniformly in the cells, when the product is slowly frozen. Instead, fresh water begins to crystallize

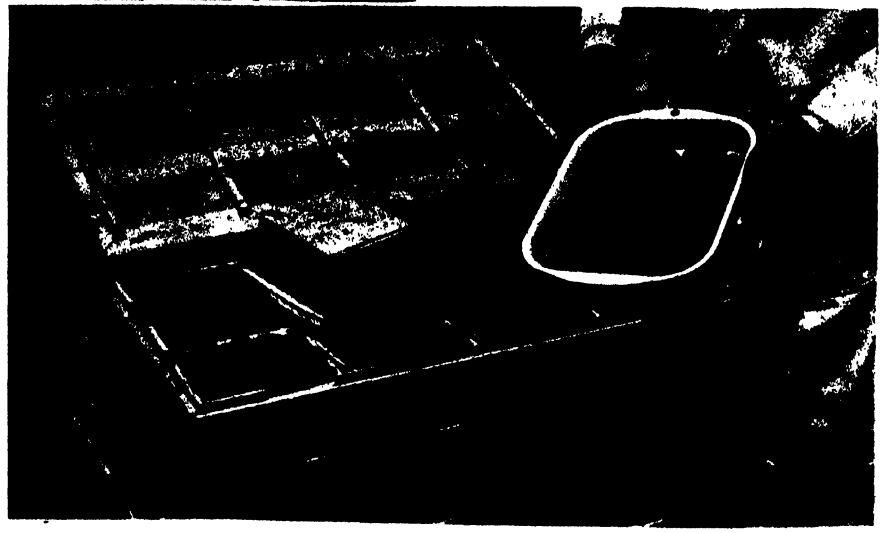




out of the cellular and intercellular tissues when the temperature is lowered to about 31° F.; and as the temperature is further lowered, more and more water crystallizes as ice, leaving more concentrated solutions of the various salts.

In slowly frozen flesh products, such as meats, fish, and poultry, the crystals may grow to many times the size of the individual cells. Such crystals injure the tissues and the delicate cell walls. On thawing the product, flavor and texture are impaired.

The important problem in quick-freezing is properly to quick-freeze the product in the shortest possible time. In other words, what is the zone of optimum crystal formation, and what procedures



Above. Refrigerator cars are loaded by a conveyor with frozen asparagus tips. *Right.* Strawberries are looked over carefully before being made ready for quick-freezing. Only vegetables and fruits are frozen which meet the high standards set up for trained selectors to use in choosing those to be packed.

are needed to race the product through that zone with the best results in preserving the food?

In 1907 W. D. Richardson and E. J. Scherubel presented a paper before the American Chemical Society on the comparative effects of ordinary freezing and more rapid freezing by convection. Z. Plank and Ehrenbaum and Reuter in 1916 made a more comprehensive study. They were followed by Harden F. Taylor and Clarence Birdseye, who conducted developmental work, mechanical and chemical.

The zone of optimum crystal formation was determined through experiments in the percentage-temperature curve needed for quick-freezing. Experiments by Plank showed that, between the temperatures of 31° to 25° F., about 75 per cent of the total water content is frozen. This was termed the zone of maximum crystal formation.

In the General Foods method, a machine resembling a large metal box is used. When the front and rear sliding doors of this machine are pushed back, the opened box shows a series of multiple metal plates placed one above another. The plates are made of aluminum alloy. They contain curved passages through which the refrigerant is circulated. Normally the plates are held apart with an opening between them greater than the thickness of the product to be frosted. This is accomplished by pins in the four corners of the plates resting on pins in vertical guide bars. This arrangement of pins allows the plates to be freely lifted to insert products and dropped to make contacts on both sides of the product being frozen.

There is virtually no waste material on quick-frozen foods, for the waste is utilized as by-products. When Birds Eye purchases sides of beef, the parts not used are turned back to the processor to be sold as fresh meats. The accumulation of vines and pods, for example, in one central place makes possible the utilization of waste material which could not be used if collected in small quantities. Pods and vines are used as ensilage. Parts of fish not used as frosted fillets are used as fertilizer.

The elimination of waste cuts down on transportation and storage, important factors, especially under present wartime conditions.

One of the greatest problems in the development of quick-freezing was to bridge the gap between the laboratory and the ultimate consumer. It required many millions of dollars of investment, years of development work, and overcoming countless obstacles.

Today Birds Eye foods are served in hundreds of thousands of homes; in institutions—hotels, restaurants, and hospitals; on the high seas; and in the Army. The development is remarkably geared to war economy in every way, and will continue to render increasing service after the war.

Molecular Distillation

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Soon after molecular distillation was first studied by commercial laboratories, it was found that the vitamins could be stripped from various natural oils in the molecular still, leaving the main bulk of oil unaltered and thus available for other industrial use. Vitamin A was particularly amenable to this treatment, since the fish liver oils in which it occurs provided a bulk of raw material and a ratio of value to bulk which was well suited to the stage of development that the molecular still had reached in the middle 1930's. Vitamin A exists in fish liver oils as a mixture of esters, with the palmitate predominating. The development of stills to operate economically at the high temperatures at which the esters distill (220° to 270° C.) required the parallel evolution of large pumps to carry away the great volume of gases evolved and yet maintain a pressure of a millionth of an atmosphere.

The design of machinery to distill the vitamin A esters was begun in Eastman Kodak Laboratories before 1930. From 1934 onwards the project was sponsored jointly by Eastman Kodak and General Mills until transferred to Distillation Products, Inc., which continues to be concerned chiefly with the distillation of the oil-soluble vitamins.

The vitamin A esters, introduced commercially in 1937, were first produced by five-stage falling-film stills having a capacity of about 400 gallons of crude oil a day. The vacuum was maintained by condensation pumps of the "fractionating" type. In the effort to reduce cost and increase throughput a new kind of molecular still was devised which employed rapidly rotating plates to spread the oil in a thin uniform film for distillation. An installation of 21 centrifugal stills, 32 inches in diameter, was completed in 1941 together with 23 centrifugal units with 14-inch rotors. The 32-inch stills accommodate about 40,000 gallons monthly and are used almost exclusively for processing vitamin A oils. A view of this installation at Distillation Products is shown in Figure 1.

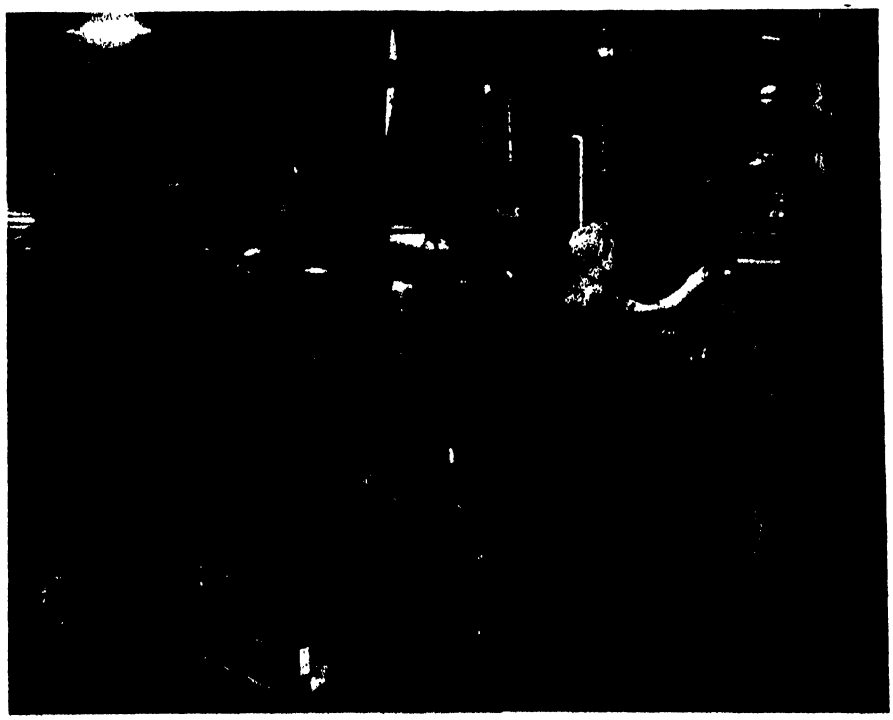


Figure 1. Stills for processing vitamin A oils

Of the other fat-soluble vitamins, only the tocopherols (vitamin E) at present warrant commercial distillation.

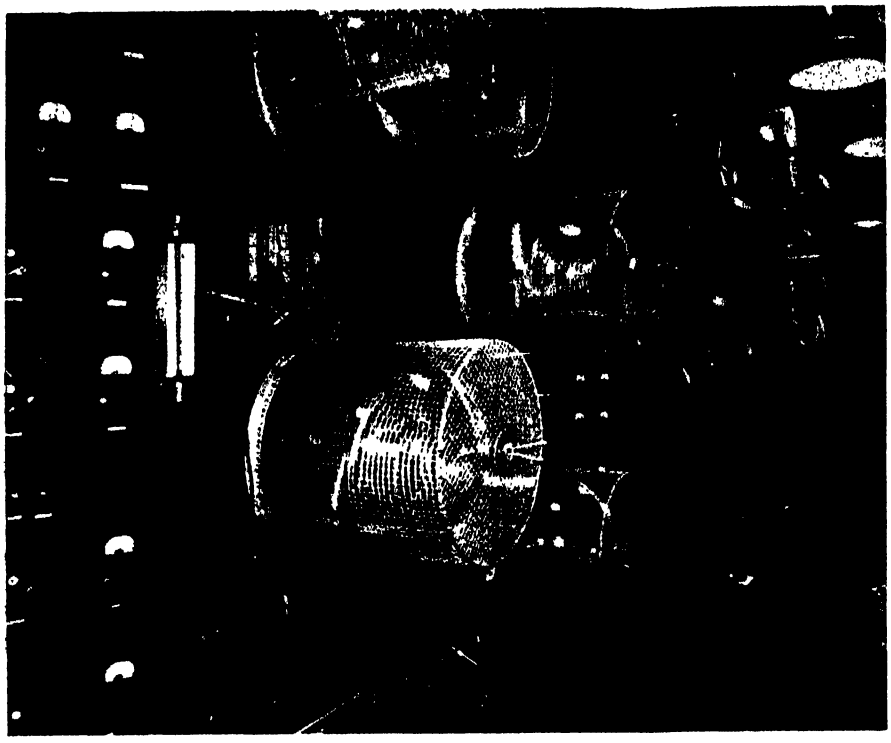


Figure 2.

The separation of vitamin K is not attractive by this means because it occurs in low concentration even in the richest practicable soybean oil, of which about one-third of a gallon must be distilled to provide one human day dose of the vitamin. The distillation of vitamin D from tuna and sardine oil has likewise become unattractive since the manufacture of synthetic vitamin D_3 has been perfected.

The production of vitamin E is now paralleling that of vitamin A. Starting with soybean, cottonseed, and corn oil, a crude distillate is produced which can be concentrated excellently by multiple redistillations. The final steps by which the potency is raised to 40 to 80 per cent mixed tocopherols are performed at Distillation Products on the 14-inch stills shown in Figure 2.

Research in the steroids and the oil-soluble vitamins is being furthered in about equal degree by the molecular still and the Tswett absorption column. Recent advances include the production of pure crystalline vitamin A and its esters, crystalline α-tocopherol acetate, and γ-tocopherol palmitate, and isolation of the new provitamin A, which has been named Kitol, by Embree and Shantz.

American Medicinal Chemistry

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WHILE it is true that science is one of the very few pursuits of mankind which maintains a semblance of internationality, even in wartime, the major and outstanding contributions of our own nation have been vital. This is especially true in the field of medicinal chemistry. There seems to remain in the minds of some a vestige of the false idea that a majority of the outstanding drugs originated abroad. A very brief résumé of American contributions will show some examples of the fundamental contributions made in our country.

General anesthesia, as we know it today, had its origin in the period from 1842 to 1847, when Morton, Long, and Wells—Americans all—introduced the use of ether. Following the discovery of procaine in 1904, new local anesthetics of real value were developed here. The most generally recognized intravenous anesthetic was developed in the United States less than ten years ago.

Progress in hypnotics and sedatives owes more to developments in this country during the last twenty years than to work in any other land. This was paralleled by the discovery of the effectiveness of a similar product for the control of epilepsy. Constrictors of capillaries are very largely of domestic origin, beginning with epinephrine (adrenalin) and continuing through many analogs of ephedrine, as benzedrine.

Our chemists have led in the development of potent new germicides which as a group perhaps outrank those of any other nation. One of the newest antiseptic agents, gramicidin, discovered in the United States, has led to significant further developments in such studies. Penicillin, discovered in England in 1929, has been the subject of considerable attention in American laboratories during recent years. Sulfanilamide owes its present status to successive major contributions by German, French, English, and American investigators, and later sulfa drugs have been largely of domestic origin.

Ehrlich's discovery of the arsphenamines failed to lead to important further developments of antisyphilitic agents for a number of years, but during the last decade important contributions have occurred, practically all of American origin. Very shortly after the blockade during World War I cut off arsphenamine supplies, our chemists were producing adequate quantities of good quality products, and domestic production has since been measured only in terms of high quality, much lower cost, and greatly enlarged volume.

Among the most significant discoveries in the medicinal field, during the last twenty-five years, were most of the important hormones used today. Thyroxin, the principal male and female sex hormones, insulin, liver extract, adrenal cortex hormones—all claim an American parenthood. Similarly the blood anticoagulants, heparin and dicoumarol, whose possibilities as aids in surgery and certain disease conditions are constantly increasing, have an American origin.

In the vitamin field, too, the contributions have been many. Vitamin A and its first isolation in crystalline form; the preparation of vitamin D; the discovery and syntheses of ascorbic acid, thiamine, nicotinic acid, pyridoxine, pantothenic acid; and, in a different category, vitamin K—all owe a considerable part of their advanced status to the work of able American investigators.

Of direct interest during the war are developments in the field of blood and blood substitutes. The preparation of immense volumes of dried human blood plasma, and, still more recently, of blood albumin, is of typical American origin.

The array of examples could be greatly extended. Briefly summarized, American ingenuity and application in the medicinal field have led to many advances of major importance. Fortunately no one nation will ever contribute all the great ideas in any one field; one can ask only that his country should do more than its share, and this the United States has done.

The Economic Status of the Members of the American Chemical Society (Continued[1])

Approved Report of the Committee on Economic Status

George Calingaert, Walter A. Schmidt, Walter G. Whitman, Frank C. Whitmore, L. W. Bass[2], Chairman

Prepared for the Committee by Andrew Fraser, Jr., Washington, D. C.

BEFORE passing to the analyses of the data reported by the membership regarding the three aspects of their employment status, it is pertinent to note that there are distinct limitations attaching to the findings of the preceding analyses of monthly salary rates. These earnings, to be sure, do indicate the general level of prevailing rates at which the members were able to sell their professional services. There is no justification, however, for applying these general rates of monthly earnings to individual members of the SOCIETY, because at any particular experience level these rates are a composite of earnings. Actually, they include earnings reported by male and female regular members and male and female junior members, among whom there are especially marked differences with respect to formal educational training and professional experience. To obtain, therefore, the best relative measure of their economic status individual members of the SOCIETY are advised to consult the series of special analyses of monthly salary rates presented subsequent to Section 8.

Section 6. Occupational Status of the Membership

In order adequately to cover the possible variations in occupational status in the 15-year period 1926 to 1941, the members of the SOCIETY were asked to indicate what their individual occupational status was in each of the nine years by responding to one, and only one, of the 26 items listed in the questionnaire. The distributions of the responses to these questions are presented in Table 12. Since, however, these particular data are shown without regard to years of professional experience, only a broad picture of the occupational status of the reporting membership as a whole can be derived from them.

They show that, for example, in each of the nine years covered by the survey, as much as 50 per cent of the membership were included in the three occupational statuses of industrial research, technical administration, and college or university teaching. Approximately 30 per cent more in each year were classified in the five occupational statuses designated as analysis and testing, research in basic science, development, production, and nontechnical administration. Among the remaining 18 occupational statuses, postgraduate study excepted, while the combined pro-

TABLE 12.—DISTRIBUTION IN PERIOD 1926 TO 1941 OF ALL MEMBERS REPORTING OCCUPATIONAL STATUS

OCCUPATIONAL STATUS	NUMBER REPORTING IN YEAR								
	1941	1940	1939	1938	1937	1934	1932	1929	1926
TOTAL REPORTING STATUS	18,721	18,366	17,801	17,136	16,484	13,671	12,010	9,982	8,009
RESEARCH, INDUSTRIAL	4,673	4,487	4,175	3,996	3,818	2,695	2,250	1,929	1,280
ADMINISTRATION, TECHNICAL	3,868	3,381	2,955	2,627	2,388	1,869	1,687	1,415	1,119
TEACHING, COLL. OR UNIV.	2,626	2,690	2,654	2,600	2,502	2,250	2,168	1,861	1,616
ANALYSIS AND TESTING	1,616	1,787	1,827	1,821	1,920	1,628	1,347	1,290	1,225
RESEARCH IN BASIC SCIENCE	1,183	1,202	1,189	1,141	1,071	968	880	644	473
DEVELOPMENT	1,018	984	941	862	840	641	513	427	306
PRODUCTION	915	899	849	819	799	705	560	516	442
ADMINISTRATION, NON-TECH.	595	520	471	427	372	335	281	246	208
SALES	362	347	345	326	281	218	194	162	127
TECHNICAL SERVICE	351	337	302	283	270	211	165	141	114
CONSULTATION, INDEPENDENT	204	202	197	202	182	160	134	100	95
TEACHING, SEC. SCH.	192	224	219	219	235	263	242	239	269
PATENTS	181	180	174	159	149	120	99	68	46
DESIGN	158	142	115	96	89	63	51	52	35
OTHER PROFESSIONAL	138	104	108	94	95	90	77	53	43
POSTGRADUATE STUDY	99	384	784	1,022	1,065	990	970	590	408
NON-PROFESSIONAL	94	74	91	79	78	138	87	44	46
EDITING & WRITING	85	79	71	69	65	48	48	41	31
LIBRARY & INF. SERVICE	84	72	70	61	59	48	32	29	19
RETIRED	77	59	47	32	27	21	16	8	6
CONSTRUCTION & INSTALLATION	71	73	75	61	61	46	53	63	46
TEACHING, OTHER	44	35	39	34	37	48	42	30	26
MAINTENANCE	29	28	20	26	28	20	14	14	11
SAFETY ENGINEERING	23	17	13	13	11	8	8	5	7
UNEMPLOYED	29	53	64	62	29	87	138	15	11
RELIEF, DIRECT	6	6	6	5	3	1	4	–	–
	PERCENTAGE								
TOTAL REPORTING STATUS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
RESEARCH, INDUSTRIAL	25.1	24.5	23.5	23.2	23.1	19.6	18.8	19.3	16.0
ADMINISTRATION, TECHNICAL	20.7	18.4	16.6	15.2	14.5	13.6	13.7	14.2	14.0
TEACHING, COLL. OR UNIV.	14.0	14.6	14.9	15.1	15.2	16.4	18.2	18.6	20.2
ANALYSIS AND TESTING	8.6	9.7	10.3	10.6	11.6	11.9	11.2	12.9	15.3
RESEARCH IN BASIC SCIENCE	6.3	6.5	6.7	6.7	6.5	7.1	7.3	6.5	5.9
DEVELOPMENT	5.4	5.4	5.3	5.0	5.1	4.7	4.3	4.3	3.8
PRODUCTION	4.9	4.9	4.8	4.8	4.9	5.2	4.7	5.2	5.5
ADMINISTRATION, NON-TECH.	3.2	2.8	2.6	2.5	2.3	2.5	2.3	2.5	2.6
SALES	1.9	1.9	1.9	1.9	1.7	1.6	1.6	1.6	1.6
TECHNICAL SERVICE	1.9	1.8	1.7	1.7	1.6	1.5	1.4	1.4	1.4
CONSULTATION, INDEPENDENT	1.1	1.1	1.1	1.2	1.1	1.2	1.1	1.0	1.2
TEACHING, SEC. SCH.	1.0	1.2	1.2	1.3	1.4	1.9	2.0	2.4	3.4
PATENTS	1.0	1.0	1.0	.9	.9	.9	.8	.7	.6
DESIGN	.8	.8	.6	.6	.5	.5	.4	.5	.4
OTHER PROFESSIONAL	.7	.6	.6	.5	.6	.7	.6	.5	.5
POSTGRADUATE STUDY	.5	2.1	4.4	6.0	6.5	7.2	8.1	5.9	5.1
NON-PROFESSIONAL	.5	.4	.5	.5	.5	1.0	.7	.4	.6
EDITING & WRITING	.5	.4	.4	.4	.4	.4	.4	.4	.4
LIBRARY & INF. SERVICE	.4	.4	.4	.4	.4	.4	.3	.3	.2
RETIRED	.4	.3	.3	.2	.2	.2	.1	.1	.1
CONSTRUCTION & INSTALLATION	.4	.4	.4	.4	.4	.3	.4	.6	.6
TEACHING, OTHER	.2	.2	.2	.2	.2	.4	.3	.3	.3
MAINTENANCE	.2	.2	.1	.2	.2	.1	.1	.1	.1
SAFETY ENGINEERING	.1	.1	.1	.1	.1	.1	.1	.1	.1
UNEMPLOYED	.2	.3	.4	.4	.2	.6	1.1	.2	.1
RELIEF, DIRECT	(1)	(1)	(1)	(1)	(1)	(1)	(1)	–	–

1 LESS THAN 0.05 PERCENT

[1] CHEM. ENG. NEWS, 20, 1497 (Nov. 25, 1942).

[2] Communications regarding this report should be addressed to L. W. Bass, Director, New England Industrial Research Foundation, 137 Newbury St., Boston, Mass.

TABLE 13.— PERCENTAGE DISTRIBUTION IN 1941 WITHIN EACH OCCUPATIONAL STATUS OF ALL MEMBERS REPORTING, BY YEAR OF ENTERING PROFESSION

YEAR OF ENTERING PROFESSION	19__ TO 19__	41	40	39	38	37	35 TO 36	32 TO 34	28 TO 31	24 TO 27	20 TO 23	15 TO 19	10 TO 14	05 TO 09	00 TO 04	(1)	N.R. (2)
YEARS AFTER ENTERING PROFESSION		½	1	2	3	4	5 TO 6	7 TO 9	10 TO 13	14 TO 17	18 TO 21	22 TO 26	27 TO 31	32 TO 36	37 TO 41	42+	
OCCUPATIONAL STATUS		PERCENTAGE															
TOTAL REPORTING STATUS	100.0	.5	2.0	2.8	3.4	4.1	10.0	13.1	15.5	12.8	11.4	9.1	6.8	4.1	2.5	.5	1.4
RESEARCH, INDUSTRIAL	100.0	.7	2.2	3.2	4.2	5.7	15.0	18.3	19.2	12.0	7.9	5.0	3.4	1.5	.9	.2	.6
ADMINISTRATION, TECHNICAL	100.0	.1	.7	.9	1.0	1.7	4.4	8.9	13.5	16.1	15.9	13.9	10.9	6.1	3.6	.6	1.7
TEACHING, COLL. OR UNIV.	100.0	—	.4	.7	1.1	1.6	6.3	9.9	15.6	14.7	15.8	12.9	8.9	6.5	2.9	.5	2.2
ANALYSIS & TESTING	100.0	2.2	6.1	6.8	8.2	6.9	11.6	12.9	13.4	8.0	6.2	5.9	4.5	3.3	2.2	.7	1.1
RESEARCH IN BASIC SCIENCE	100.0	.2	.3	2.3	2.3	5.7	12.7	17.4	17.2	13.9	11.3	5.9	4.8	2.9	2.1	.3	.3
DEVELOPMENT	100.0	.3	4.4	6.0	7.1	6.3	14.4	16.2	16.0	10.5	7.3	5.4	2.8	1.3	1.2	.1	.3
PRODUCTION	100.0	1.0	3.6	5.4	5.2	5.4	12.1	13.0	15.5	10.7	9.7	8.3	4.9	3.0	1.5	.1	.4
ADMINISTRATION, NON-TECH.	100.0	.2	—	.8	1.0	.8	3.5	6.4	8.4	7.4	16.0	17.3	16.5	10.1	6.4	1.3	3.7
SALES	100.0	.3	3.0	1.9	1.7	3.3	10.5	12.2	17.2	14.1	14.4	11.3	5.5	3.0	.8	—	.8
TECHNICAL SERVICE	100.0	.3	2.6	4.6	6.0	7.4	7.7	17.4	14.4	11.3	8.0	7.1	6.6	2.6	2.3	.6	1.1
CONSULTATION, INDEPENDENT	100.0	—	—	1.0	—	1.0	2.5	2.5	7.8	6.9	14.2	13.7	19.6	13.7	9.3	3.9	3.9
TEACHING, SEC. SCH.	100.0	—	1.6	1.0	1.6	2.1	4.7	8.9	14.5	17.6	12.0	11.5	9.4	6.2	6.8	.5	1.6
PATENTS	100.0	—	1.1	—	1.7	2.8	5.0	13.8	13.8	19.8	18.2	10.5	6.1	2.8	3.3	—	1.1
DESIGN	100.0	.6	4.4	3.8	7.6	.6	18.4	19.7	15.8	12.0	7.6	5.1	1.3	.6	.6	.6	1.3
OTHER PROFESSIONAL	100.0	2.2	2.9	4.3	3.6.	6.5	8.7	14.3	11.6	15.2	8.7	5.8	5.8	5.8	2.2	—	2.2
POSTGRADUATE STUDY	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
NON-PROFESSIONAL	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
EDITING & WRITING	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
LIBRARY & INF. SERVICE	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
RETIRED	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
CONSTRUCTION & INSTALL.	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
TEACHING, OTHER	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
MAINTENANCE	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
SAFETY ENGINEERING	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
UNEMPLOYED	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
RELIEF, DIRECT	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)

1 PRIOR TO 1900
2 INCLUDES MEMBERS WHO REPORTED OCCUPATIONAL STATUS BUT NOT THE YEAR IN WHICH THEY ENTERED THE PROFESSION
3 FEWER THAN 100 MEMBERS REPORTED

TABLE 14.— PERCENTAGE DISTRIBUTION IN 1941 WITHIN EACH YEAR OF ENTERING PROFESSION GROUP OF ALL MEMBERS REPORTING OCCUPATIONAL STATUS

YEAR OF ENTERING PROFESSION	19__ TO 19__	41	40	39	38	37	35 TO 36	32 TO 34	28 TO 31	24 TO 27	20 TO 23	15 TO 19	10 TO 14	05 TO 09	00 TO 04	(1)	N.R. (2)
YEARS AFTER ENTERING PROFESSION		½	1	2	3	4	5 TO 6	7 TO 9	10 TO 13	14 TO 17	18 TO 21	22 TO 26	27 TO 31	32 TO 36	37 TO 41	42+	
OCCUPATIONAL STATUS		PERCENTAGE															
TOTAL REPORTING STATUS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	(3)	100.0
RESEARCH, INDUSTRIAL	23.1	31.6	26.8	28.7	31.2	34.2	37.4	34.8	30.9	23.5	17.4	13.8	12.6	9.2	8.8	(3)	10.0
ADMINISTRATION, TECHNICAL	20.7	5.0	6.8	6.6	6.2	8.3	9.2	14.1	17.9	25.9	28.9	31.6	33.2	30.8	30.2	(3)	23.6
TEACHING, COLL. OR UNIV.	14.0	—	2.6	3.7	4.5	5.3	8.9	10.6	14.0	16.2	19.5	19.9	18.3	22.3	16.4	(3)	21.8
ANALYSIS & TESTING	8.6	34.6	25.7	21.1	20.9	14.3	10.1	8.5	7.5	5.4	4.7	5.6	5.7	7.0	7.5	(3)	6.3
RESEARCH IN BASIC SCIENCE	6.3	2.0	1.6	5.2	4.3	8.9	8.0	8.4	7.0	6.9	6.3	4.1	4.5	4.5	5.4	(3)	2.2
DEVELOPMENT	5.4	3.0	11.8	11.7	11.4	8.6	7.9	6.8	5.6	4.5	3.6	3.2	2.2	1.7	2.6	(3)	1.1
PRODUCTION	4.9	8.8	8.7	9.4	7.6	6.3	6.0	4.9	4.8	4.1	4.2	4.6	3.5	3.5	3.0	(3)	1.5
ADMINISTRATION, NON-TECH.	3.2	1.0	—	1.0	1.0	.6	1.1	1.6	1.7	1.8	4.5	6.1	7.7	7.9	8.2	(3)	8.1
SALES	1.9	1.0	2.9	1.4	1.0	1.5	2.0	1.8	2.1	2.1	2.4	2.4	1.6	1.4	.6	(3)	1.1
TECHNICAL SERVICE	1.9	1.0	2.4	3.1	3.3	3.4	1.4	2.5	1.7	1.7	1.3	1.5	1.8	1.2	1.7	(3)	1.5
CONSULTATION, INDEPENDENT	1.1	—	—	.4	—	.3	.3	.2	.5	.6	1.4	1.6	3.1	3.7	4.1	(3)	3.0
TEACHING, SEC. SCH.	1.0	—	.6	.4	.5	.5	.5	.7	1.0	1.4	1.1	1.3	1.4	1.6	2.8	(3)	1.1
PATENTS	1.0	—	.5	—	.5	.6	.5	1.0	.9	1.5	1.5	1.1	.9	.7	1.3	(3)	.7
DESIGN	.8	1.0	1.8	1.2	1.9	.1	1.6	1.3	.9	.8	.6	.5	.2	.1	.2	(3)	.7
OTHER PROFESSIONAL	.7	3.0	1.0	1.2	.8	1.2	.6	.8	.5	.9	.6	.5	.6	1.0	.6	(3)	1.1
POSTGRADUATE STUDY	.5	2.0	2.9	1.2	1.0	1.9	1.5	.5	.3	.2	.1	—	—	—	.2	(3)	—
NON-PROFESSIONAL	.5	2.0	1.0	2.1	1.0	.9	.9	.3	.3	.3	.3	.3	.2	.5	.2	(3)	1.5
EDITING & WRITING	.5	—	—	—	.3	.5	.3	.3	.5	.3	.3	.5	.8	.8	1.5	(3)	1.5
LIBRARY & INF. SERVICE	.4	2.0	.3	.2	.6	.6	.5	.3	.6	.4	.6	.5	.2	.3	.2	(3)	.7
RETIRED	.4	—	—	.2	—	.1	—	(4)	.1	.1	(4)	.2	.4	.8	3.2	(3)	10.3
CONSTRUCTION & INSTALL.	.4	1.0	1.0	.8	.5	1.0	.4	.2	.4	.4	.1	.2	.4	.3	.9	(3)	—
TEACHING, OTHER	.2	—	.3	—	—	.1	.3	.1	.1	.5	.3	.1	.2	.5	.2	(3)	—
MAINTENANCE	.2	1.0	.3	.2	1.1	.1	.2	.1	.1	.1	.1	.1	.2	—	—	(3)	—
SAFETY ENGINEERING	.1	—	.5	—	—	.1	.2	.1	.2	.2	.1	.1	—	—	—	(3)	—
UNEMPLOYED	.2	—	.3	.2	.2	—	.2	.1	.1	.2	.1	.1	.2	.1	.2	(3)	1.8
RELIEF, DIRECT	(4)	—	—	—	.2	—	—	—	—	—	(4)	.1	.1	.1	—	(3)	.4

1 PRIOR TO 1900
2 INCLUDES MEMBERS WHO REPORTED OCCUPATIONAL STATUS BUT NOT THE YEAR IN WHICH THEY ENTERED THE PROFESSION
3 FEWER THAN 100 MEMBERS REPORTED
4 LESS THAN 0.05 PERCENT

portions of the membership so classified covered nearly 20 per cent, the proportion for any single occupational status generally did not exceed 2 per cent.

From the data in Table 12 it is possible also to trace the shifting pattern that occurred among the several occupational statuses. Over the whole period 1926 to 1941 this particular analysis shows that steady increases in membership proportions occurred in 15 of the statuses, while steady decreases appeared in nine of them. Only one, safety engineering, showed no change in proportions over the 15-year period. In each of the years in the period 1932 to 1941, fewer than 0.05 per cent of all the members reporting were classified as being on direct relief.

The over-all extent of these fluctuations in membership proportions is measured by the fact that they effected a gross net

TABLE 13.—PERCENTAGE DISTRIBUTION OF OCCUPATIONAL STATUS OF MEMBERS WITH ADVANCING YEARS OF PROFESSIONAL EXPERIENCE IN PERIOD 1926 TO 1941

YEAR	1926	1929	1932	1934	1937	1938	1939	1940	1941	1926	1929	1932	1934	1937	1938	1939	1940	1941
YEARS	1	3	5	7	10	11	12	13	14	9	12	15	16	18	19	20	21	22
AFTER			TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO
ENTERING PROFESSION			6	8	13	14	15	16	17	12	15	18	19	22	23	24	25	26
OCCUPATIONAL STATUS	MEMBERS WITH 1 YEAR EXPERIENCE IN 1926									MEMBERS WITH 9 TO 12 YEARS EXPERIENCE IN 1926								
TOTAL REPORTING STATUS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
RESEARCH, INDUSTRIAL	10.5	21.1	27.1	28.9	28.3	27.2	25.1	24.1	23.5	20.1	20.4	18.7	17.2	17.4	16.5	15.6	14.4	13.8
ADMINISTRATION, TECHNICAL	1.4	3.9	5.4	8.0	14.9	17.2	20.2	23.0	25.9	17.6	22.0	25.1	24.1	26.6	27.7	29.2	31.1	31.6
TEACHING, COLL. OR UNIV.	12.0	14.1	15.1	15.2	16.9	17.0	17.2	17.0	16.2	19.2	18.4	18.4	20.3	20.8	20.7	20.5	20.2	19.9
ANALYSIS & TESTING	29.1	18.2	12.2	10.3	8.5	7.1	6.5	5.8	5.4	11.7	8.4	8.3	7.2	6.0	5.8	5.7	5.6	5.6
RESEARCH IN BASIC SCIENCE	6.1	8.1	10.6	9.7	7.5	7.7	7.6	7.0	6.9	6.1	6.0	5.4	5.4	4.6	4.5	4.3	4.3	4.1
DEVELOPMENT	3.6	6.8	5.8	6.2	6.1	5.8	5.6	5.5	4.5	5.3	4.5	4.2	4.0	3.4	3.5	3.4	2.8	3.2
PRODUCTION	2.8	4.4	4.5	5.5	4.7	4.8	4.5	4.2	4.1	7.0	6.8	6.4	6.0	5.6	5.0	4.9	4.6	4.6
ADMINISTRATION, NON-TECH.	–	.5	.5	.5	1.2	1.5	1.5	1.8	1.8	2.5	3.2	3.3	3.7	3.7	4.3	5.0	5.5	6.1
SALES	.8	.7	1.5	1.5	1.9	2.1	2.2	2.2	2.1	2.5	2.1	2.1	2.9	2.9	3.2	2.8	2.5	2.4
TECHNICAL SERVICE	1.0	.8	1.3	1.5	1.6	1.6	1.7	1.6	1.7	2.0	2.4	1.9	1.7	1.6	1.4	1.4	1.5	1.5
CONSULTATION, INDEPENDENT	.2	.2	.3	.6	.8	.8	.8	.8	.6	.7	1.0	1.0	1.2	1.6	1.7	1.7	1.7	1.6
TEACHING, SEC. SCH.	5.5	3.4	1.8	1.7	1.4	1.5	1.4	1.5	1.4	2.0	1.4	1.5	1.7	1.5	1.5	1.4	1.4	1.3
PATENTS	.6	.7	1.1	1.3	1.7	1.8	1.8	1.5	1.5	.2	.3	.7	1.1	1.1	1.1	1.1	1.1	1.1
DESIGN	–	.7	.2	.3	.9	.8	.8	.8	.8	.3	.4	.6	.6	.5	.5	.6	.6	.5
OTHER PROFESSIONAL	1.2	1.0	1.2	1.0	.8	.7	.8	.7	.9	.3	.4	.6	.5	.7	.5	.5	.5	.5
POSTGRADUATE STUDY	20.8	13.4	8.2	4.7	.9	.4	.4	.5	.3	.6	.3	.2	.1	.1	.1	(1)	–	–
NON-PROFESSIONAL	2.0	.5	.5	.7	.3	.3	.3	.1	.3	.2	.2	.1	.3	.2	.2	.2	.2	.3
EDITING & WRITING	.2	.2	.4	.5	.3	.2	.2	.3	.3	.4	.3	.4	.5	.4	.4	.4	.5	.5
LIBRARY & INF. SERVICE	.2	.2	.2	.3	.3	.4	.3	.4	.4	.2	.3	.2	.4	.5	.5	.5	.5	.5
RETIRED	–	–	.1	.1	.1	(1)	.1	.2	.1	–	–	.1	–	–	.1	.2	.2	.2
CONSTRUCTION & INSTALL.	.2	.2	.3	.2	.3	.3	.2	.3	.4	.7	.8	.4	.4	.2	.2	.2	.2	.2
TEACHING, OTHER	.6	.2	.3	.2	.3	.2	.3	.3	.5	.1	.1	–	.1	.1	.1	.1	.1	.1
MAINTENANCE	.4	.2	.2	.2	(1)	(1)	(1)	.1	.1	.1	.1	–	–	.1	.1	–	–	.1
SAFETY ENGINEERING	.4	.2	.1	.2	.1	.2	.1	.1	.2	.2	.2	.2	.2	.1	.1	.1	.2	.1
UNEMPLOYED	.4	.3	1.1	.7	.2	.4	.4	.1	.2	–	–	.2	.3	.2	.2	.1	.1	.1
RELIEF, DIRECT	–	–	–	–	–	–	(1)	–	–	–	–	–	.1	.1	.1	.1	.1	.1
YEARS	3	6	9	12	14	15	16	17	18	17	20	23	25	28	29	30	31	32
AFTER	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO
ENTERING PROFESSION	5	8	11	13	17	18	19	20	21	21	24	27	29	32	33	34	35	36
OCCUPATIONAL STATUS	MEMBERS WITH 3 TO 5 YEARS EXPERIENCE IN 1926									MEMBERS WITH 17 TO 21 YEARS EXPERIENCE IN 1926								
TOTAL REPORTING STATUS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
RESEARCH, INDUSTRIAL	20.0	26.9	24.8	22.5	21.9	20.6	19.3	18.4	17.4	11.7	11.6	10.9	9.4	9.6	9.2	9.2	8.9	9.2
ADMINISTRATION, TECHNICAL	6.0	9.7	13.0	17.7	21.9	23.9	25.8	27.6	28.9	27.1	29.3	28.2	28.9	29.3	29.7	30.9	31.1	30.8
TEACHING, COLL. OR UNIV.	20.3	19.3	20.1	20.6	19.8	20.1	19.9	19.6	19.5	22.7	22.5	23.0	22.6	22.3	22.4	22.1	22.1	22.3
ANALYSIS & TESTING	17.4	11.1	9.2	7.7	6.5	5.9	5.4	5.3	4.7	8.4	7.2	7.6	6.7	6.7	6.5	6.4	6.7	7.0
RESEARCH IN BASIC SCIENCE	7.2	7.7	7.5	6.3	6.9	6.7	6.7	6.5	6.3	5.7	5.3	5.3	6.0	5.2	5.0	4.5	4.6	4.5
DEVELOPMENT	4.9	4.9	5.4	4.6	4.4	4.0	3.9	3.7	3.6	2.2	2.2	1.8	1.9	2.0	1.8	1.8	1.9	1.7
PRODUCTION	5.9	5.8	5.2	5.3	4.9	4.7	4.6	4.0	4.2	5.3	4.8	5.0	4.6	4.3	4.3	4.1	3.8	3.5
ADMINISTRATION, NON-TECH.	.8	1.1	1.4	2.7	2.7	3.1	3.7	4.1	4.5	5.4	5.9	6.9	7.3	7.3	7.5	7.6	7.7	7.9
SALES	1.3	1.8	1.6	2.2	2.2	2.0	2.1	2.3	2.4	1.4	1.8	1.5	2.0	1.6	1.5	1.5	1.5	1.4
TECHNICAL SERVICE	1.5	1.6	2.0	1.9	1.7	1.7	1.7	1.4	1.3	1.1	1.0	1.1	1.1	1.6	1.6	1.5	1.5	1.2
CONSULTATION, INDEPENDENT	.6	.5	.8	1.2	1.4	1.4	1.5	1.4	1.4	3.5	3.0	3.3	3.5	3.5	3.8	3.1	3.2	3.7
TEACHING, SEC. SCH.	3.7	1.7	1.3	1.5	1.1	1.1	1.2	1.1	1.1	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.6	1.6
PATENTS	.8	.9	1.4	1.1	1.3	1.4	1.5	1.6	1.5	.7	.8	.8	.8	1.0	.8	.8	.8	.7
DESIGN	.6	1.2	.9	.6	.8	.7	.7	.5	.6	.3	.1	–	.3	.1	.1	.1	.1	.1
OTHER PROFESSIONAL	.6	.6	.5	.5	.4	.4	.4	.4	.6	.7	.7	1.0	1.0	1.0	1.0	1.1	1.1	1.0
POSTGRADUATE STUDY	6.3	2.8	1.7	.8	.3	.2	.1	.1	.1	–	.1	–	–	.1	–	–	–	–
NON-PROFESSIONAL	.7	.6	.4	.4	.2	.2	.2	.2	.3	.3	.4	.4	.7	.5	.5	.5	.5	.5
EDITING & WRITING	.3	.5	.6	.5	.5	.6	.4	.4	.3	.5	.3	.3	.4	.4	1.0	.9	.9	.8
LIBRARY & INF. SERVICE	.1	.2	.2	.5	.3	.3	.3	.4	.6	.1	.3	.1	.1	.4	.4	.3	.3	.3
RETIRED	–	–	–	.2	.1	.1	(1)	(1)	(1)	.1	.1	–	–	.3	.3	.4	.4	.8
CONSTRUCTION & INSTALL.	.5	.6	.4	.4	.2	.3	.1	.1	.1	.4	.5	.4	.1	.1	.1	.4	.3	.3
TEACHING, OTHER	.1	.2	.3	.3	.3	.3	.3	.3	.3	.4	.3	.3	.4	.3	.3	.4	.4	.5
MAINTENANCE	.3	.2	.1	.1	.1	.1	.1	.1	.1	.1	–	–	–	–	–	–	–	–
SAFETY ENGINEERING	.1	–	.2	.1	.1	.1	.1	.1	.1	–	–	–	–	–	–	–	–	–
UNEMPLOYED	–	.1	.9	.3	(1)	.1	.2	.2	.1	–	–	.3	.4	.3	.3	.5	.5	.1
RELIEF, DIRECT	–	–	.1	–	(1)	(1)	(1)	(1)	(1)	–	–	–	–	.1	.1	.1	.1	.1

1 LESS THAN 0.05 PERCENT

change of 21 per cent over the whole period 1926 to 1941. Essentially this means that in this period 210 in every 1,000 of the membership were affected by the shifts which occurred among the 26 occupational statuses. Of the total net increase of 21 per cent in the 15 statuses that showed relative increases, no less than 9.1 per cent covered industrial research alone; 6.7 per cent technical administration, and 1.6 per cent development; but among the remaining 12 occupational statuses in which relative increases also occurred the range in proportions was from only 0.1 to 0.6 per cent. The negative part of the net change included a relative decline of 6.2 per cent in the proportions of members classified as being in college or university teaching, a 6.7 per cent relative decline in analysis and testing, and relative decreases of 4.6 and 2.4 per cent in the proportions reported over the period for postgraduate study and secondary school teaching, respectively. Negligible declines occurred among the remaining five occupational statuses.

It is apparent of course that these overall comparisons have limited application. They do not reveal, for example, as Table 13 does, how the membership was distributed within each occupational status by years of professional experience. It should be emphasized that, because of the variations in the lengths of the several experience spans of the membership, no direct comparisons of the data in Table 13 with similar data for earlier years is possible.

Furthermore, neither Table 12 nor Table 13 can be used to derive information on two important aspects of the economic status of the membership: first, as to what extent the shifts in occupational status were affected by years of advancing experience; and second, as to what shifts occurred among the statuses reported by members with corresponding years of professional experience in the period 1926 to 1941. The information required for these two distinct analyses, however, may be readily obtained by contrasting the data for 1941 shown in Table 14 with data similarly compiled for each of the eight prior years covered by the survey.

To trace the shifts in occupational status with advancing years of experience the data for four experience levels in the 1926 experience span have been selected and are

presented in Table 15. Analysis shows that the shifts of the youngest of these four selected groups of members among the 26 occupational statuses effectuated a gross net change of 51.2 per cent over the whole period 1926 to 1941. By 1941, therefore, over 50 in every 100 of this group found themselves in a different occupational status than in 1926. Taken in order of increasing age, the net changes over the same period for the other three groups of members were 30, 21, and 8 per cent. This marked relative decline in the shifts of the membership among the several statuses is precisely what would be expected with advancing years and experience—that most of the membership reporting had made final choice regarding their occupational status somewhere between 40 and 44 years of age.

Of further interest to the membership is the fact that from Table 15 it is possible to derive information concerning the occupational statuses which were used by the majority of them as essentially training grounds and fields of final choice. For the majority of the membership the principal training grounds apparently were industrial research, analysis and testing, secondary school teaching, and postgraduate study. To illustrate this situation, in 1926 while 10.5 per cent of the youngest group of members reported industrial research as their occupational status, and the proportion had increased to 28.9 per cent by 1934, by 1941 it had declined to 23.5 per cent. For members who had had 3 to 5 years' professional experience in 1926 the proportions, on the other hand, steadily declined with advancing age from 20 to 17.4 per cent over the 15-year period; and for the next two oldest age groups the proportions, also classified in industrial research, declined from 20.1 to 13.8 per cent, and from 11.7 to 9.2 per cent. Relatively, the sharpest continuous declines in proportions for each age group occurred in analysis and testing; they were, however, less marked for secondary school teaching. In the case of postgraduate study, the declines in proportions over the period 1926 to 1941, were, as would be expected, most marked for the youngest of the four groups of members.

Among all four age groups these declines in proportions were in large part accounted for by relatively sharp increases in the proportions of members classified in technical administration. And since these increases, together with those reported for nontechnical administration, independent consulting, patents, and library and information service, accounted for virtually all of the decreases previously noted, it is reasonable to assume that these occupational statuses constituted fields of final choice for the greater part of the membership which was involved in the shifts

TABLE 16.—PERCENTAGE DISTRIBUTION OF OCCUPATIONAL STATUS OF MEMBERS WITH CORRESPONDING YEARS OF PROFESSIONAL EXPERIENCE IN PERIOD 1926 TO 1941

YEAR	1926	1929	1932	1934	1937	1938	1939	1940	1941	1926	1929	1932	1934	1937	1938	1939	1940	1941
OCCUPATIONAL STATUS	1 YEAR AFTER ENTERING PROFESSION									13 TO 16 YEARS AFTER ENTERING PROFESSION								
TOTAL REPORTING STATUS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
RESEARCH, INDUSTRIAL	10.5	17.6	7.6	14.3	19.2	15.4	19.0	26.4	31.6	15.2	20.4	18.9	22.5	21.9	27.2	25.1	24.1	23.5
ADMINISTRATION, TECHNICAL	1.4	.7	1.5	.5	-	.9	.7	1.7	5.0	25.6	22.0	17.6	17.7	21.2	17.2	20.2	23.0	25.9
TEACHING, COLL. OR UNIV.	12.0	11.8	9.9	5.6	4.9	3.9	3.2	3.2	-	20.2	18.4	24.3	20.6	19.8	17.0	17.2	17.0	16.2
ANALYSIS & TESTING	29.1	28.0	16.2	24.2	30.1	29.5	34.3	34.9	34.6	9.8	8.4	7.6	7.7	6.5	7.1	6.5	5.8	5.4
RESEARCH IN BASIC SCIENCE	6.1	6.2	7.6	6.4	4.1	4.6	4.7	1.4	2.0	4.5	6.0	6.8	6.3	6.9	7.7	7.6	7.0	6.9
DEVELOPMENT	3.6	3.6	2.5	2.6	5.6	3.7	4.2	6.9	3.0	3.0	4.5	3.9	4.6	4.4	5.8	5.6	5.5	4.5
PRODUCTION	2.8	3.1	2.5	7.4	5.1	9.4	9.4	10.6	8.8	6.3	6.8	5.6	5.3	4.9	4.8	4.5	4.2	4.1
ADMINISTRATION, NON-TECH.	-	.5	1.1	1.0	.2	.9	.7	.3	1.0	4.5	3.2	2.1	2.7	2.7	1.5	1.5	1.8	1.8
SALES	.8	.4	.8	.7	1.2	.5	1.5	1.7	1.0	2.2	2.1	3.4	2.2	2.2	2.1	2.2	2.2	2.1
TECHNICAL SERVICE	1.0	.4	1.5	1.6	1.9	1.4	1.7	2.0	1.0	1.2	2.4	.9	1.9	1.7	1.6	1.7	1.6	1.7
CONSULTATION, INDEPENDENT	.2	.2	.2	.2	-	-	.2	.3	-	1.6	1.0	1.0	1.2	1.4	.8	.8	.8	.6
TEACHING, SEC. SCH.	5.5	2.0	5.1	1.8	.3	.5	.5	1.1	-	1.5	1.4	1.7	1.5	1.1	1.5	1.4	1.5	1.4
PATENTS	.6	.2	.2	.3	.2	-	-	-	-	.3	.3	.9	1.1	1.3	1.8	1.8	1.6	1.5
DESIGN	-	-	-	.2	.5	.7	.2	1.1	1.0	.3	.4	.3	.6	.8	.8	.8	.8	.8
OTHER PROFESSIONAL	1.2	.2	1.5	.8	.7	.7	1.5	1.4	3.0	.9	.4	.3	.5	.4	.7	.8	.7	.9
POSTGRADUATE STUDY	20.8	22.2	29.0	25.2	23.0	21.2	11.8	3.2	2.0	.5	.3	.9	.8	.3	.4	.4	.5	.2
NON-PROFESSIONAL	2.0	.7	5.9	3.1	1.2	3.9	3.0	.9	2.0	.3	.2	.8	.4	.2	.3	.3	.1	.3
EDITING & WRITING	.2	-	-	-	.2	-	-	-	-	.3	.3	.5	.5	.5	.2	.2	.3	.3
LIBRARY & INF. SERVICE	.2	.5	-	.3	.3	-	-	.3	2.0	.2	.3	.4	.5	.3	.4	.3	.4	.4
RETIRED	-	.2	-	-	-	-	-	-	-	-	-	-	.2	.1	(1)	.1	.2	.1
CONSTRUCTION & INSTALL.	.2	.4	.8	.5	.5	.5	1.2	-	1.0	.8	.8	.3	.4	.2	.3	.2	.3	.4
TEACHING, OTHER	.6	.2	.6	.7	-	.7	.5	.6	-	.5	.1	.5	.3	.3	.2	.3	.3	.5
MAINTENANCE	.4	.5	-	.3	.3	.7	.5	.6	1.0	.1	.1	.1	.1	.1	(1)	(1)	.1	.1
SAFETY ENGINEERING	.4	.2	-	-	-	-	-	-	-	.1	.2	.1	.1	.1	.2	.1	.1	.2
UNEMPLOYED	.4	.2	5.3	2.3	.5	.9	1.2	1.4	-	.1	-	.9	.3	(1)	.4	.4	.1	.2
RELIEF, DIRECT	-	-	-	-	-	-	-	-	-	-	-	.2	-	(1)	-	(1)	-	-
OCCUPATIONAL STATUS	3 TO 5 YEARS AFTER ENTERING PROFESSION									22 TO 26 YEARS AFTER ENTERING PROFESSION								
TOTAL REPORTING STATUS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
RESEARCH, INDUSTRIAL	20.0	23.3	22.2	22.4	28.0	29.1	30.0	32.4	34.2	9.4	9.3	10.9	14.5	14.4	13.6	13.6	14.4	13.8
ADMINISTRATION, TECHNICAL	6.0	5.7	2.2	2.9	2.7	4.4	4.2	5.4	8.5	30.3	31.0	28.2	29.5	32.5	32.0	29.2	31.1	31.6
TEACHING, COLL. OR UNIV.	20.3	18.2	15.0	13.9	9.9	10.2	9.9	7.0	5.5	18.5	18.0	23.0	18.6	18.2	18.5	20.5	20.2	19.9
ANALYSIS & TESTING	17.4	13.9	16.4	16.6	18.3	15.1	10.9	13.7	14.5	8.9	6.1	7.6	7.5	6.4	6.0	5.7	5.6	5.6
RESEARCH IN BASIC SCIENCE	7.2	7.4	9.1	8.2	7.5	8.5	8.7	7.8	6.9	5.8	5.8	5.3	5.0	4.8	4.9	4.3	4.3	4.1
DEVELOPMENT	4.9	6.7	5.3	5.9	6.2	6.2	7.4	8.0	8.0	1.6	2.5	1.8	3.1	2.5	2.7	3.4	2.9	3.2
PRODUCTION	5.9	5.7	3.8	6.0	5.6	4.8	5.0	6.0	6.3	4.5	3.4	5.0	4.9	3.9	3.8	4.9	4.6	4.6
ADMINISTRATION, NON-TECH.	.8	.5	.1	.7	.6	.4	.2	.8	.6	7.8	7.6	6.9	5.7	6.1	6.5	5.0	5.5	6.1
SALES	1.3	1.7	1.5	.9	.9	1.9	2.5	2.3	1.5	.9	1.1	1.5	1.1	1.0	1.3	2.8	2.5	2.4
TECHNICAL SERVICE	1.5	2.0	1.3	1.0	1.3	1.6	1.4	1.8	3.4	.7	.7	1.1	1.9	2.0	2.0	1.4	1.5	1.5
CONSULTATION, INDEPENDENT	.6	.3	.4	.3	.1	.2	.2	.1	.3	3.3	3.6	3.3	2.0	2.3	2.7	1.7	1.7	1.6
TEACHING, SEC. SCH.	3.7	3.0	2.8	1.8	1.7	.3	1.3	.5	.5	3.6	3.8	1.8	1.4	1.5	1.4	1.4	1.4	1.3
PATENTS	.8	.9	.9	.5	1.0	.6	.5	-	.6	.9	1.3	.8	.9	.9	.9	1.1	1.1	1.1
DESIGN	.6	.6	.6	.1	.6	.4	1.0	1.0	.1	.7	.4	-	.4	.2	.4	.6	.6	.5
OTHER PROFESSIONAL	.6	.4	.1	.8	.3	.2	.5	.4	1.2	.4	.4	1.0	.7	.6	.6	.5	.5	.5
POSTGRADUATE STUDY	6.3	7.3	14.6	15.2	13.4	14.0	12.8	9.7	1.9	-	-	-	.1	.1	.1	(1)	-	-
NON-PROFESSIONAL	.7	.2	.4	.7	.4	.3	.7	.3	.9	.2	.2	.4	.4	.2	.2	.2	.2	.3
EDITING & WRITING	.3	.5	.6	.3	.3	.2	.1	.2	.5	.9	.9	.3	.5	.7	.7	.4	.5	.5
LIBRARY & INF. SERVICE	.1	.2	.4	.3	.4	.6	.3	.5	.6	.2	.2	.1	.1	.2	.1	.5	.5	.5
RETIRED	-	-	.1	.1	-	-	-	-	.1	.4	.4	-	.1	.1	.1	.2	.2	.2
CONSTRUCTION & INSTALL.	.5	.7	.6	.3	.3	.3	.8	.3	1.0	.2	.2	.4	.5	.6	.6	.2	.2	.2
TEACHING, OTHER	.1	.3	.1	.3	.1	.1	.4	.1	.1	.4	.4	.3	.4	.2	.2	.1	.1	.1
MAINTENANCE	.3	.2	-	.3	.4	.2	.3	-	.1	-	-	-	.2	.2	.2	-	-	.1
SAFETY ENGINEERING	.1	.1	-	-	-	.1	.1	.2	.1	-	-	-	-	-	-	.1	.2	.1
UNEMPLOYED	-	.2	1.5	.5	-	.3	.8	.4	-	.4	.7	.3	.5	.4	.4	.1	.1	.1
RELIEF, DIRECT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.1	.1	.1	.1

1 LESS THAN 0.05 PERCENT

made among the several occupational statuses.

Despite the emphasis that has been placed upon tracing the pattern of movement among the several occupational statuses it should be recognised also that, in each of the four age groups dealt with, a number of the statuses showed relative stability with advancing age and experience over the period 1926 to 1941. Collectively these statuses included a substantial number of the membership. No reasons, however, can be given to explain why this situation existed.

To trace the effects of the fluctuations in economic activity which occurred over the period 1926 to 1941 upon the distributions of occupational statuses, it is necessary to compare the data reported by members who had approximately the same experience spans. For purposes of analysis again four groups of members have been selected. The data reported by them in each of the nine years are presented in Table 16.

In so far as occupational status is concerned these data clearly demonstrate that it was the younger members of the SOCIETY who suffered, relatively, the most from unemployment in the great depression years. In 1932 no less than 5.3 per cent of the membership who had just qualified for professional work were unemployed. Unemployment also affected 1.5 per cent of the membership, who, in 1932, had had from 3 to 5 years' professional experience. Among the other two groups of members unemployment in 1932 was negligible. Although unemployment among the membership was highest in 1932, small proportions of each of the four groups were so classified in practically every year in the period 1926 to 1941.

The reported data on postgraduate study and non-professional work again emphasize the difficulties encountered by the younger members in obtaining regular professional work. This is evidenced by the fact that, for members just beginning their professional careers, in 1929 22.2 per cent were classified as being engaged in postgraduate study but by 1932 the proportion was as high as 29 per cent for members with similar experience spans in that year. The relative increase in proportions in nonprofessional work over the same period for the same two groups of members was from 0.7 to 5.9 per cent. The situation noted above with respect to postgraduate study was paralleled by the proportions reported by members who had been professionally active for 3 to 5 years. It was found also to exist, but to a much lesser extent, among members with from 13 to 16 years' professional experience.

Despite the fact that members with longer experience spans did not suffer unduly from unemployment in 1932, the data in Table 16 make clear that like the members with shorter experience spans they, too, had to make adjustments to meet the then prevailing economic conditions. This is partially evidenced by the fact that members who had from 13 to 16, and 22 to 26 years' professional experience in 1932 reported relatively higher proportions in that year for college or university teaching than were reported by members with similar experience spans in either 1929 or 1934. These increased proportions in 1932 were in large part accounted for by declines in the proportions reported for industrial research and technical administration, which, in turn, were relatively lower than those reported for 1929 or 1934.

Subsequent to 1932 the data in Table 16 evidence the increasing tempo of the country's prewar and war efforts. Relatively, marked increases had occurred by 1941, for example, in the proportions of members with the same experience spans who reported they were engaged in industrial research. These several proportions in fact for 1941 were relatively very much greater than those reported by similarly experienced members in 1929 which was also a year of exceptionally high industrial activity. The effect of the increased industrial activity upon the membership is reflected also in the exodus of members from college or university teaching in all but the group with 22 to 26 years of professional experience. The increased demands for industrial research workers and technical administrators seem to have been partially met by drawing from the members engaged in analysis and testing; the services of the remainder appear to have been diverted to development and production.

Section 7. Sources of Employment of the Membership

In order to cover all aspects of sources of employment, the membership was asked to specify one of six public or one of six nonpublic sources in each of the nine years, or to report their status with respect to retirement, unemployment, or direct relief. The last two topics, it should be noted, were combined in one query.

Considered without regard to age, comparisons among the data shown in Table 17 for total public employment, total nonpublic employment, retirement, and unemployment or direct relief evidence the fact that the shifts which occurred among these four groupings of sources of employment over the whole period 1926 to 1941 were relatively negligible in that they affected only 33 in every 1,000 of the membership. The positive part of this gross net change of 3.3 per cent included a 2.9 per cent increase in total nonpublic employment and an 0.4 per cent increase for members who reported they had retired. The negative part of gross net change covered a 3.2 per cent decrease in total public employment and a decrease

TABLE 17.- DISTRIBUTION IN PERIOD 1926 TO 1941 OF ALL MEMBERS REPORTING SOURCE OF EMPLOYMENT

SOURCE OF EMPLOYMENT	NUMBER REPORTING IN YEAR								
	1941	1940	1939	1938	1937	1934	1932	1929	1926
TOTAL REPORTING	18,637	18,225	17,630	16,955	16,316	13,511	11,831	9,859	7,918
TOTAL PUBLIC:	3,372	3,145	3,120	3,063	2,997	2,665	2,459	1,980	1,690
STATE GOVERNMENT	1,525	1,673	1,745	1,755	1,711	1,509	1,460	1,123	930
FEDERAL GOVERNMENT	1,296	914	826	783	757	614	545	453	371
MUNICIPAL GOVERNMENT	405	422	400	371	353	345	315	301	282
OTHER PUBLIC AUTHORITY	91	90	94	98	100	99	85	62	66
COUNTY GOVERNMENT	53	41	42	40	43	59	48	40	41
W.P.A. OR WORK RELIEF	2	5	13	16	33	39	6	1	-
TOTAL NON-PUBLIC:	15,124	14,935	14,366	13,760	13,225	10,703	9,192	7,824	6,188
PRIVATE FIRM (1)	11,477	11,088	10,347	9,731	9,299	7,215	5,988	5,261	4,051
EDUCATIONAL (2)	1,903	2,123	2,361	2,470	2,424	2,251	2,118	1,660	1,389
CONSULTING (3)	1,129	1,084	1,017	965	927	752	621	553	470
RESEARCH INSTITUTE	456	478	478	441	427	353	322	262	200
TECH. OR TRADE ASSN. (4)	87	88	78	77	74	58	58	50	38
OTHER NON-PUBLIC	72	74	85	76	74	74	75	38	40
RETIRED	85	64	51	38	25	24	20	6	5
UNEMPLOYED OR DIRECT RELIEF	56	81	93	94	69	119	170	49	35
	PERCENTAGE								
TOTAL REPORTING	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
TOTAL PUBLIC:	18.1	17.2	17.7	18.1	18.4	19.7	20.8	20.1	21.3
STATE GOVERNMENT	8.1	9.2	9.9	10.4	10.5	11.2	12.3	11.4	11.7
FEDERAL GOVERNMENT	7.0	5.0	4.7	4.6	4.6	4.5	4.6	4.6	4.7
MUNICIPAL GOVERNMENT	2.2	2.3	2.3	2.2	2.2	2.6	2.7	3.1	3.6
OTHER PUBLIC AUTHORITY	.5	.5	.5	.6	.6	.7	.7	.6	.8
COUNTY GOVERNMENT	.3	.2	.2	.2	.3	.4	.4	.4	.5
W.P.A. OR WORK RELIEF	(5)	(5)	.1	.1	.2	.3	.1	(5)	-
TOTAL NON-PUBLIC:	81.1	82.0	81.5	81.1	81.0	79.2	77.6	79.2	78.2
PRIVATE FIRM (1)	61.5	60.9	58.7	57.3	56.9	53.4	50.7	53.3	51.2
EDUCATIONAL (2)	10.2	11.7	13.4	14.6	14.8	16.7	17.9	16.8	17.5
CONSULTING (3)	6.1	5.9	5.8	5.7	5.7	5.6	5.2	5.6	5.9
RESEARCH INSTITUTE	2.4	2.6	2.7	2.6	2.6	2.6	2.7	2.7	2.5
TECH. OR TRADE ASSN. (4)	.5	.5	.4	.5	.5	.4	.5	.5	.5
OTHER NON-PUBLIC	.4	.4	.5	.4	.5	.5	.6	.4	.5
RETIRED	.5	.4	.3	.2	.2	.2	.2	.1	.1
UNEMPLOYED OR DIRECT RELIEF	.3	.4	.5	.6	.4	.9	1.4	.5	.4

1 INCLUDES PRIVATE FIRM, COMPANY, CORPORATION OR ORGANIZATION ENGAGED IN ACTIVITIES OTHER THAN THOSE LISTED SEPARATELY
2 INCLUDES EDUCATIONAL INSTITUTIONS EXCLUSIVE OF THOSE UNDER PUBLIC AUTHORITIES
3 LABORATORY, FIRM OR OFFICE
4 INCLUDES PUBLISHING ORGANIZATIONS
5 LESS THAN 0.05 PERCENT

TABLE 18.— PERCENTAGE DISTRIBUTION IN 1941 WITHIN EACH SOURCE OF EMPLOYMENT OF ALL MEMBERS REPORTING, BY YEAR OF ENTERING PROFESSION

YEAR OF ENTERING PROFESSION	19— TO 19—	41	40	39	38	37	35 TO 36	32 TO 34	28 TO 31	24 TO 27	20 TO 23	15 TO 19	10 TO 14	05 TO 09	00 TO 04	(1)	N.R. (2)
YEARS AFTER ENTERING PROFESSION		½	1	2	3	4	5 TO 6	7 TO 9	10 TO 13	14 TO 17	18 TO 21	22 TO 26	27 TO 31	32 TO 36	37 TO 41	42+	
SOURCE OF EMPLOYMENT							PERCENTAGE										
TOTAL REPORTING	100.0	.5	2.0	2.8	3.4	4.2	10.0	13.1	15.5	12.8	11.4	9.1	8.8	4.0	2.5	.5	1.4
TOTAL PUBLIC:	100.0	.4	1.2	2.1	3.1	3.4	8.7	10.7	15.8	13.6	12.3	10.1	7.2	3.5	3.5	.6	1.8
STATE GOVERNMENT	100.0	.3	.7	1.4	1.8	2.2	7.3	10.2	16.2	15.0	12.5	12.5	7.0	6.7	3.7	.7	1.8
FEDERAL GOVERNMENT	100.0	.7	2.2	3.0	4.6	5.4	11.1	11.5	15.9	12.7	10.6	6.9	6.8	3.8	3.0	.3	1.5
MUNICIPAL GOVERNMENT	100.0	—	.2	1.5	2.0	2.0	4.9	10.9	14.7	12.6	15.6	10.9	10.4	6.2	5.4	1.0	1.7
OTHER PUBLIC AUTHORITY	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
COUNTY GOVERNMENT	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
W.P.A. OR WORK RELIEF	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
TOTAL NON-PUBLIC:	100.0	.6	2.2	2.9	3.5	4.4	10.3	13.6	15.6	12.7	11.2	8.9	8.7	3.6	2.2	.4	1.2
PRIVATE FIRM (4)	100.0	.6	2.4	3.2	3.8	4.4	10.8	13.9	16.0	12.9	10.6	8.8	8.3	3.2	1.9	.3	.9
EDUCATIONAL (5)	100.0	.1	.9	1.1	1.5	3.5	8.7	11.6	14.4	12.6	15.2	10.3	8.9	5.7	2.7	.5	2.3
CONSULTING (6)	100.0	1.0	2.2	3.1	3.7	5.1	9.5	14.9	14.2	10.6	10.1	7.2	6.8	4.4	3.9	1.3	2.0
RESEARCH INSTITUTE	100.0	1.1	2.2	2.6	2.6	4.8	8.1	17.1	18.7	12.1	10.5	8.8	5.5	3.7	1.5	.7	—
TECH. OR TRADE ASSN. (7)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
OTHER NON-PUBLIC	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
RETIRED	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
UNEMPLOYED OR DIRECT RELIEF	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)

1 PRIOR TO 1900
2 INCLUDES MEMBERS WHO REPORTED SOURCE OF EMPLOYMENT BUT NOT THE YEAR IN WHICH THEY ENTERED THE PROFESSION
3 FEWER THAN 100 MEMBERS REPORTED
4 INCLUDES PRIVATE FIRM, COMPANY, CORPORATION OR ORGANIZATION ENGAGED IN ACTIVITIES OTHER THAN THOSE LISTED SEPARATELY
5 INCLUDES EDUCATIONAL INSTITUTIONS EXCLUSIVE OF THOSE UNDER PUBLIC AUTHORITIES
6 LABORATORY, FIRM OR OFFICE
7 INCLUDES PUBLISHING ORGANIZATIONS

TABLE 19.— PERCENTAGE DISTRIBUTION IN 1941 WITHIN EACH YEAR OF ENTERING PROFESSION GROUP OF ALL MEMBERS REPORTING SOURCE OF EMPLOYMENT

YEAR OF ENTERING PROFESSION	19— TO 19—	41	40	39	38	37	35 TO 36	32 TO 34	28 TO 31	24 TO 27	20 TO 23	15 TO 19	10 TO 14	05 TO 09	00 TO 04	(1)	N.R. (2)
YEARS AFTER ENTERING PROFESSION		½	1	2	3	4	5 TO 6	7 TO 9	10 TO 13	14 TO 17	18 TO 21	22 TO 26	27 TO 31	32 TO 36	37 TO 41	42+	
SOURCE OF EMPLOYMENT							PERCENTAGE										
TOTAL REPORTING	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	(3)	100.0
TOTAL PUBLIC:	18.1	13.7	11.1	14.0	16.4	14.7	15.8	14.8	18.2	19.3	19.6	20.1	19.2	24.7	25.6	(3)	22.6
STATE GOVERNMENT	8.1	3.9	2.7	4.3	4.5	4.4	6.0	6.5	8.5	9.6	9.0	11.2	8.5	13.6	12.3	(3)	10.6
FEDERAL GOVERNMENT	7.0	8.8	7.3	7.5	9.5	9.0	7.7	6.1	7.0	6.9	6.5	5.3	7.0	6.6	8.4	(3)	7.1
MUNICIPAL GOVERNMENT	2.2	—	.3	1.2	1.3	1.0	1.1	1.8	2.1	2.1	3.0	2.6	3.3	3.3	4.7	(3)	2.6
OTHER PUBLIC AUTHORITY	.5	—	.3	.8	.6	.3	.6	.2	.4	.4	.6	.8	.3	.9	.2	(3)	1.9
COUNTY GOVERNMENT	.3	1.0	.5	.2	.5	—	.4	.2	.2	.3	.5	.2	.1	.3	—	(3)	.4
W.P.A. OR WORK RELIEF	(4)	—	—	—	—	—	—	(4)	(4)	—	—	—	—	—	—	(3)	—
TOTAL NON-PUBLIC	81.1	86.3	88.4	85.4	83.3	85.2	84.0	85.0	81.4	80.3	80.1	79.3	79.8	73.8	70.1	(3)	66.1
PRIVATE FIRM (5)	61.5	68.6	73.5	71.8	69.0	65.9	66.6	65.2	62.6	62.4	57.6	59.5	57.1	49.4	46.7	(3)	40.1
EDUCATIONAL (6)	10.2	1.0	4.5	3.9	4.5	8.5	8.9	9.0	9.5	10.0	13.8	11.6	13.4	14.6	11.2	(3)	16.2
CONSULTING (7)	6.1	10.8	6.6	6.8	6.7	7.5	5.8	6.8	5.5	5.0	5.4	4.8	6.1	6.7	9.5	(3)	8.6
RESEARCH INSTITUTE	2.4	4.9	2.7	2.3	1.9	2.8	2.0	3.2	2.9	2.3	2.3	2.4	2.0	2.3	1.5	(3)	—
TECH. OR TRADE ASSN. (8)	.5	—	.3	.4	.2	.1	.3	.5	.6	.3	.7	.5	.6	.5	.6	(3)	.8
OTHER NON-PUBLIC	.4	1.0	.8	.2	1.0	.4	.4	.3	.3	.3	.3	.5	.6	.3	.6	(3)	.4
RETIRED	.5	—	—	—	—	—	—	(4)	.1	.1	.1	.2	.6	1.1	3.7	(3)	10.5
UNEMPLOYED OR DIRECT RELIEF	.3	—	.5	.6	.3	.1	.2	.2	.3	.3	.2	.4	.4	.4	.6	(3)	.8

1 PRIOR TO 1900
2 INCLUDES MEMBERS WHO REPORTED SOURCE OF EMPLOYMENT BUT NOT THE YEAR IN WHICH THEY ENTERED THE PROFESSION
3 FEWER THAN 100 MEMBERS REPORTED
4 LESS THAN 0.05 PERCENT
5 INCLUDES PRIVATE FIRM, COMPANY, CORPORATION OR ORGANIZATION ENGAGED IN ACTIVITIES OTHER THAN THOSE LISTED SEPARATELY
6 INCLUDES EDUCATIONAL INSTITUTIONS EXCLUSIVE OF THOSE UNDER PUBLIC AUTHORITIES
7 LABORATORY, FIRM OR OFFICE
8 INCLUDES PUBLISHING ORGANIZATIONS

of 0.1 per cent for members classified as being unemployed or on direct relief.

Among the separate sources of public employment, however, it should be noted that over the 15-year period while federal employment increased by 2.3 per cent, all other categories of public employment decreased by 5.5 per cent. As much as 3.6 per cent of this net change embraced members in the employ of state governments, 1.4 per cent covered members employed by municipal governments, and only 0.5 per cent included the combined declines in membership employment with other public authorities and county governments.

By contrast, among the separate categories of total nonpublic employment the net change of 2.9 per cent has been derived from a 10.2 per cent increase over the 15-year period in private firm employment and an 0.2 per cent increase in consulting, in contrast to net decreases of 7.3 per cent in membership employment with educational institutions exclusive of those under public authorities, and negligible declines of 0.1 per cent in research institute employment and other nonpublic employment.

It is apparent, too, from the data in Table 17 that in each of the nine years in the period 1926 to 1941 the membership as a whole was predominantly dependent upon nonpublic sources of employment. In 1926, 78.2 per cent of all members reporting were so classified as against 21.3 per cent who were then in the employ of public authorities. By 1941, however, total public employment embraced only

TABLE 20.—PERCENTAGE DISTRIBUTION OF SOURCE OF EMPLOYMENT OF MEMBERS WITH ADVANCING YEARS OF PROFESSIONAL EXPERIENCE IN PERIOD 1926 TO 1941

YEAR	1926	1929	1932	1934	1937	1938	1939	1940	1941	1926	1929	1932	1934	1937	1938	1939	1940	1941
YEARS	½	3	5	7	10	11	12	13	14	9	12	15	16	18	19	20	21	22
AFTER			TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO
ENTERING PROFESSION			6	8	13	14	15	16	17	12	15	18	19	22	23	24	25	26
SOURCE OF EMPLOYMENT	MEMBERS WITH ½ YEAR EXPERIENCE IN 1926									MEMBERS WITH 9 TO 12 YEARS EXPERIENCE IN 1926								
TOTAL REPORTING	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
TOTAL PUBLIC:	20.7	20.1	18.3	17.1	18.3	17.9	16.0	18.3	19.3	19.1	16.8	16.8	19.2	19.4	19.5	19.7	19.9	20.1
STATE GOVERNMENT	11.5	11.9	10.8	9.3	10.0	9.6	9.8	9.7	9.6	10.2	9.4	9.0	10.8	11.2	11.6	11.7	11.5	11.2
FEDERAL GOVERNMENT	2.8	3.5	4.9	5.0	5.5	5.4	5.5	5.7	6.9	5.7	4.5	4.8	4.6	4.7	4.4	4.4	4.7	5.3
MUNICIPAL GOVERNMENT	4.4	3.3	1.8	1.7	2.1	2.3	2.1	2.3	2.1	2.4	2.2	2.4	2.7	2.5	2.5	2.6	2.6	2.6
OTHER PUBLIC AUTHORITY	1.0	.5	.6	.7	.4	.3	.3	.3	.4	.5	.5	.4	.5	.7	.7	.7	.8	.8
COUNTY GOVERNMENT	1.0	.9	.2	.2	.3	.3	.3	.3	.3	.3	.2	.2	.4	.2	.2	.2	.2	.2
W.P.A. OR WORK RELIEF	-	-	-	.2	(1)	(1)	-	-	-	-	-	-	.2	.1	.1	.1	.1	-
TOTAL NON-PUBLIC:	78.5	79.2	80.1	82.0	81.3	81.7	81.3	81.2	80.3	80.3	82.7	82.2	80.2	80.1	80.0	79.0	79.5	79.3
PRIVATE FIRM (2)	42.5	49.2	52.2	56.6	61.1	61.5	61.3	62.1	62.4	59.4	61.8	61.6	60.7	60.2	60.1	60.2	59.7	59.5
EDUCATIONAL (3)	25.7	20.8	17.7	15.5	11.0	11.3	11.2	10.9	10.0	12.5	11.8	11.8	12.0	12.2	12.1	12.0	11.7	11.6
CONSULTING (4)	6.3	5.7	5.3	5.9	5.7	5.4	5.4	5.0	5.0	5.0	5.4	5.2	4.3	4.5	4.6	4.6	4.9	4.8
RESEARCH INSTITUTE	2.8	2.8	3.9	3.2	2.9	2.7	2.8	2.6	2.3	2.6	2.9	2.9	2.6	2.4	2.4	2.2	2.4	2.4
TECH. OR TRADE ASSN. (5)	-	-	.4	.3	.3	.4	.3	.3	.3	.3	.2	.2	.2	.4	.4	.4	.4	.5
OTHER NON-PUBLIC	1.2	.7	.6	.5	.3	.4	.3	.3	.3	.5	.6	.5	.4	.4	.4	.4	.4	.5
RETIRED	-	-	-	-	(1)	(1)	.1	.1	.1	-	-	.2	.1	-	-	.1	.1	.2
UNEMPLOYED OR DIRECT RELIEF	.8	.7	1.6	.9	.4	.4	.6	.4	.3	.6	.5	.8	.5	.5	.5	.4	.5	.4
YEARS	3	6	9	12	14	15	16	17	18	17	20	23	25	28	29	30	31	32
AFTER	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO
ENTERING PROFESSION	5	8	11	15	17	18	19	20	21	21	24	27	29	32	33	34	35	36
SOURCE OF EMPLOYMENT	MEMBERS WITH 3 TO 5 YEARS EXPERIENCE IN 1926									MEMBERS WITH 17 TO 21 YEARS EXPERIENCE IN 1926								
TOTAL REPORTING	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
TOTAL PUBLIC:	19.4	17.1	17.5	18.5	18.9	19.0	19.2	19.5	19.6	24.6	23.3	24.1	24.1	24.0	24.0	24.0	23.9	24.7
STATE GOVERNMENT	10.5	9.1	9.0	9.1	8.9	9.1	9.2	9.2	9.0	14.2	14.2	14.4	14.3	14.0	14.0	13.8	13.7	13.6
FEDERAL GOVERNMENT	3.7	3.8	4.5	4.7	5.8	5.6	5.9	6.2	6.5	6.1	5.3	5.4	5.3	5.7	5.7	5.7	5.9	6.6
MUNICIPAL GOVERNMENT	3.7	3.2	3.0	3.2	3.0	2.9	3.0	3.0	3.0	3.2	2.8	3.3	3.5	3.3	3.2	3.2	3.2	3.3
OTHER PUBLIC AUTHORITY	.8	.6	.7	1.0	.7	.7	.6	.6	.6	.7	.7	.7	.7	.7	.8	1.0	.8	.9
COUNTY GOVERNMENT	.7	.4	.3	.5	.5	.5	.5	.5	.5	.3	.3	.3	.3	.3	.3	.3	.3	.3
W.P.A. OR WORK RELIEF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL NON-PUBLIC:	80.3	82.7	81.5	80.9	81.0	80.8	80.5	80.2	80.1	75.0	76.3	75.4	75.2	75.3	75.0	74.5	74.6	73.8
PRIVATE FIRM (2)	49.5	56.5	55.4	55.5	57.4	57.4	57.2	57.2	57.6	50.5	51.7	50.5	49.6	50.2	49.6	49.7	50.0	49.4
EDUCATIONAL (3)	20.5	17.0	16.7	15.4	14.4	14.5	14.4	14.2	13.8	13.4	13.8	14.4	15.1	14.8	14.9	14.7	14.7	14.6
CONSULTING (4)	6.2	6.0	5.8	6.0	5.7	5.6	5.6	5.3	5.4	7.0	6.6	6.4	6.8	6.6	7.0	6.5	6.4	6.7
RESEARCH INSTITUTE	2.8	2.3	2.4	2.9	2.5	2.4	2.4	2.4	2.3	3.2	2.9	2.8	2.5	2.5	2.5	2.6	2.6	2.3
TECH. OR TRADE ASSN. (5)	.6	.8	.9	.8	.9	.8	.7	.8	.7	1.0	1.0	1.0	.8	.6	.6	.6	.5	.5
OTHER NON-PUBLIC	.7	.1	.3	.3	.1	.1	.2	.3	.3	-	.3	.3	.4	.6	.4	.4	.4	.3
RETIRED	-	-	-	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.4	.7	.7	1.1
UNEMPLOYED OR DIRECT RELIEF	.3	.2	1.0	.5	(1)	.1	.2	.2	.2	.3	.3	.4	.6	.6	.6	.8	.8	.4

1 LESS THAN 0.05 PERCENT
2 INCLUDES PRIVATE FIRM, COMPANY, CORPORATION OR ORGANIZATION ENGAGED IN ACTIVITIES OTHER THAN THOSE LISTED SEPARATELY
3 INCLUDES EDUCATIONAL INSTITUTIONS EXCLUSIVE OF THOSE UNDER PUBLIC AUTHORITIES
4 LABORATORY, FIRM OR OFFICE
5 INCLUDES PUBLISHING ORGANIZATIONS

TABLE 21.—PERCENTAGE DISTRIBUTION OF SOURCE OF EMPLOYMENT OF MEMBERS WITH CORRESPONDING YEARS OF PROFESSIONAL EXPERIENCE IN PERIOD 1926 TO 1941

YEAR	1926	1929	1932	1934	1937	1938	1939	1940	1941	1926	1929	1932	1934	1937	1938	1939	1940	1941
SOURCE OF EMPLOYMENT	½ YEAR AFTER ENTERING PROFESSION									13 TO 16 YEARS AFTER ENTERING PROFESSION								
TOTAL REPORTING	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
TOTAL PUBLIC:	20.7	20.3	27.6	19.1	13.1	10.9	9.7	6.4	13.7	18.2	16.8	21.3	18.5	18.9	17.9	18.0	18.3	19.3
STATE GOVERNMENT	11.5	13.5	18.3	12.7	10.1	5.0	8.4	2.0	3.9	9.6	9.4	11.7	9.1	8.9	9.6	9.8	9.7	9.6
FEDERAL GOVERNMENT	2.8	3.4	2.9	2.3	1.4	2.6	1.5	3.2	8.8	5.4	4.5	4.7	4.7	5.8	5.4	5.5	5.7	6.9
MUNICIPAL GOVERNMENT	4.4	1.9	3.1	1.3	.5	1.9	.5	.3	-	2.9	2.2	2.7	3.2	3.0	2.3	2.1	2.3	2.1
OTHER PUBLIC AUTHORITY	1.0	.9	1.3	1.2	.7	.7	1.0	.3	-	.3	.5	1.4	1.0	.7	.3	.3	.3	.4
COUNTY GOVERNMENT	1.0	.4	1.6	.8	.2	.5	-	.6	1.0	.1	.2	.7	.5	.5	.3	.3	.3	.3
W.P.A. OR WORK RELIEF	-	.2	.4	.8	.2	.2	.3	-	-	-	-	.1	-	-	(1)	-	-	-
TOTAL NON-PUBLIC:	78.5	78.2	66.8	78.6	86.4	87.4	88.8	93.0	86.3	81.4	82.7	77.6	80.9	81.0	81.7	81.3	81.2	80.3
PRIVATE FIRM (2)	42.5	49.4	32.2	48.4	56.8	57.8	67.5	72.8	68.6	58.9	61.9	52.2	55.5	57.4	61.5	61.3	62.1	62.4
EDUCATIONAL (3)	25.7	22.9	25.9	21.5	19.7	19.3	11.3	8.2	1.0	13.3	11.8	16.1	15.4	14.4	11.3	11.2	10.9	10.0
CONSULTING (4)	6.3	2.3	3.8	5.8	6.4	4.8	6.4	8.5	10.8	5.0	5.4	4.7	6.0	5.7	5.4	5.4	5.0	5.0
RESEARCH INSTITUTE	2.8	3.0	2.9	1.7	2.8	3.1	1.8	3.2	4.9	2.1	2.9	3.3	2.9	2.5	2.7	2.8	2.6	2.3
TECH. OR TRADE ASSN. (5)	-	-	-	-	.2	-	.3	-	-	.7	.2	.5	.8	.9	.4	.3	.3	.3
OTHER NON-PUBLIC	1.2	.6	2.0	1.2	.5	2.4	1.5	.3	1.0	.5	.6	.8	.3	.1	.4	.3	.3	.3
RETIRED	-	-	.2	-	-	-	-	-	-	-	-	.1	.1	.1	(1)	.1	.1	.1
UNEMPLOYED OR DIRECT RELIEF	.8	1.5	5.4	2.3	.5	1.7	1.5	.6	-	.3	.5	1.0	.5	(1)	.4	.6	.4	.3
SOURCE OF EMPLOYMENT	3 TO 5 YEARS AFTER ENTERING PROFESSION									22 TO 26 YEARS AFTER ENTERING PROFESSION								
TOTAL REPORTING	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
TOTAL PUBLIC:	19.4	19.2	22.2	20.4	14.6	15.4	17.9	14.0	14.7	25.2	25.8	24.1	18.1	18.5	18.8	19.7	19.2	20.1
STATE GOVERNMENT	10.5	11.1	15.0	12.8	9.5	10.9	11.1	9.7	4.4	12.7	12.5	14.4	8.9	8.6	8.7	11.7	11.5	11.2
FEDERAL GOVERNMENT	3.7	3.9	3.4	3.8	2.6	3.1	4.1	2.5	9.0	7.9	8.0	5.4	6.1	6.5	6.6	4.4	4.7	5.3
MUNICIPAL GOVERNMENT	3.7	3.3	3.0	2.1	1.1	.9	1.6	1.3	1.0	4.8	4.8	3.3	2.8	2.9	3.1	2.6	2.6	2.6
OTHER PUBLIC AUTHORITY	.8	.4	.7	.8	.9	.9	.7	.7	.3	.5	.5	.7	.3	.5	.4	.7	.8	.8
COUNTY GOVERNMENT	.7	.5	.1	.4	.1	-	.1	.2	-	-	-	.3	-	-	-	.2	.2	.2
W.P.A. OR WORK RELIEF	-	-	-	.5	.4	.2	.3	-	-	-	-	-	-	-	-	.1	.1	-
TOTAL NON-PUBLIC:	80.3	80.1	75.9	79.1	85.3	83.6	81.4	84.8	85.2	73.7	73.3	73.4	81.1	81.0	80.7	79.8	79.5	79.3
PRIVATE FIRM (2)	49.5	53.5	45.7	48.4	57.6	56.6	56.7	63.5	65.9	48.2	49.1	50.5	58.4	58.3	58.1	60.2	59.7	59.5
EDUCATIONAL (3)	20.5	16.8	20.7	20.8	18.1	17.8	15.8	11.8	8.5	11.8	11.2	14.4	13.5	13.5	13.4	12.0	11.7	11.6
CONSULTING (4)	6.2	5.1	5.2	5.6	5.8	6.1	4.8	6.3	7.5	10.7	10.3	6.4	5.9	6.2	6.2	4.6	4.9	4.8
RESEARCH INSTITUTE	2.8	3.8	3.1	3.3	3.0	2.4	3.2	2.1	2.8	2.0	1.8	2.8	1.9	1.9	1.9	2.2	2.4	2.4
TECH. OR TRADE ASSN. (5)	.6	.5	.6	.1	-	.7	.2	.1	.1	.5	.2	1.0	.7	.5	.5	.4	.4	.5
OTHER NON-PUBLIC	.7	.4	.6	.9	.8	-	.7	.8	.4	.5	.7	.3	.7	.6	.6	.4	.4	.3
RETIRED	-	-	-	.1	-	.1	-	-	-	.2	.2	.1	.1	.1	.1	.1	.1	.2
UNEMPLOYED OR DIRECT RELIEF	.3	.7	1.9	.4	.1	.9	.7	.8	.1	.2	.7	.4	.7	.4	.4	.4	.5	.4

1 LESS THAN 0.05 PERCENT
2 INCLUDES PRIVATE FIRM, COMPANY, CORPORATION OR ORGANIZATION ENGAGED IN ACTIVITIES OTHER THAN THOSE LISTED SEPARATELY
3 INCLUDES EDUCATIONAL INSTITUTIONS EXCLUSIVE OF THOSE UNDER PUBLIC AUTHORITIES
4 LABORATORY, FIRM OR OFFICE
5 INCLUDES PUBLISHING ORGANIZATIONS

TABLE 22.— DISTRIBUTION IN PERIOD 1926 TO 1941 OF ALL MEMBERS REPORTING FIELD OF SPECIALIZATION

FIELD OF SPECIALIZATION	NUMBER REPORTING IN YEAR								
	1941	1940	1939	1938	1937	1934	1932	1929	1926
TOTAL REPORTING	18,520	18,125	17,544	16,911	16,279	13,434	11,728	9,849	7,887
PHYSICAL CHEMISTRY (1)	1,636	1,707	1,750	1,787	1,782	1,562	1,478	1,129	916
PETROLEUM & ITS PRODUCTS	1,577	1,586	1,511	1,416	1,325	950	787	623	460
FOODS & KINDRED PRODUCTS	1,257	1,244	1,214	1,174	1,123	917	765	670	585
INDUSTRIAL CHEMISTRY, GEN.	1,243	1,207	1,140	1,087	1,043	817	680	636	513
ORGANIC CHEMICAL TECHNOL.	1,103	1,064	1,012	972	923	689	552	488	376
ORGANIC CHEMISTRY (2)	1,101	1,177	1,298	1,322	1,268	1,059	988	722	556
CHEMICAL ENGINEERING, GEN.	1,070	974	930	877	797	660	586	501	419
BIOLOGICAL CHEMISTRY (3)	931	931	956	944	887	777	684	512	378
PHARMACEUTICALS (4)	816	770	696	626	589	476	382	295	228
RUBBER & ITS PRODUCTS	730	717	679	647	620	493	411	386	283
SYNTHETIC RESINS (5)	706	652	541	459	431	267	198	140	77
PAINTS & VARNISHES (6)	693	689	649	633	623	469	406	372	277
OTHER FIELD OF SC. OR ENG.	621	572	544	502	491	409	365	316	247
GENERAL CHEMISTRY (2)	551	591	577	578	601	589	543	537	499
INORGANIC CHEM. TECHNOL. (7)	510	507	487	454	457	391	341	301	238
AGRICULTURAL CHEMISTRY	435	409	399	389	368	328	307	261	220
PAPERS & FOREST PRODUCTS (8)	364	357	346	337	324	264	230	192	135
EXPLOSIVES	308	146	114	109	115	89	76	75	67
TEXTILES (9)	292	291	269	257	245	205	183	148	124
PUBLIC HEALTH (10)	282	272	255	246	237	207	180	144	122
METALLURGICAL TECHNOL. (11)	274	266	261	252	248	212	191	196	179
GAS & FUELS (12)	253	268	260	270	265	249	245	215	180
SYNTHETIC FIBER TECHNOL.	242	225	207	179	172	130	104	96	55
CERAMIC INDUSTRIES (13)	240	251	245	231	226	191	150	136	112
METALLURGICAL TECHNOL. (14)	232	211	189	186	197	151	136	139	121
MEDICAL CHEMISTRY (15)	215	218	207	201	185	180	153	129	107
FERTILIZERS (16)	202	207	218	201	208	179	147	135	117
OTHER NON-PROFESSIONAL	177	165	167	157	145	205	161	96	90
MACHINERY & IMPLEMENTS (17)	111	100	87	85	78	70	63	62	51
LABORATORY APPAR. & EQUIP.	108	104	103	99	97	75	70	55	40
EQUIPMENT (PROCESS INDUS.)	93	102	92	85	76	62	55	45	33
LEATHER & ITS MNFRS.	92	97	98	102	99	81	76	62	55
TRANSPORTATION EQUIP. (18)	29	21	17	20	18	17	20	22	16
MOTOR VEHICLES	21	27	26	27	20	14	15	13	11
	PERCENTAGE								
TOTAL REPORTING	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
PHYSICAL CHEMISTRY (1)	8.7	9.3	9.9	10.6	10.9	11.7	12.6	11.4	11.7
PETROLEUM & ITS PRODUCTS	8.4	8.7	8.5	8.4	8.1	7.1	6.7	6.3	5.8
FOODS & KINDRED PRODUCTS	6.8	6.8	6.9	6.9	6.9	6.8	6.5	6.7	7.5
INDUSTRIAL CHEMISTRY, GEN.	6.7	6.7	6.5	6.4	6.4	6.1	5.9	6.5	6.5
ORGANIC CHEMICAL TECHNOL.	6.0	5.9	5.8	5.7	5.7	5.1	4.7	5.0	4.8
ORGANIC CHEMISTRY (2)	5.9	6.5	7.4	7.8	7.8	7.9	8.4	7.2	7.1
CHEMICAL ENGINEERING, GEN.	5.8	5.4	5.3	5.2	4.9	4.9	5.0	5.1	5.3
BIOLOGICAL CHEMISTRY (3)	5.0	5.1	5.4	[illegible]	5.5	5.8	5.9	5.2	4.8
PHARMACEUTICALS (4)	4.4	4.2	4.0	[illegible]	3.6	3.5	3.3	3.0	2.9
RUBBER & ITS PRODUCTS	3.9	4.0	3.9	[illegible]	3.8	3.7	3.5	3.9	3.6
SYNTHETIC RESINS (5)	3.8	3.6	3.1	[illegible]	2.6	2.0	1.7	1.4	1.0
PAINTS AND VARNISHES (6)	3.7								
OTHER FIELD OF SC. OR ENG.	3.4	3.2	3.1	[illegible]	3.0	3.0	3.1	3.2	3.1
GENERAL CHEMISTRY (2)	3.0	3.3	3.3	[illegible]	3.7	4.4	4.6	5.5	6.3
INORGANIC CHEM. TECHNOL. (7)	2.8	2.8	2.8	2.7	2.8	2.9	2.9	3.1	3.0
AGRICULTURAL CHEMISTRY	2.3	2.3	2.3	2.3	2.3	2.4	2.6	2.7	2.8
PAPERS & FOREST PRODUCTS (8)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.7
EXPLOSIVES	.7	.8	.6	.6	.7	.7	.6	.8	.9
TEXTILES (9)	.6	1.6		.5	1.5	1.5	1.6	1.5	1.6
PUBLIC HEALTH (10)	.5	1.5		.5	1.5	1.5	1.5	1.5	1.5
METALLURGICAL TECHNOL. (11)	.5	1.5		.5	1.5	1.6	1.6	2.0	2.3
GAS AND FUELS (12)	.4	1.5		.6	1.6	1.9	2.1	2.2	2.3
SYNTHETIC FIBER TECHNOL.	.3	1.2		.1	1.1	1.0	.9	1.0	.7
CERAMIC INDUSTRIES (13)	.3	1.4		.4	1.4	1.4	1.3	1.4	1.4
METALLURGICAL TECHNOL. (14)	.3	1.2		.1	1.2	1.1	1.2	1.4	1.5
MEDICAL CHEMISTRY (15)	.2	1.2		.2	1.1	1.3	1.3	1.3	1.4
FERTILIZERS (16)	.1	1.1		.2	1.3	1.3	1.3	1.4	1.5
OTHER NON-PROFESSIONAL	1.0	.9	1.0	.9	.9	1.5	1.4	1.0	1.1
MACHINERY & IMPLEMENTS (17)	.5	.6	.5	.5	.5	.5	.5	.6	.6
LABORATORY APPAR. & EQUIP.	.6	.6	.6	.6	.6	.6	.6	.6	.5
EQUIPMENT (PROCESS INDUS.)	.5	.6	.5	.5	.5	.5	.5	.5	.4
LEATHER & ITS MNFRS.	.5	.5	.6	.6	.6	.6	.6	.6	.7
TRANSPORTATION EQUIP. (18)	.2	.1	.1	.1	.1	.1	.2	.2	.2
MOTOR VEHICLES	.1	.1	.1	.2	.1	.1	.1	.1	.1

1 INCLUDES ANALYTICAL AND INORGANIC CHEMISTRY (BASIC SCIENCE)
BASIC SCIENCE
INCLUDES PHYSICOLOGICAL CHEMISTRY (BASIC SCIENCE)
INCLUDES BIOLOGICALS AND VITAMINS
INCLUDES PLASTICS
INCLUDES LACQUERS
INCLUDES HEAVY CHEMICALS
INCLUDES NAVAL STORES
AND THEIR PRODUCTS, EXCLUSIVE OF SYNTHETIC FIBER TECHNOLOGY
10 INCLUDES WATER, SEWERAGE, AND SANITATION
11 NON-FERROUS
12 INCLUDES NATURAL AND MANUFACTURED, AND POWER GENERATION
13 INCLUDES GLASS AND CEMENT TECHNOLOGY
14 FERROUS
15 INCLUDES CLINICAL
16 INCLUDES INSECTICIDES
17 INCLUDES MECHANICAL AND ELECTRICAL EQUIPMENT
18 OTHER THAN MOTOR VEHICLES

18.1 per cent of the membership as against 81.1 per cent who were in the employ of all nonpublic agencies.

Despite the net changes in proportions noted to have occurred over the period 1926 to 1941, the separate categories maintained the same ranking order. In the case of public agencies, state government gave employment to a larger proportion of the membership than did the Federal Government, which was followed in order by municipal government, other public authorities, and county government employment. It is of interest to note that WPA or work relief embraced a negligible proportion of the membership in the period 1929 to 1941.

Of all members classified as being in the employ of nonpublic agencies, over 75 per cent were dependent upon private firms for their employment. Approximately one eighth more were engaged by educational institutions. Most of the remaining one eighth were shown as being in consulting work, followed in order by research institutes, technical or trade associations, and other nonpublic agencies.

Since the remainder of this particular analysis is similar in pattern to that followed in the earlier discussion of occupational statuses of the membership, passing reference only is made to Table 18 and Table 19. The former shows the distributions in 1941 within each source of employment of all members reporting, by year of entering the profession. In the latter table there is presented for each year of entering the profession the distributions in 1941 of all members reporting source of employment. It is from this second table, and similar compilations for the eight prior years, that the data have been obtained to examine the changes that took place in the membership's sources of employment with advancing years of experience, as well as those for corresponding years after entering the profession.

With advancing years of experience Table 20 clearly demonstrates that in both total public employment and total nonpublic employment there was virtually no change in the proportions reported by the membership from year to year in the period 1926 to 1941. Another interesting feature of these data is that among the three youngest of the four selected groups of members the proportions of each group classified in total public employment and total nonpublic employment were practically the same and averaged, respectively, 20 and 80 per cent. The corresponding figures for members who had had 17 to 21 years' experience in 1926 were slightly higher. These were 24 and 75 per cent.

Thus far, therefore, the analysis seems to indicate that with advancing years and experience there was little or no transfer by the membership from public to nonpublic employment. This is partially substantiated by the fact that, among the separate categories of total public and total nonpublic employment, the propor-

PROFESSION

YEAR OF ENTERING PROFESSION	19— TO 19—	41	40	39	38	37	35 TO 36	32 TO 34	28 TO 31	24 TO 27	20 TO 23	15 TO 19	10 TO 14	05 TO 09	00 TO 04	(19)	N.R. (20)
YEARS AFTER ENTERING PROFESSION		½	1	2	3	4	5 TO 6	7 TO 9	10 TO 13	14 TO 17	18 TO 21	22 TO 26	27 TO 31	32 TO 36	37 TO 41	42+	
FIELD OF SPECIALIZATION							PERCENTAGE										
TOTAL REPORTING	100.0	.5	2.0	2.8	3.4	4.2	10.0	13.1	15.7	12.8	11.3	9.1	6.7	4.0	2.5	.5	1.2
PHYSICAL CHEMISTRY (1)	100.0	.5	1.5	2.1	2.8	3.6	10.3	13.1	16.2	13.2	12.6	10.1	5.9	3.7	2.4	.4	1.6
PETROLEUM & ITS PRODUCTS	100.0	.6	2.4	3.2	4.2	5.3	11.9	16.8	18.4	12.6	10.7	6.3	4.6	1.7	.8	.1	.4
FOODS & KINDRED PRODUCTS	100.0	.6	1.1	2.1	3.3	3.9	8.4	13.2	13.2	13.0	11.7	10.1	8.6	5.8	3.2	.6	1.8
INDUSTRIAL CHEMISTRY, GEN.	100.0	.7	2.3	2.9	3.6	3.9	8.4	14.3	13.6	12.0	11.3	9.7	7.1	4.8	3.5	.7	1.8
ORGANIC CHEMICAL TECHNOL.	100.0	.3	1.8	2.9	3.0	4.9	11.3	15.2	18.1	12.5	8.7	9.6	6.9	2.2	1.0	.2	1.4
ORGANIC CHEMISTRY (2)	100.0	.5	2.6	2.2	2.1	5.7	12.7	13.1	16.0	11.4	12.2	8.2	5.9	3.7	1.9	.5	1.3
CHEMICAL ENGINEERING, GEN.	100.0	.7	2.4	3.7	5.2	3.8	10.9	10.3	13.4	12.0	12.0	10.2	6.3	3.7	2.8	.6	2.0
BIOLOGICAL CHEMISTRY (3)	100.0	.5	.3	1.4	1.8	2.7	8.7	13.5	17.6	14.0	14.1	9.1	7.2	4.4	3.0	.5	1.2
PHARMACEUTICALS (4)	100.0	.4	2.1	3.7	3.6	3.8	10.7	14.8	18.2	12.7	10.7	7.7	5.3	3.3	1.7	.4	.9
RUBBER AND ITS PRODUCTS	100.0	.5	2.3	3.2	3.4	4.4	11.6	13.2	14.8	17.3	9.5	10.1	6.2	2.2	1.2	—	.1
SYNTHETIC RESINS (5)	100.0	.6	3.3	4.5	5.0	6.1	13.3	18.8	20.5	12.0	6.8	5.5	2.4	.8	.3	—	.1
PAINTS AND VARNISHES (6)	100.0	.7	2.3	3.2	4.3	5.8	10.4	12.8	15.5	11.8	11.5	9.5	6.6	3.0	1.0	.6	1.0
OTHER FIELD OF SC. OR ENG.	100.0	1.1	1.9	2.7	4.3	4.0	8.2	12.9	17.2	12.2	10.8	9.0	6.8	5.0	3.5	.3	.6
GENERAL CHEMISTRY (2)	100.0	.4	.9	1.5	1.1	2.7	4.7	8.7	13.1	14.6	12.3	10.9	11.6	7.3	6.4	.9	2.9
INORGANIC CHEM. TECHNOL. (7)	100.0	.2	1.8	2.2	2.0	2.9	11.0	10.6	13.7	17.2	11.4	9.0	9.0	3.7	3.1	.8	1.4
AGRICULTURAL CHEMISTRY	100.0	—	1.4	2.1	3.0	3.7	7.8	9.4	14.9	10.6	13.1	9.0	8.0	8.5	3.7	1.6	3.2
PAPERS & FOREST PRODUCTS (8)	100.0	.3	3.6	1.4	2.7	4.4	11.0	12.6	15.9	13.5	11.3	7.4	6.9	4.9	1.9	.8	1.4
EXPLOSIVES	100.0	2.3	7.1	7.1	8.1	7.8	14.8	13.0	12.3	8.1	4.9	4.5	4.2	3.6	1.6	—	.6
TEXTILES (9)	100.0	—	2.1	3.1	4.5	4.1	9.6	8.9	18.3	13.4	10.3	12.7	6.2	3.4	.3	.9	2.4
PUBLIC HEALTH (10)	100.0	.4	1.8	2.8	4.6	5.7	10.6	9.2	13.5	11.0	9.6	11.3	7.1	5.3	2.5	.7	3.9
METALLURGICAL TECHNOL. (11)	100.0	.4	3.3	1.1	3.6	2.9	7.3	8.0	12.0	11.7	13.5	12.4	10.6	6.6	5.5	.7	.4
GAS AND FUELS (12)	100.0	.4	1.2	2.0	2.0	1.6	5.5	8.3	14.6	17.4	17.6	12.3	9.1	3.6	2.8	—	1.6
SYNTHETIC FIBER TECHNOL.	100.0	—	2.1	2.1	2.1	4.1	12.0	17.4	17.8	19.7	11.6	5.8	4.1	.8	—	—	.4
CERAMIC INDUSTRIES (13)	100.0	—	1.2	3.3	3.3	5.8	8.3	10.4	13.0	13.0	11.2	7.9	6.7	6.3	7.9	—	1.7
METALLURGICAL TECHNOL. (14)	100.0	2.6	2.2	3.4	1.7	4.7	8.6	8.6	10.3	9.1	13.0	9.9	10.8	6.9	5.6	1.3	1.3
MEDICAL CHEMISTRY (15)	100.0	—	.9	2.8	2.3	4.7	4.2	14.0	14.0	13.0	15.7	11.2	6.0	5.1	3.7	.5	1.9
FERTILIZERS (16)	100.0	—	1.0	1.0	2.0	2.5	5.4	11.4	17.7	11.9	11.9	13.4	6.4	7.4	4.5	2.0	1.5
OTHER NON-PROFESSIONAL	100.0	.6	2.3	5.1	3.4	5.1	11.9	11.9	15.1	7.3	8.5	7.9	6.5	5.1	3.4	1.1	2.8
MACHINERY & IMPLEMENTS (17)	100.0	.9	2.7	4.5	3.6	2.7	4.5	11.7	12.6	10.8	15.4	10.8	12.6	4.5	1.8	—	.9
LABORATORY APPAR. & EQUIP.	100.0	—	3.7	—	1.9	1.9	8.3	11.1	14.8	14.8	11.1	11.1	9.3	8.3	.9	—	2.8
EQUIPMENT (PROCESS INDUS.)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)
LEATHER & ITS MNFRS.	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)
TRANSPORTATION EQUIP. (18)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)
MOTOR VEHICLES	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)

NOTE: SEE TABLE 22 FOR STUB FOOTNOTES 1 TO 18 INCLUSIVE

19 PRIOR TO 1900

20 INCLUDES MEMBERS WHO REPORTED FIELD OF SPECIALIZATION BUT NOT THE YEAR IN WHICH THEY ENTERED THE PROFESSION

21 FEWER THAN 100 MEMBERS REPORTED

TABLE 24.— PERCENTAGE DISTRIBUTION IN 1941 WITHIN EACH YEAR OF ENTERING PROFESSION GROUP OF ALL MEMBERS REPORTING FIELD OF SPECIALIZATION

YEAR OF ENTERING PROFESSION	19— TO 19—	41	40	39	38	37	35 TO 36	32 TO 34	28 TO 31	24 TO 27	20 TO 23	15 TO 19	10 TO 14	05 TO 09	00 TO 04	(19)	N.R. (20)
YEARS AFTER ENTERING PROFESSION		½	1	2	3	4	5 TO 6	7 TO 9	10 TO 13	14 TO 17	18 TO 21	22 TO 26	27 TO 31	32 TO 36	37 TO 41	42+	
FIELD OF SPECIALIZATION																	
TOTAL REPORTING	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	(21)	100.0
PHYSICAL CHEMISTRY (1)	8.7	7.9	6.6	6.8	7.4	7.7	9.0	8.8	9.1	9.1	9.9	10.0	7.8	8.1	8.8	(21)	10.5
PETROLEUM & ITS PRODUCTS	8.4	8.8	10.2	9.7	10.8	10.9	10.0	10.8	10.0	8.4	8.0	5.9	5.8	3.6	2.6	(21)	2.4
FOODS & KINDRED PRODUCTS	6.8	6.9	3.7	5.2	6.6	5.5	5.7	6.9	5.7	6.9	7.0	7.6	8.8	9.8	8.8	(21)	8.9
INDUSTRIAL CHEMISTRY, GEN.	6.7	8.8	7.7	7.0	7.2	5.3	5.6	7.3	5.8	6.3	6.7	7.2	7.2	8.1	9.7	(21)	8.9
ORGANIC CHEMICAL TECHNOL.	6.0	3.0	5.3	6.2	5.3	7.0	6.7	6.9	6.9	5.8	4.6	6.3	6.1	3.2	2.4	(21)	6.0
ORGANIC CHEMISTRY (2)	5.9	5.0	7.7	4.6	3.7	8.2	7.6	6.0	6.1	5.2	6.4	5.3	5.2	5.5	4.6	(21)	5.6
CHEMICAL ENGINEERING, GEN.	5.8	6.9	6.9	7.7	9.0	5.3	6.3	4.5	5.0	5.4	6.1	6.6	5.4	5.4	6.6	(21)	8.5
BIOLOGICAL CHEMISTRY (3)	5.0	5.0	.8	2.5	2.7	3.2	4.4	5.2	5.6	5.5	6.2	5.0	5.4	5.5	6.1	(21)	4.4
PHARMACEUTICALS (4)	4.4	3.0	4.5	5.8	4.6	4.0	4.7	5.0	5.2	4.4	4.1	3.7	3.5	3.6	3.1	(21)	2.8
RUBBER AND ITS PRODUCTS	3.9	4.0	4.5	4.4	4.0	4.2	4.6	3.9	3.7	5.3	3.3	4.4	3.6	2.2	2.0	(21)	.4
SYNTHETIC RESINS (5)	3.8	4.0	6.1	6.2	5.6	5.6	5.1	5.5	5.0	3.6	2.3	2.3	1.4	.8	.4	(21)	.4
PAINTS AND VARNISHES (6)	3.7	5.0	4.2	4.3	4.8	5.2	3.9	3.7	3.7	3.4	3.8	3.9	3.7	2.8	1.5	(21)	2.8
OTHER FIELD OF SC. OR ENG.	3.4	6.9	3.2	3.3	4.3	3.2	2.8	3.3	3.6	3.2	3.2	3.3	3.1	4.2	4.8	(21)	1.6
GENERAL CHEMISTRY (2)	3.0	2.0	1.3	1.5	1.0	1.9	1.4	2.0	2.5	3.4	3.2	3.6	5.2	5.4	7.7	(21)	6.4
INORGANIC CHEM. TECHNOL. (7)	2.8	1.0	2.4	2.1	1.6	1.9	3.0	2.2	2.4	3.7	2.8	2.7	3.7	2.6	3.5	(21)	2.8
AGRICULTURAL CHEMISTRY	2.3	—	1.6	1.7	2.1	2.1	1.8	1.7	2.2	1.9	2.7	2.3	2.8	5.0	3.5	(21)	5.6
PAPERS & FOREST PRODUCTS (8)	2.0	1.0	3.4	1.0	1.6	2.1	2.2	1.9	2.0	2.1	2.0	1.6	2.0	2.4	1.5	(21)	2.0
EXPLOSIVES	1.7	6.9	5.8	4.3	4.0	3.1	2.4	1.6	1.3	1.0	.7	.8	1.0	1.5	1.1	(21)	.8
TEXTILES (9)	1.6	—	1.6	1.7	2.1	1.6	1.5	1.1	1.9	1.6	1.4	2.2	1.5	1.3	.2	(21)	2.8
PUBLIC HEALTH (10)	1.5	1.0	1.3	1.5	2.1	2.1	1.6	1.1	1.3	1.3	1.3	1.9	1.6	2.0	1.5	(21)	4.4
METALLURGICAL TECHNOL. (11)	1.5	1.0	2.4	.6	1.6	1.0	1.1	.9	1.1	1.3	1.8	2.0	2.3	2.4	3.3	(21)	.4
GAS AND FUELS (12)	1.4	1.0	.8	1.0	.8	.5	.8	.9	1.3	1.8	2.1	1.8	1.9	1.2	1.5	(21)	1.6
SYNTHETIC FIBER TECHNOL.	1.3	—	1.3	1.0	.8	1.3	1.6	1.7	1.5	2.0	1.3	.8	.8	.3	—	(21)	.4
CERAMIC INDUSTRIES (13)	1.3	—	.8	1.5	1.3	1.8	1.1	1.0	1.1	1.3	1.3	1.1	1.3	2.0	4.2	(21)	1.6
METALLURGICAL TECHNOL. (14)	1.3	5.9	1.3	1.5	.6	1.4	1.1	.8	.8	.9	1.4	1.4	2.0	2.2	2.9	(21)	1.2
MEDICAL CHEMISTRY (15)	1.2	—	.5	1.2	.8	1.3	.5	1.2	1.0	1.2	1.6	1.4	1.0	1.5	1.8	(21)	1.6
FERTILIZERS (16)	1.1	—	.5	.4	.6	.6	.6	.9	1.2	1.0	1.1	1.6	1.0	2.0	2.0	(21)	1.2
OTHER NON-PROFESSIONAL	1.0	1.0	1.1	1.7	1.0	1.2	1.1	.9	.9	.5	.7	.8	1.2	1.2	1.3	(21)	2.0
MACHINERY & IMPLEMENTS (17)	.6	1.0	.8	1.0	.6	.4	.3	.5	.5	.5	.8	.7	1.1	.7	.4	(21)	.4
LABORATORY APPAR. & EQUIP.	.6	—	1.1	—	.3	.3	.5	.5	.6	.7	.6	.7	.8	1.2	.2	(21)	1.2
EQUIPMENT (PROCESS INDUS.)	.5	1.0	.3	1.4	.3	—	.4	.6	.4	.5	.7	.4	1.0	.9	.7	(21)	—
LEATHER & ITS MNFRS.	.5	—	—	.6	.3	.1	.5	.5	.4	.5	.7	.5	.6	.7	.9	(21)	—
TRANSPORTATION EQUIP. (18)	.2	2.0	.3	.6	.3	—	—	.1	.1	.1	.1	—	—	.7	.4	(21)	.4
MOTOR VEHICLES	.1	—	—	—	.2	—	.1	.1	.1	.2	.1	.2	.2	—	—	(21)	—

NOTE: SEE TABLE 22 FOR STUB FOOTNOTES 1 TO 18 INCLUSIVE

19 PRIOR TO 1900

20 INCLUDES MEMBERS WHO REPORTED FIELD OF SPECIALIZATION BUT NOT THE YEAR IN WHICH THEY ENTERED THE PROFESSION

21 FEWER THAN 100 MEMBERS REPORTED

TABLE 25.—PERCENTAGE DISTRIBUTION OF FIELD OF SPECIALIZATION OF MEMBERS WITH ADVANCING YEARS OF PROFESSIONAL EXPERIENCE IN PERIOD 1926 TO 1941

YEAR		1926	1929	1932	1934	1937	1938	1939	1940	1941	1926	1929	1932	1934	1937	1938	1939	1940	1941
YEARS		1	3	5	7	10	11	12	13	14	9	12	15	16	18	19	20	21	22
AFTER				TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO
ENTERING PROFESSION				6	8	13	14	15	16	17	12	15	18	19	22	23	24	25	26
FIELD OF SPECIALIZATION		MEMBERS WITH 1 YEAR EXPERIENCE IN 1926									MEMBERS WITH 9 TO 12 YEARS EXPERIENCE IN 1926								
TOTAL REPORTING		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
PHYSICAL CHEMISTRY	(1)	15.2	14.9	12.7	11.8	9.6	9.5	9.8	9.4	9.1	10.6	9.9	10.2	10.5	10.4	10.0	10.0	10.2	10.0
PETROLEUM & ITS PRODUCTS		7.8	7.7	7.8	8.6	9.0	8.9	8.8	8.5	8.4	6.0	6.5	6.7	6.2	6.1	6.0	5.9	5.6	5.9
FOODS & KINDRED PRODUCTS		7.6	6.0	6.2	6.6	7.1	6.8	6.8	7.0	6.9	6.9	6.5	6.9	7.1	7.5	7.4	7.6	7.7	7.6
INDUSTRIAL CHEMISTRY, GEN.		4.7	5.5	5.5	6.3	5.9	6.0	6.1	6.3	6.3	7.8	7.5	7.7	6.5	7.0	7.1	7.1	7.1	7.2
ORGANIC CHEMICAL TECHNOL.		2.7	5.5	5.2	5.4	5.7	5.6	5.6	5.4	5.8	7.1	7.3	6.5	5.8	6.4	6.4	6.2	6.2	6.3
ORGANIC CHEMISTRY	(2)	11.2	9.4	8.7	6.9	5.2	5.3	5.5	5.3	5.2	4.6	4.5	4.4	5.7	5.5	5.7	5.6	5.5	5.3
CHEMICAL ENGINEERING, GEN.		6.1	4.3	3.9	4.0	4.5	4.7	5.0	5.2	5.4	5.4	5.5	5.3	5.4	5.6	5.8	5.8	6.2	6.6
BIOLOGICAL CHEMISTRY	(3)	2.9	4.0	5.9	5.5	5.9	6.0	5.8	5.6	5.5	4.7	4.9	5.3	4.8	5.2	5.2	5.2	5.1	5.0
PHARMACEUTICALS	(4)	2.2	2.9	3.0	3.4	3.9	4.2	4.5	4.4	4.4	2.9	3.0	3.1	3.4	3.7	3.5	3.7	3.8	3.7
RUBBER AND ITS PRODUCTS		4.1	4.6	4.7	5.1	5.6	5.7	5.6	5.7	5.3	5.3	5.3	5.0	4.9	4.2	4.4	4.4	4.3	4.4
SYNTHETIC RESINS	(5)	.8	2.1	2.2	2.6	3.2	3.1	3.2	3.4	3.6	1.5	1.0	1.9	2.3	2.2	2.3	2.4	2.5	2.3
PAINTS AND VARNISHES	(6)	2.7	3.4	3.3	3.9	4.0	3.9	3.5	3.6	3.4	4.6	4.8	4.5	4.0	4.1	4.1	4.1	3.9	3.9
OTHER FIELD OF SC. OR ENG.		3.3	2.9	3.3	3.3	3.0	3.0	3.0	3.0	3.2	2.8	2.6	2.9	2.8	3.0	3.0	3.1	3.1	3.3
GENERAL CHEMISTRY	(2)	8.2	4.8	4.3	3.8	3.4	3.4	3.3	3.6	3.4	3.9	3.3	3.0	3.6	3.8	3.6	3.6	3.6	3.6
INORGANIC CHEM. TECHNOL.	(7)	2.7	2.9	2.7	2.7	3.4	3.3	3.4	3.6	3.7	3.6	3.7	3.7	3.1	2.7	2.8	3.0	2.8	2.7
AGRICULTURAL CHEMISTRY		1.8	2.4	3.1	2.9	2.0	1.9	1.6	1.8	1.9	2.7	2.5	2.3	2.6	2.8	2.2	2.2	2.2	2.3
PAPERS & FOREST PRODUCTS	(8)	1.6	2.1	2.3	2.3	2.2	2.1	2.1	2.0	2.1	1.4	1.6	1.7	1.6	1.6	1.8	1.7	1.6	1.6
EXPLOSIVES		.8	.5	.7	.7	.6	.6	.6	.6	1.0	1.4	1.1	1.2	1.0	.8	.8	.8	.8	.8
TEXTILES	(9)	1.0	.9	.9	1.1	1.6	1.6	1.6	1.7	1.6	2.3	2.4	2.3	2.6	2.4	2.4	2.3	2.3	2.2
PUBLIC HEALTH	(10)	1.0	.9	1.2	.9	1.2	1.4	1.3	1.3	1.3	1.6	1.6	1.6	2.0	1.9	1.9	1.9	1.5	1.9
METALLURGICAL TECHNOL.	(11)	.8	1.2	1.2	1.2	1.6	1.5	1.4	1.2	1.3	2.2	2.3	2.4	2.2	2.2	2.1	2.1	2.1	2.0
GAS AND FUELS	(12)	2.2	2.2	1.6	1.7	1.8	2.0	2.0	1.9	1.8	1.8	2.1	2.2	2.0	1.9	2.0	1.9	1.8	1.8
SYNTHETIC FIBER TECHNOL.		.4	.9	1.5	1.5	2.0	1.9	2.1	2.2	2.0	.5	.9	1.0	.8	.7	.7	.8	.8	.8
CERAMIC INDUSTRIES	(13)	1.0	.5	.9	1.1	1.4	1.4	1.3	1.3	1.3	.8	1.0	1.0	1.4	1.3	1.3	1.3	1.3	1.4
METALLURGICAL TECHNOL.	(14)	1.4	1.0	.7	.7	.6	.7	.6	.8	.9	1.0	1.0	1.0	1.2	1.5	1.4	1.3	1.3	1.4
MEDICAL CHEMISTRY	(15)	1.0	1.2	1.7	1.6	1.3	1.3	1.2	1.2	1.2	1.3	1.3	1.4	1.6	1.4	1.4	1.4	1.5	1.4
FERTILIZERS	(16)	1.0	1.2	.7	1.0	1.2	1.1	.9	1.0	1.0	1.4	1.5	1.4	1.6	1.5	1.5	1.6	1.5	1.6
OTHER NON-PROFESSIONAL		2.0	1.0	.9	.8	.8	.6	.5	.5	.5	.8	.8	.5	.5	.6	.6	.6	.7	.8
MACHINERY & IMPLEMENTS	(17)	.6	.7	.7	.6	.4	.4	.4	.5	.5	.5	.4	.3	.5	.5	.7	.7	.7	.7
LABORATORY APPAR. & EQUIP.		.4	.5	.7	.6	.5	.5	.7	.6	.7	.7	.7	.7	.9	.7	.7	.7	.7	.7
EQUIPMENT (PROCESS INDUS.)		.2	.7	.4	.5	.6	.6	.6	.5	.5	.4	.5	.6	.4	.2	.2	.2	.4	.4
LEATHER & ITS MNFRS.		.8	1.2	.7	.6	.5	.6	.6	.5	.5	1.1	.9	1.0	.7	.7	.6	.6	.5	.5
TRANSPORTATION EQUIP	(18)	-	-	-	-	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	-	-	.1	-
MOTOR VEHICLES		-	-	.1	.1	.2	.3	.3	.3	.2	.3	.2	.2	.2	.3	.4	.2	.2	.2
YEARS		3	6	9	12	14	15	16	17	18	17	20	23	25	28	29	30	31	32
AFTER		TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO
ENTERING PROFESSION		5	8	11	15	17	18	19	20	21	21	24	27	29	32	33	34	35	36
FIELD OF SPECIALIZATION		MEMBERS WITH 3 TO 5 YEARS EXPERIENCE IN 1926									MEMBERS WITH 17 TO 21 YEARS EXPERIENCE IN 1926								
TOTAL REPORTING		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
PHYSICAL CHEMISTRY	(1)	12.4	11.2	10.5	10.1	10.2	10.3	10.3	10.3	9.9	8.2	7.9	7.8	7.6	8.2	8.7	7.9	8.2	8.1
PETROLEUM & ITS PRODUCTS		7.7	8.6	8.6	8.7	8.7	8.5	8.5	8.3	8.0	3.5	4.0	3.8	3.3	3.3	3.3	3.6	3.6	3.6
FOODS & KINDRED PRODUCTS		6.1	6.4	6.6	7.0	7.3	7.1	7.3	7.2	7.0	9.8	10.1	9.7	9.3	9.6	9.4	9.4	9.4	9.8
INDUSTRIAL CHEMISTRY, GEN.		5.6	6.0	6.0	6.2	6.5	6.6	6.6	6.5	6.7	7.9	8.4	7.8	8.3	6.4	8.5	8.4	8.3	8.1
ORGANIC CHEMICAL TECHNOL.		3.7	4.6	5.2	4.2	5.0	4.9	4.6	4.7	4.6	4.3	3.3	3.1	3.2	3.5	3.2	3.2	3.3	3.2
ORGANIC CHEMISTRY	(2)	6.7	6.1	6.5	6.7	6.4	6.6	6.5	6.5	6.4	5.5	5.4	6.0	5.7	5.7	6.0	5.7	5.8	5.5
CHEMICAL ENGINEERING, GEN.		5.7	5.8	5.8	5.3	5.6	5.8	5.9	5.8	6.1	5.0	5.0	5.1	5.3	5.4	5.6	5.3	5.4	5.4
BIOLOGICAL CHEMISTRY	(3)	4.6	5.7	5.9	6.3	6.1	5.9	6.1	6.1	6.2	5.2	5.0	5.1	5.3	5.3	5.3	5.3	5.4	5.5
PHARMACEUTICALS	(4)	2.9	3.0	3.2	3.7	3.6	3.6	3.6	4.0	4.1	3.5	3.2	3.3	3.3	3.3	3.3	3.3	3.3	3.6
RUBBER AND ITS PRODUCTS		3.1	3.5	3.3	3.7	3.4	3.3	3.2	3.2	3.3	2.3	2.6	2.2	2.2	2.2	2.2	2.4	2.2	2.2
SYNTHETIC RESINS	(5)	.6	1.4	1.5	1.8	2.0	2.1	2.0	2.2	2.3	.7	1.0	.7	.8	.7	.7	.7	.8	.8
PAINTS AND VARNISHES	(6)	3.1	4.1	4.1	3.8	3.9	4.1	3.9	3.9	3.8	3.5	3.3	3.3	3.1	3.2	3.2	3.2	3.0	2.8
OTHER FIELD OF SC. OR ENG.		3.0	2.5	2.6	3.5	2.9	3.0	3.2	3.1	3.2	3.2	3.6	3.6	3.6	3.9	3.9	3.9	3.9	4.2
GENERAL CHEMISTRY	(2)	7.0	4.7	4.1	3.8	3.1	3.0	3.0	3.2	3.2	5.5	5.4	5.6	6.0	5.6	5.6	6.0	5.4	5.4
INORGANIC CHEM. TECHNOL.	(7)	2.6	3.2	3.0	2.6	2.7	2.7	2.6	2.9	2.8	2.6	2.9	3.1	3.1	2.6	2.6	2.8	2.8	2.6
AGRICULTURAL CHEMISTRY		2.8	2.6	2.2	1.9	2.5	2.6	2.6	2.7	2.7	5.1	4.8	4.5	4.6	4.5	4.5	4.6	4.6	5.0
PAPERS & FOREST PRODUCTS	(8)	1.7	1.6	2.0	1.8	1.9	1.9	1.9	1.9	2.0	2.1	1.9	2.1	2.4	2.4	2.4	2.4	2.2	2.4
EXPLOSIVES		.5	.4	.6	.5	.6	.6	.6	.6	.7	1.0	.8	.8	.8	.8	.8	.8	1.1	1.5
TEXTILES	(9)	1.4	1.5	1.4	1.2	1.3	1.2	1.3	1.4	1.4	1.4	1.4	1.4	1.5	1.4	1.3	1.3	1.2	1.3
PUBLIC HEALTH	(10)	1.5	1.5	1.5	1.2	1.3	1.4	1.3	1.3	1.3	1.9	1.9	2.2	2.2	2.1	2.1	2.1	2.1	2.0
METALLURGICAL TECHNOL.	(11)	2.6	2.4	2.1	2.1	1.7	1.7	1.7	1.7	1.8	2.9	2.5	2.6	2.5	2.6	2.6	2.6	2.6	2.4
GAS AND FUELS	(12)	2.6	2.6	2.5	2.6	2.3	2.2	2.2	2.3	2.1	1.8	1.5	1.5	1.5	1.4	1.4	1.3	1.4	1.2
SYNTHETIC FIBER TECHNOL.		.8	1.2	1.1	1.2	1.4	1.3	1.3	1.2	1.3	.3	.3	.3	.3	.6	.6	.4	.3	.3
CERAMIC INDUSTRIES	(13)	1.0	1.3	1.1	1.3	1.2	1.3	1.2	1.3	1.3	1.6	2.1	1.9	1.6	1.9	1.9	2.1	2.1	2.0
METALLURGICAL TECHNOL.	(14)	1.1	1.4	1.4	1.2	1.2	1.3	1.2	1.3	1.4	1.6	2.1	2.1	1.9	1.9	1.9	2.1	2.2	2.2
MEDICAL CHEMISTRY	(15)	1.3	1.5	1.6	1.9	1.7	1.6	1.5	1.6	1.6	1.5	1.4	1.4	1.5	1.4	1.5	1.4	1.4	1.5
FERTILIZERS	(16)	1.7	1.6	1.4	1.5	1.4	1.4	1.4	1.2	1.1	2.2	2.5	2.9	2.6	2.5	2.5	2.4	2.2	2.0
OTHER NON-PROFESSIONAL		1.3	.9	1.0	1.2	.6	.9	.9	.8	.7	1.1	1.1	1.0	1.1	1.0	1.0	.8	1.1	1.2
MACHINERY & IMPLEMENTS	(17)	.8	.8	.9	.7	.7	.8	.7	.8	.8	.8	1.0	.7	.7	.6	.6	.7	.8	.7
LABORATORY APPAR. & EQUIP		.1	.2	.4	.5	.7	.7	.6	.6	.6	1.4	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.2
EQUIPMENT (PROCESS INDUS.)		.4	.6	.8	.6	.8	.7	.7	.6	.7	.7	.8	1.3	1.4	1.1	1.1	1.0	1.0	.9
LEATHER & ITS MNFRS.		.8	.6	.8	.4	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7
TRANSPORTATION EQUIP.	(18)	.2	.2	.1	.2	.1	.1	.1	.1	.1	.6	.7	.7	.7	.7	.7	.7	.7	.7
MOTOR VEHICLES		.1	.2	.2	.2	.1	.1	.1	.1	.1	-	-	-	-	-	-	-	-	-

NOTE: SEE TABLE 22 FOR STUB FOOTNOTES 1 TO 18 INCLUSIVE

tions reported in each of the nine years in the period 1926 to 1941 by the two oldest groups of members showed practically no variation. And although marked shifts occurred from year to year in the proportions of the two younger groups of members classified in the separate sources of public and nonpublic employment, it will be recalled that over the period 1926 to 1941 the totals of these separate proportions also remained fairly stable.

Consideration of the movements from one category of public employment to another in the case of members who had just begun their professional work in 1926 shows that with advancing years and experience total public employment for this group gradually declined from 20.7 per cent in 1926 to 19.3 per cent in 1941. This net decrease of 1.4 per cent over the period covers a 4.1 per cent net increase

in federal government employment and a 5.5 per cent net decrease in all other categories of public employment combined among this group of members. Their changes in total nonpublic employment over the same period were much sharper, in that private firm employment for the group increased over the 15-year period by 19.9 per cent from 42.5 per cent in 1926 to 62.4 per cent in 1941. The compensating decline was in large measure accounted for by the decrease in educational institution employment of 15.7 per cent. This category, in fact, in 1926 gave employment to 25.7 per cent of this group, but to only 10 per cent in 1941. The net declines in proportions reported for consulting and employment in research institutes totaled 1.8 per cent. This pattern of movement was paralleled in every respect by the shifts reported for members who had had from 3 to 5 years' experience in 1926.

It is evident, therefore, from the preceding analysis that, with advancing years and experience, it was the younger members of the Society who were primarily responsible for the movements which occurred among the several sources of public and nonpublic employment. For the period 1926 to 1941, while the Federal Government may be considered the source of final employment, all other categories of public employment may be considered training grounds. In the case of nonpublic employment the field of final employment was that of private firms.

TABLE 20.—PERCENTAGE DISTRIBUTION OF FIELD OF SPECIALIZATION OF MEMBERS WITH CORRESPONDING YEARS OF PROFESSIONAL EXPERIENCE IN PERIOD 1926 TO 1941

YEAR	1926	1929	1932	1934	1937	1938	1939	1940	1941	1926	1929	1932	1934	1937	1938	1939	1940	1941
FIELD OF SPECIALIZATION	1 YEAR AFTER ENTERING PROFESSION									13 TO 16 YEARS AFTER ENTERING PROFESSION								
TOTAL REPORTING	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
PHYSICAL CHEMISTRY (1)	15.2	17.3	17.6	13.3	13.4	9.3	6.4	7.0	7.9	8.4	9.9	11.2	10.1	10.2	9.5	9.8	9.4	9.1
PETROLEUM & ITS PRODUCTS	7.8	6.3	5.0	6.9	9.9	10.8	9.8	11.1	8.0	5.0	6.5	7.6	8.7	8.7	8.9	8.8	8.5	8.4
FOODS & KINDRED PRODUCTS	7.6	3.9	4.0	5.7	5.1	6.4	5.4	2.6	6.9	9.6	6.5	7.2	7.0	7.3	6.8	6.8	7.0	6.9
INDUSTRIAL CHEMISTRY, GEN.	4.7	5.4	3.1	5.3	5.6	5.5	6.2	7.0	8.8	6.6	7.5	5.3	6.2	6.5	6.0	6.1	6.3	6.3
ORGANIC CHEMICAL TECHNOL.	2.7	5.4	4.1	5.5	4.2	4.0	4.6	5.9	3.0	6.9	7.3	4.6	4.2	5.0	5.6	5.6	5.4	5.8
ORGANIC CHEMISTRY (2)	11.2	11.3	13.3	14.2	11.7	9.7	8.3	6.2	5.0	5.5	4.5	8.0	6.7	6.4	5.3	5.5	5.3	5.2
CHEMICAL ENGINEERING, GEN.	6.1	3.9	4.5	4.5	5.1	10.2	9.8	7.4	6.9	5.0	5.5	5.2	5.3	5.8	4.7	5.0	5.2	5.4
BIOLOGICAL CHEMISTRY (3)	2.9	3.5	7.1	5.0	1.9	3.6	2.6	1.5	3.0	4.3	4.9	6.9	6.8	6.1	6.0	5.8	5.6	5.3
PHARMACEUTICALS (4)	2.2	2.4	2.9	4.0	2.8	3.6	3.6	4.7	3.0	2.8	3.0	4.0	3.7	3.6	4.2	4.5	4.4	4.4
RUBBER AND ITS PRODUCTS	4.1	3.0	1.6	3.3	3.7	3.6	4.6	3.5	4.0	4.5	5.8	3.1	3.7	3.4	5.7	5.6	5.7	5.3
SYNTHETIC RESINS (5)	.8	1.7	1.1	1.8	2.4	1.9	3.4	5.3	4.0	1.2	1.8	1.6	1.8	2.0	3.1	3.2	3.4	3.6
PAINTS AND VARNISHES (6)	2.7	4.3	1.8	4.3	4.9	3.8	4.4	4.7	5.0	3.9	4.8	3.6	3.0	3.9	3.9	3.5	3.6	3.4
OTHER FIELD OF SC. OR ENG.	3.1	3.7	4.0	2.2	2.3	4.0	4.1	3.8	6.9	3.1	2.6	3.3	3.5	2.9	3.0	3.0	3.0	3.2
GENERAL CHEMISTRY (2)	8.2	5.5	6.6	4.5	3.1	2.1	2.3	3.2	2.0	5.2	3.3	4.2	3.9	3.1	3.4	3.3	3.6	3.4
INORGANIC CHEM. TECHNOL. (7)	2.7	2.4	1.8	2.3	2.1	1.9	2.1	2.1	1.0	3.4	3.7	2.4	2.8	2.7	3.3	3.4	3.6	3.7
AGRICULTURAL CHEMISTRY	1.8	3.0	2.9	2.3	3.0	2.1	1.8	1.2	-	2.6	2.5	1.9	1.9	2.5	1.9	1.8	1.8	1.9
PAPERS & FOREST PRODUCTS (8)	1.6	2.8	1.6	1.7	2.1	1.0	.5	2.1	1.0	2.2	1.6	1.6	1.8	1.9	2.1	2.1	2.0	2.1
EXPLOSIVES	.8	1.1	-	.5	.7	-	.5	2.4	6.9	.7	1.1	.6	.5	.6	.6	.6	.6	1.0
TEXTILES (9)	1.0	.6	2.0	1.2	1.2	2.4	2.6	2.1	-	1.3	2.4	1.7	1.2	1.3	1.6	1.6	1.7	1.6
PUBLIC HEALTH (10)	1.0	1.3	1.8	1.2	1.4	1.2	2.3	1.2	1.0	1.7	1.6	1.6	1.3	1.3	1.4	1.3	1.3	1.3
METALLURGICAL TECHNOL. (11)	.8	.9	.9	.8	1.2	1.4	1.3	2.4	1.0	2.9	2.3	1.9	2.1	1.7	1.5	1.4	1.2	1.3
GAS AND FUELS (12)	2.2	2.4	2.2	.8	1.2	1.2	1.0	1.5	1.0	1.8	2.1	2.2	2.6	2.3	2.0	2.0	1.9	1.8
SYNTHETIC FIBER TECHNOL.	.4	1.3	-	.8	.7	1.2	1.0	1.2	-	.6	.9	1.0	1.2	1.4	1.9	2.1	2.2	2.0
CERAMIC INDUSTRIES (13)	1.0	.6	.2	.8	2.4	1.0	2.1	1.2	-	1.8	1.0	1.2	1.3	1.2	1.4	1.3	1.3	1.3
METALLURGICAL TECHNOL. (14)	1.4	1.1	.4	.2	2.1	1.4	1.3	2.9	5.9	2.1	1.0	1.6	1.2	1.2	.7	.6	.8	.9
MEDICAL CHEMISTRY (15)	1.0	.7	.9	.7	.7	.7	1.0	.9	-	1.4	1.3	1.7	1.9	1.7	1.3	1.2	1.2	1.2
FERTILIZERS (16)	1.0	.7	.7	.8	1.4	1.0	.8	.6	-	1.0	1.5	1.1	1.5	1.4	1.1	.9	1.0	1.0
OTHER NON-PROFESSIONAL	2.0	1.1	5.8	3.5	.9	2.6	3.1	1.5	1.0	1.3	.8	1.2	1.2	.8	.6	.5	.5	.5
MACHINERY & IMPLEMENTS (17)	.6	.6	.4	.2	1.6	.5	.8	.6	1.0	1.2	.4	.8	.7	.7	.4	.4	.5	.8
LABORATORY APPAR. & EQUIP.	.4	.7	.4	.5	.5	.5	.3	-	-	.5	.7	.8	.5	.7	.5	.7	.8	.7
EQUIPMENT (PROCESS INDUS.)	.2	.2	-	.5	.2	.5	1.0	.3	1.0	.6	.5	.2	.6	.8	.6	.6	.5	.5
LEATHER & ITS MNFRS.	.8	.7	1.1	.8	.5	.5	.5	-	-	.6	.6	.3	.4	.7	.6	.6	.5	.5
TRANSPORTATION EQUIP. (18)	-	-	.2	-	-	.2	-	.3	2.0	-	.1	.3	.2	.1	.1	.1	.1	.1
MOTOR VEHICLES	-	-	.2	-	-	.2	.5	-	-	.3	.2	.1	.2	.1	.3	.3	.3	.2
FIELD OF SPECIALIZATION	3 TO 5 YEARS AFTER ENTERING PROFESSION									22 TO 26 YEARS AFTER ENTERING PROFESSION								
TOTAL REPORTING	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
PHYSICAL CHEMISTRY (1)	12.4	13.2	13.9	14.8	11.5	12.0	12.2	10.6	7.7	10.2	9.6	7.8	8.2	8.3	8.1	10.0	10.2	10.0
PETROLEUM & ITS PRODUCTS	7.7	7.0	8.2	9.5	9.5	9.0	10.1	9.3	10.9	2.5	2.7	3.8	6.2	6.3	6.2	5.9	5.6	5.9
FOODS & KINDRED PRODUCTS	6.1	5.4	6.1	4.3	8.0	6.8	4.9	5.8	5.5	8.8	8.6	9.7	8.7	8.8	8.7	7.6	7.7	7.6
INDUSTRIAL CHEMISTRY, GEN.	5.6	5.5	4.9	4.8	6.4	6.8	5.8	5.0	5.3	6.9	10.1	7.8	6.7	7.3	7.3	7.1	7.1	7.2
ORGANIC CHEMICAL TECHNOL.	3.7	4.4	6.4	5.3	5.9	6.1	6.1	6.8	7.0	3.2	3.2	3.1	6.4	6.3	6.2	6.2	6.2	6.3
ORGANIC CHEMISTRY (2)	8.7	6.1	11.4	12.8	9.3	11.5	11.6	9.8	8.2	4.7	4.8	6.0	4.9	4.9	4.8	5.6	5.5	5.3
CHEMICAL ENGINEERING, GEN.	5.7	5.2	2.6	3.5	4.3	4.2	5.1	4.6	5.3	5.9	6.4	5.1	5.1	4.6	5.0	5.8	6.2	6.6
BIOLOGICAL CHEMISTRY (3)	4.6	5.6	6.7	5.5	7.0	5.6	5.0	5.8	3.2	5.4	5.5	5.1	5.1	5.2	5.5	5.2	5.1	5.0
PHARMACEUTICALS (4)	2.9	2.7	3.2	4.8	3.0	4.0	3.9	4.2	4.0	3.8	3.9	3.3	3.3	3.3	3.7	3.8	3.7	
RUBBER AND ITS PRODUCTS	3.1	6.1	3.0	3.2	4.3	3.4	4.3	3.7	4.2	2.0	1.8	2.2	4.1	3.9	3.6	4.4	4.3	4.4
SYNTHETIC RESINS (5)	.8	2.2	2.1	3.1	4.2	3.6	3.8	5.8	5.6	-	.2	.7	1.3	1.6	1.7	2.4	2.5	2.3
PAINTS AND VARNISHES (6)	3.1	4.4	2.9	2.1	2.5	3.7	3.3	3.7	5.2	1.4	1.1	3.3	3.9	4.0	4.0	4.1	3.9	3.8
OTHER FIELD OF SC. OR ENG.	3.0	2.9	3.2	3.6	1.7	2.7	2.7	2.2	3.2	4.1	4.3	3.6	3.1	3.1	3.1	3.1	3.1	3.3
GENERAL CHEMISTRY (2)	7.0	6.6	4.6	3.1	3.4	2.6	2.7	1.6	1.9	6.8	6.9	5.6	4.9	4.9	5.0	3.6	3.6	3.6
INORGANIC CHEM. TECHNOL. (7)	2.6	2.8	3.8	2.1	2.9	2.8	2.0	3.2	1.9	3.6	3.6	3.1	3.9	4.0	4.0	3.0	2.8	2.7
AGRICULTURAL CHEMISTRY	2.8	1.6	3.0	2.4	1.6	3.0	1.7	2.2	2.1	2.7	2.7	4.5	2.4	2.6	2.6	2.2	2.2	2.3
PAPERS & FOREST PRODUCTS (8)	1.7	1.8	1.2	3.2	1.7	2.3	2.6	2.0	2.1	1.6	1.6	2.1	2.1	2.2	2.1	1.7	1.6	1.6
EXPLOSIVES	.5	1.1	.3	1.1	.7	.8	.8	1.1	3.1	1.1	1.1	.8	.9	.9	.9	.8	.8	.8
TEXTILES (9)	1.4	1.6	.9	1.5	1.3	.8	1.2	1.2	1.6	1.1	.9	1.4	1.5	1.4	1.4	2.3	2.3	2.2
PUBLIC HEALTH (10)	1.5	1.8	1.4	1.3	.8	1.0	1.0	1.2	2.1	.9	.9	2.2	1.7	1.6	1.7	1.6	1.6	1.6
METALLURGICAL TECHNOL. (11)	2.6	1.2	.5	.5	1.3	.3	1.0	1.0	1.0	3.6	3.4	2.6	2.5	2.4	2.1	2.1	2.1	2.6
GAS AND FUELS (12)	2.6	2.7	2.3	1.7	1.1	.9	.7	1.4	.5	2.0	1.8	1.5	2.1	2.0	1.6	1.9	1.8	1.8
SYNTHETIC FIBER TECHNOL.	.8	1.1	1.4	.3	.8	1.2	1.0	1.2	1.3	-	-	.3	.8	.7	.8	.8	.8	.8
CERAMIC INDUSTRIES (13)	1.0	1.6	1.2	1.6	1.1	1.0	1.1	1.3	1.8	4.3	4.3	1.9	1.2	1.2	1.3	1.3	1.3	1.1
METALLURGICAL TECHNOL. (14)	1.4	1.0	.6	.7	1.2	.3	.8	1.0	1.4	1.8	2.0	2.1	1.6	1.9	1.8	1.3	1.3	1.4
MEDICAL CHEMISTRY (15)	1.3	1.7	.8	.7	1.1	.8	1.1	.4	1.3	1.4	1.4	1.4	1.2	1.2	1.2	1.4	1.5	1.4
FERTILIZERS (16)	1.7	.9	.5	.4	1.1	.3	.8	.8	.6	2.0	2.0	2.9	1.3	1.2	1.1	1.6	1.5	1.6
OTHER NON-PROFESSIONAL	1.3	.9	1.2	1.5	.7	.7	1.0	1.0	1.2	1.1	.9	1.0	1.1	.9	1.0	16	.7	.8
MACHINERY & IMPLEMENTS (17)	.8	.3	.3	.1	.4	.2	-	.4	.4	.2	.2	.7	.9	.9	1.1	.7	.7	.7
LABORATORY APPAR. & EQUIP.	.1	.5	.6	.4	-	.7	.2	.4	.3	-	-	1.5	.7	.8	.8	.7	.7	.7
EQUIPMENT (PROCESS INDUS.)	.4	.2	.2	-	.1	.3	.8	.3	-	.5	.7	1.3	.7	.7	.9	.2	.4	.4
LEATHER & ITS MNFRS.	.8	.3	.3	.1	.3	.7	.6	.8	.1	.9	.9	.7	.7	.7	.7	.6	.8	.9
TRANSPORTATION EQUIP. (18)	.2	.1	-	-	-	.1	-	-	-	.3	.5	.7	.1	-	-	-	.1	-
MOTOR VEHICLES	.1	.2	.3	-	.3	-	-	.2	-	-	-	-	.3	.2	.2	.2	.2	.2

NOTE: SEE TABLE 22 FOR STUB FOOTNOTES 1 TO 18 INCLUSIVE

From the data in Table 21, which contrasts the distributions of sources of employment reported in each of the nine years by members with corresponding years of experience, it is again evident that, in 1932 the incidence of unemployment was greater among the members with short experience spans than among those with longer experience spans. Also for those members who were employed in 1932, but who were affected by the decline in private firm employment which occurred in that year, unemployment was avoided only because they obtained jobs with state governments and with educational institutions.

Over the whole period 1926 to 1941, however, only for members with from 13 to 16 years' experience were the proportions reported consistently the same for the several categories of public employment. Among these groups of members the over-all decline in their employment by educational institutions was absorbed by a corresponding increase in private firm employment.

Among the other several groups of members with experience spans greater and less than 13 to 16 years the proportions reported by them for private firm employment also increased in each of the years subsequent to 1932. For members with one half, and with from 3 to 5 years' professional experience, the greater part of the marked net increase in this class of employment was accounted for by marked declines in the proportions classified from year to year with educational institutions.

By contrast, among members who had had from 22 to 26 years of professional experience in each of the nine years, while their proportions in the employ of educational institutions remained approximately the same from year to year, progressive declines were reported for consulting work. From 1926 to 1941, smaller proportions of these same groups of members found employment with the Federal Government and with municipal governments. On the other hand, while among the other three selected groups of members, each with similar experience spans, the proportions reported for municipal government employment also declined, those covering federal government employment actually increased.

Section 8. Fields of Specialization of the Membership

According to the data in Table 22 the movements of the membership over the period 1926 to 1941 were such that, by 1941, 12 in every 100 had located themselves in different fields of specialization than they were in in 1926. This gross net change was relatively nearly four times as great as the corresponding net change previously derived from the similar analysis of sources of employment. It was, however, only one half the over-all net change, also derived from the data reported without regard to years of professional experience, for occupational statuses of the membership.

Comparisons among the proportions reported for each of the 34 fields of specialization show that over the 15-year period covered by the survey 8.1 per cent of the total positive net change of 11.8 per cent was accounted for by increases of 2.8, 2.6, 1.5, and 1.2 per cent, respectively, in synthetic resins, petroleum and its products, pharmaceuticals, and organic chemical technology. Of the total negative net change of 11.8 per cent, 7.5 per cent was accounted for by decreases of 3.3, 3.0, and 1.2 per cent, respectively, in general chemistry, physical chemistry, and organic chemistry. Over the period of 1926 to 1941 no changes in proportions occurred in the four fields of specialization designated "textiles", "public health", "transportation equipment", and "motor vehicles". The remaining 22 fields of specialization were equally divided as between those which showed net increases and decreases. Among these the range in proportions of the membership affected over the period 1926 to 1941 was exactly the same—namely, from 0.1 to 0.9 per cent.

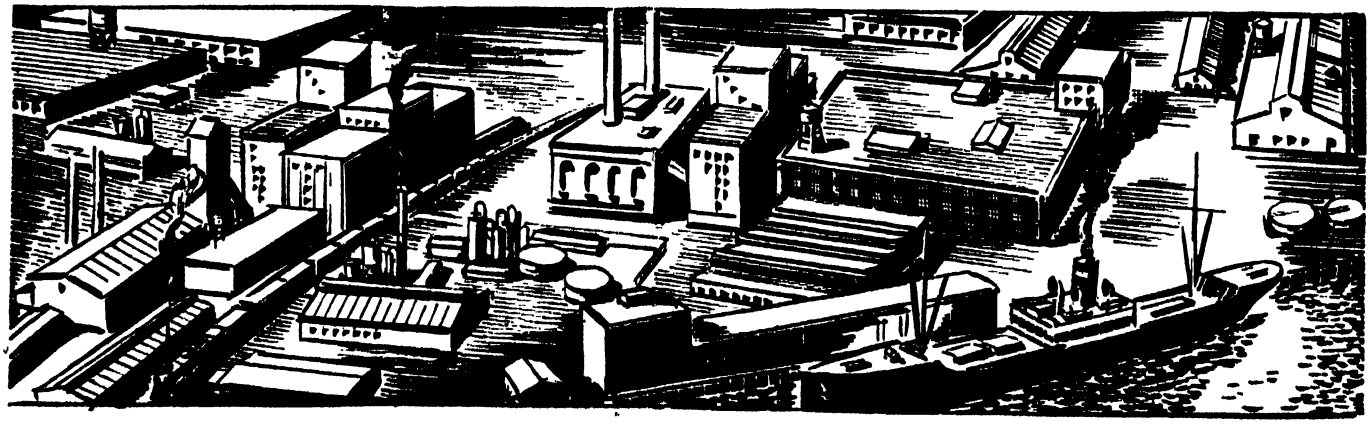
To maintain a pattern of analysis similar to that used in the discussions of the occupational statuses and the sources of employment, Tables 23 and 24 are included in the body of the report. It is from the series of tables similar to Table 24 that the information has been derived for selected groups of the membership whereby analyses can be made to determine their movements with advancing years and experience among the 34 fields of specialization and how the several distributions compared for selected groups of members with corresponding years of experience.

With advancing age (Table 25) members who had had one-half year of professional experience in 1926 reported a net change over the period 1926 to 1941 in their fields of specialization that affected 21.1 in every 100 of the group. The corresponding net change for members who had had from 3 to 5 years' experience in 1926 was 11.6 per cent. For the next two oldest groups of members the net change was virtually nil, a clear indication that before the age of 35 the membership as a whole had made final choice as to the field of specialization. Among the younger members of the SOCIETY their movements involved the same fields of specialization noted in the earlier discussion of similar data reported by the membership without regard to years of professional experience. This merely indicates that the principal fields of specialization used by the membership in the period 1926 to 1941 as training grounds were general chemistry, physical chemistry, and organic chemistry, and those desired as fields of specialization of final choice were synthetic resins, petroleum and its products, pharmaceuticals, and organic chemical technology.

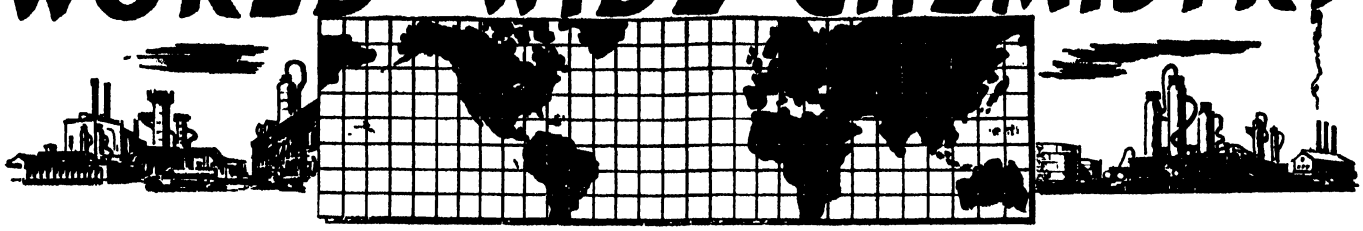
From the data in Table 26, in which the proportions of four selected groups of members with similar experience spans are shown for each of the 34 fields of specialization, it is again evident that movement among these fields was confined to members with short experience spans.

In summary, therefore, these broad analyses of three aspects of employment status of the membership show that in the period 1926 to 1941 their choice of both field of specialization and source of employment was made at a relatively much earlier age than was the case with occupational status. As regards source of employment there was virtually no movement from public to nonpublic employment over the same period. Among the several categories of public employment and nonpublic employment there were, however, significant shifts.

(To be continued)



WORLD-WIDE CHEMISTRY



It was surprising to learn from the Japanese September broadcast that a new project for synthetic rubber had been developed as the result of studies of the Scientific Research Institute of the Kyoto Imperial Institution. The synthetic rubber is claimed to be made by a two-process method, compared with the four-process method of Germany based on acetylene, and the three-process method of the Soviet Union using alcohol as raw material.

The Japanese broadcast in October announced that the Goodyear factory at Buitenzorg, which up to that date was manufacturing only bicycle tires, would shortly be operated at full capacity. Before the Japanese occupation, this factory was partly destroyed. The heavy collander for impregnating the canvas was totally destroyed, and the available stocks of zinc oxide, accelerators, and other chemicals used in rubber manufacture had been removed and destroyed.

Production of Natural Rubber Is Not Curtailed

According to Japanese news sources the production of natural rubber is not being curtailed, as production has to continue to prevent general unemployment in the rubber area.

Rubber Used as Source of High Octane Gasoline

The Japanese also say that the excess rubber they are obtaining is being used for the production of gasoline. Rubber and petroleum experts are producing high octane gasoline from rubber.

A factory has been installed near Kuala Lumpur for the transformation of Hevea rubber from North Sumatra and the Straits by dry distillation and by using the low-boiling unsaturated hydrocarbons for alkylation and hydrogenation. The first plant for production of 100 tons of high octane aviation gasoline per month has been put into operation. It is the intention of the Japanese to increase the quantity as time goes on.

The use of rubber as a source of high octane gasoline has been studied before, also in the Netherlands Indies. Perhaps it will be possible to use the oil refinery installations for the manufacture of high octane gasoline. The N. E. I. installations have been destroyed, but some exist in Japan and the Japs collected the available information on the subject of producing high octane gasoline before the war started.

The Japs mentioned that 400,000 laborers are employed at the Sumatra and Malayan plantations. From German sources it was learned that 30 per cent of the Dutch employees engaged in agricultural industries in Sumatra have been put to work again.

The Agricultural Experimental Station in Medan is managed by the Japanese; this station is now directing the big rubber concerns in Northern Sumatra, such as the Rubber Cultuur Maatschappij Amsterdam (the Rubber Plantation Co. Amsterdam), the U. S. Rubber, the H. V. A., and Goodyear.

Oil Industry Looks Hopeful

The Japanese have announced that they are again using the oil wells at Tarakan. This oil can be used as fuel oil for the Japanese fleet. The Japanese have given notice that the Wonokromo refinery near Surabaya has resumed operation, using crude oil from the Kroeka oil wells, also situated near Surabaya. They are expecting a yearly output of 200,000 tons. The annual capacity of the oil wells in this region of Java before the outbreak of the war was 700,000 tons.

The Japanese claim that Dutch New Guinea is to be considered one of the treasure houses for Japan in the Southwest Pacific. Fermia Sytal, adviser of the Nanjo Development Co., who investigated northern parts of New Guinea on several occasions before the war, has guaranteed a bright prospect for the development of the oil industry in this region of the N. E. I.

Quinine Production Assured by Japanese

The Japanese have announced that they will assure a yearly production of 150 tons of quinine sulfate, required for treatment of malaria in the "Co-Prosperity Sphere".

The capacity of the Bandoengsche Kinine Fabriek (Bandoeng quinine factory), which was able to handle all the cinchona bark of Java and which has been in large part destroyed, had an annual capacity of about 1,000 tons.

Billiton Tin Mines Destroyed

It has also been announced by the Japanese that the Perak tin mines (Malaya) have resumed operation. They made the same announcement in regard to the Netherlands Indies tin mines at Bangka, Singkep, and Billiton. However, the tools, motors, and all other mechanical equipment of the latter mines have been destroyed or removed from Billiton to other islands.

Sugar Supply to Be Reduced

The production of Java sugar will be reduced in 1943 to 600,000 tons, a reduction of more than 50 per cent, compared with the 1941 and the expected 1942 crop. The Japanese announced that they will try to use the Java sugar industry to the fullest possible extent, since they consider it the most modern and efficient in the Southeast Asian countries.

Salt Production Decreased One Half

The normal production of salt, which is concentrated on the Island of Madura, has been reduced considerably. The normal production is 300,000 tons annually, with a local consumption of 200,000 tons and an export of 100,000 tons. It was announced that the salt production has decreased to about 150,000 tons.

Paper Industry in Java Continues

The paper industry in Java, according to the Japanese, has resumed operation. Java has two paper factories with an annual capacity of 4,500 tons each, including cigaret paper.

It was also announced that a paper mill, costing 20,000,000 yen ($6,500,000), will be built shortly.

Steel Foundry Resumes Operations

The Japanese announced that one of the foundry works has resumed operations, producing 300 tons of steel per month. This achievement has no great significance when it is remembered that the annual iron consumption of Java itself was 120,000 tons.

The Japanese further announced that important equipment of the General Motors plant at Tandjong Priok, near Batavia, which had been moved to the interior of Java and completely destroyed, has been found.

Sugar Cane Areas to Produce Cotton

The Japanese have announced that the kapok plantations have been put under military supervision. However, of the total of 480,000 acres planted with kapok, only 60,000 acres are part of plantations. The remaining area, planted with kapok, belongs to native growers. The Japanese have also announced that in the Philippines 45,000 acres of land planted up to now with sugar cane, will be transformed to cotton-growing, in order to make the Philippines one of the large cotton-producing centers of Southeast Asia.

Textile Factories Resume Operation on Limited Scale

The textile factories, which were left intact on account of their importance to the native population for clothing have resumed operations on a reduced scale.

India Increases Explosives Production

INDIA is rapidly attaining self-sufficiency in the manufacture of high explosives, according to a report to our Government. Pure toluene for nitration is being produced, it is stated, at a new benzene-toluene plant; a nitric acid plant, recently installed in an explosives factory, has passed acceptance tests. The first unit of a sulfuric acid concentration plant of Indian manufacture has also been found satisfactory and additional plants have been ordered. Production on a plant scale of mineral jelly for cordite has been successful; a new process for making the latter has been developed which eliminates the use of imported materials. Mercury fulminate for detonators and kieselguhr for making dynamite are being manufactured and a TNT plant is nearing completion.

Physical Chemistry in the Soviet Union

TO BE effective, research into physical chemistry requires good laboratories and workshops, with abundant equipment, none of which Russia possessed in pre-revolutionary times. These few words are necessary to appreciate the progress made by physical chemistry in the Soviet Union in the course of the past 25 years. How different is the picture today! In my institute in Leningrad, for instance, there were large workshops at the disposal of budding scientists, with a staff of 40 workmen, each of whom was a past master in his field.

Physical chemistry in the Soviet Union originally developed along two main lines —physical and chemical. The first originated in the Physicotechnical Institute under A. Joffee and in the Optical Institute under D. Rozhedestvensky, both in Leningrad, and was subsequently often referred to as chemical physics. In the early twenties the Laboratory of Electronic Chemistry of the Physicotechnical Institute was founded under the direction of the author of these lines, and in 1931 was converted into a large independent Institute of Chemical Physics. A similar process of concentration of physicochemical forces also proceeded in the Optical Institute, the Optical Glass Department being formed under Grebenshchikov and the Photographic and Photochemical Branch under Terenin.

As for the second or chemical trend, the Karpov Physicochemical Institute was founded in Moscow under the direction of Bach. At the same time the Ukrainian Institute of Physical Chemistry was founded in Dniepropetrovsk, first under Pisarevsky and then under his disciple Brodsky.

On the initiative of the Leningrad group, the first physicochemical conference was convened in Leningrad in 1927. This conference marked the inauguration of new trends in chemical kinetics, which led to results that have aroused the interest of the scientific world. To anticipate a little, the seventh conference, likewise devoted to chemical kinetics, which met in Leningrad in 1931, bore something of the character of an international congress; nine eminent foreign scientists read papers, while papers were sent in by leading physicochemists, Langmuir and Taylor, of America, and Hinshelwood and Garner of England.

In the thirties Soviet physical chemistry developed into a powerful science, with wide ramifications in diverse fields of theory and practice. It may be safely said that in the past 25 years, Soviet physical chemistry has won for itself a leading place in highly important branches. Most characteristic of its development in this period is the work done in three branches: structure of matter, speed of chemical reactions or chemical kinetics, and chemical phenomena on surfaces of bodies.

In the first of these branches Soviet science has done comparatively little, but even here certain important achievements are to be recorded. One of the most important discoveries of this period—combined scattering of light by molecules, or the Raman effect—was simultaneously and independently discovered by the Indian scientist Raman and the Soviet scientists Mandelstam and Landsberg. We know what an important part this phenomenon has played in the study of the structure of matter. Subsequent Soviet work, notably by Gross, has considerably facilitated progress in this field. Kapustinsky devised simple and reliable methods for calculating the energy of crystal screens, successfully applied in geochemistry; Syrkin applied definitions of dipolar factors in the calculation of molecular structure; the Optical Institute worked on fine structure of molecular spectra, etc.

The pioneer role of Soviet physical chemistry in the second and third branches is generally acknowledged.

Together with the German scientist Frank, Nobel Prize winner and exile from Nazi Germany, the Soviet scientists Terenin and Kondratyev laid the foundations of modern photochemistry by their experiments on the disintegration of salt vapors by light, and electronic bombardment. Subsequently these scientists took an active share in the foundation of the science of elementary chemical processes (transmission of energy, elementary reactions of atoms, molecules, etc.). In the twenties Semenov and his collaborators, parallel with the school of the Englishman Hinshelwood, laid the foundations for the study of chain reactions. Their views aroused the interest of foreign researchers and active work in this field in all countries resulted in the science of chain reactions becoming one of the fundamental branches of chemical kinetics, embracing important chemical processes.

The modern theory of combustion and explosions has likewise been largely developed by Soviet scientists—Hariton, Zeldovich, Sokolik, Neuman, Semenov, and other staff members of the Institute of Physical Chemistry.

The work of Rosinsky on pseudochemical reactions in solids, of Rabinovich on processes of photographic development, and of Roginsky, Balandin, Temkin, and others on the theory of catalysis, made no little contribution to the world progress of

chemical kinetics of heterogeneous reactions. No less definite and even more numerous are the achievements of Soviet physical chemistry in the development of the science of phenomena on surfaces of bodies.

The precipitation of metals on electrodes during the passage of a current through a solution and electrolysis in general, work on dry cells and accumulators, phenomena of solution, and corrosion of metals—all these important electrochemical phenomena are connected with the behavior of the so-called double electric layer on surface electrodes. New stimulus to electrochemistry was given by the theory of building up and breaking down of this double layer.

With the German exile Stern, Frumkin is the founder of the modern theory in this field. Extensive theoretical and experimental work of Frumkin and his school threw light on details of structure of the double layer, on kinetics of its discharge in electrodes, and the value of these phenomena in theoretical and applied electrochemistry. It would scarcely be an exaggeration to say that Frumkin's school takes the lead in modern theoretical electrochemistry.

An interesting Soviet school in the field of surface phenomena was founded by Rebinder. Apart from his extensive work on the influence of superficial layers on the properties of emulsions in suspension and colloids, of special interest is his latest work on the influence of environmental medium on elasticity, plasticity, and strength of solids. Addition of the slightest admixture of superficially active substances to a neutral fluid surrounding a solid body has considerable influence on its mechanical properties and in particular on its strength. Rebinder discovered many of these phenomena, provided interesting theoretical interpretations, and finally applied them to technology, thus facilitating and expediting the working of metals and drilling of hard rock. Mention should also be made of the pioneer work of Derigin on the theory of the lubricating effect of a layer of liquid between frictional surfaces, of his theory of the stability of colloids, and his work on radius action of molecular forces in thin layers of liquid.

Noteworthy, too, is the work of Grebenshchikov on reactions in fine layers of surfaces of solid bodies, and its brilliant practical application in speeding up polishing of optical glass and metal.

Extensive researches of the Soviet scientists Rabinovich, Dumansky, Kargin, Shalnikov, and others in colloidal chemistry have helped no little to promote its progress.

Such in its main outline is the path of development of Soviet physical chemistry during the 25 years' existence of the Soviet state.

Over a year ago our country was the victim of attack by a treacherous enemy, who is trying to turn the whole world back to days of barbarism and reduce all freedom-loving nations to slavery. This attack has interrupted our peaceful constructive work. Soviet physical chemists who are not at the front are, like all our people, devoting all their efforts, experience, and knowledge to speeding up our industry and perfecting the armament of our heroic Red Army, in whose ranks many of our young scientists are fighting.

We are confident that our colleagues in America and Great Britain are doing likewise and we believe that the hour is not far off when by a crushing blow at Fascism the enemy will be destroyed and mankind will enter on a new and flourishing era of science and culture.

NIKOLAI SEMENOV
Member of the Academy of Sciences of the U. S. S. R.

Rubber Products from South America

GROWTH of rubber manufacturing capacity in the other Americas in the past decade is emphasized in a recent contract by the United States for purchase from Brazil of an unspecified amount of rubber goods. Brazil has three tire factories with sufficient capacity to allow some surplus for the export market and may be able to cover minimum needs of neighboring countries like Bolivia, Chile, Uruguay, Paraguay, Argentina, and Peru. Argentina has three tire factories, but no rubber of her own. In all there are 12 tire factories in the other Americas, as well as a number of other rubber goods factories, and additional plants are projected or under construction.

Substitutes Found for Scarce Medicinals

VARIOUS substitutes have been devised to meet the scarcity or complete lack of important medicinals and related products in France, according to a report to the Department of Commerce. Cod liver oil is replaced by tunny liver oil under the guise of chocolate sweets. Mercurochrome supplants iodine, and derivatives of oleaginous plants take the place of vaseline. Sterilized cotton and gauze are made from rayon. Experts are also trying to discover substitutes for certain other natural products, such as mustard powder.

Chemical Found to Retard Bread Mold

CANADIAN experiments have shown that sodium proprionate retards mold in wartime bread made from a flour containing larger amounts of wheat germ than the white flour normally used. The chemical does not alter the flavor, quality, or appearance of the bread. Tests have shown that mold in butter and cheese is retarded when wrappers are impregnated with sodium proprionate.

Synthetic Camphor Produced in India

SYNTHETIC camphor is being made in Madras by Deccan Chemicals, Ltd., according to an unofficial report to the Commerce Department. This company was incorporated in July 1940 as a private firm but has recently been reorganized into a public company, with a capital of 500,000 rupees. The company plans to increase the capacity of its Madras plant, which is equipped for the manufacture of acetic and hydrochloric acids as well as synthetic camphor, and to build an additional factory in Bombay.

Paraguay Exports Surplus Alcohol

PARAGUAY uses considerable quantities of alcohol as motor fuel and exports that product to both Argentina and Uruguay. With her own alcohol needs supplied, Paraguay last year exported a total of 201,941 liters, of which 119,659 went to Argentina and 82,282 to Uruguay. The government at Asuncion is interested in the further development of the local alcohol industry, but has been unable to obtain priorities covering necessary equipment.

Supplemental Swedish-Danish Trade Agreement for the Year 1942

UNDER the terms of a supplement to the existing Swedish-Danish trade agreement for the second half of 1942, signed in October, Denmark is to make additional deliveries of 5,000 tons of sugar, 150 tons of preserved eggs, milk, preserves, and artificial honey to the amount of 7,500,000 kroner (about $1,875,000 at par) against exports of wood, paper, pulp, steel, tools, and machinery to the same amount by Sweden. In addition Sweden will supply similar goods to the amount of 5,260,000 kroner (about $1,315,000), and receive in return 2,000 tons of Danish butter.

BETWEEN September and the end of the year about 120,000 gallons of nonfreezing medicinal cod liver oil in St. Johns, Newfoundland, is expected to be offered for shipment, according to an unofficial report received by the government. There is a possibility of a further 50,000 to 100,000 gallons being available later.

PRODUCTION of caffeine citrate in India has increased owing to orders placed by the Medical Stores Department. Tea planters are now turning over tea waste to Indian firms instead of exporting it.

POTOMAC POSTSCRIPTS

WPB Activities

Phenolic Resins. An exception to the control over delivery and use of phenolic resins and phenolic resin molding compounds set up in Order M-246 is included in Amendment 1, permitting delivery and use during December of phenolic resins and phenolic resin molding compounds produced from phenol delivered in accordance with November allocations under M-27, without special authorization under M-246.

Price Regulations

Drums. A maximum price of 10 cents each for used 100-pound calcium carbide drums, which packers would like to buy back and refill again, has been established by the Office of Price Administration.

The ceiling price is for drums delivered to the purchaser and is established in Order No. 153 under Section 3 (b) of the General Maximum Price Regulation, effective November 25, 1942.

Chemicals. Adjustable pricing for sales of formaldehyde, lithopone, titanium pigments, and acetic acid has been established by the Office of Price Administration to aid sellers and buyers preferring to make long-term contracts. The adjustable pricing was effected through the issuance of amendments to four maximum price regulations, all effective December 2, 1942.

Incorporated in the amendments is a provision allowing deliveries on an open invoice if special permission is obtained from the Price Administrator. This permission can be obtained where a petition has been filed and time is needed for consideration of the application The price finally paid for the commodity delivered on an open invoice must be no higher than the maximum established after consideration of the application.

Fats and Oils. Sellers of refined soybean oil, peanut oil, and cottonseed oil for nonedible industrial purposes may advance their present ceiling prices under the fats and oils regulation by one-half cent per pound, the Office of Price Administration has ruled in Amendments 17 and 18 to Revised Price Schedule 53 (Fats and Oils), effective November 19, 1942. This increase is allowed because sellers of such oils for nonedible industrial purposes are not entitled to receive the Commodity Credit Corporation's one-half cent per pound subsidy, which is confined to those oils going into edible use. Therefore, the increased nonedible ceiling price will assure continued industrial supplies and yet will have little significance to the consumer.

Personnel Changes in Chemicals Division, WPB

APPOINTMENT of D. P. Morgan as director of the Chemicals Division has been announced by Ernest Kanzler, Director General for Operations, War Production Board. He will assume his duties immediately, releasing Dr. Reid, the former director, for his new appointment as Director of the Commodities Bureau.

Dr. Morgan came to Washington in June 1940, as group executive of the Chemicals Section, Materials Division, Advisory Commission to the Council for National Defense.

Other appointments include J. W. Raynolds, as deputy director of the Chemicals Division, W. Fletcher Twombly, as chief of the Aromatics and Intermediates Section, and Hugh Hughes, as assistant to the director of the Commodities Bureau.

Conversion of Chemical Plants Studied

THE essential need of converting plants for the increased production of critical chemicals was considered at the first meeting of the newly appointed Chemical Plant Facilities Industry Advisory Committee on November 17, in Washington. Information was sought from the committee on present facilities which might be converted to the rapid manufacture of various chemicals including ethylcellulose, ethyl alcohol, dibutylamine, diethylamine, ethylaniline, furfural, mannitol, sorbitol, monochlor benzene, phenol, thiokol, triacetin, tricresyl phosphate, triethyl phosphate, acetanilide, aluminum chloride, calcium carbide, calcium hypochlorite, dichloroethyl ether, silica gel, acrylonitrile, polyvinyl formaldehyde resins, and carbon black.

There is a need for 1,000,000 more pounds of ethylcellulose a month, the Protective Coatings Section stated, and it would like to aim at an increased production of 1,500,000 more pounds a month. The problem involved concerns equipment, since elaborate chemical autoclaves are necessary for the production of ethylcellulose, and these have been made of nickel to resist chemical corrosion. It was suggested by the committee that silver might be substituted for nickel, since it is not as critical a material, and might possess adequate resistance to the process. The committee also considered the problem of an increased production of ethylchloride for ethylcellulose and advised the Chemicals Division that in its opinion this problem could be solved satisfactorily.

The committee will act as the representative for the entire chemical industry in advising the Chemicals Division of the War Production Board on problems of chemical manufacture. A primary consideration will be the concentration of present facilities wherever possible in an attempt to conserve money, materials, manpower, and time.

New Advisory Committees Announced by WPB

THE following new industry advisory committees have been announced by the War Production Board:

ARSENICAL INSECTICIDES MANUFACTURERS INDUSTRY ADVISORY COMMITTEE. Hallam Boyd, Commercial Chemical Co.; J. B. Cary, Niagara Sprayer & Chemical Co.; J. A. Cavanagh, Dow Chemical Co.; H. C. Davies, California Spray Chemical Corp.; J. M. Fountain, Cotten Poisons, Inc.; J. J. Haprov, Los Angeles Chemical Co.; T. H. Macormack, E. I. du Pont de Nemours & Co., Inc.; C. B. Malander, Pittsburgh Plate Glass Co.; George E. Riches, American Agricultural Chemical Co.; M. L. Somervilles, The Sherwin-Williams Co.; William Steinschneider, Ansbacher Siegle Corp.; and B. P. Webster, Chipman Chemical Co., Inc.

CHEMICAL PLANT FACILITIES INDUSTRY. James A. Lawson, government presiding officer. Arthur C. Boylston, Mallinckrodt Chemical Works; Frederick Dehls, Benzol Products Co.; Daniel S. Dinsmoor, Monsanto Chemical Co.; William T. Haebler, Van Ameringen-Haebler, Inc.; Elvin H. Killheffer, E. I. du Pont de Nemours & Co., Inc.; Frank A. Lidbury, Oldbury Electrochemical Co.; Frederick G. Zinsser, Zinsser & Co., Inc.; Harry B. McClure, Carbide & Carbon Chemical Corp.; Thomas H. Roberts, Arnold, Hoffman & Co., Inc.; Harold L. Simmons, Harold L. Simmons, Inc.; Seymour J. Spitz, New Port Industries, Inc.; Robert Trubek, Trubek Laboratories, Inc.; and M. C. Whitaker, American Cyanamid Co.

ETHYLENE DICHLORIDE INDUSTRY ADVISORY COMMITTEE. John C. Leppart, government presiding officer. Glen Haskell, U. S. Industrial Alcohol Co.; J. W. McLaughlin, Carbide & Carbon Chemicals Corp.; Leland I. Doan, Dow Chemical Co.; and J. H. Schaefer, Ethyl Corp.

Allocations of Chemicals Announced by WPB

OVER $50,000,000 worth of scarce chemicals were allocated to industry for use in November, the Chemicals Division of WPB has announced in its second monthly report on allocations of individual chemicals. The allocations reported do not include direct military needs.

This report lists each chemical and states the percentage of requests allowed for each use. Allocations are on an end-use basis, and these percentages represent requests made for allocation, and not the percentage of requirements. Wherever limitation orders govern, requests for allocations are made in accordance with the percentage of each chemical permitted to be used by such order. The allocation report lists uses which were filled com-

CONTINUED ON PAGE 1580

SCARCE PLASTICIZERS



To extend the allotted quantities of the now-scarce plasticizers such as castor oil (raw or blown), dibutyl phthalate, tricresyl phosphate, and so forth —as well as to replace them entirely for uses to which they may not be allocated— industrial America is turning to Hercolyn.*

This high-boiling liquid resin—the hydrogenated methyl ester of pale wood rosin —has been used for years by manufacturers of lacquers and coated textiles when they wanted good "build" or body, high gloss, maximum alkali resistance, or greatest development of pigment color in the film.

Hercolyn can be intelligently applied as an extender in the more critical uses, or as a complete replacement where the final degree of service life is not demanded. Some of these new uses will last, frankly, only for the duration. Others will prove so acceptable as to remain even when current shortages have disappeared.

Write for complete information.

*Reg. U.S. Pat. Off.

HERCULES POWDER COMPANY
Incorporated

Potomac Postscripts

CONTINUED FROM PAGE 1578

pletely, partially filled, and totally denied. It reflects situations in which applications are denied to encourage industry to substitute less critical materials.

This report does not indicate total requirements, since applications are made in accordance with restrictions on use imposed by various limitation orders, and with an awareness of current supply, so that requests are usually pared down to approximate the supply situation. Copies of the report may be procured from the WPB Office of War Information, Washington, D. C.

Alien Property Custodian Controls U. S. Patents

All transactions between private persons or companies involving U. S. patents and copyrights are now subject to control by Leo T. Crowley, Alien Property Custodian. Formerly this control rested in the Treasury Department. All patent applications, assignments, licenses, and other agreements affecting foreign-owned patents are included in the controls.

The Custodian has issued three general orders, 11, 12, and 13, and supplementary regulations, setting up a complete regulatory system for transactions that are subject to his control. An exception from the prohibitions of the orders is made in the case of persons residing in this country on December 7, 1941. Therefore, enemy nationals who are resident in this country, many of whom have long been employed in large research laboratories in legitimate capacities, will be free to deal with their inventions as they wish.

A regulation issued under General Order 11 authorizes on certain conditions transactions forbidden by the order. Thus the filing and prosecution of patent and trademark applications and the receipt of letters, patent, and trademark registrations are permitted provided the applicant, assignee, or attorney attach to the first paper filed a report of certain information regarding the application.

Dow Chemical to Construct Plant in Texas

Secretary of Commerce Jesse Jones, has announced that Defense Plant Corporation, RFC subsidiary, has authorized execution of a contract with the Dow Chemical Co., Midland, Mich., to provide for the construction and equipment of a plant in Texas, at a cost in excess of $2,500,000. These facilities will be operated by the Dow Chemical Co., and title will remain in Defense Plant Corporation.

Cylinder Conservation Stressed by WPB

Manufacturers and distributors of compressed gases were commended by Donald M. Nelson, chairman of the WPB, for their efforts to conserve steel cylinders for compressed gases and urged to still greater effort in a letter distributed to the Oxygen and Acetylene Industry Advisory Committee at a meeting on November 17, in Washington.

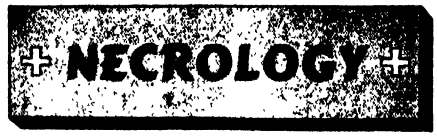
Stressing the vital part compressed gases play in the war production program, Mr. Nelson pointed out that the shortage of cylinders for compressed gases is so serious that it appears there will be no additional cylinders made available to the oxygen and acetylene industry during 1943, despite increasing demands, because of heavy demands of military forces outside the country for all production.

A considerable expansion of oxygen production facilities now under way indicates there will be no serious deficiency of oxygen for war purposes and hydrogen production seems generally adequate for war purposes. However, increasing demands for acetylene have placed this commodity in a more precarious position.

The shortage of steel is leading to a necessary re-use of calcium carbide drums, and industry is making every effort to re-use single-trip containers. The industry also is installing acetylene generators at plants which use acetylene, and piping the gas through the yard, further reducing the use of cylinders.

Transportation of Explosives

The Interstate Commerce Commission on October 28, 1942, issued Order 3666, superseding and amending previously published orders of August 16, 1940, November 8, 1941, December 18, 1941, February 26, 1942, and July 14, 1942, having to do with the transportation of explosives.



Clyde Coleman

Clyde Coleman, research chemist for the United States Rubber Co., died in Hohokus, N. J., on November 6 at the age of 59.

Dr. Coleman was born in Galesburg, Ill., received the B.S. degree from Williams College and the Ph.D. from the University of Chicago. Before entering the employ of U. S. Rubber he had worked for E. I. du Pont de Nemours & Co., Inc., and had been manager of the New Brunswick plant of E. R. Squibb & Sons. During the first World War he developed processes for making toluene and dyes. He joined the American Chemical Society in 1935.

Winfield Scott

Winfield Scott, rubber chemist and past Chairman of the Akron Section of the American Chemical Society, died November 19.

Mr. Scott was born in Senecaville, Ohio, December 14, 1887, and was graduated from Oberlin College with an A.B. degree and from the University of Washington with a master's degree. During the first World War he was sent to the Goodyear Tire and Rubber Co. to do war work, and remained there until 1920, when he went to the Quaker City Rubber Co. in Philadelphia as a compounder. From 1922 to 1924 he was in the Rubber Chemicals Division of E. I. du Pont de Nemours & Co., Inc., and from 1924 to 1929 did research work at The Rubber Service Laboratories. In 1933 he became vice president of the Kavalco Products Co., returning in 1933 to the Research Division of the Goodyear Tire and Rubber Co.

Mr. Scott had written numerous articles on vulcanization accelerators and antioxidants, and held many patents on such compounds. He was considered an authority on the theory of vulcanisation. He was a member of the American Chemical Society, which he joined in 1919, of the American Institute of Chemical Engineers, and the Franklin Club.

Samuel A. S. Strahan

Samuel A. S. Strahan, professor of organic chemistry, died suddenly on November 15 in Woburn, Mass., as the result of a heart ailment.

Professor Strahan was born in Everett, Mass., May 11, 1881, and studied at Massachusetts Institute of Technology where he became an assistant instructor for a short time. In 1917 he served as instructor of chemistry and later as professor of chemistry and chairman of the department at Northeastern University, Boston, Mass. In 1938, owing to ill health, he relinquished his administrative duties but continued his teaching until his death.

Professor Strahan was a member of the American Chemical Society, and the Society for the Promotion of Engineering Education.

William T. Sturges

William T. Sturges, assistant to the director of the Lederle Laboratories, Pearl River, N. Y., died November 17 at the age of 56. Mr. Sturges had been employed by the Lederle Laboratories since 1927, having been superintendent and manager of the laboratories before appointment last year as assistant to the director.



How to Feed a Battleship!

TODAY, battleships refuel and get back on the job faster . . . hundreds of cargo ships are "turning around" in port more quickly because, several years ago, Thiokol* synthetic rubber supplied the key to constructing smooth-bore, oil-loading hose. In this hose America's pioneer synthetic is used as the silk-smooth inner liner which eliminates turbulence, cuts friction between oil and hose to the bone. The rate-of-flow through hose with a Thiokol liner is much higher than with the older types.

Thiokol synthetic rubbers have improved oil-loading hose in many other ways. Previous types necessarily embodied oil-vulnerable, natural rubber liner reenforced with heavy metal bands. The use of flexible, oil-proof Thiokol synthetic rubber removed these disadvantages, decreased weight, increased ease of handling and provided a far longer hose life.

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NEWS-MAKERS

Walter D. Albert, professor of chemistry at the Eastern Illinois State Teachers College, has been elected to a position on the science staff of the Slippery Rock State Teachers College, Slippery Rock, Penna.

D. L. Beeman has been appointed engineer, Industrial Power Section, General Electric Co., succeeding **E. G. Merrick;** and **R. S. Sage** has been made engineer, Mining Section, succeeding **F. L. Stone.** Mr. Merrick and Mr. Stone will continue service with the company with specially assigned duties and as engineering consultants.

Fitzhugh W. Boggs is now a research engineer at the laboratories of the Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penna. **Elizabeth M. Boggs** is a lecturer in the Department of Physics, University of Pittsburgh.

M. C. Brockmann is now connected with Joseph E. Seagram & Sons, Inc., Louisville, Ky., and is supervisor of the Alcoholic Division in the Research and Development Department. He was previously research chemist for Hiram Walker and Sons, Inc.

Harold P. Brown has resigned his position as chairman of the Chemistry Department, University of Kansas City, to enter the employ of the Synthetic Rubber Division, B. F. Goodrich Rubber Co., Research Laboratories, Akron, Ohio.

Edward S. Coe, Jr., has been appointed manager of the New York office of the Farrel-Birmingham Co. He has been with the company since 1936.

Lloyd M. Cooke, formerly lecturer and research associate, Division of Industrial and Cellulose Chemistry, McGill University, has become a member of the research staff of the Corn Products Refining Co., Argo, Ill.

Virginia J. Dusold is now head of the Chemistry and Mathematics Departments, Cottey Junior College, Nevada, Mo. She was formerly medical chemist at the Milwaukee-Children's Hospital.

P. L. Fahrney has recently been elected president of the American Bitumuls Co., San Francisco, Calif.

Seymour Faulkner has joined the staff of the Girdler Corp., Louisville, Ky., to direct the development and further the sales of new processes and catalysts to be used in the gas, chemical, and other fields. Prior to 1941 Mr. Faulkner was associated with The Procter and Gamble Co., Cincinnati, Ohio, for more than 15 years. **J. Earl Taylor,** formerly with the Research Department, Procter and Gamble Co., is now with The Girdler Corp. in charge of a research group. **A. A. Azar,** formerly with the Koppers Co., Bartlett-Hayward Division, has joined the engineering staff of Girdler.



Seymour Faulkner

Lewis Fowler has left his position as chemist at the Portland, Ore., mill of the Archer-Daniels-Midland Co. to accept a place with the Puget Sound Navy Yard, Bremerton, Wash., as assistant chemist.

Lieutenant Frank B. Freese has been on active duty for six months as a first lieutenant in the United States Marine Corps, part of the time on temporary duty with the Royal Air Force. He is now in command of the 1st Marine Company, Marine Aviation Detachment, at Corpus Christi, Tex., and is instructor at the Naval Training School there. He has been granted leave of absence by the American Chemical Paint Co. for this activity.

Milton Green has left the Burroughs Wellcome Co. and is now associated with the Hoffmann–LaRoche Co., Nutley, N. J., as a research chemist in their synthetic organic department.

Charles H. Grimm, for many years connected with the laboratories of Fritzsche Bros., Inc., New York, has taken a position as technical supervisor and chief chemist of Lenthéric, Inc., Brooklyn, N. Y.

Edwin E. Hays, who received the Ph.D. degree in biochemistry at the University of Chicago in March, has accepted an instructorship in biochemistry at the St. Louis University School of Medicine. Until September he was research assistant in biochemistry on the Armour & Co. fund at the University of Chicago.

G. F. Hogg, manager of the Naval Stores Department in the Chicago office of the Hercules Powder Co., has been made technical assistant superintendent of the plant at Hercules, Calif. **L. P. Killilea** will replace Mr. Hogg in Chicago. **Robert L. Skov** has been transferred to the Engineering Department at Hercules, Calif.

Arthur D. Holmes, for 21 years director of research for the E. L. Patch Co., Stoneham, Mass., has resigned to accept an appointment as research professor of chemistry at the Massachusetts State College and Agricultural Experiment Station, Amherst, Mass. **Mrs. Holmes,** formerly Julia B. Outhouse, professor of nutrition at the University of Illinois, has been appointed research professor of nutrition at the Massachusetts State College.

B. J. Humphrey has joined the staff of the Connecticut Hard Rubber Co., New Haven, Conn., as assistant director of research. For the past 12 years he was in the Research Laboratory of the Firestone Tire & Rubber Co., Akron, Ohio.

Frank H. Hurley, Jr., Department of Chemistry, The Rice Institute, is teaching this year at Reed College. Dr. Hurley went to Reed to fill the gap created by the appointment of **Arthur F. Scott,** head of the Department of Chemistry, to the acting presidency of the college.

Captain Sidney Kaye is now with an Army Medical Laboratory in charge of chemistry and toxicology and can be reached at the Puerto Rican Department Laboratory, San Juan, P. R. He was formerly with New York University.

William B. Plummer, manager of the Development and Patent Department, Standard Oil Co. of Indiana, has been commissioned as a lieutenant-colonel in the United States Army for special duty in the office of the Under Secretary of War. While he is on leave of absence **Pike H. Sullivan,** assistant manager of the department, will act as manager.



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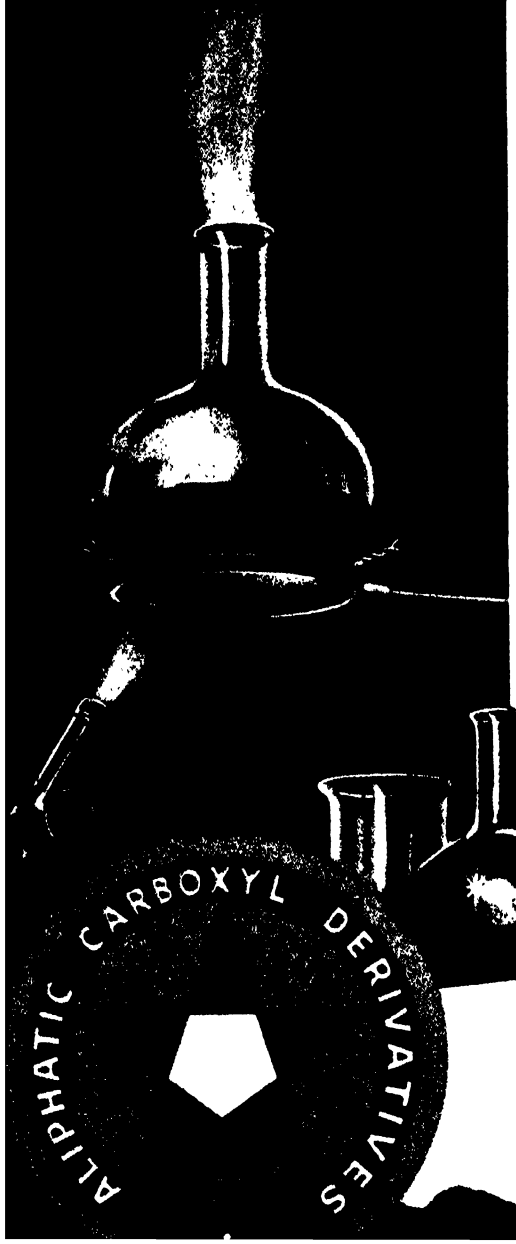
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Without being changed by synthesis, they are finding wide acceptance in such diverse fields as powerful germicides . . . fungicides . . . algaecides...collectors in the concentration of phosphate...potash... mica...lepidolite...magnesite...gasoline stabilization...anti-tack agents...dispersing agents...synthetic rubber compounding...flocculating agents.

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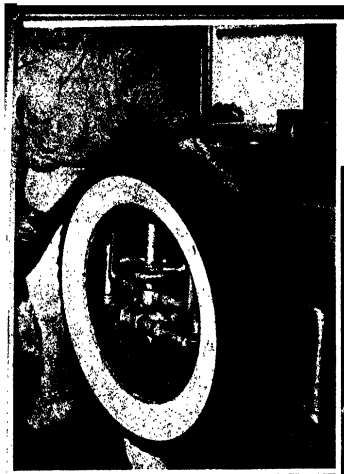
RNH_2

Melting points	19°C to 65°C.
Boiling range	133°C to >350°C at 760 mm.
Molecular weights	101 to 773.
Alkyl-chain lengths	6 to 18 carbon atoms.

Very reactive chemically

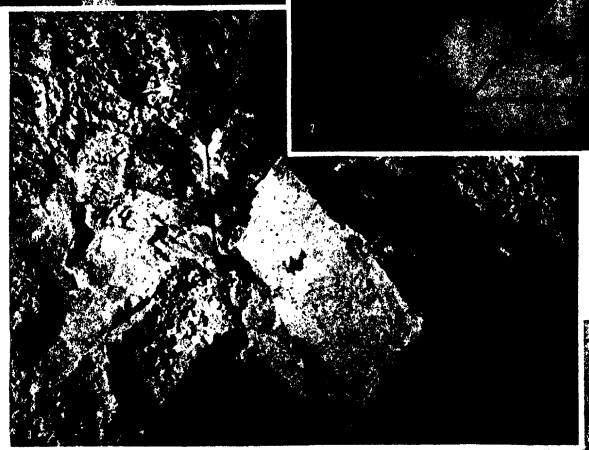
NEWS PARADE

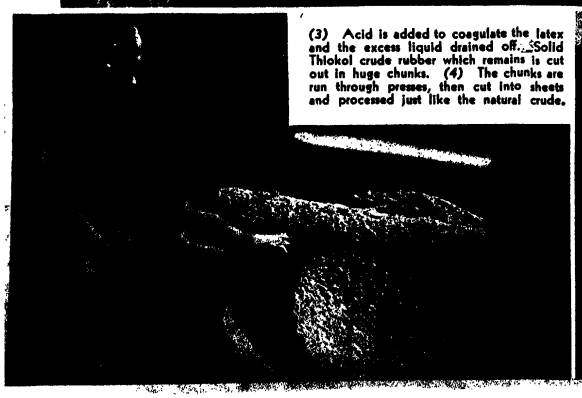
(See also "Thiokol", page 1362, Nov. 10, 1942 issue)



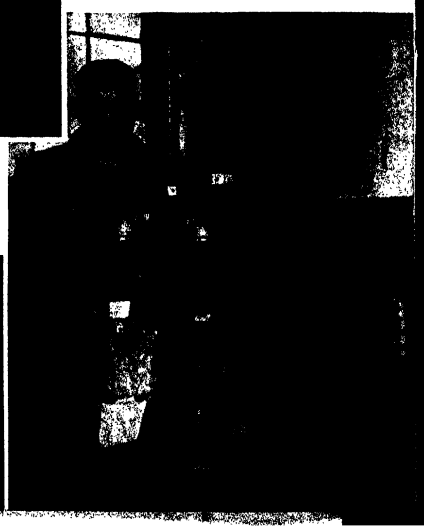


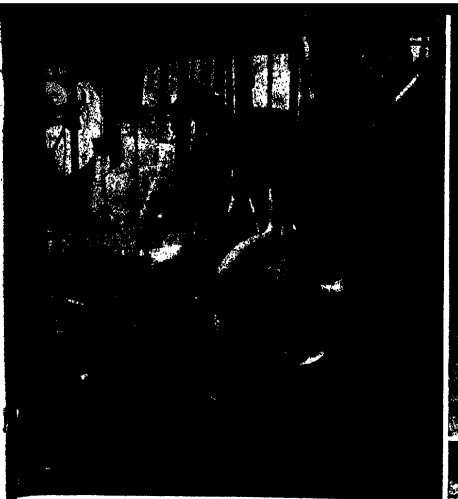
America's oldest synthetic rubber is produced at the plant of the Thiokol Corp. in Trenton, N. J., where it is rapidly manufactured from noncritical sulfur and salt. *(1)* Retreader applies Thiokol camelback to tire carcass. *(2)* The first step in making Thiokol synthetic rubber is to add sodium polysulfide to ethylene dichloride in a huge vat of iron, wood, or cement. The two compounds combine to form a milky fluid.





(3) Acid is added to coagulate the latex and the excess liquid drained off. Solid Thiokol crude rubber which remains is cut out in huge chunks. *(4)* The chunks are run through presses, then cut into sheets and processed just like the natural crude.



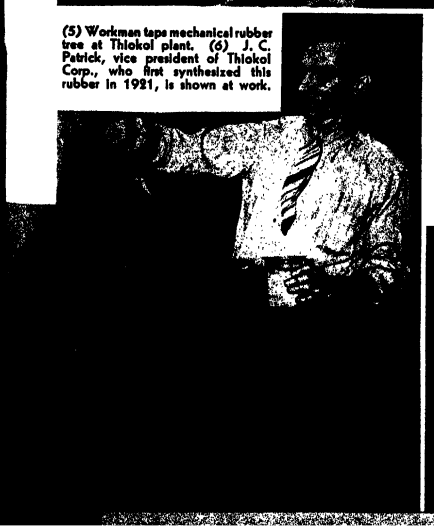








(5) Workman taps mechanical rubber tree at Thiokol plant. *(6)* J. C. Patrick, vice president of Thiokol Corp., who first synthesized this rubber in 1921, is shown at work.



(7) Self-sealing gas tank in Douglas bomber has inner layer of Thiokol and jacket of Thiokol-impregnated fabric. *(8)* J. C. Patrick beside car with first Thiokol retreads. *(9)* Mareng cell made from Thiokol is used to convert box cars into tank cars. *(10)* Two coats of Thiokol add 700 miles to tire life. *(11)* Stanley I. Mason, Jr. left, receives rationing certificate from Walter Lochner of Trenton Chamber of Commerce for first synthetic retread in country given civilian war worker by rationing board. Tire is retreaded with Thiokol.





American Chemical Society[1]

105TH MEETING. Detroit, Mich., April 12 to 16, 1943.

106TH MEETING. Minneapolis, Minn., September 6 to 10, 1943.

BUFFALO RUBBER GROUPS. Hotel Westbrook, Buffalo, N. Y., December 16, 1942.

CHEMICAL ENGINEERING SYMPOSIUM. Palmer House, Chicago, Ill., December 28 and 29, 1942. "The Application of Kinetics to Design and Operation of Chemical Engineering Equipment". Ninth Annual Symposium.

ORGANIC CHEMISTRY SYMPOSIUM. Boston, Mass., December 28 to 30, 1943. Tenth National Symposium.

Other Scientific Societies

AMERICAN SCIENCE TEACHERS ASSOCIATION. Hotel Pennsylvania, New York, N. Y., December 29 and 30.

ELECTROCHEMICAL SOCIETY. Hotel Roosevelt, Pittsburgh, Penna., April 7 to 10, 1943.

PULP AND PAPER INDUSTRY, TECHNICAL ASSOCIATION. Commodore Hotel, New York, N. Y., February 15 to 18, 1943.

[1] The list of the SOCIETY's National Officers and Directors, Editors, members of Council, Divisional and Local Section Officers, Committees, and Chapters of Student Affiliates appears in CHEMICAL AND ENGINEERING NEWS three times a year—usually February 10, May 10, and October 10. The latest list is printed on page 1239 of the October 10 issue.

Local Sections

SECTION AND PLACE	DEC.	SPEAKER	SUBJECT
Chicago, Medinah Club, 505 North Michigan Ave.	17	Pieter Honig	What Is Past Is Prologue
Cleveland, Engineering Society, 2136 East 19th St.	16	A. L. Henne	Organic Fluorides
Louisiana, Auditorium, Chemistry Building, Tulane University, New Orleans	18	John H. Yoe	Inorganic Analysis with Organic Reagents
Maryland, Remsen Hall, Johns Hopkins University, Baltimore	18	W. F. G. Swann	
Memphis, Tenn., University Club	18	H. D. Galloway	Synthetic Rubber
Philadelphia, Lecture Hall, Franklin Institute	17	Florence B. Seibert	Protein Chemistry in Tuberculosis
Pittsburgh, Mellon Institute	17	H. I. Schlesinger	Chemistry of Boron
Rochester, Memorial Art Gallery, Prince Street Campus, University of Rochester	21	D. I. Mayne	Patents Today
Southeastern Texas, Houston	17	John H. Yoe	
Texas A. & M., Chemistry Lecture Room, College Station	16	John H. Yoe	Inorganic Analysis with Organic Reagents
Western Connecticut, Piccadilly Restaurant, 71 Federal St., Stamford	21	Victor K. La Mer	Kinetics in Solution
Wisconsin, Auditorium, Chemistry Building, University of Wisconsin, Madison	16	W. H. Lycan	Solvent Fractionation of Glyceride Oils



GEORGE NELIDOFF

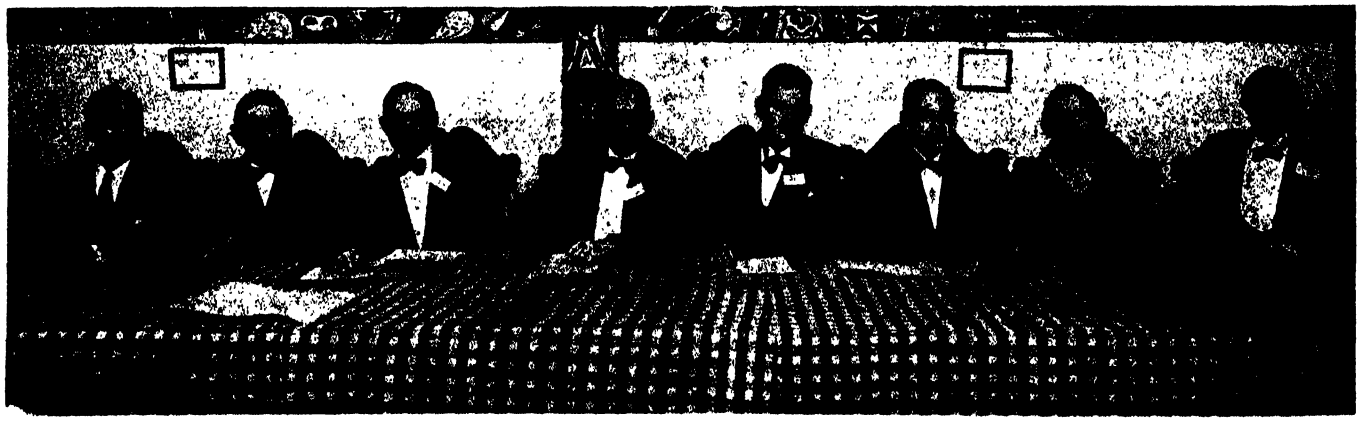
Dr. and Mrs. Vladimir N. Ipatieff

Montreal Section, Rubber and Plastics Division, Society of Chemical Industry

THE Montreal Section, Rubber and Plastics Division, Society of Chemical Industry, was addressed on November 13 by A. E. Byrne, who discussed the chemical derivation of plastics and described glyptal resins.

On December 16 there will be a joint meeting with the Montreal Section, Society of Chemical Industry, at the Ritz Carlton Hotel. H. I. Cramer, Sharples Chemicals, Inc., will speak on synthetic rubber.

Wilmer T. Rinehart, who was recently associated with the United States Gypsum Co. and formerly with the Roessler & Hasslacker Chemical Co. at Niagara Falls, N. Y., has joined the Chemical Engineering staff of the Armour Research Foundation.



Chicago Honors Chemist

Speakers' table at banquet of the Chicago chapter, American Institute of Chemists, November 20, in honor of Vladimir N. Ipatieff. *Left to right.* J. G. Alther, vice president, Universal Oil Products Co.; H. J. Halle, president, Universal Oil Products Co.; Gustav Egloff; Frank C. Whitmore; Vandeveer Voorhees; Ipatieff; Mrs. Ipatieff; and Ward V. Evans. [Story, CHEM. ENG. NEWS, 20, 1532 (Nov. 25, 1942).]

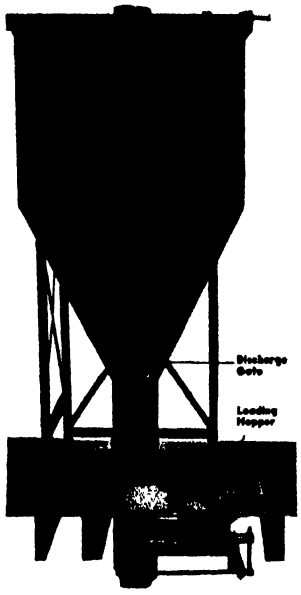
Ion-Exchange Resins

THERE is scarcely a major industry in the United States in which there are not applications for the newly developed synthetic ion-exchange resins, according to Robert J. Myers, of the Resinous Products and Chemical Co. Laboratories, Philadelphia. Speaking before the Western New York Section of the AMERICAN CHEMICAL SOCIETY in Buffalo on November 17, Dr. Myers declared that though the ion-exchange resins have found their biggest practical use in water-conditioning and softening, many special new applications are now in the development stage.

"Desalting" aqueous solutions of carbohydrates, with an increased sucrose yield from cane and beet sugar sirup, is an outstanding application of the resins. Aqueous solutions of formaldehyde, gelatin, etc., may likewise be desalted.

The exchange capacity depends more on chemical constitution than on mere composition. The resins can be used as selective adsorbents in columns where chromatographic banding occurs. Their more flexible structure means lower attrition losses. Experiments prove that there is no appreciable decrease in capacity as the number of cycles is increased.

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Officers of American Petroleum Institute

AT THE 23rd annual meeting of the American Petroleum Institute, held in Chicago on November 11, the officers were reelected for 1943. President, William R. Boyd, Jr.; vice president for production, George A. Hill, Jr.; vice president for refining, J. Howard Pew; vice president for marketing, E. V. Weber; treasurer, O. D. Donnell; secretary and assistant treasurer, Lacey Walker.

A. A. A. S. Meeting Postponed

AT THE request of the Office of Defense Transportation, the American Association for the Advancement of Science has indefinitely postponed the meeting that was scheduled to take place the week of December 28 in New York City.

AT A recent meeting of the Western Vermont Section of the AMERICAN CHEMICAL SOCIETY the following officers were elected for the coming year:

Chairman, F. S. Quinlan, St. Michael's College; *Chairman-Elect*, H. B. Pierce, University of Vermont; *Secretary-Treasurer*, Constance L. Brown, University of Vermont; *Councilor*, Prof. E. B. Womack, Middlebury College.

Institute of Agricultural Sciences Established

THE cooperative program of the Americas for development of Western Hemisphere resources will be facilitated by the establishment of the Inter-American Institute of Agricultural Sciences, designed to function as an aid to continental research and experiment stations for agricultural science in the American republics. Earl N. Bressman has been named director and Jose L. Colom, chief of the Division of Agricultural Cooperation of the Pan American Union, has been named secretary. Costa Rica has been recommended as a proposed site and accepted by the governing board. The preliminary planning was done by an inter-American committee on tropical agriculture, headed by Hector David Castro, Minister to the United States from El Salvador.

Neil F. Robertson, formerly with the Scott Paper Co., Chester, Penna., and the Pulp Bleaching Co., Wausau, Wis., has accepted a position in the Research Laboratory of the Crossett Lumber Co., Crossett, Ark., where he will work in the pulp and paper division.



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October Journal of Physical Chemistry

THE *Journal of Physical Chemistry* for October contains the following papers:

WILFRIED HELLER. Reversible Aggregations of Colloidal Particles. III. Isothermal Reversible Sol Syneresis.
THERALD MOELLER. Contributions to the Chemistry of Indium. VI. The Effects of Certain Hydroxy Anions upon the Precipitation of Hydrous Indium Hydroxide.
M. A. BREDIG. The Polymorphism of Calcium Carbide.
BORIS LEAF AND F. T. WALL. Separation of Gas Mixtures by Thermal Diffusion.
R. L. ANTHONY, R. H. CASTON, AND EUGENE GUTH. Equations of State for Natural and Synthetic Rubberlike Materials.

Journal of Physical Chemistry for November

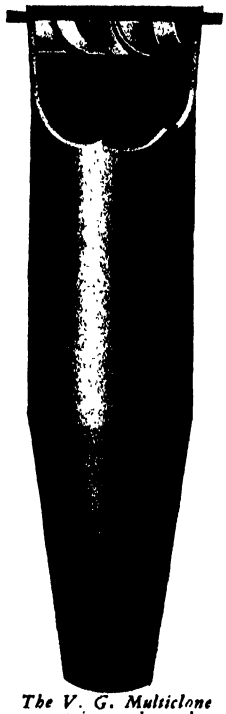
THE *Journal of Physical Chemistry* for November contains the following papers, as well as reviews of new books:

G. COHN AND J. A. HEDVALL. The Influence of the Transition from Ferromagnetism to Paramagnetism on Catalytic Activity.
F. E. BARTELL AND FRANK C. BENNER. Adsorption at Solid-Liquid Interfaces. Determination of Adsorption by Adhesion-Tension and Interfacial-Tension Measurements on Binary Organic Liquid Systems.
R. M. DEANESLY AND L. T. CARLETON. Additive Physical Properties in Hydrocarbon Mixtures.
PAUL J. FLORY. Viscosities of Polyester Solutions. Application of the Melt Viscosity–Molecular Weight Relationship to Solutions.
HERMAN C. FROELICH AND GORTON R. FONDA. Exaggerated Phosphorescence of Zinc Silicate Phosphors.
HUGH M. HUFFMAN. Thermal Data. XV. The Heats of Combustion and Free Energies of Some Compounds Containing the Peptide Bond.
R. SCHUHMANN, JR. Flotation Kinetics. I. Methods for Steady-State Study of Flotation Problems.
A. M. GAUDIN, R. SCHUHMANN, JR., AND G. W. SCHLECHTEN. Flotation Kinetics. II. The Effect of Size on the Behavior of Galena Particles.
JOHN W. IRVINE, JR. Cyclotron Targets: Preparation and Radiochemical Separations. I. Arsenic and Germanium.
W. G. EVERSOLE AND W. W. BOARDMAN. A New Method for the Determination of Electrokinetic Potential in the Flow of a Semiconducting Liquid through a Single Capillary.
GUSTAV EGLOFF AND ROBERT C. KUDER. Simplifications in the Statistical Analysis of Physical-Chemical Data.
GUSTAV EGLOFF AND ROBERT C. KUDER. Studies of the Physical Properties of Alicyclic Hydrocarbons. II. Boiling Points of Monocyclic Hydrocarbons.
H. J. MCDONALD, A. F. KLUENDER, AND R. W. LANE. The System Ethyl Alcohol–Glycerol–Carbon Tetrachloride at 25° C.
HERRICK L. JOHNSTON AND EDWARD R. GRILLY. Viscosities of Carbon Monoxide, Helium, Neon, and Argon between 80° and 300° K. Coefficients of Viscosity.
BERNARD BERK AND OLIVER W. BROWN. Catalytic Activity of Intermetallic Compounds in the Vapor-Phase Reduction of Nitrobenzene. II.
ALLAN T. GWATHMEY AND ARTHUR F. BENTON. The Reaction of Gases on the Surface of a Single Crystal of Copper. I. Oxygen.
F. O. KOENIG AND S. W. GRINNELL. On the Theory of Galvanic Cells Subject to Fields of Force. II. The Electric and the Magnetic Field.

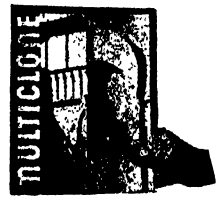
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October Issue of Chemical Reviews

CONTENTS of *Chemical Reviews* for October include the following:

E. W. R. STEACIE AND D. J. LE ROY. Experimental Methods of Determining the Activation Energies of Elementary Reactions.
H. E. SCHWEYER. Particle-Size Studies. Properties of Finely Divided Materials.
JAMES A. NORTON. The Diels-Alder Diene Synthesis.

Machining Alcoa Aluminum

A 44-PAGE book on "Machining Alcoa Aluminum", produced by the Aluminum Co. of America, Pittsburgh, Penna., sets forth the general principles of machining aluminum and its alloys; suggests speeds, feeds, and depths of cut which will produce satisfactory results; points out where practices and tools common to other methods may be used; and indicates where special practices or tools are desirable. Copies are available from the company without charge.

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CHEMICAL AND ENGINEERING NEWS



Outlines of Food Technology. *Harry W. von Loesecke.* 1st ed. 505 pages. Reinhold Publishing Corp., 330 West 42nd St., New York, N. Y. 1942. Price, $7.00.

IN THE words of the Preface, "the purpose of this book is to outline the processes used in the modern food industry. No attempt has been made to give detailed descriptions of the preparation of the different food materials * * *. As an aid to those desiring further information pertaining to any particular field, a list of suggested readings is appended to each chapter. These are by no means complete, but include those references which are considered most important * * *. The nutritional value of the different foods has not been discussed * * *. Statistical data have been kept to a minimum. . . ."

The field covered can best be indicated briefly by listing the chapter headings: The Tin Can and Glass Container; Fruits and Their Products; Canning of Vegetables; Dairy Products; Meat, Meat Products, and Poultry; Fish and Shellfish; Grains and Their Products; Edible Fats and Oils; Sugars and Starches; Nuts; Spices, Relishes, Essential Oils, and Extracts; Beverages; Confectionery, Jams, Jellies, Preserves, and Certified Dyes; Storage and Marketing of Fruits and Vegetables; Preservation of Foods by Freezing.

Some errors have been noticed. On page 23, the obsolete term "calcia" is used for "high calcium limestone or burned lime". On page 38 it is said that "the Pure Food and Drugs Act defines cider or apple vinegar as * * *". This act did not define any food stuffs. On page 163 it is said that "evaporated milk * * * contains not less than 7.9 per cent of milk fat, nor less than 25.9 per cent of total milk solids; provided, however, that the sum of the percentages of milk fat and total solids be not less than 33.7 per cent". The advisory standard of identity for evaporated milk which was effective under the Food and Drugs Act of June 30, 1906, required that the evaporated milk contain not less than 7.8 per cent (not 7.9 per cent) and not less than 25.5 per cent of total milk solids (not 25.9 per cent), the sum of these to be not less than 33.7 per cent. Probably the author has confused this with the evaporated milk standard set forth in the *Federal Register* of July 2, 1940, issued under the Food, Drug, and Cosmetic Act, wherein it is stated that evaporated milk must contain not less than 7.9 per cent of milk fat and not less than 25.9 per cent of total milk solids, but there is no requirement for the sum of these.

Irradiated evaporated milk is described (page 165) as being made from irradiated whole milk by concentration. As a rule it is the concentrated milk which is irradiated and not the whole milk prior to concentration. In the discussion of baking powder (page 261) it is stated that "some baking powders also contain small amounts (about 0.15 per cent) of albumen in the form of dry egg white". As a

CONTINUED ON PAGE 1594

PURE ENOUGH TO DRINK...

but Unfit for Industrial Use!

Water, clear and sparkling from a mountain lake, may be perfectly potable in its natural state, yet without chemical treatment will be altogether unsuitable for boiler feed. Water demands of industry are sometimes more exacting than those of the human system.

Any water from lake or river requires study and treatment before being used as an industrial water. Thus, the accurate and continuous conditioning of boiler feed-water will reduce boiler outages caused by scale, corrosion and carryover . . . outages requiring costly repairs and resulting in loss of production.

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Louisiana Well Company.....Monroe, La.
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Layne-Northwest Company.....Milwaukee, Wis.
Layne-Ohio Company.....Columbus, Ohio
Layne-Texas Company.....Houston, Texas.
Layne-Western Company.....Kansas City, Mo.
Layne-Western Co. of Minn.....Minneapolis, Minn.
International Water Supply, Ltd...London, Ont.

Beyond the Flyleaf

CONTINUED FROM PAGE 1592

matter of fact, the use of white of egg has practically disappeared from baking powders. Of all the baking powders on the market today, the reviewer knows of but one that contains egg white and in this case in amount (as stated on the label) of but 0.01 per cent.

On page 252 the author says that the Earle process is one that "would seem to dispense with the need for enriched flour * * *". It is referred to as a process of milling, which it is not. Flour from wheat cleaned by the Earle process is merely but the whole wheat berry ground to a flour but minus the outer fibrous covering or "beeswing" which constitutes but approximately 2.5 per cent of the berry. In its essential characteristics, it differs little from whole wheat flour. Experiences through the years have amply demonstrated that it is practically impossible to increase the whole wheat flour consumption much beyond 2 per cent of the total flour output. Therefore to expect the Earle process flour to replace enriched flour is to expect the impossible.

Bromated flours (page 252) are described as those to which "potassium bromide" has been added. This should read "potassium bromate".

Much of the technology of this book is sketchy. This is inevitable in the attempt to cover such a wide field in such a limited space. Use of the book, however, along with suggested readings may serve well for outlining some of the fundamental principles of food technology.

F. L. DUNLAP

Physical Science. *William F. Ehret*, Editor, and *Leslie E. Spock, Jr.*, *Walter A. Schneider*, *Carel W. van der Merwe*, and *Howard E. Wahlert*. xii + 639 pages. The Macmillan Co., 60 Fifth Ave., New York, N. Y., 1942. Price, $3.90.

IN THE final form of this book, which has evolved from that first prepared six years ago, the authors have had a definite object in view, and have done their work well. All are teachers in Washington Square College of Arts and Science, New York University.

The Preface states: "Matter is here viewed through the eyes of the astronomer, chemist, geologist, mathematician, and physicist". A belief in "the value of the more rigorous approach with the frequent application of mathematics" is evident. There is much valuable information, generally well arranged.

The effort to give "broadly the present state of our knowledge of the physical universe" in a composite picture has been reasonably successful. Classified arbitrarily, 12 of the 35 chapters are devoted chiefly to physics, with nine to chemistry, eight to geology, two to astronomy, and four general. This statement cannot be exact, but it does give an idea of the contents of the book.

Exercises, problems, and topics for further study are given, usually at the end of each chapter, occasionally within the chapter discussion. There are also well-chosen references to books and journal articles. In the nine chemical chapters references are made to nine journals, the *Journal of Chemical Education* containing 34 of the 51 articles and *Industrial and Engineering Chemistry* nine, including one to CHEMICAL AND ENGINEERING NEWS as late as April 25, 1942.

Mechanical work is excellent, and the care, which might be expected, has eliminated almost all mistakes. Very, very rarely one creeps in as "1938" for the centennial year of organic chemistry, which is obviously a typographical error.

There should be a word of warning. This excellent book should not be used by students of inferior ability, or by those who do not intend to work and to work hard.

HARRISON HALE

Textile Fiber Atlas. *Werner von Bergen* and *Walter Kraus*. 38 + vi pages, 24 plates. American Wool Handbook Co., New York, N. Y., 1942. Price $3.00.

THE purpose of this book is to present a set of photomicrographs of all important textile fibers. It is divided into the following four sections: Natural Animal Fibers; Natural Vegetable Fibers; Artificial and Synthetic Fibers; Mineral Fibers.

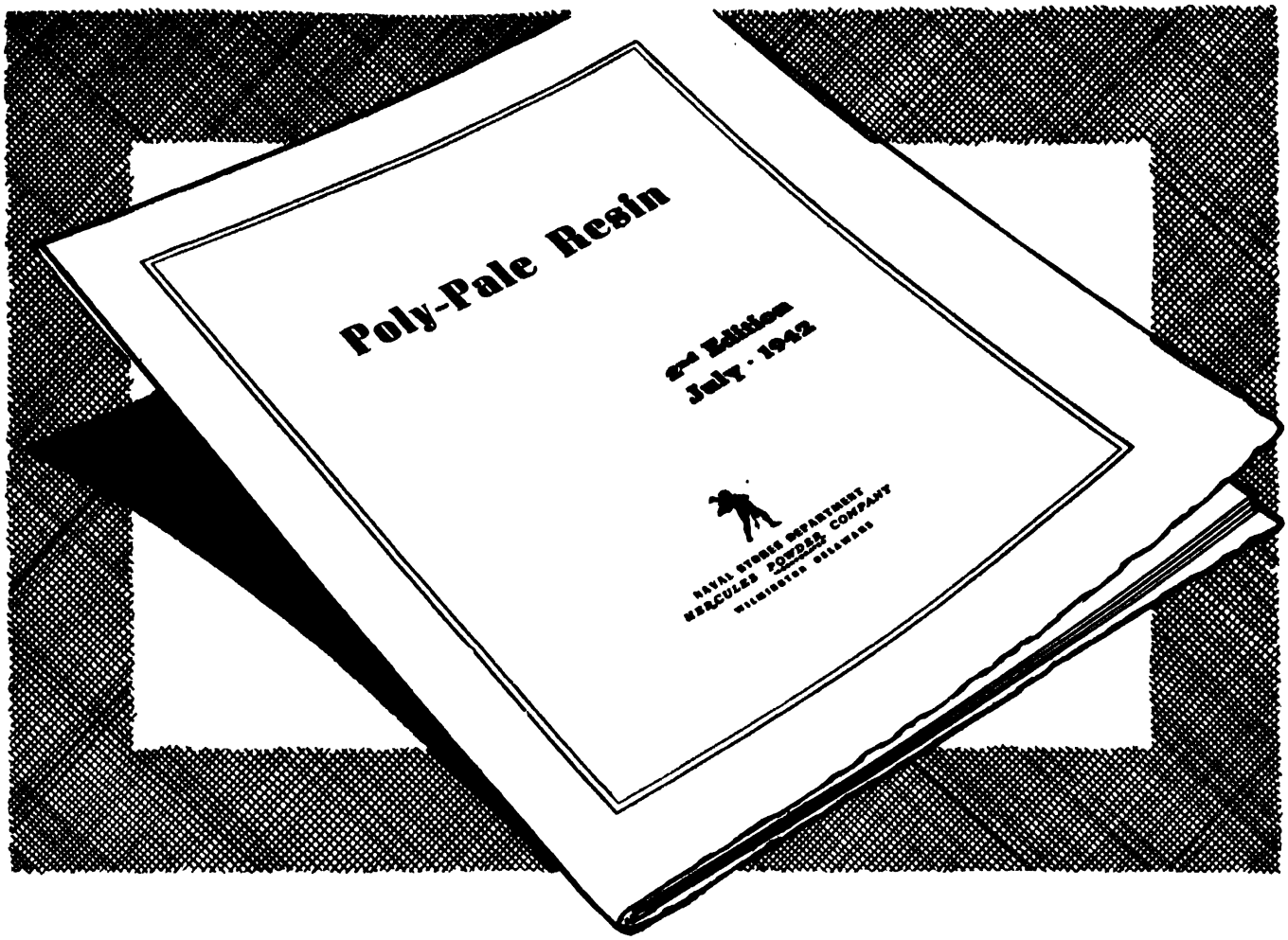
This book is the logical result of the practice in textile microscopy of maintaining, for comparisons, collections of typical samples of various textile fibers. For those laboratories where a complete collection is not available, this Atlas should be of great assistance. In those laboratories where fiber collections are extensive the Altas will serve as a handy reference text.

The 311 photomicrographs have been well selected to show the most marked characteristics of the different fibers. The illustrations of various types of damage occurring in wool fibers should be of particular interest to those concerned with the Wool Products Labeling Act. About half of the book is devoted to wool and minor hair fibers.

The minor hair fibers pictured include mohair, cashmere, camel, alpaca, llama, vicuna, hog bristles, goat, horse, cow, rabbit, and muskrat, with examples of beaver, raccoon, squirrel, and fox fur.

The sections on cotton and the other seed fibers, with the bast and structural fibers, are well chosen to give a ready means of differentiation between the various types.

CONTINUED ON PAGE 1596



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Beyond the Flyleaf

CONTINUED FROM PAGE 1594

The discussion of the artificial fibers includes not only cellulose and protein fibers, but nylon and Vinyon as well. It is rather unfortunate that the authors used the word "Prolon" for the fibers prepared from natural proteins, because this word is a registered trade mark of the Pro-phy-lac-tic Brush Co.

The comparative scale for fineness of various textile fibers is an excellent addition to the text.

A splendid bibliography is appended.

The Textile Fiber Atlas is printed on good paper and is attractive with its glazed cover and plastic binding. It is unfortunate that an otherwise valuable book should have so many typographical errors in the text. At times this makes difficult reading.

GUSTAVUS J. ESSELEN

The Pharmacopoeia of the United States of America (The United States Pharmacopoeia). 12th rev. (U. S. P. XII), official from November 1, 1942. By authority of the United States Pharmacopoeial Convention, meeting at Washington, D. C., May 14 and 15, 1940. Prepared by the Committee of Revision and published by the Board of Trustees. lxxxviii + 880 pages. Mack Printing Co., Easton, Penna., 1942. Price, $7.50.

THE U. S. Pharmacopoeia sets forth principles by which right in medical and surgical agents is defined and can be enforced and wrong is detected and can be punished legally. These principles—definitions and specifications of therapeutic and allied supplies—have been discovered beneath the husks of centuries of medical and pharmaceutical experience; they have been extracted, mastered, refined, modified, and improved by decennial pharmacopoeial revisions by specialists during the past hundred years. The revision of the U. S. Pharmacopoeia is the greatest labor of love in the realm of science. It has such wide scope and intricacy, such severe logic and nice dependencies, that it has always tasked the highest minds to reach its boundaries. Success has been attained by continuous diligent study, united with devotion and talents of superior order, and by mastery of the territory through frequent surveys of old and new landmarks.

We who know the U. S. Pharmacopoeia have reverence for it. It is a book covered with the armor of federal government authority. It is composed mainly (pp. 9–550) of precisely definite monographs on vegetable and animal drugs, chemicals, and preparations written by expert committees after thorough research; it presents the most carefully selected knowledge of official remedies. The General Notices on pp. 1–8 explain in specific fashion the purposes and limitations of the various standards throughout the work. Since its inception the Pharmacopoeia has emblemized faith, morals, and doctrine in medicine and pharmacy; it has taught the physician and the pharmacist their own individual responsibilities regarding drugs; it has given pharmacy dignity and sound professional status.

Enough has been said to show that the Pharmacopoeia is the indispensable guide of the pharmaceutical chemist and drug manufacturer. It is, however, deserving of very much broader chemical acquaintance. It is essential to the nutritionist and bromatologist, especially because of its coverage of the vitamins. The ceramist and packaging specialist will find worthy of their attention the standards for light-resistant containers and for chemical resistance of containers. The textile chemist will be interested in the standards laid down for surgical supplies. Those specialists who are engaged in teaching will find the treatise valuable for providing practica for their students. This fact suggests that teachers of inorganic, organic, and analytical chemistry can also benefit from the work by securing from it ideas for laboratory exercises, especially evaluations of the purity of ordinary preparations.

The section on general tests, processes, and apparatus (pp. 551-644) is quite notable, being rich in analytical information and of high value to every practicing chemist. It tells, to cite a few examples, how to ascertain the absorbency and fiber length of cotton, to examine for arsenic, to appraise gelatin bacteriologically, to find the purity of medicinal gases and the fineness of powders, to identify chemicals, to determine physical properties, and to assay drugs for potency. There follow a comprehensive section on reagents, test solutions, indicators, standard solutions, and hydrogen ions, and a series of useful tables. The whole is then elaborately indexed.

As brought out in detail earlier this year (THIS JOURNAL, 20, 13), to a greater extent than ever before pharmacopoeial recognition is given in this revision to organic synthetics in the province of medicine—a real tribute to organic chemistry, pharmacology, and chemotherapy. The following admissions to U. S. P. XII will be made by supplemental announcement (second supplement), probably appearing before the end of the year: sulfathiazole sodium, nonsterile, for ointments, and a special sterile grade for injections; sulfadiazine; sulfadiazine sodium, nonsterile and sterile; sulfaguanidine; calcium pantothenate; pyridoxine hydrochloride; and bioassay processes for the several vitamin B factors in medicinal preparations, likewise adaptable to foods.

CONTINUED ON PAGE 1598



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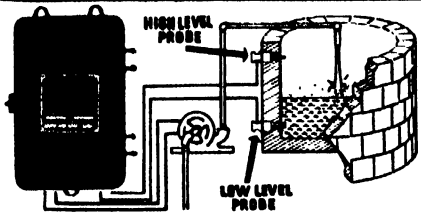
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Beyond the Flyleaf

CONTINUED FROM PAGE 1596

To the list of official reference standards for assay controls (pp. 607–8) will be added calcium pantothenate and pyridoxine hydrochloride for the same purpose.

The electrotyping, printing, and binding have been very well done. The paper and fabrikoid cover are substantial. Every purchaser will find that the volume will easily stand the heavy use to which it will be put.

W. A. HAMOR

Advances in Enzymology and Related Subjects. Volume II. Edited by *F. F. Nord* and *C. H. Werkman.* viii + 374 pages. Interscience Publishers, Inc., 215 Fourth Ave., New York, N. Y., 1942. Price, $5.50.

THIS is the second volume in a series of reviews invaluable to the enzyme chemist. As in the previous volume, specialized topics in the field of enzymology and related subjects are discussed by competent workers. For the most part these reviews have the advantage of being didactic and provide the reader with a fair background of the problem under consideration, a quality which increases considerably the audience to whom the volumes are useful.

The review by M. Delbrück deals with bacteriophages considered as viruses. Among the many topics covered very lucidly are: The "life cycle" in the host, the specificity of virus for host as compared to serological specificities, propagation of the virus in the absence of the host, etc.

D. D. Van Slyke discusses the selection of assay methods for hydrolytic enzymes on the basis of the kinetics involved.

"A Classification of Proteolytic Enzymes" by M. Bergmann supplements his previous article in Volume I. According to the author, proteinases may be classified on the basis of the ease with which they split peptide bonds of given types. Work with substrates of known structure is of course not original with Bergmann, but his is the first work sufficiently extensive to permit more than vague generalizations on differences in proteinase behavior. M. J. Johnson and J. Berger in the chapter on The Enzyme Properties of Peptidases employ the historical and more arbitrary system of classification of peptidases, which is illustrated by the terms, "dipeptidase", "polypeptidase", "leucyl peptidase", etc. Such a classification seems incongruous in the light of Bergmann's more fundamental system. Nevertheless, the article is the best résumé which the reviewers have seen of the accumulated data in the field of the so-called peptidases.

Diamine oxidase finally comes of age with a full review by E. A. Zeller, who has contributed more to its understanding than any other worker since Best reported "histaminase" in 1929. This article is in German. E. A. H. Roberts' summary of the chemical changes in the so-called fermentation of tea emphasizes the complex nature of the reactions involved. "Heterotrophic Assimilation of Carbon Dioxide" is the contribution of C. H. Werkman and H. G. Wood. Fixation of carbon dioxide by bacteria which normally require organic sources of carbon is now well recognized. This and the similar phenomenon in animal tissue are discussed with attention to the possible mechanisms involved. H. Tamiya presents in German an extensive review, which embodies much of his original work, on the respiration, fermentation, and associated enzyme systems of *Aspergillus.*

The brief but complete discussion, Cellulose Decomposition by Microorganisms, by A. G. Norman and W. H. Fuller serves to emphasize the paucity of knowledge concerning the actual changes in the cellulose and enzyme systems involved. E. J. Witzemann sets forth an hypothesis of the interrelationship of carbohydrate and fat catabolism.

In what the reviewers consider the best of a number of recent reviews on the subject, H. Dam covers the chemistry and physiology of vitamin K. In the final article, J. J. Pfiffner deals with the chemistry, isolation, methods of assay, and physiological effects of the adrenal cortical hormones and also touches upon the related adrenal steroids.

The book not only is valuable to the enzyme chemist, but, in spite of the title, it is of sufficient general interest to warrant a place in any biochemical library.

BERNARD AXELROD
MARIAN W. KIES

Annual Review of Biochemistry. Volume XI. Edited by *James Murray Luck* and *James H. C. Smith.* vi + 736 pages. Annual Reviews, Inc., Stanford University P. O., Calif., 1942. Price, $5.00.

IT IS already a great deal to say that the eleventh volume of this well-known review comes fully up to the usual standard. Certainly no biochemist could easily stay in business without access to a copy.

In spite of the war, about the usual number of papers have been considered, and there are 44 pages more of text than last year. The international character of the effort is shown in that eight of the 26 chapters came from sources outside the United States. One is tempted to speculate on the activities of A. G. van Veen

CONTINUED ON PAGE 1600

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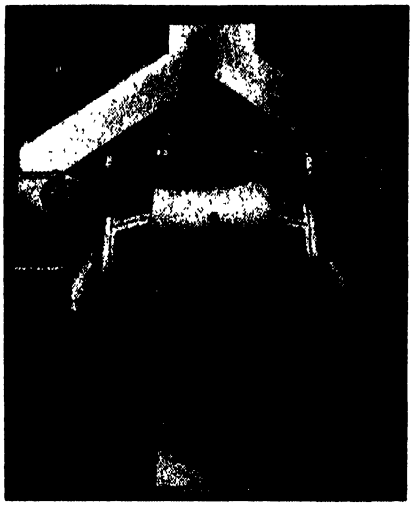


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	Seasonally Adjusted			Without Adjustment		
	Oct. *1942*	Sept. *1942*	Oct. *1941*	Oct. *1942*	Sept. *1942*	Oct. *1941*
(Base 1935–39 = 100)						
Industrial production[a]	188[b]	185	164	192[b]	191	168
Chemical production	172[b]	172	148	181[b]	178	153
Steel production	229	219	207	229	219	207
Freight car loadings	133	136	127	150	152	144
(Base 1923–25 = 100)						
Construction contracts, residential	81[b]	70	87	78[b]	70	84
All other	269[b]	268	192	253[b]	271	181
Department store sales, value	129[b]	123	116	138[b]	133	125

	Oct. *1942*	Sept. *1942*	Oct. *1941*
(Base 1939 = 100)			
Index of factory employment[b]:			
All manufacturing	154.8[b]	154.2	139.0
Chemicals	158.0[b]	159.1	150.3
Drugs	140.5[b]	139.1	126.1
Fertilizers	104.3[b]	102.9	97.8
Compressed gases	160.0[b]	161.9	141.4
Index of factory pay rolls[c]:			
All manufacturing	261.0[b]	252.1	186.8
Chemicals	231.0[b]	221.8	187.4
Drugs	179.8[b]	172.9	145.0
Fertilizers	166.5[b]	164.3	122.1
Compressed gases	232.7[b]	229.3	169.7
(Base 1926 = 100)			
Wholesale price indexes:			
All products (except farm products and foods)	95.5[b]	95.5	93.4
Chemicals	96.2	96.3	88.4
Drugs and pharmaceuticals	128.8	128.9	124.1
Fertilizer materials	78.3	78.2	77.3
Purchasing power of the dollar:			
All products (except farm products and foods)	$1.048	$1.048	$1.071
Chemicals	1.040	1.039	1.131
Drugs and pharmaceuticals	0.777	0.776	0.806
Fertilizer materials	1.278	1.279	1.293

[a] Source of statistics in first six items: Federal Reserve Board.
[b] Preliminary figures.
[c] U. S. Department of Labor.

Beyond the Flyleaf

CONTINUED FROM PAGE 1598

shortly after he mailed his manuscript on Nutrition from Java.

Most of the usual subjects are covered. The customary section on sulfur compounds seems to have been replaced by one on phosphorus derivatives. Other less usual topics include: Lignin; The Chemistry of Visual Substances; Avian Biochemistry; Animal Pigments; Plant Tissue Cultures; Immunochemistry; and Microbiology.

Ben H. Nicolet

The Pirotechnia of Vannoccio Biringuccio (1540). Translated by *Cyril Stanley Smith* and *Martha Teach Gnudi*. 476 + xxvi pages. American Institute of Mining and Metallurgical Engineers, 29 West 39th St., New York, N. Y., 1942. Price, $5.00.

This volume has been translated under the sponsorship of the American Institute of Mining and Metallurgical Engineers (Seeley W. Mudd Memorial Fund). Pirotechnia is the earliest printed work in the field of metallurgy.

Gold, silver, copper, and iron have been found in archaeological excavations dated earlier than 3000 B. C. and the alloy bronzes date from about 2000 B. C. Nevertheless, there exists no document covering smelting and its related arts prior to Pirotechnia except a manuscript dated around 1100 written by the monk, Theophilus. In this connection it is interesting to note that De Re Metallica by Agricola (translated by the Hoovers) is dated 1556.

Pirotechnia covers a surprisingly wide field, since it describes not only the smelting and casting of metals and alloys but mining as well. In addition, the manufacture and use of explosives in the arts of peace and war are described in detail. The metals discussed are gold, silver, copper, lead, mercury, tin, iron, antimony, etc. Various minerals are likewise described ranging in character from salt and rock alum to emeralds.

The translation is exceptionally well

CONTINUED ON PAGE 1602

Service in Wartime

Now that the war—for America—is one year old. . . . Now that the Army is on the march and growing every day. . . . Now that Industry is backing up the Army man for man, it is time to take stock.

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Beyond the Flyleaf

CONTINUED FROM PAGE 1600

done, the English version being smooth and fluid. One can well visualize the difficulties encountered by Drs. Smith and Gnudi in converting sixteenth century Italian to mid-twentieth century English. They should be congratulated on their fine work.

So far as the processes described in Pirotechnia are concerned, Harvey S. Mudd, in his foreword, sums this up in one sentence: "Basically the old and the new are not very different." And in further confirmation of this, it is interesting to note that Biringuccio recommends a six-hour day.

All in all, this is a very worth-while publication and is recommended as a distinct addition to anyone's library.

MARX HIRSCH

Strength and Properties of Materials. *John Elberfeld.* 150 pages. Harper & Brothers, 49 East 33rd St., New York, N. Y., 1942. Price, $1.75.

THIS is a condensed treatment of the essential practical information that should be known by those engaged in industrial work. It is to the point and should be easily understood. It should be an excellent text for short courses, for trade schools, and for those preparing for unfamiliar work in war industries.

The book is about equally divided between engineering mechanics subjects (strength of riveted and welded joints, of beams, columns, shafting, etc.) and of the manufacture and properties of the more common engineering materials used in industry. Its appendix has about 20 pages of condensed tables adaptable to the problems most often encountered. It also contains tables of the trigonometric functions.

The instructor could easily supply whatever elaboration might be necessary if certain of the phases of the course should require slightly more detailed explanation or slightly larger scope.

This book is an excellent text for the field it covers. It should be in great demand for present and foreseeable near-term industrial conditions.

E. J. FETTIG



Mellor Química Inorgánica Moderna. *G. D. Parkes,* in collaboration with *J. W. Mellor.* Translated by *E. V. Zappi.* Rev. ed. 910 pages. Librería El Ateneo, Florida 340, Buenos Aires, Argentina, 1942. Price, $32 (Argentine).

THIS is a Spanish translation of the 1939 new and revised edition of Mellor's Modern Inorganic Chemistry, prepared by Enrique V. Zappi, professor in the Universities of Buenos Aires and La Plata, who has followed the original book faithfully.

A. S. T. M. Standards on Petroleum Products

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The 1942 (October) edition includes some 87 standards, as well as several proposed tests not yet adopted by the committee.

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To all petroleum chemists, engineers and research workers in fields involving organic chemistry this long-awaited treatise will prove to be one of the most valuable scientific works published in 1942. It covers in the greatest detail the results of thousands of experiments in isomerization — the phenomenon responsible for the present high-octane motor fuels and other miracles of petroleum research. Nearly half the volume consists of exhaustive tabulations of reaction data which can be found nowhere else in chemical literature, and which will save untold hours of time on the part of those using them. The text is profusely illustrated with structural diagrams, and the entire book is characterized by the thoroughness and critical exactness of its authors.

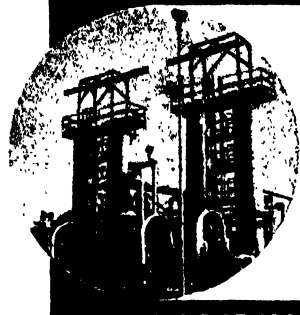
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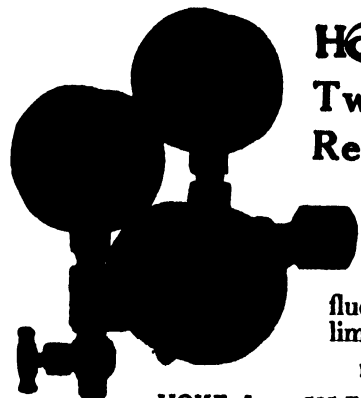


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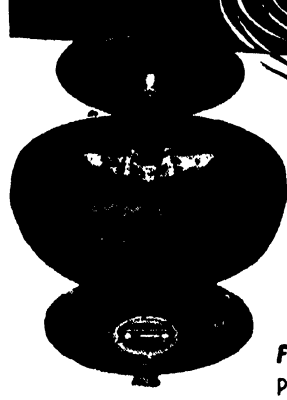
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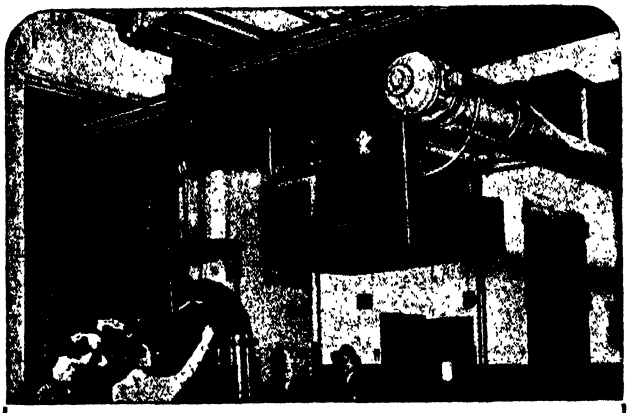
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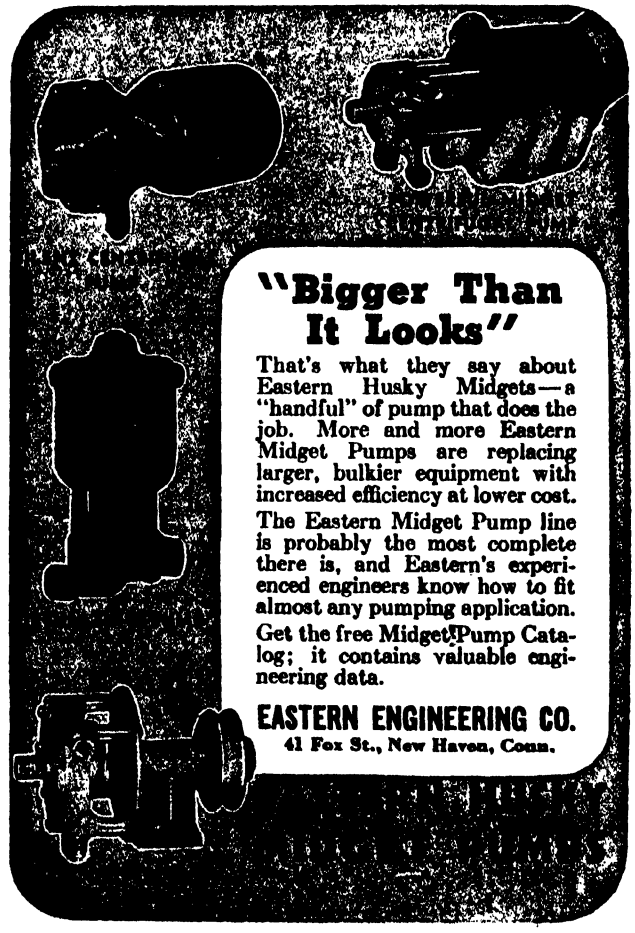


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Anais da Associacao Quimica do Brasil

IN JANUARY 1942 the Chemical Society of Brasil began publication of a quarterly journal, *Anais da Associação Quimica do Brasil*, which is edited by C. E. Nabuco de Araujo, Jr., president of the society for 1941–42, for some years the Brazilian correspondent of CHEMICAL AND ENGINEERING NEWS and very active in South American chemistry. The journal is published in Rio de Janeiro and is written in Portuguese. The first two issues, which have reached us, are of about 80 pages each and contain interesting articles by Brazilian scientists on various phases of chemistry, based on research done in that country. The journal also gives the names of the officers of the society and of its regional and scientific divisions.

Syllabus in Chemistry

THE New York State Science Teachers Association has prepared a proposed revision of its Syllabus in Chemistry, which is intended as a preliminary step toward a more adequate direction of chemistry teaching in New York State. The chairman of the Chemistry Committee of the association is Carl Baisch, Head of the Science Department, Kenmore Senior High School, Kenmore, N. Y.

Totaquine from Cinchona Bark

FORMERLY quinine was extracted from cinchona bark and the rest was thrown away. Now, with the quinine supply in the hands of the Japanese, other medicinal substances in the bark will also be extracted and used for the same purposes as quinine. Totaquine is intended for use by the public, according to reports, to free additional supplies of quinine for fighting men in the malaria-infested countries, and is said to be the equal of quinine in its action.

Guayule Seed

WITH so much attention having been given to synthetic rubber, we have somewhat neglected guayule, but it is encouraging to know that the growth and harvesting of seed have gone on at such a rate that by the end of 1942 250,000 pounds of seed are to be available. Development of successful mechanical methods for harvesting the seeds from the 560 experimental acres planted in the Salinas Valley, California, has made this possible. It is estimated that one pound of seed will produce seedlings for two field acres. Two new nurseries are to be established in California to provide additional seedlings for harvesting in the fall of 1944.

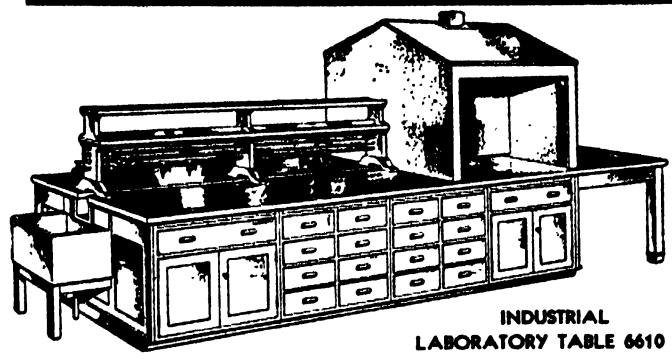
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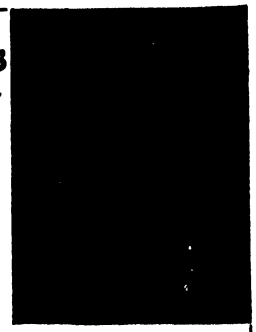
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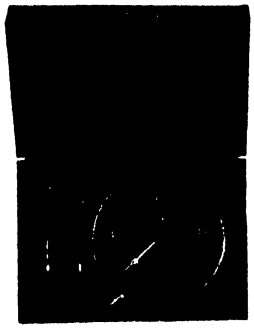


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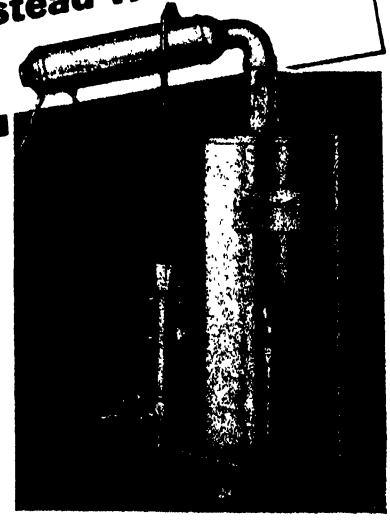
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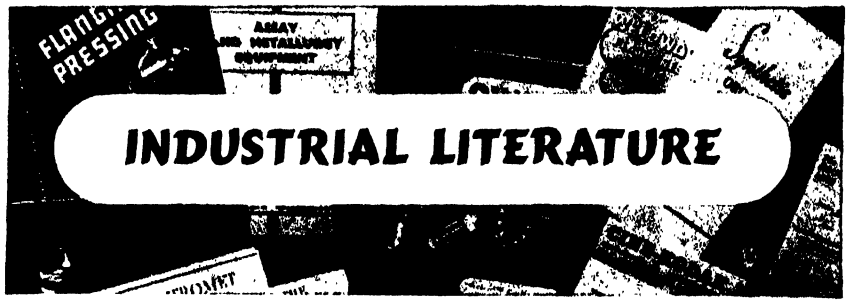
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Listed publications should be requested directly from the company concerned. Use business stationery, mention bulletin numbers, and refer to this journal. Publications will be sent free unless otherwise noted.

Acrawax C. A circular describes means of overcoming blocking and stickiness in coatings containing synthetic resins. *Circular CEN.* GLYCO PRODUCTS Co., 228 King St., Brooklyn, N. Y.

Centrifugal Compressors. A 20-page catalog describes and illustrates Design 9 centrifugal compressors, designed for application wherever blowers of smaller capacity work are required. It contains descriptive data, performance tables, dimension diagrams, unit and installation photographs. *Catalog 386-2 CEN.* B. F. STURTEVANT Co., INC., Hyde Park, Boston, Mass.

Chain Drives. First aid for chain drives, things to be done to keep chain drives running, are included in a 6-page folder. *Folder 1951 CEN.* LINK-BELT Co., 307 North Michigan Ave., Chicago, Ill.

Ignitron-Mercury Arc Rectifiers in the Steel Industry. A 28-page bulletin, profusely illustrated, outlines conversion equipment problems in the steel industry and discusses applications of ignitron-mercury arc rectifiers in meeting these problems. *Bulletin GEA-3827 CEN.* GENERAL ELECTRIC Co., Schenectady, N. Y.

Mixers. Straightline mixers for flocculation tanks at sewage and water-treatment plants are covered by a new 4-page illustrated folder. *Folder 2042 CEN.* LINK-BELT Co., 307 North Michigan Ave., Chicago, Ill.

Power Transformers for Mercury-Arc Rectifiers. A new 4-page bulletin describes and illustrates the interior and exterior construction details of two G-E mercury-arc rectifier transformers which are typical of sizes both above and below 1000 kw. *Bulletin GEA-3883 CEN.* GENERAL ELECTRIC Co., Schenectady N. Y.

Pressure and Temperature Controls. An 8-page booklet describes controls and shows suggested methods of application. *Bulletin 836 CEN.* ALLEN-BRADLEY Co., 1311 South First St., Milwaukee, Wis.

Propeller Fans. A brochure on self-cooled motor-propeller fans, universal blowers, and unit heaters. In 42 duotone photographs a comprehensive bird's-eye view of two wars is given. Blackout ventilation systems, portable fume exhausters, cooling communication apparatus, heating, etc., are all touched upon. *Brochure 305 CEN.* ILG ELECTRIC VENTILATING Co., 2850 North Crawford Ave., Chicago, Ill.

Resin Glues. The fourth edition of a 20-page handbook describes resin glues for all kinds of veneer bonding. *Handbook CEN.* PERKINS GLUE Co., Lansdale, Penna.

Steam Generator. A simple, efficient steam generator which needs only fuel and water for automatic operation is described in this booklet. This flash-type generator works on the principle of jet control, without the use of thermostats or motor-driven pumps, and furnishes feed water in direct proportion to the amount drawn off as steam. Burners are provided for gas or oil fuel; no pit is required; no firebox or electrical connections are needed. Units from 10 to 70 horsepower are available, the small unit developing 150 pounds steam in less than 5 minutes from a cold start. *Booklet 222A CEN.* SUPER MOLD CORP. OF CALIFORNIA, Lodi, Calif.

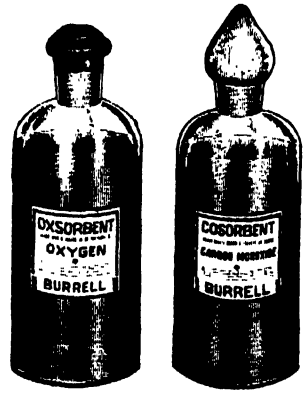
"Unique" Process Equipment. This bulletin is a convenient, file-size reference piece which illustrates and briefly describes the latest developments in, and additions to, the "Unique" line of mixers, sifters, cutters, crushers, grinders, attrition mills, hammer mills, pulverizers, and rubber-reclaiming equipment. It is useful for every phase of the processing industries. *Bulletin 300 CEN.* ROBINSON MFG. Co., 30 Church St., New York, N. Y.

Vinylite Plastics. A 12-page booklet describes vinylite plastics for wire and cable insulation and reviews the advantages of their use from the standpoints of installation, service, and safety. *Booklet CEN.* HALOWAX PRODUCTS DIVISION, UNION CARBIDE AND CARBON CORP., 30 East 42nd St., New York, N. Y.

Water Spray Nozzle. This leaflet describes an "Alfcospray" spray nozzle developed to meet the demand for an all-spray unit. From the shut-off position, a slight turn gives a cone spray of 40°. Further rotation of the head gives cones up to a full curtain of 150°. This permits the covering of a large area with abundant water and, because no solid stream of water is present, there is no means of live current making contact. *Leaflet CEN.* AMERICAN-LAFRANCE-FOAMITE Co., Elmira, N. Y.

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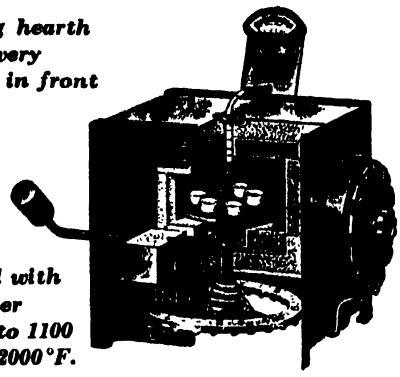
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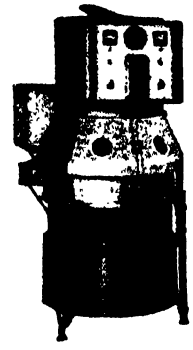
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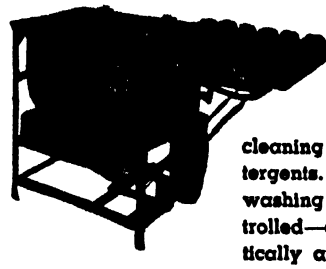
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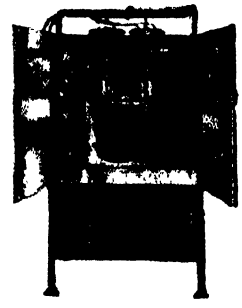
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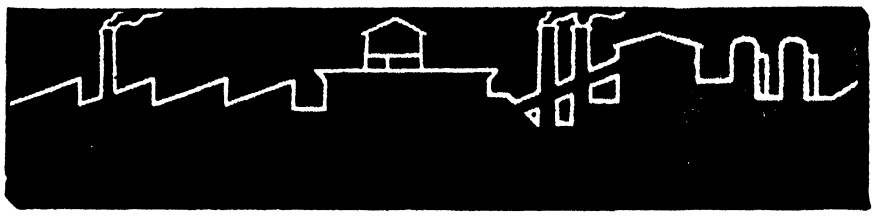
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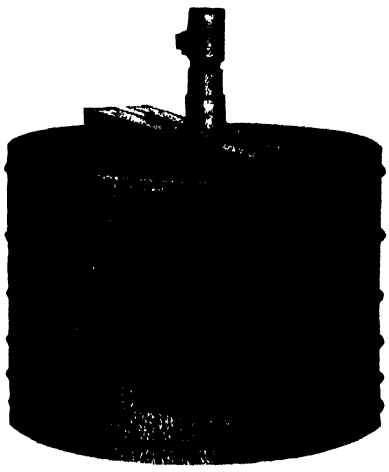
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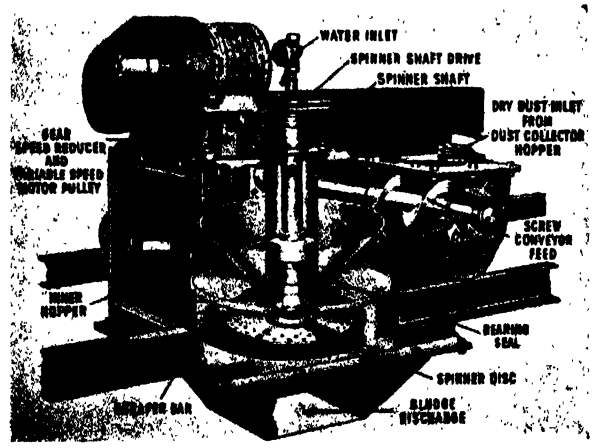
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The American wet disposal unit, introduced in 1941 by the American Foundry Equipment Co., 555 South Byrkit St., Mishawaka, Ind., is designed to make a wet sludge of the dust discharged from the hoppers of dry-type dust collectors by centrifugally mixing the accumulated dust with water or other liquids.



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PLASTIC compositions which can replace steel or other metals in many uses may now be manufactured by incorporating with various cellulosic fibers a resin powder known as Vinsol, extracted by Hercules Powder Co. chemists from the southern pine tree.

This new structural resin plastic is a thermoplastic, fibrous-resin composition, hard, dense, stiff, but with reasonable toughness. It is described as sturdy but lightweight and has low water absorption.

Fibers used in the production process include newsprint, clean cotton rags, sulfite, sulfate, and the like, in straight or

Specify EIMER AND AMEND
TESTED PURITY REAGENTS



Informative Labels

Eimer and Amend was the first reagent chemical manufacturer in America to state the exact amount of impurities on the label —not merely the maximum amount of impurities. That practice has not been changed.

Chemists who employ E & A Tested Purity Reagents can depend upon their purity and the exact analysis on each label.

EIMER AND AMEND
Manufacturing Chemists
635 Greenwich St., New York, N. Y., U.S.A.



ARMSTRONG Low Cost, Efficient Steam Type HUMIDIFIERS . . .

ATTENTION WOOD WORKING DEPARTMENTS

Approximately 1% dimensional change in wood results from every 3% change in moisture content making humidification essential to precision woodworking. Write for full details on the application of Armstrong Humidifiers in this vital, fast-growing industry.

WHEN you install Armstrong Unit Humidifiers you don't have to disrupt plant routine to make complicated hook-ups. Just connect them into existing steam lines with a minimum amount of critical materials.

Armstrong Humidifiers are low in initial cost and operating expense, too. Units capable of handling 40,000 cu. ft. of space or more list at only $100.00 complete, with sensitive Friez humidistat and all accessories. The steam they use is available in most plants for less than $1.00 per ton. *Ask for literature!*

ARMSTRONG MACHINE WORKS
870 MAPLE STREET THREE RIVERS, MICH.

BUILT BY THE MAKERS OF ARMSTRONG STEAM TRAPS

mixed furnish. The Vinsol resin is currently available without priorities.

Lucite in Water Purification

THE transparent chemical chamber of a water purification unit on an emergency "blitz buggy", marketed by Proportioneers, Inc., Providence, R. I., is a recent wartime application of Lucite methyl methacrylate resin.



Long-range enemy bombers are a constant threat to civilian water works. This mobile "blitz buggy" carries equipment for emergency pumping, decontamination, and purification of water for drinking and fire-fighting.

The large chamber of Lucite on the chemical feeder allows the operator to keep a constant check on the chlorine or other chemical being used to purify water.

Induction Heating Speeds Tin Plate Output

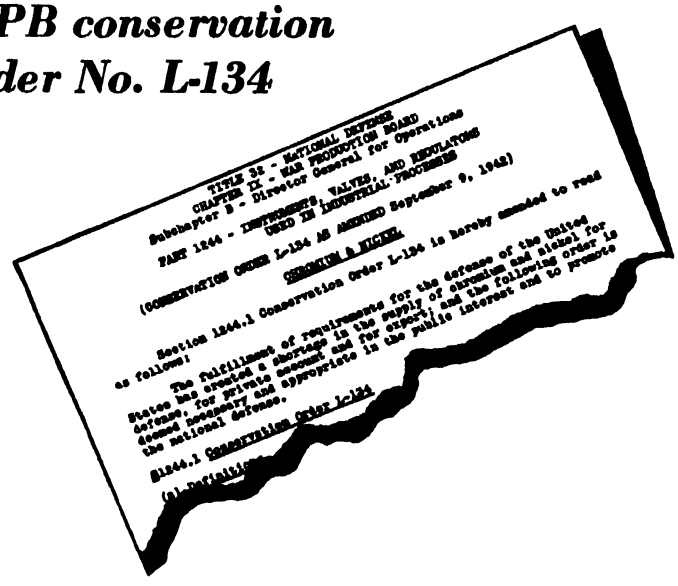
HARNESSED to save dwindling supplies of tin, high frequency induction heating is now producing a smooth, shiny, corrosion-resisting finish on tin plate urgently needed to protect rations for the Nation's armed forces.

Already at work in a big steel mill the first commercial installation is now producing about 60 tons a day of 14-inch strip. The new method was developed by Westinghouse research and radio engineers to boost output to keep pace with rapidly growing requirements of the armed forces and at the same time use a minimum of tin. It was designed as the final step in making electrolytic tin plate, a process which uses only one third as much tin as the system of dipping steel sheets into tanks of this molten metal. The need for a suitable tin fusing was so urgent that research work which would normally require two years was completed in less than six months.

Present electrolytic lines operate at a speed of 500 feet per minute, but in the

How to
CONSERVE
Essential
INSTRUMENT MATERIALS

in compliance with WPB conservation order No. L-134


TITLE 32 - NATIONAL DEFENSE
CHAPTER IX - WAR PRODUCTION BOARD
Subchapter B - Director General for Operations
PART 1244 - INSTRUMENTS, VALVES, AND REGULATORS USED IN INDUSTRIAL PROCESSES
(CONSERVATION ORDER L-134 AS AMENDED September 9, 1942)
CHROMIUM & NICKEL
Section 1244.1 Conservation Order L-134 is hereby amended to read as follows:
The fulfillment of requirements for the defense of the United States has created a shortage in the supply of chromium and nickel for defense, for private account and for export; and the following order is deemed necessary and appropriate in the public interest and to promote the national defense.
§1244.1 Conservation Order L-134

Many valuable solutions to problems arising from the new WPB Conservation Order L-134, which drastically limits the use of various materials for thermocouples, lead wire, thermometer bulbs, protecting tubes, etc., are given in the recently published Wheelco Supplement to Thermocouple Bulletin S2-3. The Supplement S2-3 is the result of an extensive analysis of the WPB Order L-134 by Wheelco Engineers and is published for the benefit of those who will be affected by this order. The Supplement also contains a partial summary of the L-134 Order; the complete L-134 Order as amended September 9, 1942, additions and revisions applying to various items in the Wheelco S2-3 Bulletin and a complete list of Wheelco Sales and Service Engineers who can help you with your instrument problems.

Write for your FREE copy of Supplement to Bulletin S2-3 and the issue of Wheelco Comments which deals with Thermocouple construction and maintenance. Also request copy of Bulletin S2-3 if you do not have a copy.

Wheelco Instruments Co.

851 W. HARRISON STREET CHICAGO, ILL.

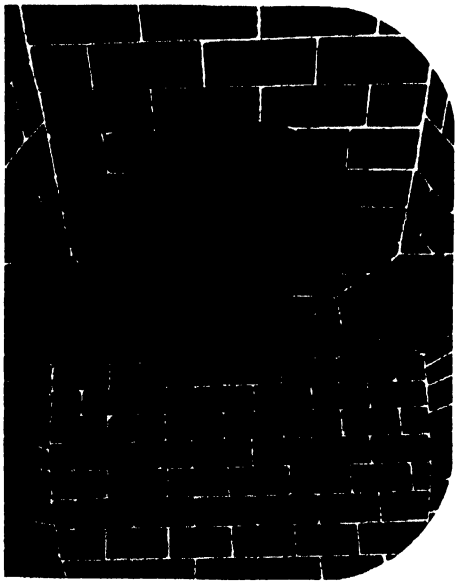
Originator of "Electronic Principle" Temperature Controls

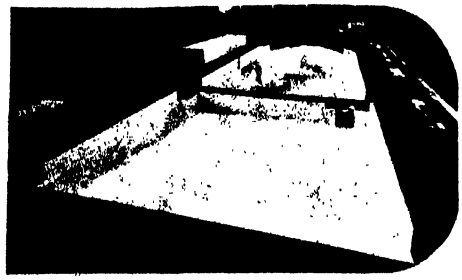
STEBBINS

Properly Engineered & Installed

LININGS







FOR a long time to come processing apparatus must operate efficiently at peak capacity. To do so, the equipment must incorporate materials, engineering skill and workmanship of the highest order.

Chemical engineers have recognized these essential characteristics in Stebbins Linings for successfully handling acid, alkali and corrosive liquids, gases and vapors in a wide range of equipment.

By employing Stebbins Service, plant owners are assured of a design according to latest engineering practice, materials specifically adapted to operating conditions and superior construction. Under a lump sum contract, Stebbins Service provides all materials and labor with an unqualified guarantee of complete satisfaction.

SEMCO

Stebbins Engineering and Manufacturing Company

367 EASTERN BLVD. WATERTOWN, N. Y.

near future it is expected they will go up to 1,000 feet per minute. This new induction heating method of finishing the tin plate could easily match that speed, whereas gas furnaces operate at only 150 feet per minute and the hot oil treatment is extremely slow—about 50 feet a minute.

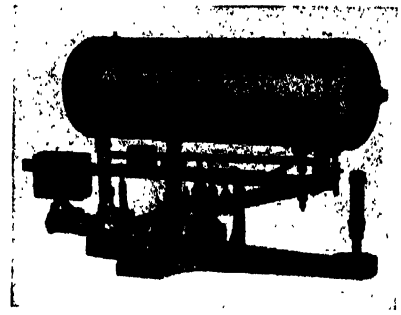
Palladium for Jewelry

COMMENTING on the recent order of the War Production Board restricting the use of platinum in jewelry, Charles Engelhard of Baker and Co., Inc., Newark N. J., concurred in the recommendation concerning the use of gold and palladium intead of platinum. The jewelry trade has available without restriction ample supplies of gold and palladium.

Palladium alloys have the required strength and hardness for rings and for the setting of gems with security, and they can be readily worked in pins and other larger pieces.

Palladium is lighter in weight than platinum, is about as heavy as 14 karat yellow gold and has a current market value approximating 70 per cent that of platinum.

Tilt Trap



A NEW three-valve tilt trap for variable pressures on lifting service has been added to the line of deaerating systems for steam drainage and boiler feeding made by the W. M. Acker Organization, Inc., Cleveland, Ohio. The sturdy construction of female trunnion supported on center bearings, and male steam and water ends which are relieved of any weight carried on the packing, is the same as that used on the basic Acker return and non-return tilt traps.

Cellulose Nitrate in War

OLDEST of all the plastics and a veteran of World War I, cellulose nitrate is back in uniform in this war, the Plastics Department of E. I. du Pont de Nemours & Co. reports.

Made first by Hyatt in 1869 as a new hard material for billiard balls, cellulose nitrate plastic today is one of three essentials of modern war manufactured from the same base—nitrocellulose. By varying the degree of nitration and the ingredients subsequently added, chemists derive smokeless powder, plastics, or lacquers.

Smokeless powder is a military propellant. Cellulose nitrate plastics are used for transparent enclosures of trainer planes, auxiliary primers for munitions, and a host of things military. Nitrocellulose lacquers protect ammunition, planes and tanks against sea water, sun, and weather.

CONTINUED ON PAGE 1615

CHEMICAL MARKET PRICES

November 27, 1942

Compiled from weekly current price listings in the *Oil, Paint, and Drug Reporter*, with permission of the publisher under its copyright. These prices, unless otherwise specified, are those prevailing in the New York market for technical grades in usual large commercial quantities.

Acetaldehyde, drums, c/l., wks.	lb.	11
Acetamide, tech., kegs, 500-lb. lots, works	lb.	.30
Acetanilide, tech., powd., bbls.	lb.	.27
Acetic anhydride, drums, c/l., frt. allowed	lb.	.11½
Acetone, c. p., drums, c/l., dlvd.	lb.	.08½
Acetophenetidin, bbls., 1000 lbs.	lb.	1.00
Acetophenone, drums, 100 lbs.	lb.	1.55
Acid, abietic, drums, c/l.	lb.	.08¾
Acetic, 28%, bbls., c/l.	100 lbs.	3.38
56%, bbls., c/l.	100 lbs.	5.58
Glacial, synth., drums, c/l.	100 lbs.	9.15
Glacial, U. S. P., drums, works	100 lbs.	10.95
Acetylsalicylic, U. S. P., bbls.	lb.	.40
Anthranilic, tech., bbls.	lb.	.95
Battery, cbys., c/l., E. wks.	100 lbs.	1.60
Benzoic, tech., bbls.	lb.	.43
Boric, tech., gran., bags	ton	99.00
Butyric (99%), drums, c/l., wks.	lb.	.22
Chloroacetic, mono-, tech., bbls. wks.	lb.	.17
Chlorosulfonic, drums, c/l., wks.	lb.	.03
Chromic, 99%, drums	lb.	.16¼
Cinnamic, bottles	lb.	3.50*
Citric, cryst., bbls., c/l.	lb.	.20
Cresylic, H. B., 210–215°, drums, c/l., wks., frt. equal	gal.	.81
Formic, 90%, cbys., f. o. b. works, c/l.	lb.	.10½
Gallic, tech., bbls.	lb.	1.10
Hydriodic, 57%, 5-lb. bot.	lb.	2.90
Hydrobromic, 34%, cbys.	lb.	.35
Hydrochloric, 20°, tank, wks.	100 lbs.	1.75
Hydrofluoric, 30%, bbls., wks.	lb.	.06
60%, lead cbys.	lb.	.14
Hydrofluosilicic, 30%, bbls., wks.	lb.	.08
Hypophosphorus, U. S. P., 30%, 5-gal. demis.	lb.	.75
Lactic, dark, 22%, bbls.	100 lbs.	2.90
Light, 22%, bbls., wks.	100 lbs.	3.90
Maleic, powd., drums	lb.	.30
Mixed, tanks, wks.	N unit, lb.	.05
	S unit, lb.	.0085
Naphthenic, 220–230, drums	lb.	.13
Nitric, c. p., cbys.	lb.	.13
36°, cbys., c/l., wks.	100 lbs.	5.00
Oxalic, bbls., wks.	lb.	.11¼
Phosphoric, U. S. P., 50%	lb.	.10½
Picramic, kegs	lb.	.65
Picric, bbls.	lb.	.35
Pyrogallic, tech., bbls.	lb.	1.45
Salicylic, tech., bbls.	lb.	.33
Stearic, distilled, d. p., bags, dlvd.	lb.	.14
Sulfanilic, tech., 250-lb. bbls.	lb.	.17
Sulfuric, 66°, cbys., c/l., E. wks.	100 lbs.	1.50
66°, tanks, E. wks.	ton	16.50
60°, tanks, E. wks.	ton	13.00
Oleum, 20%, tanks, E. wks.	ton	19.50
Tannic, tech., bbls.	lb.	.71
Tartaric, U. S. P., cryst., bbls.	lb.	.70½
Tungstic, pure, 100-lb. pkg.	lb.	2.86
Alcohol, ethyl, 190 proof, from molasses, drums, c/l.	gal.	11.99
Amyl, from pentane, tanks	lb.	.131
Butyl, normal, tanks, frt. allowed	lb.	.12½
Cinnamic, bottles	lb.	3.00
Denatured, C. D. 14, drums, c/l., wks., E.	gal.	.65
Diacetone, tech., drums, c/l.	lb.	.11
Furfuryl, tech., drums, c/l., wks.	lb.	.20
Isobutyl, ref., drums, works	lb.	.0860
Alcohol, isopropyl, ref., 91%, drums, c/l., f. o. b. dest	gal.	.39
Wood, *see* Methanol		
Aldol, 95%, drums, c/l., wks.	lb.	.12
Alpha-naphthol, bbls.	lb.	.52
Alpha-naphthylamine, bbls.	lb.	.32
Alum, ammonia, lump, bbls., wks.	100 lbs.	4.25
Chrome, bbls.	lb.	.12½
Potash, lump, bbls., wks.	100 lbs.	4.50
Soda, bbls., wks.	100 lbs.	3.25
Aluminum, metal, 98–99%, drums, c/l.	lb.	.15
Chloride, anhyd., commercial, drums extra, c/l., wks.	lb.	.08
Stearate, bbls., c/l.	lb.	.23
Sulfate, comm'l, bags, c/l., wks., frt. equal	100 lbs.	1.15
Iron-free, bags, wks.	100 lbs.	1.75
Ammonia, anhydrous, fertilizer, f. o. b. wks., frt. equalized	ton	90.00
Pure, cyls.	lb.	.16
Ammonia, aqua, 26°, tanks (on NH_3 content), f. o. b. wks.	lb.	.04
Ammonium bicarbonate, drums	lb.	.0564
Bifluoride, bbls.	lb.	.16
Bromide, bbls.	lb.	.31
Carbonate, tech., bbls.	lb.	.08¼
Chloride, gray, bbls.	100 lbs.	5.50
U. S. P., gran., bbls	lb.	.10
Iodide, 25-lb. jars	lb.	3.65
Linoleate, 80%, anhyd., bbls.	lb.	.12
Nitrate, tech., bags, c/l., wks.	100 lbs.	4.35
Oleate, bbls.	lb.	.14
Oxalate, kegs	lb.	.23
Persulfate, cases	lb.	.25½
Phosphate, dibasic, tech., bbls.	lb.	.07¼
Sulfate, bulk, c/l., f. o. b. cars, ports contract	ton	29.20
Sulfide, liq. 40–45%, basis 100%, tanks, dlvd.	lb.	.07½
Amyl acetate, from pentane, tanks, frt. allowed	lb.	.14½
Chloride, mixed, tanks, wks.	lb.	.06
Mercaptan, drums, l. c. l., wks.	lb.	1.10
Oleate, drums, l. c. l., wks.	lb.	.31
Stearate, drums, l. c. l., wks.	lb.	.32½
Amylene, tanks, wks.	lb.	.09
Anilin oil, drums	lb.	.15
Anthraquinone, subl., bbls.	lb.	.70
Antimony, chloride, soln., cbys.	lb.	.17
Needle, Bolivian, 67%	lb.	.18½
Oxide, bags, c/l.	lb.	.15
Salts, 65%, bbls.	lb.	.40
Argols, test 75–80%, basis 100%, f. o. b. Spanish ports	100 kilos	105.00
Arsenic, metal, kegs	lb.	No prices
White, c/l., kegs	lb.	.04
Arsenous chloride, cans	lb.	4.85
Barium carbonate, natural, 99%— 200 mesh, bags, c/l., wks.	ton	43.00
Chloride, tech., cryst., bgs., c/l.	ton	77.00
Dioxide, drums, wks.	lb.	.10
Hydroxide, bbls., wks.	lb.	.06
Nitrate, casks	lb.	.11
Barytes, floated, 350-lb. bbls., wks.	ton	27.65
Benzaldehyde, tech., drums	lb.	.45
Benzidine base, bbls.	lb.	.70
Benzol, tanks, frt. allowed E. of Omaha	gal.	.15
Benzoyl chloride, carboys	lb.	.23
Benzyl acetate, F. F. C., drums	lb.	.59*
Beta-naphthol, tech., bbls.	lb.	.23
Beta-naphthylamine, tech., kegs	lb.	.51
Bismuth, metal, ton lots	lb.	1.25
Bismuth nitrate, cans	lb.	1.30
Oxychloride, kegs	lb.	3.10
Subnitrate, powd., barrels	lb.	1.20
Blanc fixe, dry, bags, c/l.	ton	60.00
Bleaching powder, drums, wks.	100 lbs.	2.25
Bone black, 4, bbls., c/l., frt. allowed E	lb.	.11
Borax, tech., gran., bulk, c/l., frt. allowed	ton	41.50
Bordeaux mixture, drums	lb.	.11
Bromine, cases	lb.	.25
Bromoform, cbys.	lb.	1.42
Butyl acetate, drums, c/l., frt. allowed	lb.	.14½
Aldehyde, drums, l. c. l.	lb.	.16½
Lactate, drums	lb.	.26½
Stearate, drums	lb.	.31
Cadmium, metal, ingots, cases	lb.	.90
Bromide, 25-lb. jars	lb.	1.65
Sulfide, boxes	lb.	1.10*
Caffeine, 100-lb. drums, 10,000 lbs. or more	lb.	2.60
Calcium acetate, bags	100 lbs.	3.00
Arsenate, bgs., c/l.	lb.	.07
Carbonate, precip., bags, 50 lbs., c/l., wks.	lb.	.02½
Chloride, bags, flake, c/l., dlvd.	ton	18.50
Gluconate, U. S. P., bbls., 150 lbs.	lb.	.52
Phosphate, dibasic, 38–40% P_2O_5, bags, Atlan. pts.	unit-ton	No prices
Tribas, bbls.	lb.	.0635
Calomel, bbls., kegs, 50 lbs. or more	lb.	2.95
Camphor, synthetic, dom., tech., gran., drums, ton lots	lb.	.42
Carbasole, 95%, drums, ton lots, wks.	lb.	.70
Carbon bisulfide, drums, c/l.	lb.	.05
Black, reg., uncomp., bgs., c/l., works	lb.	.03625
Dioxide, liq., cyl.	lb.	.06
Tetrachloride, drums, c/l., frt. allowed	gal.	.73
Casein, dom., 20–30 mesh, bags, c/l.	lb.	.19
Cerium oxalate, bbls., wks.	lb.	.35
Charcoal, willow, powd., bbls.	lb.	.06
China clay, bulk, c/l., wks.	ton	7.60
Chloral hydrate, drums	lb.	.90
Chlorine, liq., c/l., cyl., dlvd.	lb.	.05¼
Tanks, wks., frt. equal	100 lbs.	1.75
Chlorobenzene, mono-, drums	lb.	.07
Chloroform, tech., drums	lb.	.20
Chromium acetate, 24%, powd., bbls.	lb.	.22
Coal tar, crude, bbls., c/l., wks.	bbl.	8.25
Cobalt oxide, black, kegs	lb.	1.84
Copper carbonate, 52–54%, bbls.	lb.	.19½
Chloride, bbls.	lb.	.23¼
Cyanide tech., bbls.	lb.	.34
Metal, elec.	lb.	.12
Oxide, black, bbls., tons, wks.	lb.	.19½
Sulfate, bbls., c/l., wks.	100 lbs.	5.15
Copperas, cryst., bulk, c/l., wks.	ton	14.00
Cream of tartar, bbls.	lb.	.57½
Cresol, U. S. P., drums, c/l., wks.	lb.	.10¾
Crotonaldehyde, 97%, c/l., wks.	lb.	.15
Cyanamide, 21% N, pulvd., works, contracts	Unit-ton	1.52½*
Diamylamine, drums, c/l., wks.	lb.	.61
Diamylene, tanks, wks.	lb.	.09½
Diamyl phthalate, tanks	lb.	.21
Diatomaceous earth, dom., bags, c/l., Pacific Cst.	ton	22.00

Dibutylamine, drums, l. c. l., wks.	lb.	.64
Dibutylphthalate, drums, c/l., dlvd.	lb.	.21
Tartrate, drums	lb.	.92
Dichloroethyl ether, drums, c/l., wks.	lb.	.15
Diethanolamine, drums, c/l., wks.	lb.	.23½
Diethylaniline, drums	lb.	.40
Diethylene glycol, drums, c/l., wks.	lb.	.14
Monobutyl ether, drums, wks.	lb.	.22½
Monoethyl ether, drums, c/l., wks.	lb.	.14½
Diethyl phthalate, drums, c/l.	lb.	.22
Sulfate, tech., drums, wks.	lb.	.15
Diglycol oleate, light, bbls.	lb.	.17
Dimethylaniline, drums	lb.	.23
Dimethyl phthalate, drums, c/l., dlvd	lb.	.20
Dinitrobenzene, tech., drums	lb.	.18
Dinitrochlorobenzene, bbls.	lb.	.14
Dinitronaphthalene, bbls.	lb.	.35
Dinitrophenol, bbls.	lb.	.22
Diphenyl, bbls., c/l., wks.	lb.	.15
Diphenylamine, bbls.	lb.	.25
Diphenylguanidine, bbls.	lb.	.35
Epsom salt, tech., bags	100 lbs.	1.80
Ether, concn., drums	lb.	.11
Nitrous, bots., 100 lbs.	lb.	.93
Ethyl acetate, 85–90%, tanks, frt. allowed	lb.	.11
Acetoacetate, drums, c/l., wks.	lb.	.37½
Bromide, drums	lb.	.50
Chloride, drums	lb.	.18
Formate, drums	lb.	.27½
Methyl ketone, drums	lb.	.09
Ethylene dichloride, drums, c/l., wks., frt. allowed	lb.	.0742
Glycol, drums, c/l.	lb.	.14½
Monobutyl ether, drums, wks.	lb.	.16½
Monoethyl ether, drums, wks.	lb.	.14½
Monoethyl ether acetate, drums, wks.	lb.	.11½
Monomethyl ether, drums, wks.	lb.	.15½
Feldspar, 20 mesh, bulk, wks.	ton	9.75
Film scrap colors, dk., cs., 1000 lbs., E. wks.	lb.	.13½
Fluorspar, 95%, bags, f. o. b. mines	ton	36.40
Formaldehyde, bbls., c/l.	lb.	.05½
Fuller's earth, bags, c/l., mines	ton	8.50
Furfural, tech., drums, contract, works	lb.	.10
Glauber's salt, bbls., c/l.	100 lbs.	1.05
Glycol phthalate, drums	lb.	.38
Stearate, drums	lb.	.26
Hexamethylenetetramine tech., drums	lb.	.32
Hydrogen peroxide, 100 vol., cbys., c/l.	lb.	.16
Hydroquinone, kegs	lb.	.90
Indigo, synth., liq., bbls.	lb.	.16½
Iodine, resubl., jars	lb.	2.00
Iodoform, drums, 100 lbs.	lb.	3.95
Iron acetate, N. F. IV, cbys.	lb.	.17
Iron chloride, tech., cryst., bbls., wks., frt. allowed	lb.	.05
Isopropyl acetate, tanks, frt. allowed	lb.	.10
Lead acetate, white, broken	lb.	.12½
Arsenate, bbls.	lb.	.11
Metal, N. Y.	1 lb.	.0650
Oxide, litharge, bbls., 20-ton lots.	lb.	.0800
Peroxide, powd., tech	lb.	.23
Red, bbls., 20-ton lots	lb.	.09
Sulfate, bbls.	lb.	.0725
White, basic carb., bbls.	lb.	.0825
Lecithin, edible, drums, c/l.	lb.	.28½
Tech., dms., c./l.	lb	.26
Lime, live, chemical, bulk, wks.	ton	7.00
Lime-sulfur, dry, bags, c/l.	lb.	No prices
Lithopone, ordinary, bbls.	lb.	.04½
Magnesite, calcined, dom., bags	ton	84.00
Magnesium carbonate, tech., bags, c/l.	lb.	.06¼
Chloride, drums	ton	32.00
Fluosilicate, cryst., bbls.	lb.	.18
Oxide, light, bbls.	lb.	.26
Manganese chloride, bbls.	lb.	.14*
Dioxide, 85–90%, bbls., c/l., wks.	ton	74.00
Sulfate, anhyd., bbls., wks.	lb.	.11¼
Mannitol, commercial, bbls., wks.	lb.	.35
Menthol, synthetic, cases	lb.	6.00
Mercury bichloride, cryst., drums, 50 lbs or more	lb.	2.39
Mercury, flasks, 76 lbs., mines	flask	191.00
Meta-phenylenediamine, kegs	lb.	.65
Meta-toluylenediamine, kegs	lb.	.70
Methanol, synthetic, drums, frt. allowed, c/l.	gal.	.34½
Tanks, frt. allowed	gal.	.28
Methyl acetate, 97–99%, tanks	gal.	.09½
Chloride, cylinders	lb.	.32
Formate, l. c. l., drums	lb.	.89
Hexylketone, drums, tech., wks.	lb.	.60
Salicylate, drums	lb.	.35
Monoamylamine, drums, c/l., wks.	lb.	.61
Monobutylamine, drums, l. c. l., wks.	lb.	.51
Monoethanolamine, drums, wks.	lb.	.24
Naphthalene, crude, dom., 74 deg., bags, c/l., wks.	100 lbs.	2.75
Nickel salt, single, bbls.	lb.	.18
Niter cake, bulk	ton	16.00
Nitrobenzene, drums	lb.	.08
Nitrocellulose, ester-sol., 30-35, ½, ½ sec., bbls, wks.	lb.	.26
Nitromethane, drums, l. c. l., wks.	lb.	.25
Octanol, normal, drums	lb.	.85
Oil, castor, No. 3, tanks	lb.	.12¼
China wood, dms.	lb.	.39
Coconut, crude, tanks	lb.	.0835
Cod, Newf., bbls.	gal.	.90
Corn, crude, tanks, mills	lb.	.12¾
Cottonseed, cooking, bbls.	lb.	.16¾
Linseed, raw, tanks	lb.	.1220
Menhaden, crude, tanks, f. o. b. Baltimore	gal.	.0880
Neat's-foot, pure, bbls.	lb.	.19¼
Oiticica, bbls.	lb.	.25
Oleo, No. 1, bbls.	lb.	.13¼
Olive oil, denat., bbls.	gal.	3.50
Edible, Calif., drums	gal.	4.00
Palm, Niger, bbls.	lb.	.0825
Peanut, crude, tanks	lb.	.13
Perilla, drums	lb.	.2450
Rapeseed, denatured, c. i. f.	gal.	.1150
Red, bbls.	lb.	.11¾
Soy bean, crude, tanks	lb.	.12¼*
Sperm, 38°, bbls.	lb.	.1301
Whale, bbls., natural, refined	lb.	.1070*
Ortho-dichlorobenzene, drums	lb.	.06
Ortho-nitrochlorobenzene, kegs	lb.	.15
Ortho-nitrotoluene, drums	lb.	.09
Ortho-toluidine, bbls.	lb.	.19
Para dichlorobenzene, drums, c/l.	lb.	.11
Para-formaldehyde, drums	lb.	.23
Paraldehyde, tech., drums	lb.	.12
Para-nitraniline, drums	lb.	.45
Para-nitrochlorobenzene, drums	lb.	.15
Para-nitrotoluene, bbls.	lb.	.30
Para-phenylenediamine, bbls.	lb.	1.25
Para-toluidine, bbls.	lb.	.48
Paris Green, 250-lb. kegs	lb.	.24
Perchlorethylene, drums, c/l., wks.	lb.	.08
Phenol, drums, c./l., wks.	lb.	.12½
Phenolphthalein, yellow, drums, ton lots	lb.	.80
Phenylethyl alcohol, bottles	lb.	2.10
Phloroglucinol, tech., tins, wks.	lb.	15.00
C. P., tins, wks.	lb.	20.00
Phosphorus, red, cases	lb.	.40
Oxychloride, 175-lb. cylinders	lb.	.15
Trichloride, cyl.	lb.	.15
Phthalic anhydride, bbls., c/l.	lb.	.14½
Platinum, metal, solid	oz.	36.00
Potash, caustic, solid, drums	lb.	.06¼
Potassium acetate, tech., bbls.	lb.	.28
Bicarbonate, gran., bbls.	lb.	.19
Bichromate, casks, c/l., wks.	lb.	.09½
Bromide, U. S. P., gran., bbls.	lb.	.27
Carbonate, 80–85%, calc., casks.	lb.	.06½
Chlorate, cryst., kegs	lb.	.11*
Chloride, tech., cryst., bgs.	lb.	.08*
Cyanide, drums	lb.	.55
Meta-bisulfite, bbls.	lb.	.18
Muriate, fert., bulk	K_2O unit	.53½
Permanganate, tech., drums	lb.	.19¾
Prussiate, red, bbls.	lb.	.70
Yellow, casks	lb.	.17
Pyridine, denat., drums	gal.	1.71
Pyrocatechin, c. P., drums	lb.	2.15
Quinine, 100-oz. caps	oz.	.97½
Resorcinol, tech., kegs	lb.	.68
Rochelle salt, powd., bbls.	lb.	.43½
Saccharin, drums	lb.	1.45
Salt cake, bulk, wks.	ton	15.00
Saltpeter, gran., bbls.	100 lbs.	8.20
Silica, amorph., 96%, 325 mesh, bags, c/l., wks.	ton	17.00
Silver nitrate, vials	oz.	.32½
Soda, ash, 58%, light, paper bags, contract, wks.	100 lbs.	1.05
Caustic, 76%, solid, drums, contract, wks.	100 lbs.	2.30
Sodium acetate, flake, 60%, bbls.	lb.	.05
Alginate, drums	lb.	.79
Antimoniate, bbls.	lb.	.15
Benzoate, U. S. P., bbls.	lb.	.46
Bicarbonate, U. S. P., powd., bbls., c/l., wks.	100 lbs.	1.85
Bichromate, c/l., wks.	lb.	.07½
Bisulfite, bbls.	100 lbs.	3.00
Bromide, U. S. P., bbls.	lb.	.27
Chlorate, cryst., bags	lb.	.06¼
Chloride, bags	ton	15.70
Cyanide, 96–98%, dom., drums.	lb.	.14
Fluoride, white, 90%, bbls., c/l., frt. alld.	lb.	.08
Metallic, untrimmed bricks, drums, f. o. b. Niagara Falls.	lb.	.15½
Metasilicate, gran., bbls.	100 lbs.	2.50
Naphthionate, bbls.	lb.	.50
Nitrate, crude, bulk, works.	ton	27.00
Nitrite, bbls.	lb.	.06¾
Perborate, bbls.	lb.	.14¾
Phosphate, disodium, cryst., bags, c/l., wks.	100 lbs.	2.55
Phosphate, trisodium, bags, c/l., wks.	100 lbs.	2.70
Picramate, kegs	lb.	.65
Prussiate, yellow, bbls.	lb.	.11
Silicate, drums, c/l., 40°	100 lbs.	.80
Silicofluoride, dom., bbls.	lb.	.09
Stannate, drums	lb.	.33½
Sulfate, anhyd., bags	100 lbs.	1.70
Sulfide, cryst., bbls.	100 lbs.	2.40
Solid, 60%	100 lbs.	3.15
Sulfocyanide, c. P., bbls.	lb.	.55
Thiosulfate, reg., cryst., bgs.	100 lbs.	2.25
Tungstate, tech., kegs	lb.	No prices
Strontium carbonate, tech., bbls.	lb.	.25*
Nitrate, bbls.	lb.	.07¾
Sulfur, bulk, mines	ton	16.00
Chloride, drums	lb.	.03
Dioxide, commercial, cyl., wks.	lb.	.07
Tetrachloroethane, 50-gal. drums.	lb.	.08
Thiocarbanilid, bbls.	lb.	.24
Tin, Straits	lb.	.52
Crystals, bbls.	lb.	.39
Oxide, bbls.	lb.	No prices
Tetrachloride, anhydrous, drums, bbls.	lb.	No prices
Titanium dioxide, bags	lb.	.14¾
Toluene, tanks	gal.	.28
Triamylamine, drums, c/l., wks.	lb.	.98
Triamylborate, drums, l. c. l., wks.	lb.	.33
Tributylamine, drums, c/l., wks.	lb.	.78
Trichloroethylene, drums, wks, frt. allowed	lb.	.08
Tricresyl phosphate, tech., drums.	lb.	.25
Triethanolamine, drums, c/l., wks.	lb.	.19
Triphenyl phosphate, barrels	lb.	.31
Tungsten, tech., powder	lb.	2.60
Urea, dom., 46 + %N., bags, f. o. b. wks. or seaboard	ton	80.00
Vanillin, 25-lb. tins	lb.	2.35
Whiting, comm., dry-grd., bags, c/l., wks.	ton	18.00
Xylene, 10°, tanks	gal.	.30
Xylidine, drums	lb.	.35
Zinc ammonium chloride, bbls.	lb.	.0565
Chloride, tech., fused, drums.	lb.	.05
Dust, bbls., c/l.	lb.	.1035
Metal slabs, at N. Y.	lb.	.0866
Oxide, Amer., bags	lb.	.0725
Stearate, tech., bbls.	lb.	.30
Sulfate, cryst., bgs., c/l., wks.	100 lbs.	3.60

* Nominal.

EMPLOYMENT INFORMATION

RATES to be paid in advance. Standard setting 5c a word, minimum ge $2.00 each; include 8 words for box address. Exceptions see ⟶ lay, $10.00 per column inch. 2 inches maximum, larger units at regular y unit rates. No discounts or allowances.

advertisements with remittance to INDUSTRIAL AND ENGINEERING CHEMISTRY, 332 West 42nd St., New York, N. Y., to reach there not later than 10:00 A.M. on the 5th and 20th, closing dates for editions of CHEMICAL and ENGINEERING NEWS of the 25th and 10th, respectively. Insertions made in order of receipt provided necessary remittances are complete. EMPLOYERS are requested to mention in their announcements the section of the country in which the open position is located to ensure replies only from those who are geographically available.
In printing these advertisements the SOCIETY assumes no obligations as to qualifications of prospective employees or responsibility of employers.

UNEMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking employment for themselves are allowed in one calendar year 3 announcements free (one per issue) set in standard style and limited to 50 words each, including 8-word box address, and 3 additional standard announcements at 50% of regular rate. Further announcements and excess words at full rate.

EMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking new positions are permitted 3 standard announcements during the calendar year at 50% of the regular rate—include 8 words for box address.

EMPLOYERS seeking chemists and chemical engineers are permitted 3 standard announcements, not to exceed 50 words each including box address and not more than one per issue, during the calendar year without charge, provided they agree in writing to acknowledge all replies (excess words 5c each), otherwise full rate applies.

The AMERICAN CHEMICAL SOCIETY is vitally interested in the welfare of its members and in seeing that the chemical industry is manned with competent chemists and chemical engineers. These pages are part of our service in that connection. In addition most of the larger sections of the AMERICAN CHEMICAL SOCIETY and several of the smaller ones have active employment committees. Local section secretaries in your area will inform you as to any employment aids that may be available locally.

An Employment Clearinghouse is operated at each national meeting of the SOCIETY for the purpose of bringing together representatives of industry looking for chemists and members and student affiliates in attendance wishing to make such contracts. For further details, consult the preliminary and final programs as printed in the NEWS EDITION prior to each meeting.

In the New York area, special employment facilities are offered by the Employment Bureau of the Chemist's Club, 52 East 41st St., New York, N. Y. In the Chicago area, the Chicago Section maintains an employment service at 505 N. Michigan Avenue, Chicago, Ill.

Those replying to announcements should be careful to send copies and not original documents. Advertising circulars will not be forwarded and to that end all letters will be opened at the forwarding office.

SITUATIONS OPEN

Those announcements in which the letter "P" is part of the address key have paid in full and are not committed to acknowledge replies. The Society regards acknowledgment by employers of all applications as an act of common courtesy but can assume no responsibility for their failure to do so.

EXECUTIVES, CHEMICAL ENGINEERS AND CHEMISTS with exceptional backgrounds of experience should use our confidential and individual method of contacting responsible employers. No limit to territory. We negotiate all overtures. Established 1915. The National Business Bourse, 20 W. Jackson Blvd., Chicago, Ill.

CHEMIST WITH some petroleum experience. Needed in Chicago area for development of petroleum products and rust preventives. State age, draft status, degree, and salary desired in opening letter.
Box 18-NP-11, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST WANTED—Instructorship or Assistant Professorship in Southern Medical School for the duration. Give details concerning training, experience, personal history, references, and date of availability.
Box 42-N-11, Ind. & Eng. Chem., Easton, Pa.

LACQUER CHEMIST with several years' experience in lacquer formulation or application for development work on protective coatings applied to metals. Eastern Pennsylvania location. In reply, state salary desired, draft status, etc.
Box 32-TP-11, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST as library assistant and for abstracting, carding, filing and necessary typing in Western New York research laboratory. Translating German and French desirable. Describe training, experience and salary desired. Submit photograph.
Box 10-N-12, Ind. & Eng. Chem., Easton, Pa.

WANTED: Instrument Expert by leading aircraft engine manufacturer in East. Engineering training and calibration experience required, not necessarily in aircraft engines. Must be able devise new and note nearly accurate methods of temperature and pressure measurement and improve existing methods. No application sought from persons employed in war production.
Box 11-N-12, Ind. & Eng. Chem., Easton, Pa.

WANTED: Research Chemist, girl for laboratory in Rhode Island. Inorganic work closely related to the war effort. Apply giving full details.
Box 13-NP-12, Ind. & Eng. Chem., Easton, Pa.

WOMAN BIOCHEMIST with B.S. or M.S. degree wanted for research assistantship in New England college. Position available January first. Salary $1000 for ten months. Some knowledge of physiology desirable. Send complete information including transcript of record, names of references, small photograph.
Box 19-N-12, Ind. & Eng. Chem., Easton, Pa.

RESEARCH ASSISTANT, preferably college graduate familiar with chemical operations, to assist in physico-chemical investigations in laboratory located in Washington, D. C. Salary and advancement commensurate with ability. Give full particulars; education, experience, race, religion, age and draft status. Enclose recent photograph. An especially good opportunity for a man of some technical ability who is not subject to draft.
Box 21-N-12, Ind. & Eng. Chem., Easton, Pa.

SALES ENGINEER FOR CHEMICAL EQUIPMENT

We have an unusual opening in our New York Office for a young sales engineer with a sound technical background—with or without previous experience in selling chemical and process equipment. He must have imagination and possess a good sales personality. Our organization is one of the oldest and best known in the industry and is "going places."

Tell us all about yourself: your age, previous experience if any, etc. We'll make the salary attractive.

Box 22-NP-12, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER to take charge of established plant manufacturing organic chemicals near New York City. Permanent position with attractive future. Must have 10-15 years' experience in plant management and chemical operations. Must have knowledge of operations of chemical equipment. Must have ability to handle men. Write, giving detailed history of experience. Reply will be kept in confidence.
Box 23-N-12, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, man (with deferment) or woman with basic training in analytical and organic chemistry for laboratory work. Research opportunity probable. War industry, Metropolitan area. Give details of education and experience, salary desired.
Box 27-N-12, Ind. & Eng. Chem., Easton, Pa.

METALLURGIST—acquainted with metallography, industrial radiography, alloy preparation and treatment, and physical testing. Excellent opportunity in light metals field. Give full details in first letter, including minimum salary and photograph. Location Southwest.
Box 31-N-12, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER or Chemist. Recent graduate with some experience, as assistant in research and development along chemical engineering and metallurgical lines. Should be capable analyst and handy with tools. Location in East. Give full details, scholastic record, experience, salary desired and recent photograph.
Box 32-N-12, Ind. & Eng. Chem., Easton, Pa.

COMPETENT ORGANIC Chemist, preferably Ph.D., 30 to 35 years old with family. Must have good personality, ability to sell ideas and get along with people, talent for, although not necessarily experience in, administrative chemical research. Salary open.
Box 34-N-12, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER with experience in chemical plant design, mechanical engineering and product design, to work for plant in East. Must be draft exempt and not employed at your highest skill in any other war plant.
Box 35-N-12, Ind. & Eng. Chem., Easton, Pa.

MECHANICAL ENGINEERS AND DRAFTSMEN

Write or Apply in Person to
The Aluminum Company of America
Plancor Plant
P.O. Box 210 Massena, New York

TUTOR: To teach undergraduate inorganic chemistry starting February 1, 1943, in a college located in New York City. Must be a U. S. citizen and preferably have advanced degrees. If male, please include draft status in replying.
Box 50-N-12, Ind. & Eng. Chem., Easton, Pa.

BACHELOR, recent graduate with good organic training for synthetic work in new organic research laboratory in essential industry. Chicago area (interviews in New York City possible). Submit complete details on education, experience, personal data, salary expected, recent photo.
Box 51-N-12, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER: Excellent opportunity for man qualified to do research and development work on Iron Plating and Iron Forming. Large manufacturing company located in Middle West. Please submit record of training and experience, personal history and a recent small photo.
Box 52-N-12, Ind. & Eng. Chem., Easton, Pa.

INSTRUCTORSHIP in Chemical Engineering in midwestern college. Qualified instructor desired to teach Stoichiometry and Laboratory courses in Chemical Engineering. $1800 for 9 months' year. Opportunity for research.
Box 54-N-12, Ind. & Eng. Chem., Easton, Pa.

CHEMIST or CHEMICAL ENGINEER—not older than 30 years. Experience in paint formulation advantageous but not essential. Excellent future for qualified man. Submit complete personal, scholastic, and professional data. State draft status and salary expected. All replies confidential. Location Middle West.
Box 55-N-12, Ind. & Eng. Chem., Easton, Pa.

CHEMIST with thorough basic knowledge of alkyd resin and associated products manufacturing. Production experience wanted but not required. This opportunity is not a defense job primarily, and may be considered as permanent to the right man. Location northwest side of Chicago.
Box 56-N-12, Ind. & Eng. Chem., Easton, Pa.

We wish to contact an individual organic chemist who is desirous of getting in on the ground floor of a potentially very profitable business. We have almost completely solved the engineering and chemical difficulties involved in the production of the Cacodylates which are considered as vital Health Supplies, but now need financial assistance and a competent organic chemist to help us complete the project and turn this into a very profitable business.
Box 61-NP-12, Ind. & Eng. Chem., Easton, Pa.

FOOD TECHNOLOGIST: Applications will be welcomed from men with outstanding records to serve as junior chemists in eastern research laboratories, engaged in essential work. Prospects for advancement excellent for men of right qualifications. Please submit record of training and experience, personal history and recent photo.
Box 64-NP-12, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 1614)

Address communications to the box number indicated and Mail to Easton, Penna.

The American Chemical Society has no information concerning the position advertised, or in regard to those seeking employment.

Experienced Chemical Engineer

Excellent opportunity for man of outstanding qualifications in research laboratories located in the East; occupied with essential activities. Please submit college record, experience, accomplishments, and small photo.

Box 65-NP-12, Ind. & Eng. Chem., Easton, Pa.

WANTED: Recent college graduate with B.A. degree wanted by eastern woman's college as part-time assistant in General Chemistry or Qualitative Analysis. Work to begin February 1st; opportunity for graduate study.
Box 67-NP-12, Ind. & Eng. Chem., Easton, Pa.

CHEMIST with some petroleum experience. Needed in Chicago area for development of petroleum products and rust preventatives. State age, draft status, degree, and salary desired.
Box 70-NP-12, Ind. & Eng. Chem., Easton, Pa.

LABORATORY HELPER for research in university in New York City. Must have had practical experience in handling chemical apparatus and preparing compounds. Typing ability desirable. Submit data, including experience and references from persons familiar with your technical ability.
Box 72-NP-12, Ind. & Eng. Chem., Easton, Pa.

RESEARCH project in university in New York area needs laboratory technician to assist in synthetic organic work and in other biochemical research. Male or female. Salary commensurate with qualifications. Please give personal data, experience, and references to persons familiar with technical training.
Box 73-NP 12, Ind. & Eng. Chem., Easton, Pa.

PAPER CHEMISTS: Experienced in synthetic resin glues and adhesives. Must be thoroughly grounded in development work and familiar commercial application in paper field. This is an excellent opportunity to take over a responsible assignment in field work for one of the country's leading chemical companies. Write outlining your educational background and experience.
Box 76-NP-12, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST: Research Department heavy chemicals plant Detroit area doing considerable war work. Permanent position for man or woman. Industrial experience preferred. Adaptability varied work, inorganic, organic, development new methods required. Enclose photograph. Salary commensurate with qualifications.
Box 78-N-12, Ind. & Eng. Chem., Easton, Pa.

TEACHING FELLOWSHIPS for Women, half-time assisting, half-time Graduate study; Master's degree in two years. $600 first year, $700 second year, free tuition, fees. Start September 1943. Send transcript, recommendations and photograph by January 15 to
Gilbert H. Ayres, Chairman, Chemistry Department, Smith College, Northampton, Mass.

ASSISTANT PROFESSOR of Chemical Engineering desired by technical institute in Metropolitan Area. Full-time; teaching Thermodynamics and Chemical Engineering. Applicant should be Protestant and active member of A.I.Ch.E. Send information, together with photograph.
Box 84-N-12, Ind. & Eng. Chem., Easton, Pa.

CHEMISTS

with Bachelor or Master degrees for positions in laboratories of Analytical Chemistry, Bio-chemistry, Organic Chemistry and Physical Chemistry in eastern organization engaged in essential activities. Opportunities for qualified men. Submit details concerning training, experience, personal history, and small photo.

Box 66-NP-12, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST, M.S. or Ph.D., with training and experience in cellulose chemistry. Also, Pulp and Paper Chemist or Chemical Engineer with machine knowledge. Give age, training, experience, references, draft status, photograph, salary desired and other essential data. By essential war, southern manufacturer.
Box 90-NP-12, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(A.C.S. MEMBERS)

CHEMICAL ENGINEER, B.S. (Ch.E.) 3½ years' experience in photographic chemicals, photography, and salesmanship. 22 years old, single, draft status 2-A. Not particular what field of Chemical Engineering work is in. Available after Dec. 1, 1942.
Box 59-N-11, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST—13 years' experience as supervisor in analytical laboratory of large rayon plant. Employed at present. Married, one child, age 39, draft 3-A. Desire permanent position with greater chance for advancement than present position.
Box 60-N-11, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. 1941, now employed but desires advantageous change. Experienced in basic organic, especially pharmaceutical, dyestuffs, and photographic chemistry. Industrial or academic position considered.
Box 25-T-11, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.A., 2 years' experience in commercial analytical control work. Desire to enter organic field. Single, age 37, draft 4-F. Prefer to be located in Mountain or Pacific time belts.
Box 31-T-11, Ind. & Eng. Chem., Easton, Pa.

VAPOR PHASE catalytic chemist and chemical engineer with ten years' experience, mostly in research and development work with a little plant control. Also some general organic and inorganic experience. Location immaterial. Available immediately.
Box 36-T-11, Ind. & Eng. Chem., Easton, Pa.

TRANSLATIONS, TYPING. Woman Chemist: Many years' experience in Industrial chemistry, a well qualified Russian translator and an expert typist, desires translations and/or typing which can be done at home.
Box 37-T-11, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Ph.D. Desires research or teaching position. Author over fifty papers, chiefly enzymes, vitamins, clinical chemistry. Holder fellowships including Rockefeller. Immediately available. Age 34, American, married, draft 3-B. Good references.
Box 46-T-11, Ind. & Eng. Chem., Easton, Pa.

RUBBER AND PLASTICS Chemist, M.S. Fifteen years' research and development experience in rubber and associated industries. Experienced in field contacts, laboratory management. Physics and mathematics training. Age 42, with family. Place of responsibility desired.
Box 52-T-11, Ind. & Eng. Chem., Easton, Pa.

PLANT SUPERINTENDENT: Chemical Engineer, five years' experience all phases of alcoholic fermentation and distillation; whiskey and alcohol; plant operation and laboratory control. Seeks position as superintendent of production in fermentation industry. Available reasonable notice. Native American, married, age 31, draft 3-A.
Box 53-T-11, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Ph.D. Eight years' wide research experience with large concern; food products, vitamin synthesis and assays, industrial fermentations. Publications, patents. Now employed, desires position progressive organization undertaking expansion of research or setting up new department. Age 34, married. Available, reasonable notice.
Box 73-T-11, Ind. & Eng. Chem., Easton, Pa.

SURFACE CHEMIST—Ph.D. Just graduated from midwestern university. Well grounded in analytical, organic, and physical chemistry. Was graduate assistant. Two years' assistant chemist. Christian, draft 2-A, available immediately. Desires midwestern or eastern location and war work.
Box 12-N-12, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, Ph.D. desires responsible research position preferably in industrial chemicals, pharmaceuticals or foods. Qualified by training and experience to take charge of an extensive research program. Licensed chemical engineer. Age, past 45. Salary, $7500 minimum. Only permanent position considered.
Box 14-N-12, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, M.S. Three years' industrial experience analytical research. Desires change to chemical engineering development work, research, or process development in defense or essential civilian industry. Married, Protestant, 27, draft 3-A.
Box 16-N-12, Ind. & Eng. Chem., Easton, Pa.

REGISTERED CHEMICAL Engineer experience as director of research available for permanent position of responsibility with established firm or institution. Successful record 21 years' research and development. Patents. Member A.I.Ch.E. Graduate eastern university. Specialist plastics, resins, waxes, asphalts and other insulations and water-proofings. Age 44, married, children, Presbyterian.
Box 20-N-12, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST wants real job. Ph.D., 1933. Seven years' industrial organic research (synthesis), development, supervision, technical service in antiseptic, insecticide fields. Patents pending, two years' teaching experience. American, 36, married, children, Protestant, 3-A. Employed New York area, not connected with war effort.
Box 24-N-12, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL, ANALYTICAL Chemist, Ph.D., 1935, large mid-western university. Well trained in inorganic, organic, and physics. Excellent scholastic record; honor societies. Publications. Fifteen years' teaching experience; two and one-half years' experience research chemist with large corporation. Now Associate Professor, teaching physical, thermodynamics, electrochemistry, advanced analytical, in state supported school of technology. Desires responsible position in essential industry. American, age 38, married, one child, 3-A. Available February 1.
Box 25-N-12, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Ph.D., Minnesota, 1941. Experience in college teaching and industrial research. Desire research or teaching position. Member Sigma Xi, Phi Lambda Upsilon. Age 29. Excellent health, married, now employed, Presbyterian, practical, good character, personality.
Box 29-N-12, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, M.A., leading university. Thorough training in analytical, organic, and physical chemistry. Excellent background in mathematics and physics. Handy with tools. Now on West Coast but available anywhere immediately. Desire position in defense work.
Box 33-N-12, Ind. & Eng. Chem., Easton, Pa.

PAINT CHEMIST: B.S. Chemical Engineering. Thirteen years' varied experience in direction research, production and sales service of paints, varnishes, synthetic resins. Specification experience. Age 36, married, three children, draft 3-A. New York area preferred.
Box 36-N-12, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, special experience in styrene chemistry, also research in Bakelites, and considerable analytical experience. Thoroughly experienced in literature and patent searches, and very good foundation in languages. Age 39, one dependent. Desires position in industry contributing to war effort. Presently employed.
Box 37-N-12, Ind. & Eng. Chem., Easton, Pa.

CHEMIST AND BACTERIOLOGIST, Ph.D., director consulting laboratories. Experienced in research and development of new products and processes, practical accomplishments, patents. Executive ability, several languages, excellent record and credentials. Interested in permanent position.
Box 38-N-12, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL EXECUTIVE, Ph.D., capable, industrious, thoroughly trustworthy, several languages. Desires position as assistant of administrative officer, technical representative of reputable concern or other situation requiring initiative and offering good opportunities. Excellent references.
Box 39-N-12, Ind. & Eng. Chem., Easton, Pa.

INSTRUCTOR IN BIOCHEMISTRY in large university medical school desires change. Author of numerous papers. Age 31, draft deferred. Experienced in research direction and teaching. Member of American Society of Biological Chemists. Will consider industrial research or teaching position. Ohio preferred.
Box 41-N-12, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST: Ph.D., January 1943. Broad training in Physical and Industrial Chemistry. Minor bacteriology. Three years' experience in organic manufacture and research. Phi Lambda Upsilon, Sigma Xi, publications. Desires research and development. Age 26, married, locate anywhere, draft 3-A.
Box 42-N-12, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., 26, proven versatility and initiative. Synthesis sulfonamides, vitamin E, arsonic aids, explosives (nitro compounds, nitrates, nitramines). Wide experience enzymes, especially oxidases. Good background physical chemistry, research surface chemistry, publications, honor societies. Single, Draft deferred, available immediately.
Box 44-N-12, Ind. & Eng. Chem., Easton, Pa.

LIAISON EXECUTIVE for research and patent departments, Ph.D. and LL.B., fifteen years' diversified experience in industrial chemistry and technical-legal problems including synthetic resins, dyes, petroleum, rubber and patents.
Box 45-N-12, Ind. & Eng. Chem., Easton, Pa.

CHEMIST: Ph.D., 1936, University of Illinois, Organic and Physiological. Six years' industrial experience including laboratory, field, and pilot-plant work. Especially familiar with soluble polymers, protein insolubilization and leather technology. Age 32, married, two children. Employed in non-war work, draft 3-A. Desires change permitting greater contribution to war effort and requiring less traveling. Location inconsequential; preference, middle west or west.
Box 46-N-12, Ind. & Eng. Chem., Easton, Pa.

COLLEGE TEACHING desired, preferably starting next academic year. Ph.D. organic, 1938. Three years' college teaching. Two years' post-doctorate bio-organic research. Publications, Christian, draft 3-A, age 29.
Box 47-N-12, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST, Ph.D., desires position with future. Prefers careful, scientific experimentation and can resolve problems into significant components. Fifteen years' industrial experience studying production of new inorganic compound, solubility diagrams and paper pulp bleaching. Publications and patents. Now employed. Age 43, married, three children, draft 3-A.
Box 48-N-12, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, M.S., 1943, in Nutrition, thorough fundamental training in chemistry. Available February 1. Experienced in vitamin assay work. Publication, white, Protestant, age 25.
Box 49-N-12, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 1615)

(Situations Wanted Continued)

CHEMIST, Ph.D., wide training and experience in Biochemistry, Food Chemistry, Physiology, Bacteriology. Employed at present, age 29, married, one son, draft 3-A. Desire permanent position with chance for advancement in essential industry.
Box 69-N-12, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, Ph.D., 1941, desires research or responsible control position. Experience and background in Viscose Rayon Research, Organic and Colloid Chemistry, Mathematics, Physics and study of gas adsorption in high vacuum systems. Age 29, married, draft 3-B. Sigma Xi member.
Box 74-N-12, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL CHEMIST, Ph.D. Experience directing and conducting research, developing uses for new products, formulating new compounds, establishing factory production methods, and supervising control procedures. Experience with emulsifiers, emulsions, cosmetics, pharmaceuticals and allied applications. Draft status 3-A. Desire executive position in essential industry.
Box 80-N-12, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, M.S., age 37, 13 years' experience in heavy chemical technology, wants responsible position in chemical manufacture or control. Organizer, planner, can handle men.
Box 81-N-12, Ind. & Eng. Chem., Easton, Pa.

TEACHER, chemical engineering graduate, experienced in college chemistry and mathematics wants position in a technical school. Age 37, M.S. degree, experience in important industrial work.
Box 82-N-12, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., 1941. One year post-graduate fellowship, desires research and development position in industry. Publications. Age 35, married with dependents, deferred classification in draft. Location immaterial. References.
Box 83-N-12, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED (NONMEMBERS)

BIOCHEMIST—Ph.D. from leading midwest university. Thirteen years' experience hormone research and teaching. Many publications. Capable investigator, alert constructive thinker, executive ability, agreeable personality and appearance. Member leading professional organizations. Employed (ninth year present position) but desire change to responsible research or teaching position not necessarily in endocrine field. Age 34, married, 2 children, U. S. Citizen, 3-A.
Box 34-T-11, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, B.A., 1942, honors in chemistry. 44 hours. Desires position assistant organic research laboratory. Prefer northeastern area near university. Knowledge French, German, shorthand, typing. Protestant, single, age 20. Available December 1.
Box 17-N-12, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL RECLAIMING of metals, detinning, cleaning; metal salts and soaps; graduate chemical engineer, thirteen years' experience at research and engineering in these fields, own patents and processes. Seeks position.
Box 18-N-12, Ind. & Eng. Chem., Easton, Pa.

HORMONES WANTED: Will buy and contract for long term purchase all crystalline hormones, Folliculine, Gonadotropine, Testosterone esters, also extracts purified and solutions. Give full information, quantity, price, potencies, assays, etc.
Box 30-N-12, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, good scientific background, presently employed. Age 35, friendly alien, first papers. Best qualified for pilot plant development work, research. Wants permanent position, New York vicinity.
Box 57-N-12, Ind. & Eng. Chem., Easton, Pa.

SYNTHETIC ORGANIC Chemist, age 27, Protestant, married, one child, 3-B draft status, U. S. citizen. Have degree in chemistry from small but well recognized college. Have approximately 2 years' experience in the precipitation of organic coloring pigments, the latter 9 months of which period was spent on nearly independent research in the field. 1½ years' experience in managing own business in research on, and production of, certain pharmaceuticals during which time gained personnel and administrative experience. Have insatiable curiosity, logical mind, and intense desire to continue research in organic synthesis or to manage pilot plant operations. Desire position with firm engaged in work vital to National Defense. Prefer Middle West area, but will consider any location.
Box 62-N-12, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER, at present time employed as designer for heavy machinery, several years' experience in chemical apparatus design and development work, patents along these lines, alien, first papers, F.B.I. investigation not objected, wants permanent position New York vicinity.
Box 63-N-12, Ind. & Eng. Chem., Easton, Pa.

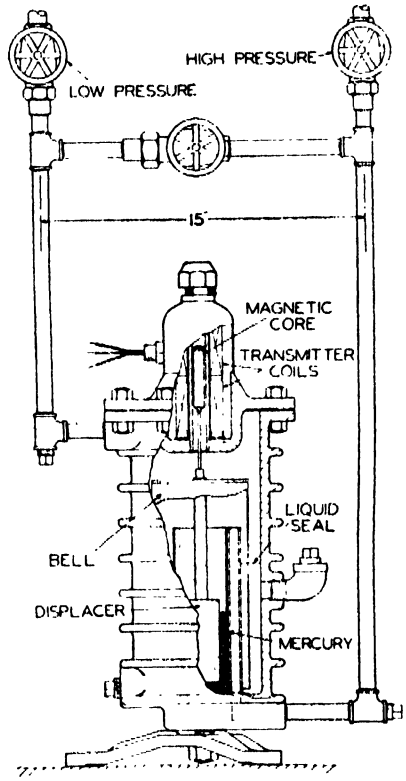
GRADUATE CHEMIST, who detests routine laboratory analysis, desires position in development work; not too good for hard work or dirty jobs; six years' varied industrial experience. Chemical background, average. Imagination and ingenuity, above average. Draft, 3-A.
Box 68-N-12, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, M.S., organic-biochemical. Experienced in foods, beverages, dairy products, oils, pharmaceuticals, explosives. Research, analysis, development, and supervision of plant operations. Citizen, married, deferred. Any location if good opportunity. Immediately available.
Box 75-N-12, Ind. & Eng. Chem., Easton, Pa.

Industrial News

CONTINUED FROM PAGE 1610

Low-Pressure Flow Transmitter



THE new Cochrane Style H transmitter, used in conjunction with standard Cochrane electric meter receiving units, is designed specifically for the measurement of low static pressure gases where low differential and resultant low permanent pressure loss are of prime importance. It is a product of the Cochrane Corp., Philadelphia, Penna.

Degreasing Solvent

CYCLODIENE HYDROCARBON as a nonaqueous degreasing solvent is offered by the Technical Processes Division, Colonial Alloys Co., Philadelphia, Penna., for high-speed solvent cleaning.

THE service of the Baltimore Branch Office of the Frick Co., Waynesboro, Penna., has lately been extended to include a new district office in Washington, D. C., with W. D. Dugas in charge. A. S. Workman is manager of the Frick Branch at Baltimore.



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The first compound Electron Microscope in America was developed and built in 1938 by the authors of this book, assisted by James Hillier, then a student of Dr. Burton's. Since then, news of the miraculous accomplishments of this instrument has spread rapidly through the scientific world. Actual magnifications of 67,000 diameters, permitting enlargement to over 200,000 diameters, have been attained. This enables investigators to examine organisms and colloidal particles of the order of magnitude of large molecules—an achievement whose importance in the fields of applied chemistry, bacteriology and immunology can scarcely be exaggerated.

In an informal and clear style, the book outlines the fundamental principles of optical and electron microscopes; the discussion is accompanied by many original line drawings illustrating the more important points. The dual nature of light is described in detail, and its bearing on the functioning of the electron microscope clearly shown, with emphasis on the contributions of Newton, Maxwell, deBroglie and Planck.

Many striking photographs of bacteria and of industrial materials such as asbestos, carbon black, clays and oxides will be of absorbing interest to all physicists, microscopists, chemists and biochemists.

CONTENTS

Vision. Light Microscopes. What Is Light? Wave Motion and Wave Motion Media. Wave Theory of Light Accepted. Electromagnetic Theory of Light. The Electron. Dual Theory of Light. Dual Theory of the Electron. Motion of Electrons in Electrical Fields. Electrostatic Electron Mirrors and Lenses. Magnetic Lenses. History of Electron Microscope. Electrostatic Electron Microscope. Applications of Electrostatic Electron Microscope. Compound Electron Microscope-Magnetic Type. What the Electron Microscope Can Accomplish. General Bibliography. Index.

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We would like to hear from individuals for firms interested in subsidising the manufacture of fine organic chemicals or specialties. Products must be vital directly or indirectly to the war effort.
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We wish to contact persons having complete formulae for the production of organic chemicals vital directly or indirectly to the war effort, but who do not have the chemical facilities for so producing. In answering please advise of the extent of your willingness to cooperate in finances.
Box 59-N-12, Ind. & Eng. Chem., Easton, Pa.

We desire to contact firms interested in purchasing the higher priced amino acids. Please state amounts interested in, purity desired, and approximate price you can pay.
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FOR SALE: Journal, American Chemical Society, ten year set, 1931-40 complete, unbound, in good condition, some covers soiled. $27.50 cash with order, F.O.B., Cambridge, Mass. Lyon Southworth, Harvard Chemical Laboratory, 12 Oxford Street, Cambridge, Mass.

DESIRED TO PURCHASE: Latest edition of Houben-Weyl, Methoden der organischen Chemie. Reply stating price.
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Box 88-N-12, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Journal American Chemical Society 1903-33, price, $150. Industrial and Engineering Chemistry, 1909-41, with Analytical Edition, 1-13, price, $175. Unbound and in first class condition.
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CHEMICAL AND ENGINEERING NEWS

HARRISON E. HOWE, Editor

PUBLISHED BY THE AMERICAN CHEMICAL SOCIETY

VOLUME 20 DECEMBER 25, 1942 NUMBER 24

Harrison Estell Howe

1881–1942

HARRISON ESTELL HOWE, for 21 years Editor of *Industrial and Engineering Chemistry*, died at his home in Washington, D. C., on December 10 in the 61st year of his life. Through his editorship and many other related activities, Dr. Howe exerted a profound influence on the development of American industry through research. Under his guidance *Industrial and Engineering Chemistry* has come to occupy a foremost place in the world's literature of industrial chemistry. Its *Analytical Edition* and CHEMICAL AND ENGINEERING NEWS were inaugurated and developed by him into outstanding publications, the latter now a journal in its own right.

The Technologic Series of AMERICAN CHEMICAL SOCIETY Monographs has grown under his editorship to an important library of chemical technology. At the time of his death he was Editor of both the Scientific and Technologic Monographs. Significant, too, has been Dr. Howe's fruitful fostering of public understanding of the vital functions of chemistry and research, particularly through the AMERICAN CHEMICAL SOCIETY News Service, of which he was Director, as well as through many other activities having similar objectives.

These services to chemists and to chemical technology earned for Dr. Howe many well-deserved honors. Honorary degrees were conferred upon him by the University of Rochester (Sc.D. 1927), Southern College (LL.D. 1934), Rose Polytechnic Institute (Eng.D. 1936), and South Dakota School of Mines (Eng.D. 1939). In 1926 he was decorated Officer of the Crown of Italy, and in 1942 was awarded the Chemical Industry Medal by the American Section of the Society of Chemical Industry. He was a fellow of the American Association for the Advancement of Science.

Harrison E. Howe was born in Georgetown, Ky., on December 15, 1881, son of William James and Mary (Scott) Howe. In 1905 he married May McCaren and their union was blessed by two daughters,



Harrison Estell Howe

Mary (Mrs. Oscar Provost) and Betty (Mrs. F. B. Clinton), who have presented him with five grandchildren.

He attended Earlham College, Richmond, Ind., where he received the B.S. degree in 1901. Subsequently he studied at the University of Michigan (1901-02) and later received the M.S. degree from the University of Rochester (1913).

His industrial career began as chemist for the Sanilac Sugar Refining Co., refiners of beet sugar at Croswell, Mich. He left this company in 1904 to join the staff of the Bausch & Lomb Optical Co., where he served in various capacities until 1916. In that year he became associated with Arthur D. Little, Inc., and its Canadian affiliate as assistant to the president and manager of the Industrial Department, respectively. During World War I he was consultant to the Nitrate Division of the Ordnance Bureau, U. S. Army. In 1919 he became chairman of the Division of Research Extension of the National Research Council, which position he left to become Editor of *Industrial and Engineering Chemistry* in December 1921. This position he held at the time of his death, and also that of Editor of CHEMICAL AND ENGINEERING NEWS.

During this active career Dr. Howe served chemistry, research, and industry in many other ways. He was a member of the Executive Board of the National Research Council for several years, beginning with the time of its founding; a trustee of Science Service; a director of the Purdue Research Foundation; and a member of the Advisory Board of the Lalor Foundation. He was chairman of the A. C. S. Committee on Cooperation with the Chemical Warfare Service and Colonel in the C. W. S. reserve. Dr. Howe was round-table and general conference leader in the Institute of Politics, Williamstown, Mass., from 1926 to 1929. He was chairman of the Chemicals Group, Priorities Division, Office of Production Management, in 1941, and subsequently chairman of the Chemical Priority Advisory Committee, WPB, as well as chairman of the Joint Committee on Miscellaneous Materials, National Academy of Sciences and National Research Council, advisory to the WPB (1941-42).

He had served as chairman of the Chemical Advisory Committee to the Department of Commerce (1926-28), chairman of the Industrial Advisory Committee to the Bureau of Industrial Alcohol (1927-30), and later as executive secretary of the Council of Industrial Alcohol Users. While with the National Research Council he took an active part in the organization of the Crop Protection Institute and the Horological Institute and in the publication of International Critical Tables, helping to secure funds and serving actively on the board of trustees. He had also been professorial lecturer in pharmacy and on scientific literature at George Washington University.

Dr. Howe was a member of many organizations and contributed much to all of them by his vigorous imagination, his

kindly humanity, and his huge capacity for work. His membership in the AMERICAN CHEMICAL SOCIETY entailed work on a long list of committees in addition to his editorial duties.

Since he joined the AMERICAN CHEMICAL SOCIETY in 1915 he had attended practically all of its national meetings, usually accompanied by Mrs. Howe. He had served as Councilor-at-Large, Divisional Chairman, Divisional Secretary, Local Section Chairman, Local Section Secretary, and Local Section Councilor.

As a member of the American Institute of Chemical Engineers he served two terms as director and represented that body on the American Engineering Council for 10 years, during eight of which he served as treasurer of the council. His clubs included the Cosmos Club, Rotary Club, Torch Club, Alpha Chi Sigma, and The Chemists' Club (New York).

Dr. Howe was a prolific writer on scientific subjects, particularly for laymen. Among his published works were: "The New Stone Age", 1921; "Profitable Science in Industry" (with three coauthors), 1924; "Chemistry in the World's Work", 1926; "Chemistry in the Home" (with Francis M. Turner), 1927; and a series of six Nature and Science Readers for school children (with E. M. Patch). He edited the two volumes of "Chemistry in Industry", 1924-25, prepared especially for use in connection with the A. C. S. Prize Essay Contest, of which he was chairman for five years. In 1930 at the request of Dr. Slosson's family he prepared the revised edition of "Creative Chemistry". He was much in demand as a lecturer on science before business men's associations, chambers of commerce, Rotary Clubs, and engineering and other professional societies all over the country.

As his principal avocation, Dr. Howe was deeply interested in Rotary International. In this organization he served in many capacities: president of the Washington, D. C., Club, governor of the 34th District, member of the Magazine Committee, and Director of Rotary International (1936-37).

Dr. Howe was always interested in people and traveled extensively. He was active in philanthropic movements and was a faithful attendant of the Calvary Baptist Church in Washington. His principal hobbies—his work might also be classed as a hobby—were gardening and photography. His homes in Washington and in Woods Hole, Mass., were surrounded by flower gardens containing many plants of prize-winning excellence, and his moving pictures and slides in color were outstanding. He also operated a farm near Richmond, Ind.

His death brought to an end a particularly fruitful and active career, and created a vacancy in American chemistry and industry that cannot be filled.

Employment of Aliens in War Industries

UNTIL comparatively recently, the employment of aliens in industry, especially war industry, was frowned upon and sometimes forbidden. Today many employers seem to be unaware that the Government's attitude in respect to the employment of aliens has been altered. This was brought out in the President's statement published under Washington dateline of July 11, 1942, and given wide circulation in the *New York Times*. That statement reads as follows:

1. Persons should not hereafter be refused employment, or persons at present employed discharged, solely on the basis of the fact that they are aliens or that they were formerly nationals of any particular foreign country. A general condemnation of any group or class of persons is unfair and dangerous to the war effort. The Federal Government is taking the necessary steps to guard against, and punish, any subversive acts by disloyal persons, citizens as well as aliens.

2. There are no legal restrictions on the employment of any person (A) in nonwar industries, and (B) even in war industries, if the particular labor is not on "classified" contracts, which include secret, confidential, restricted, and aeronautical contracts.

Contract Laws Are Stressed

The laws of the United States do provide that in certain special instances involving government contracts an employer must secure from the head of the government department concerned permission to employ aliens. Section 11 (A) of the act of June 28, 1940 (Public No. 671, 76th Congress, 3d Session), contains a provision that:

"No aliens employed by a contractor in the performance of secret, confidential, or restricted government contracts shall be permitted to have access to the plans or specifications, or the work under such contracts, or to participate in the contract trials, unless the written consent of the head of the government department concerned has first been obtained."

The Air Corps Act of 1926 has a similar provision:

"No aliens employed by a contractor for furnishing or constructing aircraft parts or aeronautical accessories for the United States shall be permitted to have access to the plans or specifications or the work under construction or to participate in the contract trials without the written consent beforehand of the secretary of the department concerned."

There are no other Federal laws which restrict the employment of aliens by private employers in national war industries. There are no federal laws restricting the employment of foreign-born citizens of any particular national origin.

3. Where, under the law, permission to employ aliens is required from the War and Navy Departments, the alien shall go to the nearest office of the United States Employment Service, which will furnish him with application form, and assist him in filling it out. The completed form will then be submitted by the alien to the employer who will fill out the reverse side of the form, and then immediately forward same to the department concerned. Upon receipt of the application, the department will act promptly thereon, in the normal case within 48 hours, and give its approval or disapproval, either of which shall be subject to change at any later time.

Special Groups Provided For

4. In passing upon applications for permits, the department will give special and expedited consideration to nationals of United Nations and friendly American Republics, and any other aliens, including enemy aliens, who come within the following categories:

A. Aliens who have served in the armed forces of the United States and have been honorably discharged.

B. Aliens who have, or who have had, members of their immediate family in the United States military service.

C. Aliens who have resided in the United States continuously since 1916 without having returned to the country of origin within the last 10 years.

D. Aliens who have married persons who, at the time of marriage, were citizens of the United States and who have resided in the United States continuously since 1924 without having returned to the country of origin within the last 10 years.

E. Aliens who have declared their intention to become citizens of the United States and who had filed petitions for naturalization before December 7, 1941.

5. Any inquiries or complaints by aliens pertaining to specific instances of discrimination, or intentional failure to carry out the above procedure, should be referred directly to the Committee on Fair Employment Practice, Washington, D. C. This committee will consider the complaints and take such action as may be warranted in the particular case.

6. Any information concerning disloyal activities in war industries or elsewhere, or indications of disloyalty on the part of persons employed in war industries, should be reported immediately to the nearest office of the Federal Bureau of Investigation. Employees have the same duty in this matter as have employers.

The AMERICAN CHEMICAL SOCIETY assumes no responsibility for the statements and opinions advanced by contributors to its publications.
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W. Albert Noyes, Jr. V. du Vigneaud, Jr.

THE following officers of the AMERICAN CHEMICAL SOCIETY for 1943 have been elected: President-Elect, Thomas Midgley, Jr.; Director, fourth district, L. H. Adams; Director, sixth district, R. E. Swain; Director-at-Large, Walter A. Schmidt; Councilors-at-Large, M. L. Crossley, Vincent du Vigneaud, W. Albert Noyes, Jr., and R. L. Shriner.

Per K. Frolich, President-Elect during the current year, and now President of the AMERICAN CHEMICAL SOCIETY, is director, Chemical Division, Esso Laboratories, Standard Oil Development Co., Elizabeth, N. J. He has included among his SOCIETY activities during the past several years the chairmanship of the North Jersey Section and of the Division of Petroleum Chemistry, as well as a term as Councilor-at-Large. (See more detailed account on page 1620.)

Thomas Midgley, Jr., newly chosen President-Elect, is vice president of the Ethyl Corp. and of Kinetic Chemicals, Inc., as well as director of the Ethyl-Dow Corp. Dr. Midgley has served as a Director of the AMERICAN CHEMICAL SOCIETY since 1930 and as chairman of the board since 1934. He has been recipient of the Nichols Medal of the AMERICAN CHEMICAL SOCIETY, the Willard Gibbs Medal of the Chicago Section, and the Priestley Medal.

As for the newly elected Directors, **L. H. Adams** and **W. A. Schmidt** have previously been national Directors, Local Section Chairmen, and Local Section Councilors of the AMERICAN CHEMICAL SOCIETY. **R. E. Swain** has served in these capacities, and also as Divisional Chairman.

Of those chosen to be Councilors-at-Large of the SOCIETY, **M. L. Crossley** has been Local Section Chairman; **Vincent du Vigneaud** has been Local Section Councilor as well as a member of committees of the AMERICAN CHEMICAL SOCIETY; **W. Albert Noyes, Jr.**, has been Councilor, assistant editor of *Chemical Abstracts*, and Divisional Chairman; and **R. L. Shriner** has served in turn as Divisional Chairman, Local Section Secretary, and Local Section Councilor.

Thank You

WE WOULD like very much to reprint the many telegrams, resolutions, and letters that are pouring into the office relative to the death of our esteemed late Editor, Harrison E. Howe, but space limitations forbid. These messages are all deeply appreciated by Dr. Howe's family, and by the editorial staff.

Hotel Reservations

Detroit Meeting

THE hotel committee of the Detroit Section of the AMERICAN CHEMICAL SOCIETY strongly requests that members planning to attend the spring meeting, April 12 to 16, 1943, make all hotel reservations through it.

Full particulars including names of hotels and rates will appear in the January 10, 1943, issue of CHEMICAL AND ENGINEERING NEWS.

Double occupancy of rooms is essential to relieve congestion.

Per K. Frolich

A. C. S. President, 1943

On January 1, 1943, Per K. Frolich will succeed Harry N. Holmes as President of the American Chemical Society, the largest professional organization of its kind in the world. Taking office at 43, he is the youngest man to serve as President of the Society in more than 30 years and is the first representative from the petroleum industry elected to the presidency.

Born in Norway, 1899, Dr. Frolich obtained his undergraduate training at the Norway Institute of Technology from which he was graduated in 1921 with a B.S. degree. He was originally trained as an electrochemist, and early in his undergraduate work so favorably impressed his instructors that he was given an assistantship in chemistry in 1919 and again in 1920.

In 1922 Dr. Frolich accepted an American-Scandinavian Foundation fellowship for graduate work at the Massachusetts Institute of Technology. There was little to indicate that this young man from Norway, who had crossed the Atlantic for graduate work in electrochemistry and chemical engineering, would, 20 years later, contribute so greatly to the war effort of his adopted country. According to his instructors at M. I. T., his work in the classroom and laboratory was characterized by quiet effectiveness, and he impressed all those with whom he came in contact as being thoroughly grounded in the fundamentals of his chosen science. He received his M.S. degree in 1923 and was given a research assistantship so that he could continue his advanced studies for his doctorate. After receiving his doctor's degree in 1925, he remained at M. I. T. as research associate, became assistant professor of chemical engineering in 1927 and associate professor in 1929. From 1927 to 1929 he served as assistant director of the Research Laboratory of Applied Chemistry.

His early participation in the vigorous forms of athletics for which his native land is noted helped to build up the splendid physique which permitted him to carry on such a wide variety of research activities along with his teaching duties. During the period 1922 to 1930, he had published some 30 scientific papers covering the general field of electrochemistry, high-pressure synthesis, and the role of catalysts in high-pressure reactions. His work in this latter field received world-wide recognition and, in 1930, he was awarded the Grasselli medal by the Society of Chemical Industry for his work on gas reactions carried out under high pressure.

Although Dr. Frolich was keenly interested in research and teaching, he was at all times the practical scientist and became increasingly interested in the industrial development of the many problems on which he had carried out basic research. In 1929 he joined the research staff of the Standard Oil Development Co. His outstanding ability was quickly recognized and he advanced rapidly, becoming assistant director of the Research Laboratories in 1931 and director in 1933. On account of the rapidly expanding research programs of the Development Co., it became necessary to segregate the chemical and purely oil research activities, and in 1935 Dr. Frolich was appointed chief chemist of the Standard Oil Development Co. and in 1936 became director of the new Chemical Division of the Esso Laboratories.

Under his direction, the chemical activities of the Development Co. have been expanded and have covered a wide variety of investigations including various types of lube oil additives, the chemical utilization of refinery gases, high-pressure oxidation, synthesis of both low and high molecular weight polymers from petroleum gases, synthetic rubber raw materials, and synthetic rubbers. One of the outstanding contributions of the Esso Laboratories-Chemical Division has been the development of Butyl rubber which finds so many uses in our war effort. Dr. Frolich and his associates have also developed improved methods for the production of butadiene and other synthetic rubber raw materials, and have made available to various industries the "know how" of the Buna rubbers.

Always a believer in cooperative effort, Dr. Frolich was quick to recognize the role of the American Chemical Society in furthering the chemical industry in the United States. He has been active in the councils of the Society and served as vice chairman and chairman of the North Jersey Section in 1933 and 1934. From 1936 through 1938 he was vice chairman of the Petroleum Division and chairman from 1938 to 1940. In 1940 he was elected councilor at large.

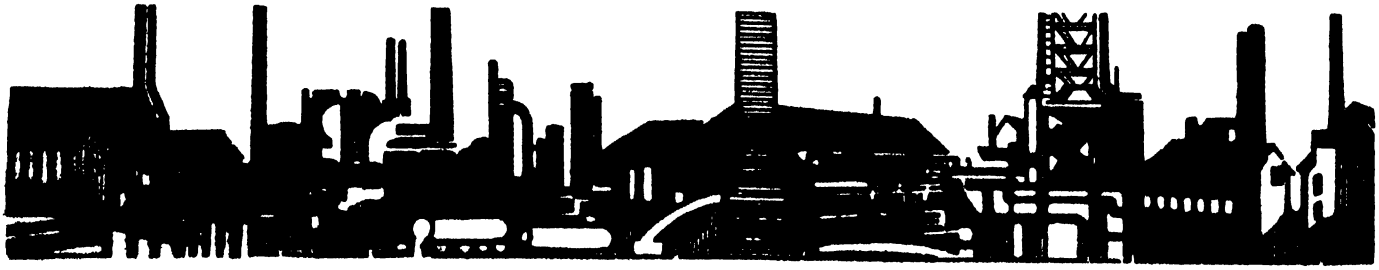
He has also found time to be an active member of the American Institute of Chemical Engineers, American Society of Automotive Engineers, the Society of Chemical Industry, the Chemical Society and the Chemists' Club. In spite of his industrial duties, he has contributed to various scientific societies some 50 technical papers. He also holds approximately 50 patents issued or applied for.

It is a tribute to Dr. Frolich's tremendous energy that his accomplishments in his chosen field have not prevented his becoming an outstanding American, keenly interested in civic activities and in various sports.

National Conference of Electron Microscopy Formed

R. Bowling Barnes, of the Stamford Research Laboratories of American Cyanamid Co., was elected first president of the National Conference of Electron Microscopy formed by leading workers in this field meeting at the National Chemical Exposition, Chicago, November 27 to 28. Albert F. Prebus, of Ohio State University, was elected vice president of the new organization, and Charles Banca, of R. C. A. Manufacturing Co., Camden, N. J., its secretary-treasurer. V. K. Zworykin, of the R. C. A. organization, and O. S. Duffendach, University of Michigan, were elected to serve with the officers of the conference as its directors.

G. L. Clark, University of Illinois, presided at the formation meeting. Dr. Clark, L. S. Matheson, Dow Chemical Co., and Dr. Duffendach constituted the committee which called and arranged the initial conference.



Directors' Minutes

The Board of Directors of the American Chemical Society met at the home of Thomas Midgley, Jr., in Worthington, Ohio, at 10:00 A. M., Saturday, November 28, 1942. Thomas Midgley, Jr., Chairman of the Board, presided and the following Directors were present: L. H. Adams, Robert T. Baldwin, William Lloyd Evans, Per K. Frolich, Arthur J. Hill, Harry N. Holmes, Charles L. Parsons, R. E. Swain, Charles A. Thomas, and Edward R. Weidlein.

It was moved, seconded, and carried that the minutes of the previous meeting be approved.

A short report from the Finance Committee was read, approved, and ordered placed on file.

The Secretary gave a verbal report on the progress of the Society, briefly summarized as follows:

Ad Interim Report of the Secretary and Business Manager

The House of Representatives of the Congress of the United States has passed Bill 7781, being the legislation to which reference was made on page 1091 of Chemical and Engineering News, September 10, 1942, which legislation concerns taxation of the real estate in Washington, D. C., belonging to the American Chemical Society. An identical bill has been approved by a Senate Committee. It is on the calendar and its passage prior to the adjournment of Congress is expected.

Censorship problems have occupied many hours of the time of both the Secretary and the Editors, but with the exception of limitations placed upon the circulation of *Chemical Abstracts* and other journals (for details see Chemical and Engineering News, page 783, June 25, 1942), our journals are being circulated quite freely. We are giving full cooperation to the Office of Censorship and are receiving courteous and considerate treatment in return.

As of November 25, 1942, 4,286 new members have joined the Society in the current year, and on the same date the membership total had increased to 31,707.

There was a loss in foreign circulation in 1942 to the extent of 715 subscriptions to the *Journal of the American Chemical Society*, 785 to *Chemical Abstracts*, 1,439 to *Industrial and Engineering Chemistry* and 1,148 to Chemical and Engineering News, but domestic subscriptions had increased so that net decrease in subscriptions to the *Journal of the American Chemical Society* is 85, and *Chemical Abstracts*, 636; on the other hand, *Industrial and Engineering Chemistry* shows a net increase of 464 paid subscriptions and Chemical and Engineering News an increase of 1,905.

The most important income item has been the large increase in advertising receipts which, in spite of the increased cost of publication and administration, will again enable the Society to show a surplus in 1942.

The Secretary's office has continued to be very active in attempting to keep chemists and chemical engineers where they can best serve the country, in the production army. Selective Service has been very cooperative as it fully understands, and has certified to, the acute shortage of this type of manpower. With very few exceptions, which have not been the fault of Selective Service administrators, chemists and chemical engineers have been retained where their services can be utilized to the best advantage for America. It is a duty and a pleasure to testify to the devotion to duty of the officials of the Selective Service System and to their intelligence and efficiency in handling a problem which at times is complex. If the Local Boards were equally well informed, many chemists and chemical engineers who are now in the combat army would be rendering far greater service to their country as essential men in its production army. In this connection, the Society calls again to the attention of the members the fact that Occupational Bulletins 10, 23, and 24 are available in planographed form with outlined procedure which, if followed from the early stages of faulty classification, will be found helpful in obtaining occupational deferment for those who should be retained in the production army.

The Secretary's report which will appear probably in the February 25, 1943, issue of Chemical and Engineering News will give a complete summary of the year's accomplishments.

Charles L. Parsons,
Secretary and Business Manager

Charles L. Parsons was re-elected Secretary and Business Manager.

Robert T. Baldwin was re-elected Treasurer.

The Finance Committee, consisting of Robert T. Baldwin (Chairman), William Callan, C. R. DeLong, Thomas Midgley, Jr., and Robert E. Wilson, was re-elected.

The following resolution was passed unanimously:

Whereas, a communication dated October 15, 1942, from Atherton Seidell to the Board of Directors of the American Chemical Society offers to assign to the American Chemical Society all rights to any future profits derived from the sale of the third edition of his book, "Solubilities", Volume I, Inorganic and Metal Organic Compounds, and Volume II, Organic Compounds, without obligation of any kind on the part of the American Chemical Society as to the future publication of this work or the disposition of the profits, estimated at several thousand dollars, derived therefrom, but with the expressed hope that the American Chemical Society may utilize these funds in the determination and publication of physical data;

Therefore, Be It Resolved, that the Board of Directors on behalf of the American Chemical Society accepts with appreciation the offer of Atherton Seidell as a contribution to the advancement of chemistry, which is quite in accord with the present activities of the Society in sponsoring monographs on chemical subjects and collecting and abstracting the literature of chemistry.

As the meeting of the American Chemical Society at Detroit, Mich., April 12 to 16, 1943, is being held specifically to enable chemists and chemical engineers to gather and hold conferences relating especially to problems connected with the war endeavor, it was moved, seconded, and carried that the Secretary be instructed to inform the Detroit Local Section that, in the opinion of the Directors, since the meeting has been called basically for the purpose of discussing the advancement of chemistry and its relation to the war activity, all extraneous entertainment, trips, and unnecessary details be omitted except for the banquet and group meals.

A statement of the activities of the Committee on the Professional Training of Chemists, including plans for 1943, was accepted and ordered placed on file.

It was moved, seconded, and carried that the Secretary be instructed to send to the Committee on the Professional Training of Chemists an expression of the Directors' appreciation for the excellent work which it is doing and for the results accomplished.

A statement received from the Committee on Patent and Related Legislation was read, accepted, and ordered placed on file.

It was moved, seconded, and carried that the Secretary be instructed to send to the Committee on Patent and Related Legislation the sincere appreciation of the Board of Directors for the active and satisfactory way in which the committee functioned during 1942.

A report on the activities of the Committee on Economic Status was presented, approved, and ordered placed on file.

It was moved, seconded, and carried that the Secretary be instructed to send to the Committee on Economic Status a communication expressing the appreciation of the Directors for the excellent results which have been and are being accomplished by this committee.

The Committee on Chemical Service to Medicine reported favorable progress but had no final conclusions to record. This

report was accepted and ordered placed on file.

Statements were received from the Editors of the SOCIETY's journals and from the Manager of the Advertising Department. These statements were accepted and ordered placed on file.

The Secretary presented to the Board of Directors correspondence with three members of the SOCIETY, employees of the Aluminum Ore Co. of East St. Louis, Ill., who claimed that they had been compelled to join the Aluminum Administrative Workers Union, Local 20061. The Secretary also presented correspondence with the Union and with the Personnel Director of the Aluminum Ore Co., and gave a report of a conference on the matter which had been held in Washington by the President of the Local, Frank E. Morton, the Secretary of the SOCIETY and the SOCIETY's Counsel, Elisha Hanson. It was moved, seconded, and carried that the letter of October 7 written by the Secretary to the Personnel Director of the Aluminum Ore Co. be spread on the record for the information of the SOCIETY's membership. Omitting the names of the three members nvolved, the letter follows:

Mr. Ian D. Marsh, Personnel Director,
Aluminum Ore Co.,
East St. Louis, Ill.

Dear Mr. Marsh:

Question has arisen between the AMERICAN CHEMICAL SOCIETY and Local 20061 of the Aluminum Administrative Workers Union in respect of the professional or nonprofessional status of three empolyees of the Aluminum Ore Co. at East St. Louis, Ill.

If these men were employed as professional chemists and are now engaged in their profession, they are not susceptible of membership in Aluminum Administrative Workers Union, Local 20061, and Mr. Morton, the president of the Union, has so agreed in a conference with me today. If, on the other hand, these men are not engaged in professional work, then the AMERICAN CHEMICAL SOCIETY has no objection to their belonging to a union made up of various types of administrative workers. Therefore, in order that the matter be adjusted between the Union and the SOCIETY, it is necessary for us to have a report from the company as to the classification of these men and the nature of the work they are performing, particularly as to whether their work is professional or nonprofessional in character. Both the SOCIETY and the Union have agreed to abide by your statement as to the professional or nonprofessional character of their work as the basis for the adjustment of the situation.

I am sending a copy of this letter to Mr. Morton, and I trust that you will send to him a copy of your reply to me.

Very truly yours,

CHARLES L. PARSONS, *Secretary*

The Directors expressed gratification that this Local of the Aluminum Administrative Workers Union adhered strictly to the understanding between the AMERICAN CHEMICAL SOCIETY and William Green, President of the American Federation of Labor (see NEWS EDITION, 17, No. 7, page 249, April 10, 1939), and to the recommendations of the National Labor Relations Board (see CHEMICAL AND ENGINEERING NEWS, 20, No. 3, page 165, February 10, 1942).

The Directors discussed at some length suggestions made by responsible parties to modify their recommendations for minimum salaries paid to chemists and chemical engineers, as enunciated in "Employer-Employee Relationships for Professional Chemists as Recommended by the American Chemical Society" adopted at the Atlantic City meeting (NEWS EDITION, 19, No. 18, page 1014, September 25, 1941). It was moved, seconded, and carried that for new employees the recommended minima be increased $300 a year in each category, and further that such increased minima be applied to present employees insofar as it is possible for employers to make such increases for present employees under the economic stabilization program of the Government.

After discussion, it was moved, seconded, and carried that the following budget for 1943 be passed:

Estimated Income, 1943

Dues	$280,000.00
Subscriptions	200,000.00
Back Numbers	7,000.00
Postage	10,000.00
Interest	14,500.00
Interest from Endowment Fund	3,000.00
Royalties	3,000.00
Advertising	279,000.00
TOTAL	796,500.00

Estimated Expenditures, 1943

Journal of the American Chemical Society	$ 71,000.00
Chemical Abstracts	187,800.00
Industrial and Engineering Chemistry including *Analytical Edition*	179,500.00
CHEMICAL AND ENGINEERING NEWS	76,900.00
News Service	8,400.00
Secretary and Business Manager's Office:	
Secretarial	29,200.00
Business Management	43,800.00
Treasurer's Office	10,700.00
President's Office	1,500.00
Printing Advertising	100,000.00
Advertising Development	14,055.00
Monographs	1,025.00
Back Numbers	6,000.00
Local Sections	33,000.00
Incidentals	12,600.00
Legal	2,400.00
Special Committees	13,000.00
General Meetings	2,000.00
Employment Clearing House	2,700.00
Total Estimated Expenditures	795,580.00
Surplus	920.00
TOTAL	796,500.00
Fourth Decennial Index	3,000.00

It was moved, seconded, and carried that $40,000, derived from any available surplus and/or from funds not otherwise appropriated, be and is hereby ordered set up as a reserve to be applied against the investment in land and buildings in Washington, D. C., and that the Treasurer be and is hereby authorized and instructed to proceed accordingly.

It was moved, seconded, and carried that $40,000, derived from any available surplus and/or from funds not otherwise appropriated, be transferred to "Decennial Index Fund", and that the Treasurer be and is hereby authorized and instructed to proceed accordingly.

It was moved, seconded, and carried that the income from the Permanent Endowment Fund for 1942 be transferred to the *Chemical Abstracts* Fund.

It was moved, seconded, and carried, subject to approval by Counsel, that additional compensation to the amount of 10 per cent of the salary received during 1942 but not to exceed $200 be given to each clerical and editorial employee of the AMERICAN CHEMICAL SOCIETY employed for not less than three months in 1942 who received less than $5,000 per annum for such services; and the Treasurer be and is hereby authorized and instructed to make the necessary expenditure from funds not otherwise appropriated.

A unanimous vote of appreciation was extended to Mrs. Thomas Midgley, Jr., and the Chairman of the Board for their hospitality.

All motions were carried unanimously.

There being no further business, the meeting was adjourned at 5:00 P. M.

CHARLES L. PARSONS, *Secretary*

Fund for Nutrition Research

THE Nutrition Foundation, Inc., Chicago, Ill., has received a total of $1,001,000 from a group of food and related manufacturers, to support a 5-year program of basic research in the science of nutrition.

President Harry N. Holmes of the AMERICAN CHEMICAL SOCIETY has been elected an honorary member of the Chemical, Metallurgical, and Mining Society of South Africa.

Raymond Vaughn, is now assistant professor of chemistry at Southeastern University, Memphis, Tenn. For the past three years he was engaged in graduate work at the University of Missouri, holding a teaching fellowship in chemistry.

Calvin Yoran, until recently associated with the Featheredge Rubber Co., Chicago, Ill., has joined the staff of the Research Laboratory, Wishnick-Tumpeer, Inc., as chief chemist.



Harry N. Holmes and Richard Remsen Holmes

To the 32,000 members of the A. C. S. it is not news that the highest honor this group of chemists can bestow upon one of its members is to make him President of the American Chemical Society—the largest specific scientific body in the world. But it may be news to some that **President Harry Nicholls Holmes,** whose term expires this month, is the product of and protagonist for the liberal arts college. Although repeatedly offered attractive positions in large universities and in industrial organizations, he has steadfastly but courteously refused them, preferring to remain in Oberlin College, where he has been head of the Department of Chemistry since 1914. There and at Earlham College, where he was head of the Department of Chemistry from 1907 to 1914, he has taught over 4,000 liberal arts college students and influenced more than 300 in becoming professional chemists. In view of his notable achievements and his valuable contributions, both in research and in scientific education, his lifetime association with liberal arts colleges needs added emphasis, particularly now, when many of the smaller colleges, though exceedingly eager and qualified to be of the utmost service, may be ignored or even denied the opportunity of helping to train young people for the immediate demands of the national emergency. Dr. Holmes epitomizes the great contribution which the liberal arts colleges have made to the development of America and the democratic way of life.

Born July 10, 1879, near New Castle, Penna., of Scotch-Irish-English parentage and constantly encouraged by his revered mother, who taught him perseverance and economy, he overcame the handicaps of meager funds and secured a college education at Westminster College (A.B. 1899, M.S. 1907, LL.D. 1941), and his first love for chemistry under the inspiring teacher, Charles C. Freeman.

With the aid of funds saved while teaching at Gallia Academy, Gallipolis, Ohio, and at Dixon Academy, near New Orleans, he realized his ambition to do graduate work at Johns Hopkins University (Ph.D. 1907). Here Ira Remsen, "the perfect teacher, taught him clearness in writing and thinking and a devotion to research", and did for Dr. Holmes what the latter has so freely passed on to his many students—helped him to secure subsequent positions.

Two years after assuming his duties at Earlham College, Dr. Holmes married Mary V. Shiveley, of Richmond, Ind., the daughter of a lawyer prominent in the State of Indiana. They have two sons, Charles, instructor in English, Pomona College, and Richard Remsen, concerning whom more will be told.

So versatile and vigorous has Dr. Holmes been that a cataloging of his activities resembles a listing of the achievements of "Superman": a basketball star and coach who introduced the game at Johns Hopkins, captained and coached the team, and twice produced the best college team in Indiana while coaching, on the side, at Earlham College; a golfer and instructor of his two sons, who now surpass him (he has been good enough to win a first prize in an A. C. S. tournament); a musician—not instrumental but vocal—member of Johns Hopkins Quartette, Glee Club, and several prominent choirs; an actor of no mean ability—he participated in numerous dramatic productions by the faculty at Oberlin; a handwriting expert, who has occasionally been expert witness in legal cases; a lover and grower of beautiful flowers, who knows just what fertilizers to use and proper pH of the soil for best results; an able administrator, who has given an international reputation to the Chemistry Department at Oberlin, as well as expanded it until every nook and cranny of the laboratory building is utilized; an organizer of regional groups of chemists in Ohio and surrounding states and one of the founders of Gamma Alpha Graduate Scientific Fraternity; the first editor of *Gamma Alpha Record;* a wide disseminator of science knowledge by means of air waves and talks before Service Clubs and P. T. A. groups; a research consultant to industrial organizations; the holder of several patents; a traveler, who made trips to Europe with his family in 1926 and 1934 (and as President of our Society has traveled over 25,000 miles!); a great exponent of vitamins, particularly partial to vitamin C; the distinguished author of eleven books, concerning the third edition of whose book "Out of the Test Tube" one reviewer wrote:

> Fortunately for the public, there are a few consummate artists among those who write on scientific subjects. In the forefront of these stands Dr. Harry N. Holmes. Chemistry is fortunate to have in its ranks a spokesman with his literary talents. In a direct, honest, clear pictorial style he presents his science in a manner that is not only informative and educational but as entertaining as many books that are read for diversion. With "Out of the Test Tube" and Dr. Holmes' latest textbook on chemistry under his arm, a high school or college student is prepared to learn chemistry and like it. While either of these volumes will stimulate his interest in the subject, there is grave peril that together they might be sufficient to make him want to be a chemist.

a lecturer extraordinary; an indefatigable investigator, who has published more than fifty research papers; a great crusader for research in colleges, who has set the pace at Oberlin, since no other college in the United States equals that institution in published research; and an inspiring teacher, who has not only trained many who are now distinguished industrial chemists or widely known teachers, but has made chemistry an interesting and exciting subject to English, Latin, economics, and history majors.

Possibly the accomplishments listed above could be achieved by a man who is indifferent to others, though this is not probable. However, a recital of his many accomplishments does not reveal the real man and his warmth of friendship nor his deep personal interest in his students, past and present. He is always on the lookout for good positions for them—not for just one or two particular favorites, but for all whom he can wholeheartedly recommend. He is not sentimental, but his love for and devotion to his students are genuine. This has its own reward, for his students reciprocate this love and loyalty (look in on an Oberlin breakfast at any of the A. C. S. meetings). On the occasion of the completion of 25 years as head of the Department of Chemistry at Ober-

lin College, his students gave a dinner in his honor at the A. C. S. meeting in Boston, September 1939. The eagerness of all to have a part in this celebration and tribute to a great teacher and friend was overwhelming. They presented him with a beautiful gold watch, appropriately engraved, and a handsomely bound book of letters of appreciation. Possibly in no more fitting way could this tribute to a great scientist, teacher, and friend be concluded than by quoting a paragraph from one of his former students:

Although I did not major in chemistry, nor do graduate work under Dr. Holmes, the lectures and demonstrations in his elementary chemistry class are among the most vivid and pleasant recollections of my undergraduate career and I still regard the course I took with him as one of the most profitable and illuminating academic experiences I have ever had. The fact that a man of his specialized training and national reputation should have made the elementary class of his department one of his chief interests has always seemed to me to be the best evidence of his sincere interest in teaching. It has also marked him for me as a truly great scientist, one who realizes that his duty is not merely to advance science's frontiers but also to give intelligent laymen, and possibly laymen not too intelligent, some inkling of the methods and discipline of science and of its promise to civilization.

Richard Remsen Holmes

Born August 21, 1920, in Oberlin, Ohio, he was named for the man whom his father so greatly admired—Ira Remsen. When Dick was about seven years old Remsen visited Oberlin and his eyes twinkled as he watched his "grand-pupil" and namesake.

Dick attended Deerfield Academy, Deerfield, Mass., and then returned to Oberlin College, completing work for graduation, with honors in chemistry, in September 1942. At once (October 15, 1942) he began work as junior chemist with the Shell Oil Development Co., Emeryville, Calif., taking with him his wife, Virginia Shaw Holmes, whom he married before completing the requirements for graduation. This required special permission, according to regulations of Oberlin College.

In 1942 Dick won the golf championship of the Ohio College Conference. In 1940 he pushed the finalist winner of the Cleveland District Junior Championship to the 36th hole.

From reliable sources it is reported that Dick's father brought no pressure on his younger son to become a chemist, but there was paternal delight when Dick indicated his desire to follow in his father's footsteps. Nor in any way did Dick seek any favoritism because of his relationship to the head of the department. Apparently both he and his father leaned over backwards in this respect, thus forming a V for Victory.

For his senior honors thesis Dick worked with his father on "Pencillin", an extraordinarily difficult problem. Dick modestly thinks he did little, but his father insists he showed the originality and accuracy of a first-class graduate student.

Naturally, he took his father's course in colloid chemistry as well as some of his vitamin C. After the war Dick plans to go on for his Ph.D., probably in the field of organic or biochemistry, since these are his favorites.

PAUL H. FALL

Remington Medal Presentation

JOSIAH K. LILLY, chairman of the board of Eli Lilly and Co., received the Remington Medal for distinguished work in pharmacy at a meeting in New York on December 10. The medal was presented by Curt P. Wimmer, vice president of the New York branch of the American Pharmaceutical Association, which sponsored the event. More than four hundred leaders of the industry were present.



Mildred Adams, who for several years has been in the chemical research division of the National Institute of Health, Washington, D. C., has taken a position with Takamine Laboratories at Clifton, N. J.

Adrian G. Allison, former ceramic engineer of the Electro Refractories & Alloys Corp., Buffalo, N. Y., has been appointed to the research staff of the Battelle Memorial Institute, Columbus, Ohio, and assigned to the Division of Ceramic Research.

William T. Anderson, Jr., for nearly 20 years director of the radiation research laboratory of the Hanovia Chemical and Manufacturing Co., Newark, N. J., has been granted a leave of absence to accept a commission as a lieutenant in the Naval Reserve.

James R. Arthur, assistant to comptroller of the Tobacco By-Products & Chemical Corp., Louisville, Ky., and **Charles M. Timblin,** auditor of Charles Pfizer & Co., Inc., New York, have been elected to membership in the Controllers Institute of America, a technical and professional organization of controllers devoted to improvement of controllership procedure.

Edward J. Barta, ordered to active duty December 30, 1940, as Chemical Warfare Officer, Armored Force Board, Fort Knox, Ky., was promoted to major on July 25, 1941, and to lieutenant colonel on August 31, 1941. He has now been relieved from duty at Fort Knox and assigned to Headquarters II Armored Corps as Corps Chemical Officer, Camp Young, Calif.

George M. Bramann has resigned as assistant to the sales manager of the Niacet Chemical Corp. and accepted the position of plant investment engineer with the Magnesium Plant, Mathieson Alkali Works, Lake Charles, La.

Harold W. Coles, formerly of Mellon Institute, has joined the research staff of the Bausch & Lomb Optical Co., Rochester, N. Y., where he will be in charge of the new Organic Chemistry Department.

Charles A. Cook, formerly senior biochemist at the Experimental Research Laboratories, Burroughs Wellcome and Co. (U. S. A.), is now in charge of the department of medical and biological chemistry at the Research Laboratories of the Lambert Pharmacal Co., St. Louis, Mo.

Ned H. Dearborn, executive vice president of the National Safety Council, **Philip Drinker,** Harvard School of Public Health, **Lieut. Col. A. J. Lanza,** chief, Occupational Hygiene Branch, U. S. Army, and **C. D. Selby,** General Motors Corp., have been elected to the board of trustees of the Industrial Hygiene Foundation.

Ogden FitzSimons has joined the General Engineering Department of Monsanto Chemical Co. and will be located in St. Louis, Mo. Mr. FitzSimons was formerly with The Barrett Division, Allied Chemical and Dye Corp.

Thomas S. Gardner, duPont Postdoctoral Fellow in Cellulose, 1941–42, Massachusetts Institute of Technology, Cambridge, Mass., has joined the staff of the Tennessee Eastman Corp., Kingsport, Tenn., as a research chemist.

Esther Griffith, formerly on the teaching staff of Texas State College for Women at Denton, Tex., has taken a position in industrial research with Devoe and Raynolds Co., Louisville, Ky.

POTOMAC POSTSCRIPTS

WPB Activities

Alcohol. To save an additional million gallons of ethyl alcohol a year for military production, use of alcohol in toiletries and cosmetics, shoe polishes, candy glazes, and nonbody deodorant sprays will be limited to 50 per cent of the amount used in a base period by General Preference Order M-30, as amended by the Director General for Operations.

Under the original order use of alcohol was restricted to 70 per cent of the base period for certain cosmetics and toiletries, while for others the permitted use was 100 per cent of the base period amount. The amended order limits quarterly consumption of alcohol to 50 per cent of consumption in the comparable quarter in the fiscal year ended June 30, 1941. For the month of December 1942, use of alcohol is limited to 50 per cent of the amount used in December 1940, and total fourth-quarter consumption may not exceed 70 per cent of consumption in the corresponding quarter in the base period.

Chlorine. Restrictions on the use of chlorine and products containing available chlorine have been revised to remove from control of Conservation Order M-19 all products containing available chlorine such as liquid sodium hypochlorite, calcium hypochlorite, and sodium chlorite. Also exempted from the order, as amended, are deliveries and use of 2,000 tons of chlorine or less per month.

Fertilizers. A grade-substitution program expected to reduce the consumption of chemical nitrogen in mixed fertilizers by approximately 20 per cent has been instituted by the Director General for Operations through issuance of General Preference Order M-231 as amended. Through this program a large amount of nitrogen will be saved without greatly impairing crop production.

Schedule B of the amended order lists the grades of fertilizer by nitrogen content used during the 1940–41 season in the respective states. Opposite these are the approved grades which are to be substituted in 1942–43. Fertilizer manufacturers are required to produce the approved 1942–43 grades in the same proportion as the 1940–41 grades. The amended order also places manufacturers on the same basis as dealers and agents in respect to stocks on hand. That is, manufacturers may now deliver stocks of fertilizer packaged in lots of less than 80 pounds. Previously they were required to reprocess these stocks into approved grades and repack them in 100-pound bags.

Graphite. Complete control over distribution and use of graphite will be effected by Conservation Order N-61, as amended by the Director General for Operations. Madagascar flake graphite alone was covered by the previous order. The amendment extends this control to a lower-grade than previously covered and brings into control all graphite which will stand on a number 50-mesh screen.

Beginning immediately no person may put into process for any purpose any strategic graphite except with specific authorization by WPB. No person except a jobber may deliver or accept delivery of any crucible, or any other product containing strategic graphite, without specific authorization. Preference ratings will hereafter have no bearing on delivery of crucibles containing strategic graphite.

Lithium. Lithium ores have been put under complete allocation and use control by General Conservation Order M-253, issued by the Director General for Operations. Beginning immediately, no supplier may deliver and no consumer may accept delivery of, or use, lithium ores except with specific authorization of WPB. This restriction covers stocks of ore which have been produced and are now in private or government hands, including spodumene, lepidolite, amblygonite, triphylite, petalite, and zinnwaldite. Allocations will be made without regard to preference ratings. Forms PD-728 and PD-729 are to be filled with WPB in connection with this order.

Lithium compounds are under allocation control by Order M-190. The operation of newly constructed production facilities is placing substantial new burdens on lithium ore supply. The new order is issued to ensure an orderly and complete regulation of all phases of lithium compounds manufacture. It is estimated that more than 300 tons of spodumene a month may be directed into war production as a result of the order.

Sulfuric Acid, including oleum and spent acid, has been placed under allocation control through the issuance by the Director General for Operations of General Preference Order M-257. Deliveries of acid will not be prohibited subject to specific authorization, as is usually the case with an allocation order, but directions will be issued when and as needed, covering deliveries to be made and uses to be permitted or prohibited.

The order is prompted by the need of a continuous supply of sulfuric acid to fulfill military explosives requirements, and will enable the Chemicals Division of the War Production Board to act promptly in emergencies. It provides that all producers of sulfuric acid, and all others who deliver spent sulfuric acid, must file monthly reports covering their shipments and production during the prior month, as well as a statement of estimated production for the current month. This report is to be made on the standard chemical supplier's form, PD-601.

Theobromine and Caffeine. Procedures for filing reports under Order M-222 covering theobromine and caffeine have been changed by issuance of an amended order by the Director General for Operations. Under the amended order three copies, rather than two, of the customer's application, Form PD-600, must be filed with WPB. Also the interval is reduced between the filing of the customer's and supplier's application. The amended order does not change the actual distribution of materials.

Vegetable Fats and Oils. Importers of vegetable fats and oils have been notified of a revision in the schedule of commodities and consideration days under which the Commodity Credit Corporation considers offers submitted to sell fats, oils, and oil-bearing materials for importation under provisions of WPB General Imports Order M-63. The new schedule, effective December 2, 1942, is a revision of the schedule announced October 20, 1942.

Jointly announced by the Board of Economic Warfare, the WPB, and the CCC, the revised schedule changes consideration days for offers from a Tuesday-Friday basis to Tuesdays only. On Tuesdays, the CCC will consider offers of the following commodities, if received by 4:00 P.M. EWT, by the Director of Foreign Purchases, Commodity Credit Corporation, U. S. Department of Agriculture, Washington, D. C.: babassu oil, babassu kernels, cashew nut shell oil, castor oil, castor seed, coconut oil, copra, corn oil, cottonseed oil, oiticica oil, palm kernels, palm kernel oil, palm oil, peanut oil, rapeseed oil, and sunflower seed oil.

Because offers by the trade were so small on muru muru oil, neatsfoot oil, ouricury oil, and tucum oil, these commodities, which were on the list announced October 20, were not included in the current list. No change is made in the procedure announced August 18, 1942, under which importers submit offers to the CCC.

Price Regulations

Fine Chemicals and Drugs. Dollars and cents maximum prices at manufacturers', wholesalers', and retailers' levels have been set by the Office of Price Administration in Maximum Price Regulation 278 issued December 4, and effective December 10, for totaquina, a newly developed product of cinchona bark. This

will be used in fighting malaria in this country, thus freeing all available supplies of quinine for the armed forces.

The use of totaquina, with attendant encouragement for the growing and collecting of the cinchona bark in Latin America, will extend the existing and future supply of cinchona bark by employing cinchonidine, cinchonine, and quinidine for malaria in addition to quinine.

Maximum retail prices will enable consumers to obtain totaquina at about half the cost of quinine. A smaller dosage of quinine is required, however.

Since only a few sales of totaquina were made on an experimental basis in March 1942, and at the higher prices which always accompany sales of this type, a specific maximum price regulation was issued. After conferences with representatives of the industry and of interested government agencies, the maximum prices were established on a basis of 40 cents an ounce for sales of totaquina powder in bulk quantities. Specific maximum prices are set for the powder and for tablets and capsules at all levels, including retail.

Fluorspar. Fluorspar ores have been freed from price control by the Office of Price Administration in another action designed to facilitate the Government's program for expansion of the production of fluorspar, Amendment 42 to Supplementary Regulation 1 to the General Maximum Price Regulation, effective November 23, 1942. Ceiling prices previously were the highest charged during the month of March 1942.

The action follows closely on the issuance November 18 of Maximum Price Regulation 126, as amended, which increased metallurgical and acid grade fluorspar maximum prices to encourage broadening of production in present mines and mills and development of new facilities. According to OPA, if fluorspar price increases are to become fully effective as production stimulants, they must be received by the producers of fluorspar ores from which the metallurgical and acid grades of fluorspar are obtained.

Glycerol. A big saving to the taxpayer on glycerol has been effected by the Office of Price Administration through a voluntary agreement with the six leading manufacturers to reduce their price one cent a pound on all sales to the Government. The companies, which produce 95 per cent of the Nation's glycerol, are Armour Soap Works, Colgate-Palmolive-Peet Co., Harshaw Chemical Co., Lever Brothers Co., Procter & Gamble Co., and Swift & Co. The agreement was worked out in conferences between company representatives and OPA's Chemicals and Drugs Price Branch.

Glycerol prices were reduced substantially in October 1942, when the product was brought under Price Schedule 38. With the new reduction of one cent, the price on sales to the Government will be 17.5 cents a pound in tank cars for C. P. glycerol (98 per cent glycerol), 17.75 cents in carload lots of drums, and 18.25 cents in less than carload lots of drums. All other grades will run 17 cents, 17.25 cents and 17.75 cents.

Phosphorus. Sales of phosphorus by the Tennessee Valley Authority to the Chemical Warfare Service of the War Department have been exempted from price control by the Office of Price Administration. The action was taken in Amendment 13 to Revised Supplementary Regulation 4, effective December 5, on the ground that TVA will make all such sales at cost.

The new form of Order M-19 is a straight allocation order replacing the previous conservation and allocation order. Under the new order control over the all-chlorine products will be exercised by controlling original shipments of chlorine. The change from end-use restriction to complete allocation control is made necessary because restrictions on consumption were too rigid when chlorine was in easy supply and not tight enough when chlorine was scarce. Under allocation control instant adjustments can be made in distribution and use control as the supply situation changes.

Under the new order no person may deliver, accept delivery, or use chlorine except by specific authorization by WPB. Exempt from these restrictions are users of 2,000 pounds or less per month, and delivery and use of chlorine for water purification and sewage treatment, so long as inventories are not for more than 30 days' supply. Purchasers under this exception must file a certificate with their supplier. Under the amended order purchasers must place their orders with distributors by the 5th of each month, and with producers by the 10th of each month. Forms PD-190 and PD-191 (revised) are to be used in applying for authorization under the order.

National Research Council Reports on Metallic Compounds

RECOMMENDATIONS as to relative essentiality of medicinal compounds made of metallic salts have been made to the War Production Board by a special subcommittee of the Committee on Drugs and Medical Supplies of the National Research Council. This report, requested by WPB, is an effort to marshal scientific advice as to which of the metallic compounds are most vital to medicine and which should, if restriction becomes necessary, be continued in production.

The recommendation of this committee, according to F. J. Stock of the Drugs and Cosmetics Section of the WPB Chemicals Branch, is simply a recommendation and does not mean that official action will be taken. The committee hopes that in matters dealing with the science of medicine it can get the advice of the medical profession and druggists.

Metallic compounds listed in the report are divided into two groups. Group I consists of arsenic and bismuth compounds, listed according to essentiality as follows: essential to the civilian practice of medicine to the extent of being practically indispensable; not indispensable but highly desirable if available; not essential to civilian practice of medicine.

Group II consists of aluminum, antimony, copper, and magnesium metal and compounds.

Interior Department Inventions Assigned to Government

OWNERSHIP and control of any inventions developed by Interior Department employees on government time or with government equipment hereafter will be assigned to the Federal Government in the interests of national security.

The Secretary's order gives official recognition to a policy already adopted voluntarily by virtually all of the technical and scientific personnel of the department. For a number of years many Interior Department employees who have made inventions have voluntarily assigned their patents to the Government, and others have turned over their patents for the duration of the war to the Government and to the war industries.

Lime Advisory Committee Formed by WPB

THE WPB Division of Industry Advisory Committees has announced formation of the following new committee:

LIME INDUSTRY ADVISORY, Committee, J. H. Russell, government presiding officer. Reed C. Rye, Warner Co.; Ralph L. Dickey, Kelley Island Lime & Transport Co.; John H. Durvall, Heesac Valley Lime Co., Inc.; Eric Johnston, Washington Brick & Lime Co.; Warren Lewis, Longview-Baginew Lime Works; H. B. Mathews, Jr., Mississippi Lime Co.; Bernard L. McNulty, Marblehead Lime Co.; Amos B. Miner, National Cyprus Co.; W. W. Sprague, National Mortar & Supply Co.; and E. I. Williams, Riverton Lime Co.

Industrial Economy Division Reorganized

THE Industrial Economy Division of the Bureau of Foreign and Domestic Commerce has again been reorganized into industrial groups. C. C. Concannon heads the Chemicals Unit, T. W. Delahanty the Drugs and Pharmaceuticals Unit, and Charles E. Lund the Fats and Oils Unit.

Chemical Exposition in War

Needs of wartime chemical industry were emphasized by 136 exhibits for the 24,000 visitors to the second biennial National Chemical Exposition, sponsored by the Chicago Section of the American Chemical Society, at the Hotel Sherman, Chicago, November 24 to 29. Concurrent with the exposition were well-attended meetings of the National Industrial Chemical Conference (four sessions), the newly formed National Conference of Electron Microscopy (two sessions), and the Chicago Section of the A. C. S. A program of industrial motion pictures of chemical interest continued throughout the Show.

Both visitors and exhibitors freely expressed satisfaction with the exposition generally, the products shown, and the value of the contacts made, in helping to solve problems arising in the rush of war production. Misgivings felt by many when both the locale and the dates of the exposition were changed as a result of the occupation of the Hotel Stevens by the Army proved groundless. Visitors found the exhibits of manufacturers (described in detail in Chemical and Engineering News of November 10, pages 1397 to 1451) replete with interest and placing emphasis on current problems of production and procurement. Exhibitors found interest on the part of visitors extraordinarily high and reported both active inquiries and orders booked in satisfying volume. With the Thanksgiving holiday and a Sunday falling in the schedule of the exposition, in addition to difficulties of transportation, volume of attendance fell short of that of 1940's show. However, representative exhibitors expressed themselves as well pleased with results obtained.

A proximate analysis of exhibits on the basis of products shown places them roughly in these classes:

Plant Equipment	76
Raw materials and chemical products	23
Laboratory supplies	21
Miscellaneous	16
Total	136

Particularly noticeable among the exhibits was the absence of heavy equipment. Photographs and small-scale models served instead to present ideas to visitors. Exceptions were a few operating units of small size.

Ten special exhibits added importantly to the completeness of the show. The Alien Property Custodian featured the thousands of seized patents and applications now available for license to American industries. The American Chemical Society showed a number of "Alternates and Substitutes" important in our war economy (see below). Deficiency diseases and their control by proper nutrition were emphasized by the American Medical Association in a striking series of color photographs. The Chicago Ordnance District, War Department, provided a military atmosphere with a showing of ammunition, shells, miniature tanks, and other matériel. New chemicals for industry, shown by *Chemical Industries*, gave visitors a view of recent additions to the list. Safety in plant operation, particularly the problem of dusts, was emphasized by the Department of Labor, State of Illinois, with demonstrations of dust-counting and control methods. Results obtained with the electron microscope in the solution of industrial problems were shown in an extensive display of electron micrographs by leading workers in the field and the RCA Manufacturing Co. demonstrated its instrument for visitors. Handling of the nutritional problems of a huge army in the field has fostered important developments in preservation, dehydration, and packaging of foods, as demonstrated by the Subsistence Research Laboratory of the Chicago Quartermaster Depot by samples displayed of the various ration units now supplied to our armed forces. The War Production Board, with the assistance of manufacturers, showed methods, particularly applicable to chemical process industries, of economizing in the use of essential materials and of salvaging wastes.

Synthetic rubber was the subject of an important exhibit of special timely interest to which leading factors in our swiftly growing synthetic rubber industry contributed. Raw materials, processes, and finished products of the several types now in production (or shortly to be) were shown by diagrams, photographs, and samples, including tires.

Descriptions of individual exhibits have already appeared in these pages and need not be repeated here. Some of them suggest further comment, which is here presented as drawn from one man's notes:

Armour & Co. has amplified its list of fatty acid derivatives, amines, nitriles, and ketones of high molecular weight, in addition to its semisynthetic drying oils.

Atlas Powder Co. has added two new surface active agents to its growing list of products. They are called "Spans" and "Tweens".

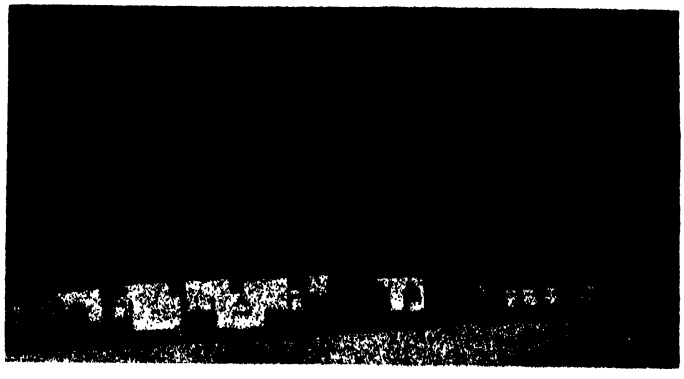
Commercial Solvents Corp. proves its case for the versatility of nitroparaffins with more new products.

Corning Glass Works' Vycor high-silica glass was interesting in new forms.

Denver Equipment Co. showed the application of its flotation processes to removing husks from wheat grains to make high vitamin bread.

Eutectic Welding Alloys, Inc., made its booth an eye stopper by having a welder at work with special alloys and fluxes as applied at low temperature to a variety of metals.







Laboratory and semicommercial air classifiers were shown in operation by **Federal Classifier Systems, Inc.**

Troubles from water and steam were the subject of the "Chamber of Horrors" by **D. W. Haering & Co.**, who showed also the effectiveness of organic chrom-glucosates in preventing scale and corrosion.

The Flosdorf-Mudd Cryochem method of dehydrating sera from the frozen state was shown by **W. A. Hammond Drierite Co.**

Haveg Corp. included Saran tubing, piping, and fittings in its exhibit of plastic equipment.

Low-temperature storage, down to −90° F., in a 5 cubic foot box was demonstrated by **Kold-Hold Manufacturing Co.**

The **Koppers Co.** featured the versatility of ammonium thiocyanate.

Lithgow Corp. emphasized its coatings for the protection of metals against corrosion: Lithcote (phenolaldehyde) and Cotoid (copolymer vinyl resin).

Ludlow Saylor Wire Co. made an attractive display of wire screens of a wide variety of metals and covering the range from coarse screens of 1-inch rods down to 325-mesh.

Marathon Paper Mills Co. demonstrated the usefulness of lignin resins, particularly in impregnated paper and laminated products.

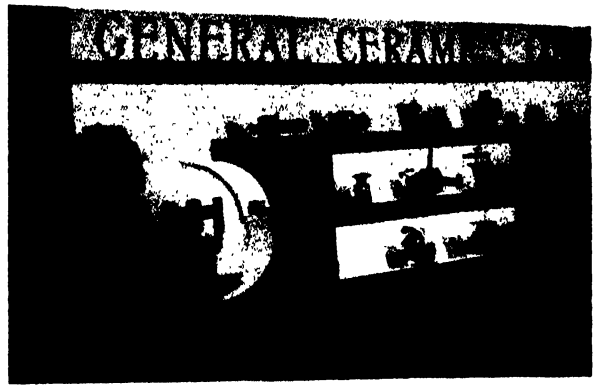
Merck & Co. emphasized synthetic vitamins and showed huge micrographs of crystals of these vital compounds. Also shown were sulfonamide drugs.

Dehydration of foods, important in its newest modifications in feeding our armies, was illustrated by **Proctor and Schwartz, Inc.**, with samples of the products of their dryers.

Ross & Rowe, Inc., showed new developments in the applications of lecithin both as a surface active agent and as an antioxidant.

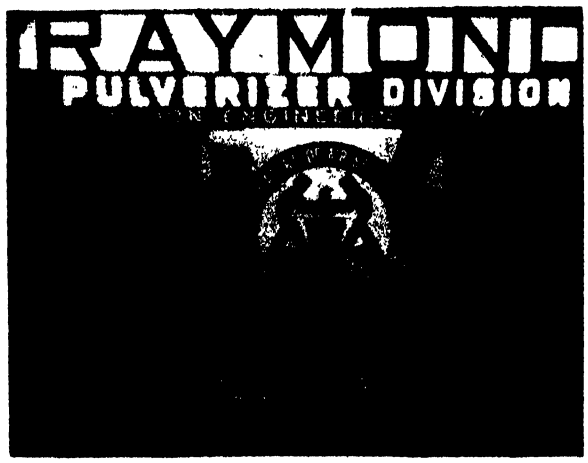
Zirconium and titanium oxides are finding new and vital applications replacing critically scarce materials in ceramic and electrical fields, as demonstrated by the **Titanium Alloy Manufacturing Co.**

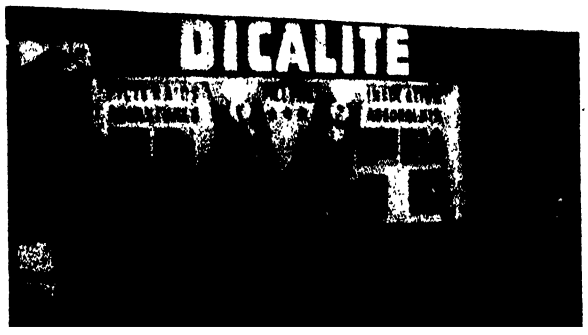
Union Bag & Paper Co. showed new developments in paper bags (multi wall and high wet strength) which enable them to serve a wider field of applications under present critical conditions.











Wilson Chemical Feeders, Inc., demonstrated its "Pulsafeeder" for handling liquid materials without contact with any of the working parts of the unit.

Particular interest under present shortages of new equipment attached to booths of three dealers in used equipment for chemical process use: **Consolidated Products Co., First Machinery Corp.**, and **Loeb Equipment Supply Co.**

A. C. S. Exhibit

"Alternates and Substitutes" was the title under which the AMERICAN CHEMICAL SOCIETY showed a number of products of special importance under present conditions. Obviously many of the items shown, adopted now of necessity, will occupy permanent places in our economy even after the emergency ceases to exist.

Replacement for Critical Metals. Resin-impregnated paper (automobile license plate).

Vulprene, rubber synthetics.

Arlac, shellac alternate.

Courtesy, AMERICAN RESINOUS CHEM. CORP.

Official Buttons. Official buttons for Army, Marine Corps, and WAAC uniforms made of Beetle resin are shown.

Courtesy, AMERICAN CYANAMID CO.

Three Stages in Development of Substitute Paint Can. First stage is the usual metal can. Next comes a paper can with bonderized metal ends, saving 65 per cent of the metal. Final stage is a can completely made of impregnated fiber and containing no metal.

Tin-Saving Cans. Hot-dipped tin plate, Pb-Sn solder, 4.07 pounds of tin per 1,000 cans.

Electrolytic tin plate, Pb-Ag solder, 1.27 pounds of tin per 1,000 cans.

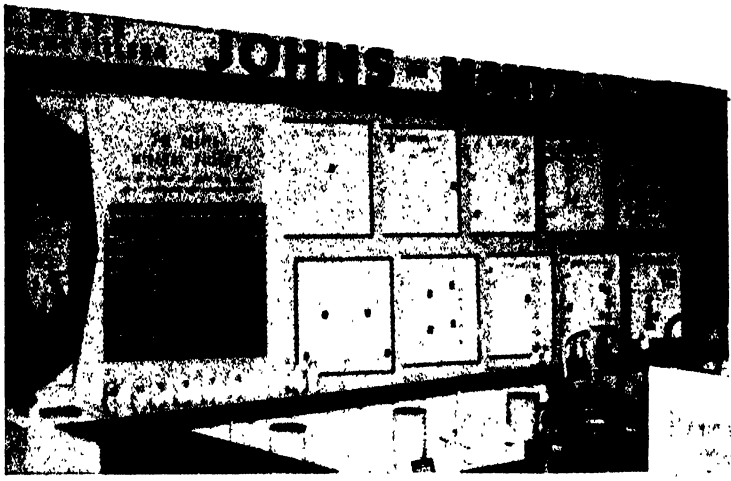
Ends of bonderized plate, bodies of electrolytic plate, Pb-Ag solder, 0.8 pound of tin per 1,000 cans.

Courtesy, AMERICAN CAN CO.

Manganese Bronze. Metallic arc-welded with 0.375-inch Ampco-Trode 10 Electrode. Preheat from 250° to 400°F., welded at 400 to 450 amperes.

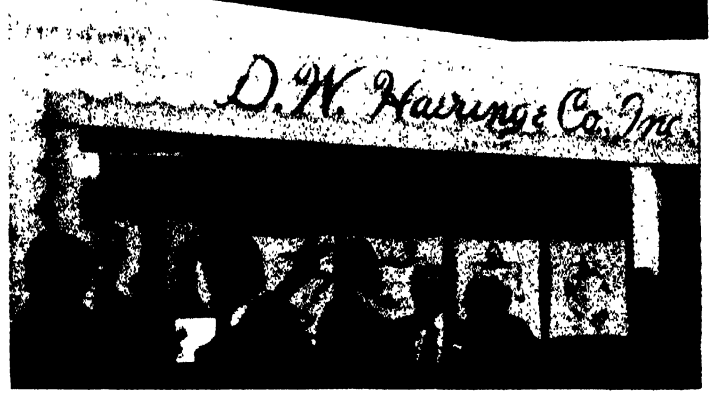
Courtesy, AMPCO METAL, INC.

Neo-Fats. Neo-Fat No. 190 (synthetic drying oil) is a raw material suitable for the production of paints, varnishes, enamels, driers, spar varnishes, baking enamels, roof cements, putty,

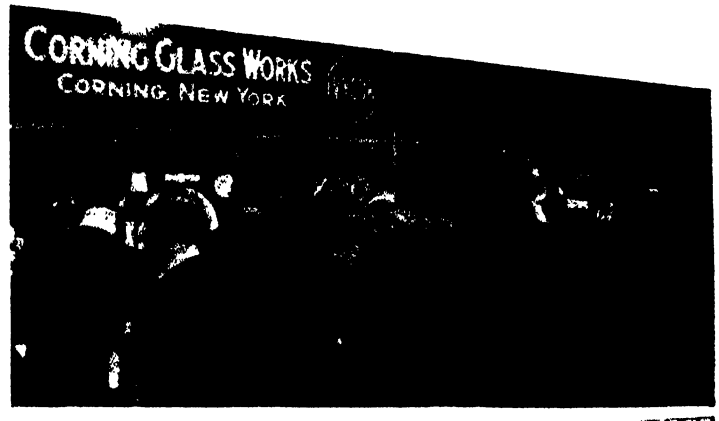




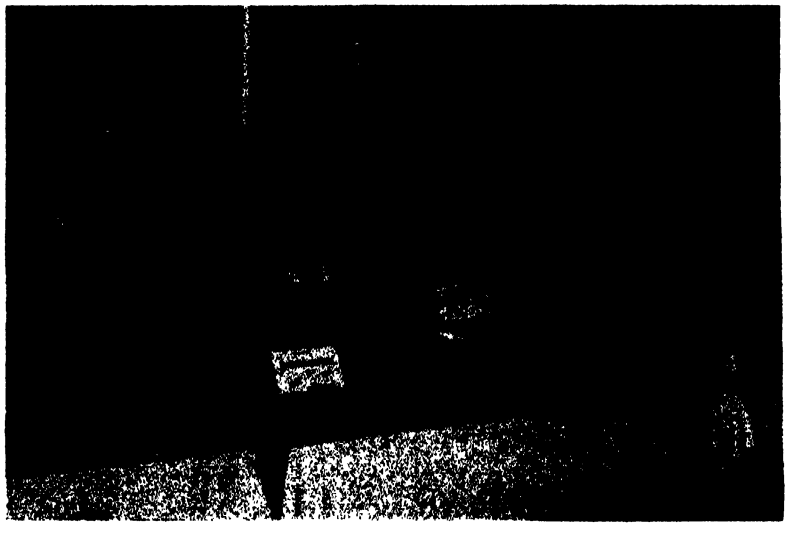

FILTER PAPER CO.


D. W. Haering & Co. Inc.


COMMINUTING EQUIPMENT

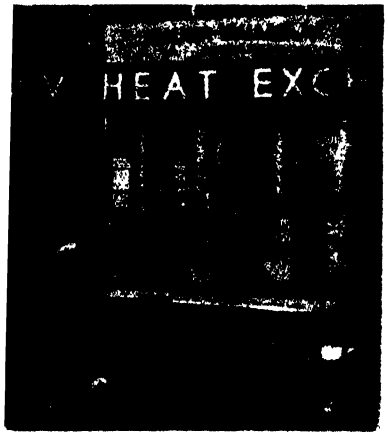

CORNING GLASS WORKS
CORNING, NEW YORK

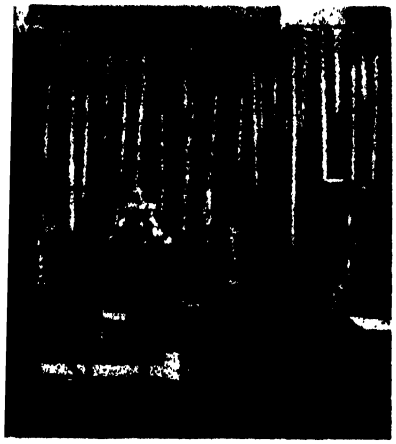

ACID PROOF TANTALUM















waterproof paints, linoleum, oilcloth, lacquers, printing and lithographic inks, patent and enameled leathers, core oils, furniture polish, plastic composition, artificial rubber, curing leather, chamois tanning, lubricating compositions, rustproof coatings, tempering steel, insecticides (tree-banding compounds), etc.

Neo-Fat No. 170 (synthetic drying oil) is an unusual drying oil and may be used to advantage in formulating paints, enamels, printing inks, putty, core oils, and allied products where darker colors are permissible.

Neo-Fat No. 290 (bodied synthetic drying oil) is a polymerized oil of the stand oil type. The thermal treatment employed in producing this oil results in a bodied oil of light color with a very low acid value. It is a valuable raw material for the production of transparent lithographic varnishes, high-quality enamels, mill whites, paints, spar varnishes, printing inks, etc.

Courtesy, Armour & Co.

Spans (technical long-chain fatty acid partial esters of hexitol anhydrides) and **Tweens** (technical polyoxyalkylene derivatives of hexitol anhydride esters) are emulsifiers, detergents, and wetting agents, which possess wide solubility range, and are nonvolatile and virtually neutral.

Courtesy, Atlas Powder Co.

Be Square Special Waxes. Microcrystalline petroleum waxes of high melting point (160/165 and 180/185) having unusual properties.

Courtesy, Bareco Oil Co.

New Waring Blendors. The scarcity of essential metals necessitated a complete redesign of the Waring Blendor. The change resulted in many improvements in performance, appearance, and service. The case, now made of plastics instead of metal, provides better cooling and insulation properties, not to mention attractiveness. Further desirable features include dynamic balancing and rubber mounting to reduce vibration to a minimum, a "fan-governor" to regulate automatically the constancy of speed for perfect blending, and a high-powered motor with self-aligning, lifetime lubricated bearings for operation on both alternating and direct current.

Courtesy, Central Scientific Co.

2-Methyl Pentadiene. Isopropylamine, Aciterge OL.

Courtesy, Commercial Solvents Corp.

Thermocouple Protecting Tube of 96 per cent silica glass No. 790 replaces critical metals and offers advantages of low lag and imperviousness to gases.

Courtesy, Corning Glass Works

Pipe made of Pyrex brand resistant glass No. 774 finds many new uses in place of critical metals in manufacture of heavy chemicals, foods, and beverages.

Courtesy, Corning Glass Works

Pyrex Brand Fritted-Glass Filters conserve "critical" asbestos.

Courtesy, Corning Glass Works

Saran tubing, pipe, and fittings resist chemicals and solvents and are easily fabricated.

Courtesy, Dow Chemical Co.

Cellophane Replacing Metal. Cellophane, thin, light, but tough cellulose film, provides a moistureproof, vaporproof, germproof, greaseproof, and dustproof and medical products formerly packaged in tin cans or metal foil. It is thus releasing large quantities of metal for vital war uses. Cellophane-wrapped packages are also lighter, and in many cases less bulky, than the same quantities in metal, with a resultant important saving of shipping weight and space.

Recent applications of cellophane are illustrated by quick-frozen baked beans and vegetable shortening in cellophane-lined paper cans; dried eggs in cellophane-wrapped cakes and cellophane-lined cartons; aspirin tablets cellophane-wrapped in paper cover, match book style; first aid dressings and sulfanilamide in packages wrapped in moisture-resistant cellophane; U. S. Army Emergency Field Rations, with individual items cellophane-wrapped and the complete units enclosed in cellophane-laminated parchment cartons.

Courtesy, E. I. du Pont de Nemours & Co., Inc.

Rayon Tow for Mechanical Packing. Rayon tow made by the viscose process was introduced to the mechanical packing trade late in 1940. Unlike tow made from vegetable fibers, such as imported long-line flax, the filaments of rayon tow are continuous and the tow is made up of several thousand parallel fibers.

Mechanical Packing Braided from Rayon Tow. This sample of "dry" or nonlubricated packing was braided by Reliance Packing Co., Philadelphia, Penna., from du Pont rayon tow, Type 126. For a few specialized uses pumps are packed with the tow without impregnation. However, in the majority of cases the braided product is impregnated with fats, waxes, oils, etc.

Lubricated Mechanical Packing. This sample of rayon packing is ready for installation in stuffing boxes on equipment such as centrifugal and reciprocating pumps. Rayon packing has shown extremely low abrasion to the moving shaft or rod. The sample exhibited was braided and lubricated by Reliance Packing Co., Philadelphia, Penna.

Courtesy, E. I. du Pont de Nemours & Co., Inc.

Tapered Nylon Bristles. Tapered nylon bristles, recently announced, will serve as an alternate for scarce hog bristle in paint brushes. This development came at an opportune time, since the supply of natural bristles, imported chiefly from the Far East, is now largely cut off. The entire output of tapered nylon bristles is now being used for military purposes.

Nylon Paint Brush. Tapered nylon bristles in this paint brush wear at least three times as long as hog bristles. The first satisfactory alternate for hog bristle, nylon has not only the taper required for paint brushes, but also the resiliency, toughness, length, and inertness to paint ingredients.

Courtesy, E. I. du Pont de Nemours & Co., Inc.

"Bubblfil". These strands of transparent air-filled cellulose bubbles are produced as a replacement for imported kapok in life jackets, life rafts, air compartments of life boats, etc. It is fully as buoyant as kapok and its resilience makes it a possible alternate for sponge rubber. The bubbles cannot be broken by squeezing and the material will not ignite when struck by tracer bullets. Obviously, gases other than air could be used to fill the bubbles.

Courtesy, E. I. du Pont de Nemours & Co., Inc.

Ceraphragms. The new procelain-type electrolytic diaphragm has uniform porosity, low electrical resistance and permeability.

Courtesy, GENERAL CERAMICS CO.

Acrawax. Acrawax blends with carnauba wax, rosin, shellac, stearic acid, ester gum. It is not compatible with paraffins and other mineral waxes.

Acrawax B has excellent luster and is very similar in properties to Acrawax. It is compatible with paraffin wax and forms gels with mineral spirits and kerosene.

Acrawax C blends with paraffin wax, carnauba wax, rosin, etc. It is of particular interest where a high melting wax which is not brittle is desired. Because of its high flash point, Acrawax C can be used where ordinary waxes are unsuitable because of fire hazards.

Courtesy, GLYCO PRODUCTS CO., INC.

Nipocer blends with japan wax, paraffin wax, beeswax, carnauba wax, rosin, etc., and replaces japan wax in many cases. It emulsifies readily with the usual emulsifying agents, giving stable, smooth emulsions.

Courtesy, GLYCO PRODUCTS CO., INC.

Rezo Wax B replaces montan wax for certain purposes.

Courtesy, GLYCO PRODUCTS CO., INC.

Organic Chrom-Glucosates. Metal piping for water or steam can be protected from scale and corrosion by treating water with organic chrom glucosates, which possess effectiveness manyfold greater than corresponding inorganic chemicals. Thus critical metal in piping systems is saved with the use of minimal quantities of treating materials.

Courtesy, D. W. HAERING & CO., INC.

Cellulose Acetate Extruded Tubing. Collapsible plastic tubes (of properly formulated cellulose acetate plastics based on Hercules cellulose acetate flake) have proved tougher and more resilient than tin-base alloys. Because the sides do not cling together the contents are more completely usable.

These tubes are currently being supplied to at least two large toilet-goods companies by the makers, Celluplastic Corp., Newark, N. J.

Courtesy, HERCULES POWDER CO.

Dresinates act as emulsifiers, foaming agents, wetting and penetrating agents, detergent assistants. Available in varied combinations of properties to meet specific uses. Uses: ore flotation, powdered soaps, metal cleaning compounds, heavy-duty laundry cleaners, soluble oils, disinfectants, scrub soaps, etc.

Courtesy, HERCULES POWDER CO.

Ethyl Cellulose Plastics. A structural material featuring rapid, low-cost formation of complicated shapes; toughness at subzero temperatures; unusual stability under heat and high humidity; inbuilt color; light weight; dielectric properties; low specific heat. Uses: steering wheels, control knobs, airplane accessories, tubing, and uses where shock resistance is important as in flashlight cases.

Extruded ethyl cellulose plastics, easily applied by extrusion with high dielectric strength, toughness at low temperatures, and stability on exposure to heat and high humidity, soft formulations of ethyl cellulose can assume many of the insulation functions normally performed by rubber. Uses: signal wire, shielded cable, assault wire, aircraft, or other engine ignition cables, etc.

Soft ethyl cellulose plastics, possessing most of the qualities of rubber, with the major exception of immediate recovery after stress, these materials are being employed where the sealing, flexibility, or film-forming properties of rubber are desirable. Uses: grommets, gaskets, jar seals, etc. Coated cloth for stratosphere suits, waders, etc.

Courtesy, HERCULES POWDER CO.

Hercolyn (Hercules hydrogenated ester of rosin) acts as plasticizer compatible with nitrocellulose and resins used, also as gloss- and depth-producing resin to improve visual qualities of coatings. Used as alternate for, or to extend, scarce plasticizers of all types. Uses: in almost all types of formulation where nitrocellulose is used, such as lacquers, artificial leather, solvent-type adhesives, etc. More particularly for interior use.

Courtesy, HERCULES POWDER CO.

Laminated Paper Pipe. This pipe, molded by the Federal Electric Co. from a special patented paper supplied by the Flintkote Co., is reported on a weight-for-weight basis to equal steel in its major physical properties. The paper contains Hercules Vinsol resin, a low-cost thermoplastic, which bonds both the fibers in the sheets and the plies in the laminations into a hard, rigid, water-resistant structure. Uses: seismograph exploration, other uses where temporary low-pressure piping is needed, electrical conduit.

Courtesy, HERCULES POWDER CO.

Staybelite Resin (Hercules hydrogenated rosin) replaces stearic acid in rubber compounding (in part depending on formulation). Promotes tackiness and plasticity. Uses: carcass stocks and tread stocks, as replacement for stearic acid. Also used in camelback for recapping, in frictioning stocks for mechanical goods, in proofing stocks for fabric coverings, heels, and soles, in rubber cements, and in reclaiming process as a softener and tackifier in the pan process.

Courtesy, HERCULES POWDER CO.

Thanite and D. H. S. Activator. Thanite is a complete replacement for pyrethrum as the toxic ingredient in sprays. D. H. S. activator is an extender for pyrethrum-base sprays which are already manufactured, which can be used to stretch pyrethrum content 50 to 100 per cent without loss of activity. Uses: household sprays for flies, mosquitoes, ants, spiders, wasps, etc. Cattle and livestock sprays. Institutional sprays.

Courtesy, HERCULES POWDER CO.

Saflex Army Raincoat. By making this army raincoat of Saflex resin, 1.75 pounds of rubber are saved and the weight of the coat is reduced by 2 pounds. Processing of the fabric is done on standard rubber industry machinery.

Courtesy, HODGMAN RUBBER CO. AND MONSANTO CHEMICAL CO.

Celite Analytical Filter Aid, highly refined diatomaceous silica filter aid, specially prepared for laboratory filtration and analytical work. Used extensively to replace Gooch crucible fiber for many analytical procedures.

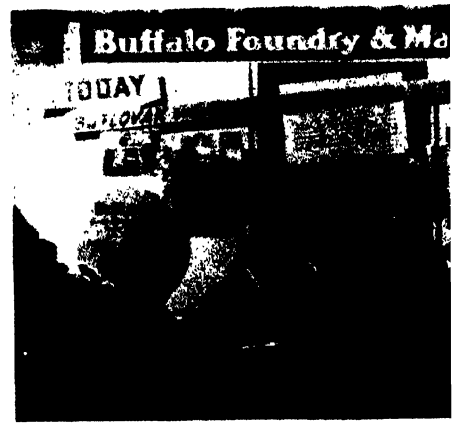
Courtesy, JOHNS-MANVILLE, INC.

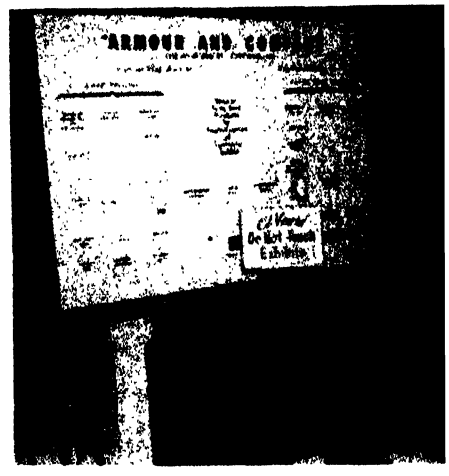
Celite 349, diatomaceous silica inert extender pigment specially prepared for low gloss finishes, particularly war camouflage paints.

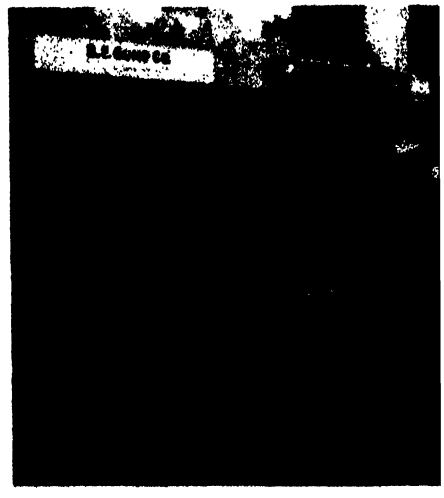
Courtesy, JOHNS-MANVILLE, INC.

Celite 340, new type of extender filler and pigment for paper industry. Among

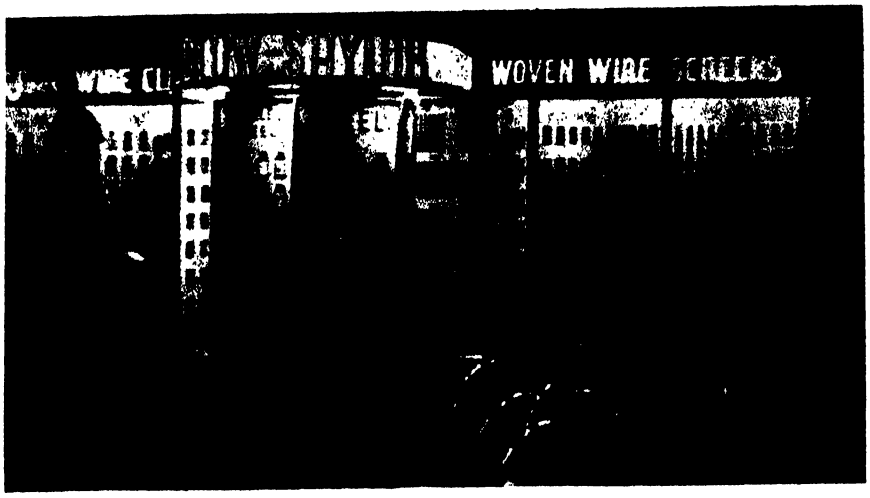




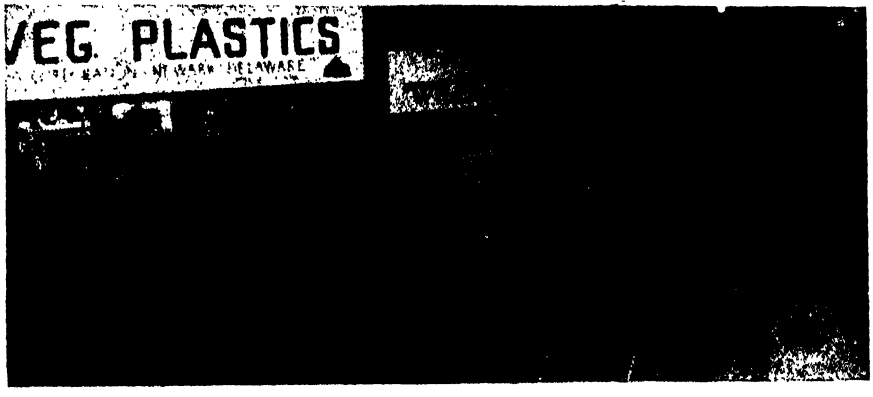














advantage are superior brightness and opacity, permitting reduction in use of prime white pigments.

Courtesy, JOHNS-MANVILLE, INC.

Zeo-Karb, carbonaceous cation exchanger, useful for recovering valuable cations or removing undesirable cations from solutions. One application is the recovery of copper and other metals from dilute solutions, such as brass pickling waste liquors. This method is especially valuable for solutions too dilute for economical handling by other methods.

Courtesy, THE PERMUTIT CO.

De-Acidite, anion exchange resin, useful for recovering valuable acids or anions, or removing undesirable acids or anions from solutions. One application is the salvage of platinum and other precious metals from plating or refinery wastes. The metal is adsorbed in the form of its complex anions, may be recovered by chemical regeneration or ashing of the saturated resin.

Courtesy, THE PERMUTIT CO.

Pfaudler Glass-Lined Pipe and Fittings, resistant to all acids, except hydrofluoric at elevated temperatures and pressures. Made in 2-inch diameter (and over) and in 10-foot length maximum. Jacketed pipe also available.

Courtesy, PFAUDLER CORP.

Wood Filter Press Plate and Frame can often be substituted for plates and frames made of critical materials.

Courtesy, D. R. SPERRY & CO.

Zirconium Opacified Glazes. Zircon-amel and zirconium oxide for hollow and flatware.

Courtesy, TITANIUM ALLOY MFG. CO.

Tygon, synthetic rubberlike material. Tygon possesses an almost universal resistance to corrosion. Flexible in application, it retains its corrosion-resistance through a wide range of physical forms. Tygon is made in flexible sheets for tank linings, gasketing, etc.; in flexible or rigid tubing and rods; in liquid form for use as a corrosion-resistant paint or for impregnation of fabrics; and in formulations for extrud ng or molding.

Courtesy, U. S. STONEWARE CO.

Ceramic Chemical Equipment. Chemical stoneware tanks, piping, valves, towers, pumps, etc., have been used throughout the chemical and process industries for many generations. Its almost universal acid and corrosion resistance and its ready availability have made chemical stoneware equipment exceedingly popular during recent months for new chemical plant construction.

Courtesy, U. S. STONEWARE CO.

Resilon, resinous thermoplastic. This new improved Resilon material can serve as an alternate for highly critical rubber and synthetics for many applications. While limited in its range of usefulness, its low cost and ready availability prompt its use for pickle tank linings, sumps, HCl storage tansk, acidproof membranes, etc., where it will perform excellently if not taxed beyond its physical limitations.

Courtesy, U. S. STONEWARE CO.

Civilian protection against war gases has received attention in many quarters. Some developments in this field were shown.

War Gas Sniff Set. Odors of war gases are simulated by harmless substances for training purposes.

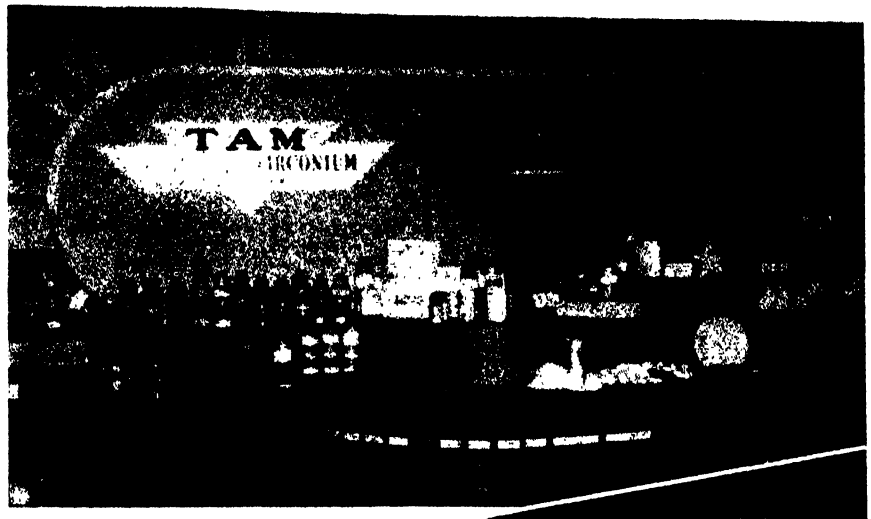
Courtesy, FRITZSCHE BROS., INC.

Liquid-Vesicant-Detecting Paint. This paint has the property of changing color permanently when splashed with liquid mustard gas or lewisite. Application has been made to the War Labor Board under order L-57 for approval of the manufacture and sale of these paints.

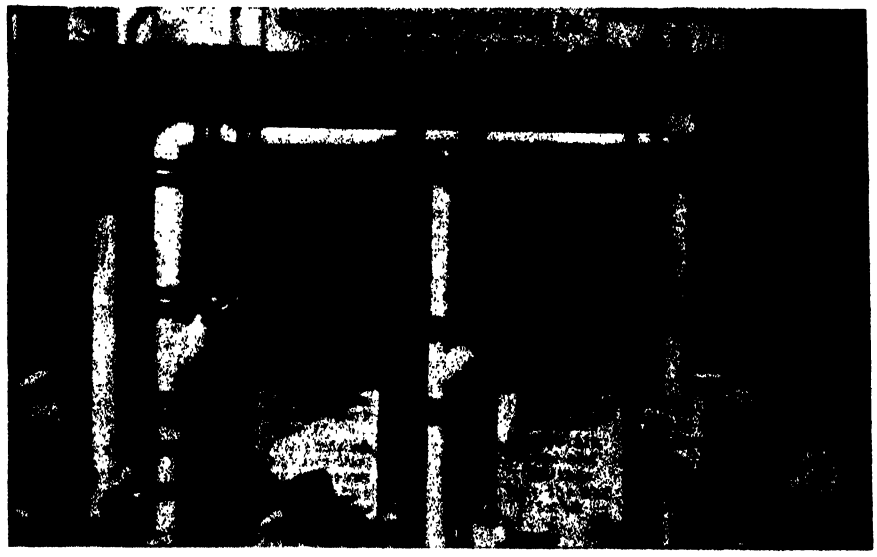
Courtesy, HILO VARNISH CORP.

Gas Tester. This aspirator automatically analyses air for war gases. It is painted with vesicant-sensitive paint to reveal the presence of liquid mustard gas or lewisite.

Courtesy, RUDMAN & SCOFIELD









Conference Topics

Meetings of the National Industrial Chemical Conference consisted of four independent sessions and a joint meeting with the Chicago Section, A. C. S.

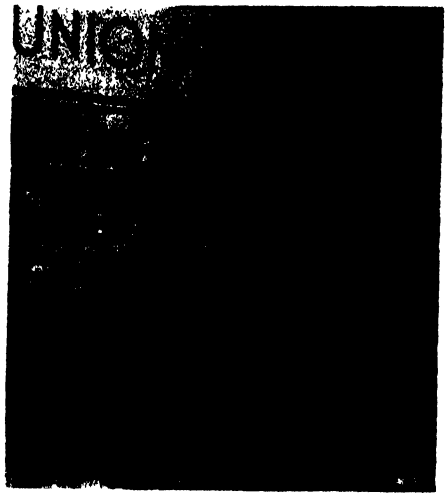
"Plastics and Paper" was the topic of Wednesday afternoon's meeting under the chairmanship of Norman A. Shepard, American Cyanamid Co. to Arthur E. Petersen, of the War Production Board, discussed factors controlling raw materials for plastic manufacture, pointing out the stringencies existing in many of these on account of military needs for them. "Paper and Paper Materials" were reviewed by Allen Abrams, of Marathon Paper Mills Co., with special emphasis on recent improvements and adaptations of pulp and paper to replace critical materials.

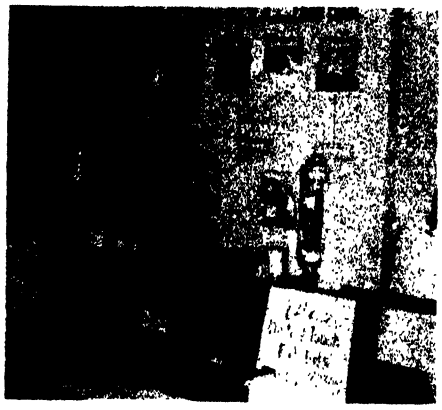
The Electron Microscope was discussed by V. K. Zworykin, of R.C.A. Manufacturing Co., at the joint meeting with the Chicago Section on Thursday evening. Dr. Zworykin described the development of the electron microscope and its applications and told of the latest developments: a simplified portable or table model, adaptation of the present instrument to make electron diffraction patterns and stereoscopic micrographs, and the use of extremely high voltages in securing greater penetration of specimens. R. C. Newton, of Swift & Co., chairman of the Chicago Section, presided.

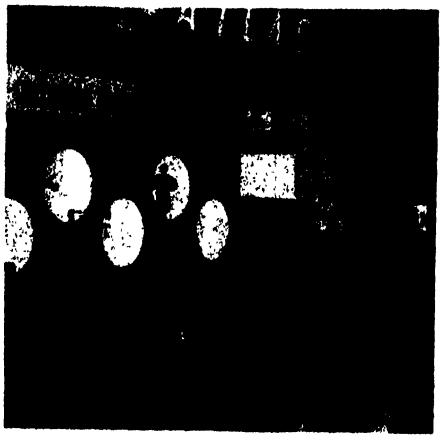
Food was the topic of Friday afternoon's session under the chairmanship of C. G. King, of the Nutrition Foundation. Soil, fertility, and nutrition were emphasized in relation to the food problem in three papers by L. A. Maynard, Cornell University, by W. A. Albrecht, College of Agriculture, Columbia, Mo., and by Dr. King.

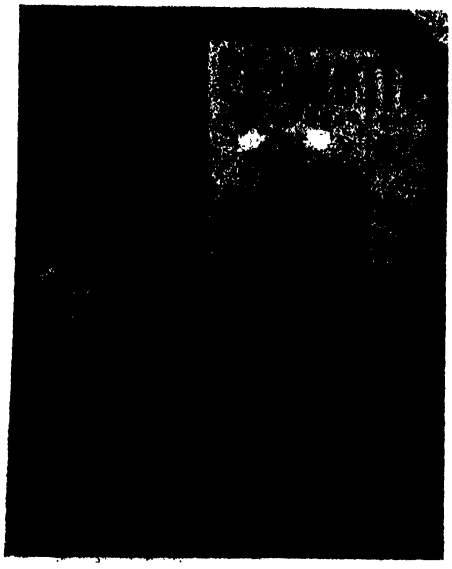
P. Gerald Kruger, University of Illinois, discussed "The Cyclotron and Its Uses in Research" at Friday evening's session, under the chairmanship of Victor Conquest, of Armour & Co.

"Industrial War Problems" were considered at Saturday afternoon's session under the chairmanship of Carl S. Miner, of Miner Laboratories. Ward V. Evans, of Northwestern University, described methods of controlling incendiaries. The treatment of wastes in a war economy









was the topic of F. W. Mohlman, of the Sanitary District of Chicago; and S. Donald Perlman, of the War Production Board, urged salvage and conservation in the chemical industry, pointing out examples of savings of valuable materials that can be effected.

Exposition Committee

Victor Conquest, of Armour & Co., was chairman of the Chicago Section's committee responsible for the exposition. Other members of the committee were. Arthur Guillaudeu, Swift & Co.; W. M. Hinman, Frederick Post Co.; W. C. Johnson, University of Chicago; L. E. May, Sherwin-Williams Co.; and H. E. Robinson, Swift & Co. Many members of the Chicago Section served on subcommittees handling various phases of the exposition. Marcus W. Hinson was exposition manager for the Section.

Food for Amazon Rubber Tappers

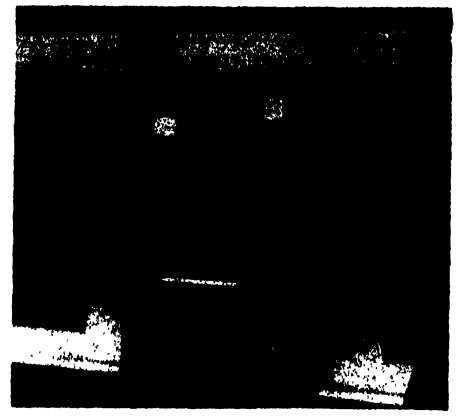
BRAZIL and the United States are working on a complicated food problem—the feeding of rubber tappers and their families in the Amazon Basin. This basin, with its millions of wild rubber trees, is considered the best potential source for quick expansion in natural rubber production, and its population is expected to double by the end of 1943, rising to perhaps 500,000 tappers, rubber handlers, and their families.

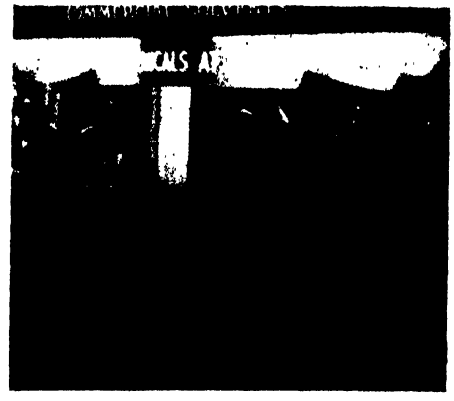
Brazilian and United States authorities agreed recently to contribute to a $4,000,000 fund for improvement of food production in Northern Brazil. Plans look to food raising in the interior, for as northern Brazil is almost without rail communications the shipping shortage makes it difficult to import needed supplies.

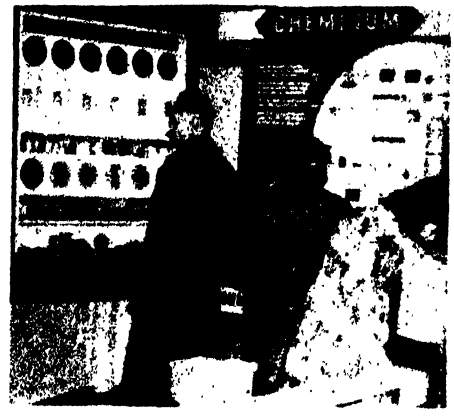
A 228-mile railway, built at the height of the Amazon rubber boom 30 years ago, but completed too late to serve this purpose may be useful now. This is the Madeira-Mamore Railway, 2,000 miles up the Amazon River, which by-passes the rapids and cataracts of the Madeira and Mamore Rivers, near Porto Velho.

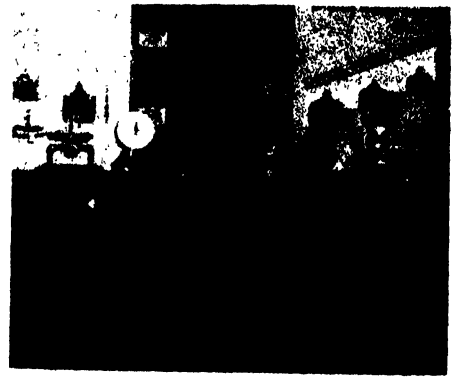
Petroleum Industry Not a Competitor of Agriculture

THE petroleum industry is far more interested in regaining its market for gasoline and motor oil than in competing with agriculture for the post-war synthetic rubber market, Gustav Egloff, director of research of the Universal Oil Products Co., told members of the National Farm Chemurgic Council at its recent conference in Cincinnati. The 1941 consumption of gasoline was 28,000,000 gallons; compared with this, the amount of petroleum used by synthetic rubber manufacturers would be relatively small.











The Economic Status of the Members of the American Chemical Society *(Continued[1])*

Approved Report of the Committee on Economic Status

George Calingaert, Walter A. Schmidt, Walter G. Whitman, Frank C. Whitmore, L. W. Bass[2], Chairman

Prepared for the Committee by Andrew Fraser, Jr., Washington, D. C.

Characteristics of the Special Analyses of Monthly Salary Rates of the Membership

EXCEPT for Section 3, the findings of the several preceding analyses have been derived from the information furnished by the membership as a whole. In the ensuing sections it is important to note that, in all but Section 9, the data analyzed are those reported by male regular members of the SOCIETY only. In all instances, however, the relationships established are concerned only with the median monthly salary rates of the several groups of members. Furthermore, in keeping with the similar analyses of monthly salary rates for the membership as a whole these median earnings were computed only if 10 or more members reported.

A general measure of the densities of the several samples on which the ensuing analyses are based can be obtained by contrasting the numbers of usable returns utilized in these special analyses with those reported by male regular members shown in Table 3. That table shows that 16,104 male regular members furnished usable information. Of this number 15,653 or 97 per cent furnished data on their monthly salary rates. In the field of chemistry 11,536 male regular members responded with usable information, but no less than 11,167 or 97 per cent furnished information that was used in the special analyses of their monthly salary rates. Among the five educational levels in the major field of chemistry, proportions used ranged from 66, or 89 per cent of the gross returns of the 14 who reported they had had no college training, to as high as 5,596, or 97 per cent who reported they had obtained doctors' degrees in chemistry. In each of the three other fields of chemical engineering, other field of science or engineering, and any other field the proportions of returns used were exactly similar to those noted above for the field of chemistry.

Not all of these special analyses of monthly salary rates are shown according to years of professional experience. For such as are shown on this basis only the year 1941 has been chosen for purposes of analysis. Of these, those presented for selected occupational statuses, sources of employment, and fields of specialization are distinctly unique in that they make available for the first time contrasts in earnings with advancing years of experience of an important group of professional members. All other special analyses are shown without regard to years of professional experience for the years 1929, 1934, and 1941. The deciding factors in choosing these particular years were: 1929 was a year of high level of earnings; earnings in 1934 were generally the lowest;

CHART 6 - MONTHLY SALARY RATES IN 1941 OF FOUR CLASSES OF REPORTING MEMBERS ACCORDING TO YEAR OF ENTERING PROFESSION

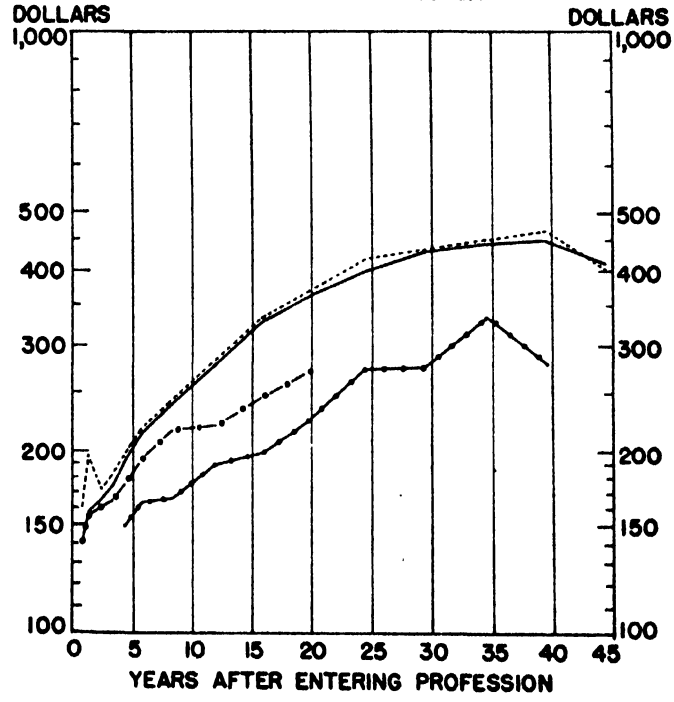


TABLE 27.—COMPARISON OF MEDIAN MONTHLY SALARY RATES IN 1941 OF FOUR CLASSES OF MEMBERS REPORTING, BY YEAR OF ENTERING PROFESSION

YEAR OF ENTERING PROFESSION	19– TO 19–	41	40	39	38	37	35 TO 36	32 TO 34	28 TO 31	24 TO 27	20 TO 23	15 TO 19	10 TO 14	05 TO 09	00 TO 04	(1)
YEARS AFTER ENTERING PROFESSION		1/2	1	2	3	4	5 TO 6	7 TO 9	10 TO 13	14 TO 17	18 TO 21	22 TO 26	27 TO 31	32 TO 36	37 TO 41	42+
CLASS OF MEMBER		MEDIAN MONTHLY SALARY RATE														
ALL MEMBERS		$140	$156	$164	$174	$189	$213	$238	$275	$323	$361	$398	$423	$439	$445	$405
MALE REGULAR		160	195	173	181	194	215	240	279	330	367	412	426	447	451	400
FEMALE REGULAR		(2)	(2)	(2)	(2)	148	163	166	188	198	225	272	278	330	278	(2)
MALE JUNIOR		140	154	162	164	174	193	214	220	247	270	(2)	(2)	(2)	(2)	(2)

1 PRIOR TO 1900
2 FEWER THAN 10 MEMBERS REPORTED

[1] CHEM. ENG. NEWS, 20, 1563 December 10, 1942).

[2] Communications regarding this report should be addressed to L. W. Bass, Director, New England Industrial Research Foundation, Statler Building Boston, Mass.

and 1941 was the most recent year for which information was requested in the survey.

Section 9. Monthly Salary Rates of Four Classes of Members

Since male regular members are the predominating class of the membership it is not surprising that at all experience spans their reported monthly salary rates in 1941 generally exceeded those reported by the membership as a whole (Table 27 and Chart 6). With advancing years of professional experience median earnings for the membership as a whole in 1941 steadily advanced from $140 a month for those just beginning their professional careers and reached a maximum of $445 a month at from 37 to 41 years after entering the profession. Within these same limits of experience, however, median earnings of male regular members advanced from $160 to $451 a month. Between all reporting members and all reporting male regular members the sharpest differences in median monthly salary rates occurred at the experience spans of one half year, and one year. At these respective points the differentials in earnings in favor of the latter were $20 and $39 a month. At all succeeding experience spans the differentials continued to favor the male regular members and ranged from $2.00 to $7.00 a month.

Between male regular and female regular members there were, however, significant differences in median monthly earnings in 1941 which were also in favor of the former class. Furthermore, the earnings capacity of female regular members reached maximum 5 years earlier, at from 32 to 36, years than that of from 37 to 41 years previously noted to be the case for male regular members. At their maximum point of earnings, median monthly salary rates reported by female regular members were $330, or $117 a month less than the median earnings of $447 a month reported by male regular members with corresponding years of experience. For the experience spans of from 22 to 36 and of from 27 to 31 years the corresponding earnings differentials, still in favor of male regular members were, respectively, $140 and $153 a month. At all six earlier experience spans among which comparisons of earnings could be made, similar favorable differentials existed. These ranged from $33 a month at from 14 to 17 years' experience to $91 a month at from 10 to 13 years after the two classes of members had entered the profession.

The median monthly earnings of male junior members in 1941 even exceeded those of female regular members for the experience spans of 4 years after entering the profession to from 18 to 21 years after entering the profession by amounts that ranged from $26 to $55 a month. Between the reported earnings of male regular and male junior members there were also significant differences. In 1941 male junior members who had just begun their professional work were earning $140 a month, whereas male regular members were earning $20 a month more, or $160 a month. Four years later the median monthly earnings of these two classes of members, also in 1941, were, respectively, $174 and $194 a month; again a differential of $20 a month in favor of male regular members. At from 18 to 21 years after entering the profession the differential had increased to $97 a month. At this experience span male regular members reported median monthly earnings of $367 a month in contrast to $270 a month for male junior members.

The differentials that existed in 1941 between monthly earnings of male regular and male junior members are not surprising. They may merely reflect differences that exist in professional activities. This situation may account also for the marked differences in earnings noted between male regular and female regular members. The extent of these differences certainly does indicate, however, that a problem exists which warrants detailed consideration to determine whether or not an improvement could be effected in the economic status of the female regular members in terms of earnings capacity.

Section 10. Monthly Salary Rates of Male Regular Members in Three Major Fields

Despite the incompleteness of the data up to 3 years after entering the profession (Table 28), it is evident from the earnings curves shown in Chart 7 that for members with from 4 to 9 years' professional experience in 1941 the median monthly earnings of male regular members in the field of chemistry were only slightly greater and only slightly less than those of similar

CHART 7 - MONTHLY SALARY RATES IN 1941 OF MALE REGULAR MEMBERS REPORTING IN THREE MAJOR FIELDS ACCORDING TO YEAR OF ENTERING PROFESSION

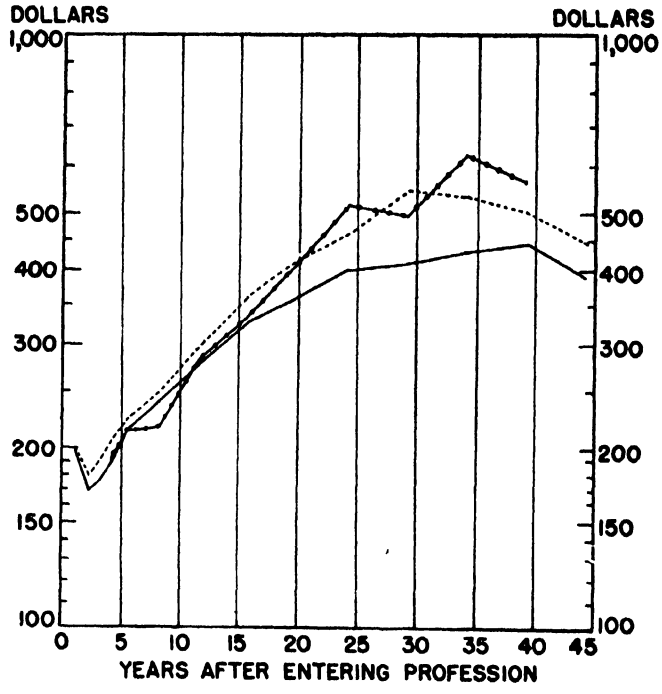


TABLE 28.—COMPARISON OF MEDIAN MONTHLY SALARY RATES IN 1941 OF ALL MALE REGULAR MEMBERS REPORTING IN THREE MAJOR FIELDS, BY YEAR OF ENTERING PROFESSION

YEAR OF ENTERING PROFESSION	19–	41	40	39	38	37	35 TO 36	32 TO 34	28 TO 31	24 TO 27	20 TO 23	15 TO 19	10 TO 14	05 TO 09	00 TO 04	(1)
YEARS AFTER ENTERING PROFESSION		1/2	1	2	3	4	5 TO 6	7 TO 9	10 TO 13	14 TO 17	18 TO 21	22 TO 26	27 TO 31	32 TO 36	37 TO 41	42+
MAJOR FIELD		MEDIAN MONTHLY SALARY RATE														
CHEMISTRY		(2)	$198	$168	$175	$189	$214	$239	$275	$322	$354	$395	$407	$423	$439	$385
CHEMICAL ENGINEERING		(2)	200	179	189	204	222	246	298	357	410	458	540	523	500	440
OTHER FIELD OF SC. OR ENG.		(2)	(2)	(2)	(2)	190	212	216	278	326	406	510	488	620	558	(2)

1 PRIOR TO 1900
2 FEWER THAN 10 MEMBERS REPORTED

classes of members in other fields of science or engineering, and chemical engineering, respectively.

Over this 6-year period, reported median earnings of male regular members in the field of chemistry advanced with professional experience from $189 to $239 a month. Thereafter they still continued to advance and reached a maximum of $423 a month for members, who, in 1941, had had from 32 to 36 years' professional experience. At all points in the latter experience span, however, the earnings of members in the field of chemistry were lower than those reported by male regular members in the other two major fields.

While median monthly earnings of male regular members in the field of chemical engineering steadily increased over this same experience span in 1941 from $298 to $523 a month, the increase over the same period for male regular members in other fields of science or engineering was from $278 to $620 a month. Between these two fields, however, the general tendency was for earnings in chemical engineering to be lower beyond the 25 years' experience span.

Section 11. Monthly Salary Rates of Male Regular Members in Relation to Educational Level

In this section the only median monthly earnings data compared are those of male regular members who reported that they had bachelors', masters', and doctors' degrees in the two major fields of chemistry and chemical engineering (Table 29 and Chart 8). Discounting the few obvious discrepancies in reporting the year in which they obtained their doctors' degrees in chemistry rather than the year in which they had obtained their bachelors' degrees, these data clearly indicate that at virtually all experience spans in 1941 members with masters' degrees in chemistry earned less in that year than did those with bachelors' and doctors' degrees. Over the 1941 experience span of approximately 30 years, median earnings of male regular members with masters' degrees in chemistry steadily increased with years of professional experience from $163 a month to $373 a month. By contrast, over the same experience span, median earnings of similar groups of members with bachelors' and doctors' degrees in chemistry increased, respectively, from $163 to $409 a month, and from $253 to $418 a month.

Among these three educational levels the spread in median monthly earnings was clearly defined after 9 years of professional experience. Beyond this experience span and up to that of maximum earning capacity, median earnings of both bachelors and doctors in chemistry consistently exceeded those of masters in this field by approximately $35 a month.

The uniformity of this earnings differential results from the fact that, as can readily be seen from Chart 8, median monthly earnings of bachelors and doctors in chemistry were practically the same at all of the experience spans extending from 15 to 31 years after these male regular members had entered the profession.

In contrast to the preceding, among male regular members trained in the field of chemical engineering median monthly salary rates in 1941 paralleled the level of education reported. That is to say, bachelors' earnings generally were

TABLE 29.—COMPARISON OF MEDIAN MONTHLY SALARY RATES IN 1941 OF ALL MALE REGULAR MEMBERS REPORTING IN TWO MAJOR FIELDS, BY EDUCATIONAL LEVEL AND YEAR OF ENTERING PROFESSION

YEAR OF ENTERING PROFESSION	19– TO 19–	41	40	39	38	37	35 TO 36	32 TO 34	28 TO 31	24 TO 27	20 TO 23	15 TO 19	10 TO 14	05 TO 09	00 TO 04	(1)
YEARS AFTER ENTERING PROFESSION		0	1	2	3	4	5 TO 6	7 TO 9	10 TO 13	14 TO 17	18 TO 21	22 TO 26	27 TO 31	32 TO 36	37 TO 41	42+
MAJOR FIELD AND EDUCATIONAL LEVEL		MEDIAN MONTHLY SALARY RATE														
CHEMISTRY																
DOCTOR		(2)	$233	$253	$247	$223	$237	$256	$291	$327	$358	$407	$418	$465	$493	(2)
MASTER (OR EQUIV.)		(2)	(2)	163	169	177	190	223	246	284	321	370	373	322	348	$260
BACHELOR		(2)	(2)	163	170	175	203	219	265	319	360	406	409	448	429	(2)
CHEMICAL ENGINEERING																
DOCTOR		(2)	(2)	(2)	(2)	(2)	254	275	309	402	465	483	545	520	(2)	(2)
MASTER (OR EQUIV.)		(2)	(2)	178	190	196	222	249	302	384	423	545	515	583	(2)	(2)
BACHELOR		(2)	(2)	179	186	203	216	239	288	339	388	439	551	460	520	(2)

1 PRIOR TO 1900
2 FEWER THAN 10 MEMBERS REPORTED

CHART 8 - MONTHLY SALARY RATES IN 1941 OF MALE REGULAR MEMBERS REPORTING IN TWO MAJOR FIELDS BY EDUCATIONAL LEVEL AND YEAR OF ENTERING PROFESSION

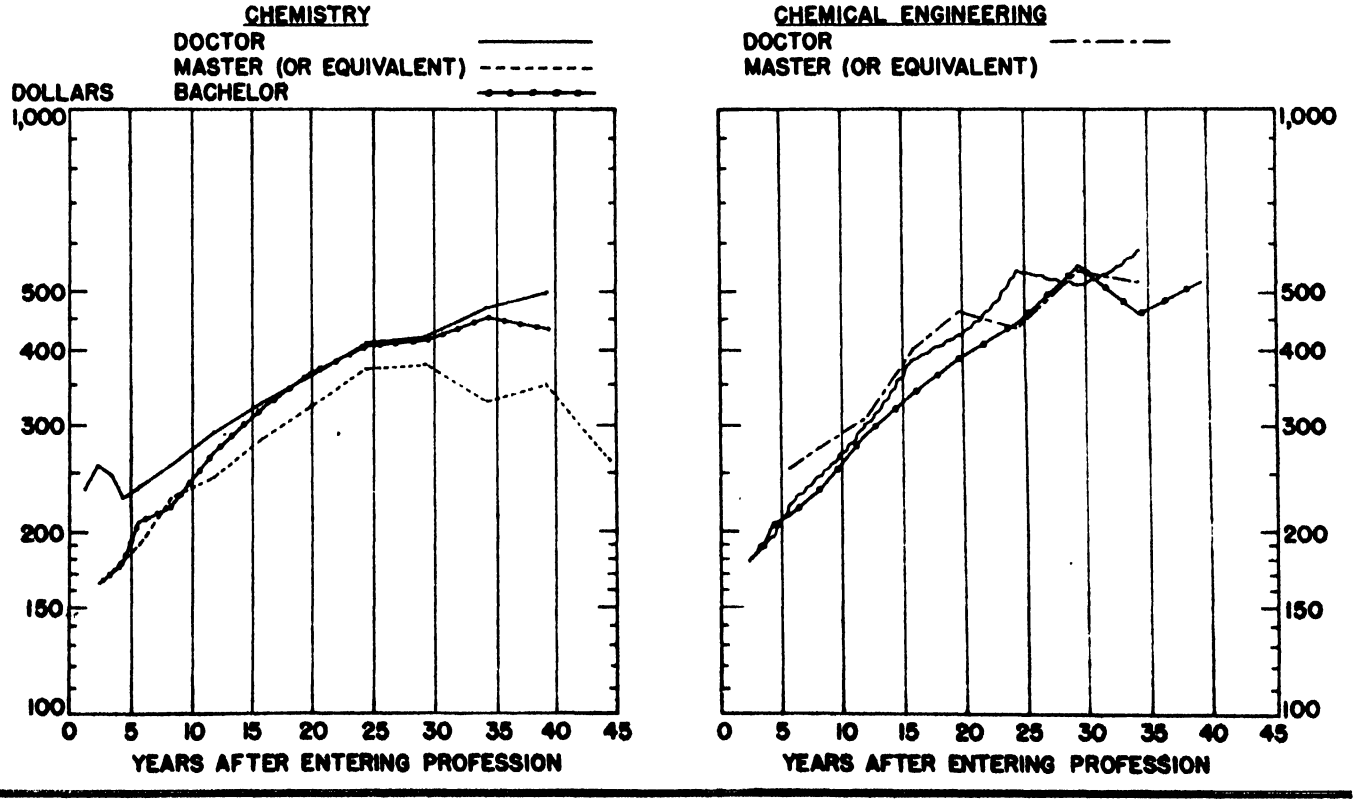
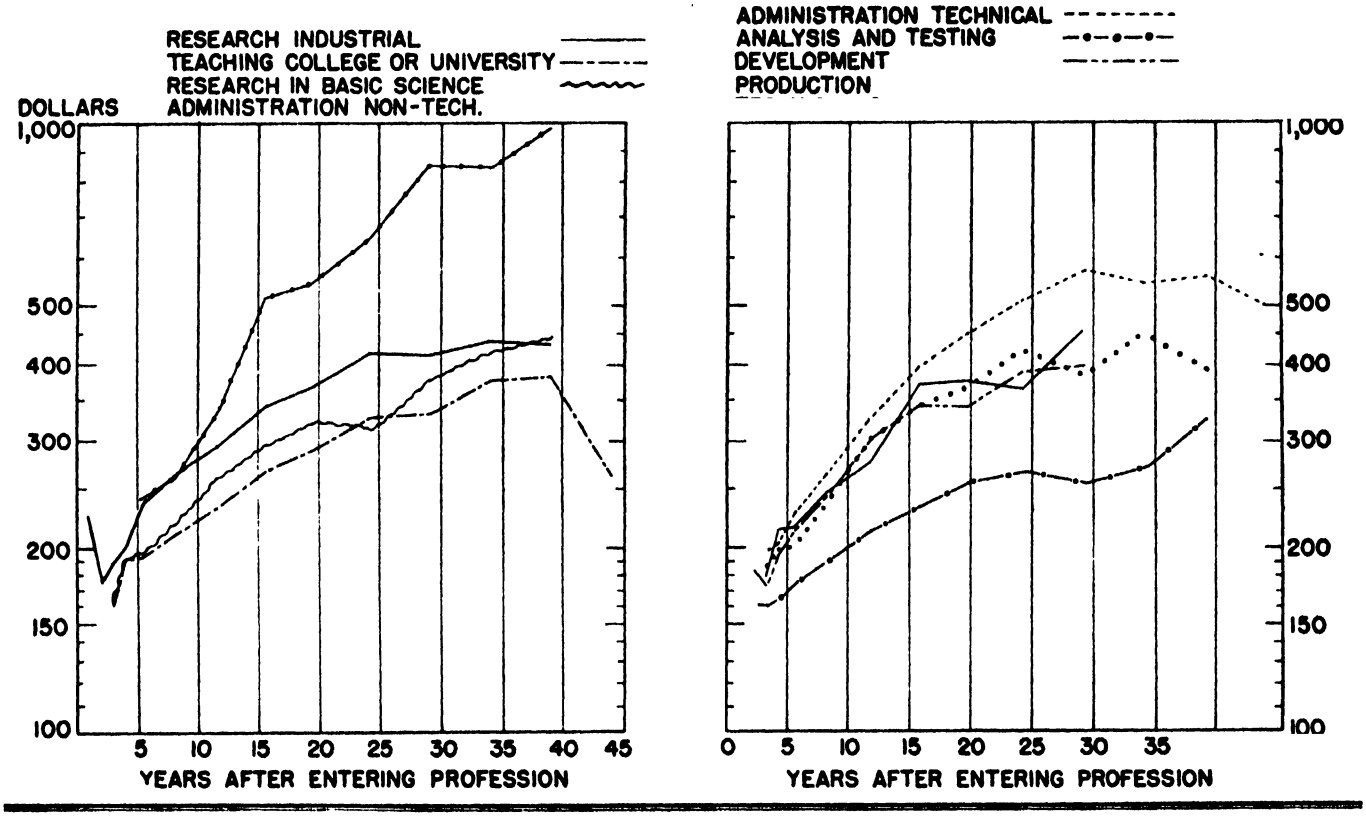


CHART 9-MONTHLY SALARY RATES IN 1941 OF MALE REGULAR MEMBERS REPORTING IN SELECTED OCCUPATIONAL STATUSES ACCORDING TO YEAR OF ENTERING PROFESSION



lower than masters' and these in turn generally were lower than doctors'. This situation existed up to the experience level of 20 years. Over this period median earnings of male regular members with bachelors' degrees in this field rose steadily from $179 to $388 a month, and those of masters rose from $178 to $423 a month. And beginning with male regular members with from 5 to 6 years' experience median earnings of doctors in chemical engineering increased steadily from $254 to reach $465 a month for those who had had 20 years' professional experience in 1941. The over-all range in earnings of approximately $35 among these three educational levels over this same period was the same as that previously noted for male regular members in the field of chemistry Beyond the 20 years' experience span the earnings reported by male regular members with bachelors' degrees in chemical engineering continued to advance steadily and reached a maximum of $551 a month for those who had had from 27 to 31 years' professional experience in 1941. In the case of male regular members classified in the other two educational levels, the break in the continuous advance in median monthly earnings reported was most probably the result of lack of data because after the 25 years' experience span doctors' earnings again began to increase and likewise for masters' after the 30 years' experience level. For these two educational levels the maximum median earnings actually reported for 1941 were, respectively, $545 and $583 a month.

TABLE 30—COMPARISON OF MEDIAN MONTHLY SALARY RATES IN 1941 OF ALL MALE REGULAR MEMBERS REPORTING SELECTED OCCUPATIONAL STATUSES, BY YEAR OF ENTERING PROFESSION

YEAR OF ENTERING PROFESSION	19– TO 19–	41	40	39	38	37	35 TO 36	32 TO 34	28 TO 31	24 TO 27	20 TO 23	15 TO 19	10 TO 14	05 TO 09	00 TO 04	(1)
YEARS AFTER ENTERING PROFESSION		½	1	2	3	4	5 TO 6	7 TO 9	10 TO 13	14 TO 17	18 TO 21	22 TO 26	27 TO 31	32 TO 36	37 TO 41	42+
OCCUPATIONAL STATUS		MEDIAN MONTHLY SALARY RATE														
RESEARCH, INDUSTRIAL		(2)	$223	$175	$187	$200	$233	$256	$292	$341	$366	$416	$411	$432	$424	(2)
ADMINISTRATION, TECHNICAL		(2)	(2)	(2)	202	207	234	269	328	400	453	516	570	543	558	$500
TEACHING, COLL. OR UNIV.		(2)	(2)	(2)	160	190	192	209	232	266	208	322	329	372	378	260
ANALYSIS & TESTING		(2)	(2)	163	162	167	178	193	213	235	258	268	254	271	323	(2)
RESEARCH IN BASIC SCIENCE		(2)	(2)	(2)	163	191	193	217	259	293	318	310	374	413	433	(2)
DEVELOPMENT		(2)	(2)	186	176	196	216	245	306	346	345	390	400	(2)	520	(2)
PRODUCTION		(2)	(2)	(2)	189	200	205	241	306	345	370	423	385	450	393	(2)
ADMINISTRATION, NON-TECH.		(2)	(2)	(2)	(2)	(2)	240	260	345	512	545	637	844	833	963	(2)
TECHNICAL SERVICE		(2)	(2)	(2)	180	214	217	249	279	373	375	366	453	(2)	(2)	(2)

1 PRIOR TO 1900
2 FEWER THAN 10 MEMBERS REPORTED

If, now, the earnings of male regular members in these two major fields be contrasted, the important fact that does emerge is that in 1941 the rate of increase in earnings at all three educational levels was relatively greater for members in the field of chemical engineering. This is evidenced by comparing the median earnings at selected experience levels of members with bachelors' degrees in either field. Thus after approximately 5, 10, 20, and 30 years' experience while bachelors in chemical engineering reported earnings of $216, $260, $388, and $551, respectively, a month for similar levels of experience the corresponding median earnings reported by male regular members in the field of chemistry were $200, $240, $360, and $409 a month.

Section 12. Median Monthly Salary Rates of Male Regular Members by Occupational Status

Although the questionnaire included 26 occupational statuses, sufficient data to warrant comparisons of the median monthly salary rates of male regular members on a year of entering profession basis are reported for only nine statuses (Table 30). As shown in Chart 9, the earnings reported in 1941 for these several occupational statuses maintained a fairly constant relationship with advancing years of professional experience. As is also evident from the chart, the highest salary rates for the nine occupational statuses were paid in nontechnical ad-

ministration, while the lowest rates were paid in analysis and testing. Over the experience levels ranging from 5 to 6 and from 27 to 31 years after entering the profession, earnings of male regular members in nontechnical administration advanced from $240 to $844 a month, while those of male regular members engaged in analysis and testing advanced from only $178 to $254 a month. The differentials in earnings during 1941 between these two occupational statuses, over the same experience levels, therefore ranged from $62 to $590 a month.

Among the remaining seven occupational statuses, on the other hand, the corresponding earnings differentials ranged from only $42 to $241 a month. The upper and lower limits of the spreads in earnings in this range covered those of male regular members engaged in technical administration, on the one hand, and college or university teaching on the other. From 5 to 31 years after entering the profession, earnings in technical administration advanced from $234 to $570 a month, whereas in college or university teaching they advanced from $192 to $329 a month.

Development work represented the middle level in earnings capacity among the remaining five occupational statuses. In 1941, male regular members with from 5 to 31 years' professional experience so reporting were able to earn from $216 to $400 a month. These median monthly earnings were only slightly less at each experience level than those reported by male regular members engaged in industrial research and technical service, and only slightly greater than those reported by similar groups of members engaged in production and in research in basic science.

Considered without regard to years of professional experience, comparisons can be made of median monthly earnings of male regular members among as many as 20, 20, and 23 occupational statuses, respectively, for the years 1929, 1934, and 1941 (Table 31). In each of these three years, the ranking order of the earnings remained fairly constant.

In 1941 the lowest level of median earnings of $183 a month was reported by male regular members engaged in nonprofessional work, while the highest level of $599 a month covered those engaged in nontechnical administration. The noted lowest level of earnings was only $22 a month less than the earnings of $205 a month reported for analysis and testing, and these in turn were practically the same as those reported for maintenance ($210 a month). It may be recalled here that, on a year of entering profession basis, analysis and testing occupied the lowest level of earnings in the nine selected occupational statuses previously discussed and technical administration was next in order to nontechnical administration. It is evident, however, from the data in Table 31 that the $404 a month earnings capacity of the technical administration status was less than that of $413 a month reported by male regular members classified as independent consultants. Earnings for technical administration in 1941 did, however, exceed those for male regular members engaged in patent work, reporting $385 a month. Between this group and sales, which was next in descending order of earnings in 1941, there was a $52 a month differential; and the median earnings of $333 a month for sales were greater by only $26 a month than the median earnings of male regular members engaged in editing and writing.

Among the 23 occupational statuses shown in Table 31 for the year 1941, the middle level of earnings of $260 a month covered development work. The statuses with earnings greater than this amount, but less than those of $307 a month previously noted for editing and writing, taken in descending order, were design, production, industrial research, technical service, and "other professional work". Among these five occupational statuses median monthly earnings of male regular members ranged from $264 to $289 a month. Immediately below development, on the other hand, the range in median earnings among seven of the occupational statuses was from $240 a month for safety engineering to $258 a month for college or university teaching. The intermediate earnings included in this range, taken in descending order of value, were those reported by male regular members in the occupational statuses of construction and installation, "teaching, other", research in basic science, secondary school teaching, and library and information service.

Despite the incomplete coverage of all statuses shown in Table 31, sufficient data were reported to provide a limited measure of the extent of the fluctuations in occupational status earnings over the period 1929 to 1941. From 1929 to 1934, median monthly earnings declined in every occupational status among which comparisons can be made. Relatively these declines ranged from as low as 6 per cent in the case of design, to as high as 46 per cent in the case of maintenance. Between 1934 and 1941, on the other hand, increases in earnings without exception were reported in relative amounts that ranged, again from 6 per cent in the case of design, to as high as 91 per cent in the case of maintenance. Covering the entire 12-year period, median monthly earnings reported by male regular members for 1941 were in a few instances higher than those reported for 1929. This situation, it should be emphasized, does not vitiate the general conclusion to the effect that earnings for the membership as a whole in 1941 had not returned to the earnings levels reported for 1926 or 1929. It merely reflects the effects of selective bias in favor of any analysis that would be made for any aspect of the data reported by male regular members only.

TABLE 31.—COMPARISON OF MEDIAN MONTHLY SALARY RATES IN 1929, 1934 AND 1941 OF ALL MALE REGULAR MEMBERS REPORTING OCCUPATIONAL STATUS

YEAR	1929	1934	1941
OCCUPATIONAL STATUS	MEDIAN MONTHLY SALARY RATE		
RESEARCH, INDUSTRIAL	$263	$233	$271
ADMINISTRATION, TECHNICAL	423	383	404
TEACHING, COLL. OR UNIV.	238	222	258
ANALYSIS AND TESTING	181	153	205
RESEARCH IN BASIC SCIENCE	232	196	248
DEVELOPMENT	256	216	260
PRODUCTION	288	222	278
ADMINISTRATION, NON-TECH.	574	493	549
SALES	355	276	333
TECHNICAL SERVICE	263	243	266
CONSULTATION, INDEPENDENT	460	370	413
TEACHING, SEC. SCH.	191	156	248
PATENTS	310	290	385
DESIGN	290	273	289
OTHER PROFESSIONAL	225	175	264
POSTGRADUATE STUDY	(1)	(1)	(1)
NON-PROFESSIONAL	150	(1)	183
EDITING & WRITING	320	290	307
LIBRARY & INF. SERVICE	(2)	200	244
RETIRED	(2)	(2)	185
CONSTRUCTION & INSTALL.	270	195	252
TEACHING, OTHER	200	158	250
MAINTENANCE	185	110	210
SAFETY ENGINEERING	(2)	(2)	240
UNEMPLOYED	(2)	(1)	(2)
RELIEF, DIRECT	(2)	(2)	(2)

1 UNDER $100
2 FEWER THAN 10 MEMBERS REPORTED

Section 13. Median Monthly Salary Rates of Male Regular Members by Source of Employment

According to the data presented in Table 32 and in Chart 10, the spread in earnings reported for 1941 by male regular members in the employ of the federal, municipal, and state governments averaged only $26 a month up to the experience level of approximately 15 years after entering the profession. The evidence is that, from 3 to 15 years after entering the profession, median earnings of male regular members engaged by state governments advanced from $145 to $263 a month, while earnings of male regular members employed by the Federal Government advanced from $181 to $290 a month. Midway between these extremes was found the earnings curve for male regular members in the employ of municipal governments.

Beyond the 15 years' experience span, earnings reported for these three sources of public employment continued to advance at approximately the same rates. At the experience level of from 27 to 31 years, members employed by the Federal Government reported they were earning $373 a month, as against $355 and $332, respectively, for members of similar experience level in the employ of municipal and state governments.

Among the four nonpublic sources of employment, the spread in earnings was considerably greater than that occurring among the three sources of public employ-

TABLE 32.—COMPARISON OF MEDIAN MONTHLY SALARY RATES IN 1941 OF ALL MALE REGULAR MEMBERS REPORTING SELECTED SOURCES OF EMPLOYMENT, BY YEAR OF ENTERING PROFESSION

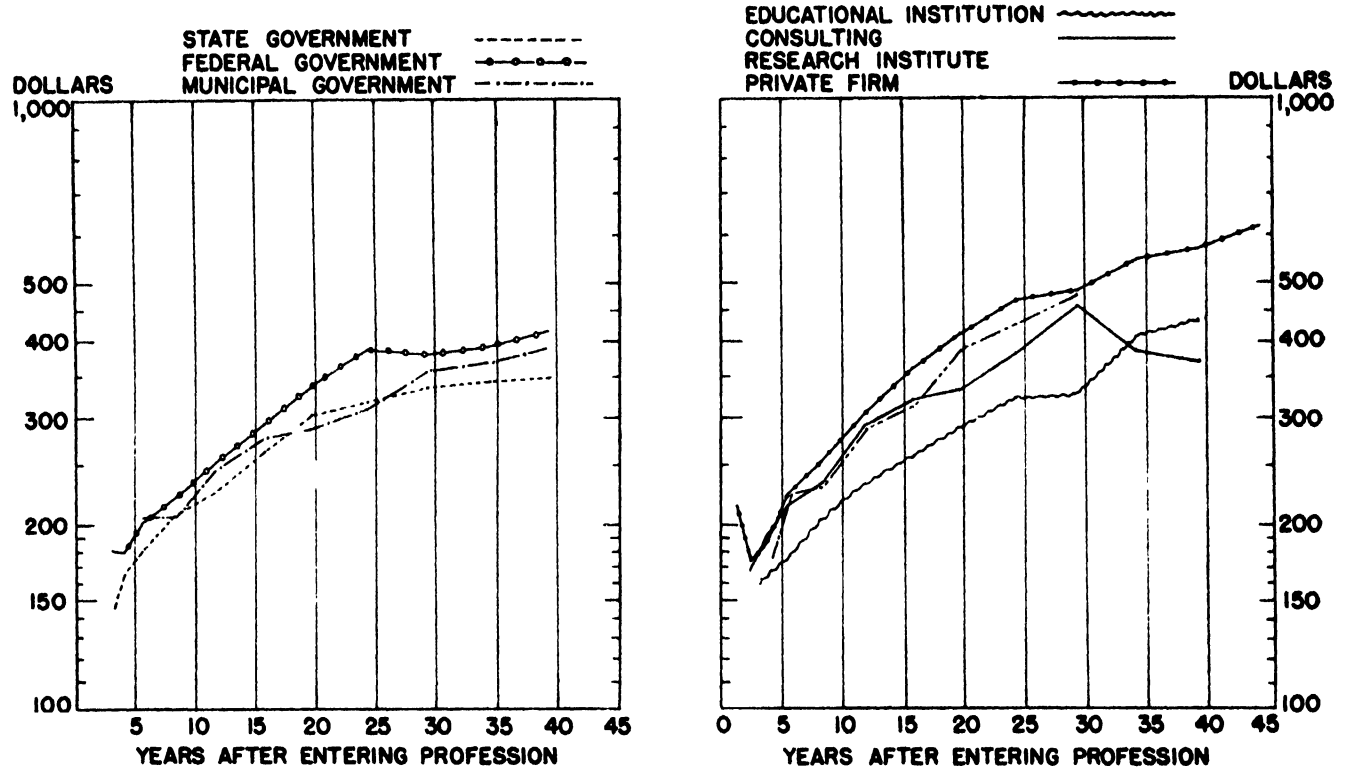
YEAR OF ENTERING PROFESSION	19– TO 19–	41	40	39	38	37	35 TO 36	32 TO 34	28 TO 31	24 TO 27	20 TO 23	15 TO 19	10 TO 14	05 TO 09	00 TO 04	(1)
YEARS AFTER ENTERING PROFESSION		½	1	2	3	4	5 TO 6	7 TO 9	10 TO 13	14 TO 17	18 TO 21	22 TO 26	27 TO 31	32 TO 36	37 TO 41	42+
SOURCE OF EMPLOYMENT		MEDIAN MONTHLY SALARY RATE														
PUBLIC:																
STATE GOVERNMENT		(2)	(2)	(2)	$145	$165	$181	$206	$225	$263	$302	$316	$332	$340	$345	(2)
FEDERAL GOVERNMENT		(2)	(2)	(2)	181	170	200	218	251	290	335	303	373	387	411	(2)
MUNICIPAL GOVERNMENT		(2)	(2)	(2)	(2)	(2)	203	205	243	273	283	307	355	363	385	(2)
NON-PUBLIC:																
PRIVATE FIRM	(3)	(2)	$218	$177	185	198	227	255	306	366	412	470	482	545	564	$620
EDUCATIONAL	(4)	(2)	(2)	(2)	163	170	180	207	233	262	292	322	328	410	432	(2)
CONSULTING	(5)	(2)	(2)	170	165	202	218	237	293	324	428	385	460	385	370	(2)
RESEARCH INSTITUTE		(2)	(2)	(2)	(2)	178	223	232	289	313	395	430	480	(2)	(2)	(2)

1 PRIOR TO 1900
2 FEWER THAN 10 MEMBERS REPORTED
3 INCLUDES PRIVATE FIRM, COMPANY, CORPORATION OR ORGANIZATION ENGAGED IN ACTIVITIES OTHER THAN THOSE LISTED SEPARATELY IN THE QUESTIONNAIRE
4 INCLUDES EDUCATIONAL INSTITUTIONS EXCLUSIVE OF THOSE UNDER PUBLIC AUTHORITIES
5 LABORATORY, FIRM OR OFFICE

than those of the sources of non-public employment. A slight qualification is necessary, however, when consideration is given to the median monthly earnings computed without regard to years of professional experience (Table 33).

As is shown in Table 33, it is possible for the period 1929 to 1941 to make comparisons of earnings among 11 of the 14 sources of employment on which data were requested. Examination of the changes in earnings which occurred over the period 1929 to 1934 indicates that earnings of male regular members declined in all sources of employment

CHART 10-MONTHLY SALARY RATES IN 1941 OF MALE REGULAR MEMBERS REPORTING IN SELECTED SOURCES OF EMPLOYMENT ACCORDING TO YEAR OF ENTERING PROFESSION



ment. Moreover, male regular members employed by private firms reported median monthly earnings in 1941 very much greater than those of similar groups of members who reported they were attached to educational institutions.

For members in the latter source of employment with 4 years of professional experience, median earnings in 1941 were $170 a month, as against $198 for members with the same span of experience in the employ of private firms. After approximately 29 years of experience, however, male regular members employed by private firms were earning $482 a month, in contrast to only $328 a month for those in the employ of educational institutions. In other words, in 1941 there was a spread in monthly earnings that ranged from $28 to $154 between private firm employment and educational institution employment over a period that covered approximately two thirds of the whole experience span. On the other hand, the median monthly earnings reported over this same period by male regular members employed in research institutes and in consulting work did not differ materially from those of members employed in private firms.

Comparisons of earnings among these seven selected sources of employment indicate that in 1941, educational institutions excepted, the earnings capacities of the sources of public employment were lower except in the Federal Government. On the other hand, from 1934 to 1941, earnings from this source of employment increased by only 6 per cent, while all other sources over the same period increased from 16 to as high as 155 per cent.

Analyzing the 1941 data, it is seen that the median earnings of $323 a month for male regular members in the employ of technical or trade associations exceeded those of $304 a month for members employed by private firms, which in turn exceeded the earnings of $281 a month for those in research institutes. Between consulting ($269 a month) and Federal Government ($263 a month), respectively fourth and fifth in descending

order of earning capacity, the earnings differential was insignificant. Similarly, there was a small differential between the earnings of male regular members classified in "other nonpublic" pursuits ($260 a month), and those for members employed with municipal and state governments which ranged downward from $259 to $254 a month. Below that level, male regular members reporting employment in educational institutions and by "other public authorities" in 1941 were able to earn $247 and $240 a month, respectively. Significantly enough, the lowest median earnings of $220 a month were reported by male regular members in the employ of county governments.

Section 14. Median Monthly Salary Rates of Male Regular Members by Field of Specialization

Following the pattern of analysis developed in Sections 13 and 14, attention is first directed to the fact that earnings on a year of entering profession basis are reported by male regular members for as many as 22 of the 34 fields of specialization to which responses were requested (Table 34). When arranged in descending order of earnings for 1941, inorganic chemical technology was found consistently to be the field of specialization with the highest earnings capacity, while general chemistry (basic science) was just as consistently the field of lowest earnings capacity.

From these two fields of specialization it is possible to derive a general measure of the over-all spread in earnings which prevailed with advancing years of professional experience in 1941. Thus, at the level of approximately 5 years after entering the profession, while median earnings reported for inorganic chemical technology were $224 a month, those reported for general chemistry were only $178 a month. After 34 years of experience, however, members in the former field of specialization were able to earn as much as $545 a month as compared to only $327 a month for members reporting in the latter field. It is readily seen, therefore, that in 1941 the general spread in median monthly earnings of male regular members reporting ranged from $46 to $218 for the experience levels from 5 to 34 years.

To facilitate discussion, the earnings in these 22 fields of specialization have been separated somewhat arbitrarily into four groups. The earnings curves for these groups are presented in Chart 11.

In the first group, a clear line of demarcation is apparent between the earnings capacities of male regular members engaged in either inorganic technology or industrial chemistry, and earnings capacities of similar groups of members in the three basic science fields of physical, organic, and general chemistry. In 1941, for example, male regular members engaged in inorganic technology reported median earnings that steadily advanced from $185 a month for those with 4 years of professional experience, to $545 a month for members who had been professionally active for approximately 34 years. Over these same experience levels, the median earnings reported for general industrial chemistry advanced from $195 to $473 a month. In contrast, however, earnings of members in the field of physical chemistry increased from $188 to only $381 a month. At all experience spans, the earnings reported for this field of specialization were only slightly less than those of male regular members in organic chemistry, and only slightly greater than those of male regular members in general chemistry.

The second group of fields of specialization chosen for analysis includes five rather closely related branches of the chemical industry. It is evident from the chart that the earnings capacities in these fields do not differ materially one from another. The average earnings curve of this second group covers the field of specialization designated as petroleum and its products. In this field, median earnings advanced from $200 a month for members with 4 years' experience to $620 a month for those with approximately 34 years' experience Synthetic resins and organic chemical technology showed median earnings slightly above those for petroleum and its products, while rubber and its products, and paints and varnishes showed median earnings slightly below.

Allowing for inconsistencies in the reported data, it is readily seen that the close relationships noted to exist among the earnings for the second group were paralleled by those in the remaining two

TABLE 33.—COMPARISON OF MEDIAN MONTHLY SALARY RATES IN 1929, 1934 AND 1941 OF ALL MALE REGULAR MEMBERS REPORTING SOURCE OF EMPLOYMENT

YEAR		1929	1934	1941
SOURCE OF EMPLOYMENT		MEDIAN MONTHLY SALARY RATE		
PUBLIC:				
STATE GOVERNMENT		$216	$181	$254
FEDERAL GOVERNMENT		240	249	263
MUNICIPAL GOVERNMENT		229	218	259
OTHER PUBLIC AUTHORITY		205	152	240
COUNTY GOVERNMENT		178	125	220
W.P.A. OR WORK RELIEF		(1)	(2)	(1)
NON-PUBLIC:				
PRIVATE FIRM	(3)	274	240	304
EDUCATIONAL	(4)	199	157	247
CONSULTING	(5)	250	211	269
RESEARCH INSTITUTE		271	233	281
TECH. OR TRADE ASSN.	(6)	310	278	323
OTHER NON-PUBLIC		200	102	260
RETIRED		(1)	(1)	140
UNEMPLOYED OR DIRECT RELIEF		(2)	(2)	(2)

1 FEWER THAN 10 MEMBERS REPORTED
2 UNDER $100
3 INCLUDES PRIVATE FIRM, COMPANY, CORPORATION OR ORGANIZATION ENGAGED IN ACTIVITIES OTHER THAN THOSE LISTED SEPARATELY IN THE QUESTIONNAIRE
4 INCLUDES EDUCATIONAL INSTITUTIONS EXCLUSIVE OF THOSE UNDER PUBLIC AUTHORITIES
5 LABORATORY, FIRM OR OFFICE
6 INCLUDES PUBLISHING ORGANIZATIONS

TABLE 34.—COMPARISON OF MEDIAN MONTHLY SALARY RATES IN 1941 OF ALL MALE REGULAR MEMBERS REPORTING SELECTED FIELDS OF SPECIALIZATION, BY YEAR OF ENTERING PROFESSION

YEAR OF ENTERING PROFESSION		19— TO 19—	41	40	39	38	37	35 TO 36	32 TO 34	28 TO 31	24 TO 27	20 TO 23	15 TO 19	10 TO 14	05 TO 09	00 TO 04	(15)
YEARS AFTER ENTERING PROFESSION			5	1	2	3	4	5 TO 6	7 TO 9	10 TO 13	14 TO 17	18 TO 21	22 TO 26	27 TO 31	32 TO 36	37 TO 41	42+
FIELD OF SPECIALIZATION			MEDIAN MONTHLY SALARY RATE														
PHYSICAL CHEMISTRY	(1)		(16)	(16)	$150	$172	$188	$204	$218	$237	$259	$302	$332	$333	$381	$400	(16)
PETROLEUM & ITS PRODUCTS			(16)	(16)	182	188	200	231	247	302	372	426	454	500	620	(16)	(16)
FOODS & KINDRED PRODUCTS			(16)	(16)	168	165	173	210	225	259	311	402	391	437	489	542	(16)
INDUSTRIAL CHEMISTRY, GEN.			(16)	(16)	165	195	195	215	245	271	339	404	483	530	473	520	(16)
ORGANIC CHEMICAL TECHNOL.			(16)	(16)	188	183	205	242	262	323	385	423	509	500	545	460	(16)
ORGANIC CHEMISTRY	(2)		(16)	(16)	(16)	190	183.	204	230	250	302	313	306	345	335	405	(16)
CHEMICAL ENGINEERING, GEN.			(16)	(16)	(16)	191	209	226	261	303	374	398	463	437	491	500	(16)
BIOLOGICAL CHEMISTRY	(3)		(16)	(16)	(16)	165	170	193	219	257	302	321	379	370	558	385	(16)
PHARMACEUTICALS	(4)		(16)	(16)	170	165	208	205	245	307	372	378	426	424	460	(16)	(16)
RUBBER AND ITS PRODUCTS			(16)	(16)	(16)	193	202	223	266	304	357	443	453	545	467	(16)	(16)
SYNTHETIC RESINS	(5)		(16)	(16)	(16)	183	202	238	269	324	394	490	495	430	(16)	(16)	(16)
PAINTS AND VARNISHES	(6)		(16)	(16)	(16)	175	174	215	238	300	369	415	460	433	545	(16)	(16)
OTHER FIELD OF SC. OR ENG.			(16)	(16)	(16)	170	181	205	224	280	343	380	365	493	650	460	(16)
GENERAL CHEMISTRY	(2)		(16)	(16)	(16)	(16)	165	178	201	215	253	256	262	296	327	413	(16)
INORGANIC CHEM. TECHNOL.	(7)		(16)	(16)	(16)	(16)	185	224	255	301	377	435	533	452	595	510	(16)
AGRICULTURAL CHEMISTRY			(16)	(16)	(16)	(16)	156	168	208	233	263	317	318	380	363	300	(16)
PAPERS & FOREST PRODUCTS	(8)		(16)	(16)	(16)	(16)	178	215	235	260	323	349	467	545	715	(16)	(16)
EXPLOSIVES			(16)	(16)	(16)	198	210	197	232	278	393	393	400	620	385	(16)	(16)
PUBLIC HEALTH	(10)		(16)	(16)	(16)	160	188	190	217	265	275	260	390	400	388	(16)	(16)
METALLURGICAL TECHNOL.	(11)		(16)	(16)	(16)	(16)	(16)	197	220	255	330	327	440	433	500	650	(16)
CERAMIC INDUSTRIES	(13)		(16)	(16)	(16)	(16)	198	208	223	303	373	405	453	453	650	420	(16)
METALLURGICAL TECHNOL.	(14)		(16)	(16)	(16)	(16)	(16)	228	235	275	305	330	473	400	533	470	(16)

NOTE: SEE TABLE 22 FOR SEVERAL FOOTNOTES
15 PRIOR TO 1900
16 FEWER THAN 10 MEMBERS REPORTED

groups yet to be considered. The possible exception to this generalization is that in the third group, the earnings capacity in the field of paper and forest products was relatively greater than in any of other five fields in the group, owing to an accentuation in the spread. Reported median earnings of male regular members in this field steadily increased from $178 to $715 a month over the 30 years' experience span that ranged from 4 to approximately 34 years after entering the profession. Among the remaining five fields of specialization in this third group, the average earnings capacity curve can be considered to be that for members engaged in biological chemistry (basic science), where an advance in earnings from $170 to $558 a year was shown. Earnings reported for pharmaceuticals and for foods and kindred products were generally slightly higher, while those reported for agricultural chemistry and for public health were generally lower than those for biological chemistry.

The last group shown in Chart 11 consists of the remaining six fields of specialization which permit analysis of earnings on the basis of years of professional experience. Since the inconsistencies in the data reported for this group do not permit relating the earnings to any one particular earnings curve, it is necessary to consider the two fields which can be assigned as occupying the upper and lower extremes of earnings in each experience span. In general, the highest median earnings of this group in 1941 were reported by male regular members in the field of ceramics, where the general advance in earnings from 4 to 29 years after entering the profession was from $198 to $650 a month. In contrast, the lower limits in earnings covered male regular members in the field of explosives, in which earnings increased from $210 to only $385 a month. Between the limits of earnings in these two fields, in descending order, were found the earnings curves for explosives, "other field of science or engineering", general chemical engineering, nonferrous metallurgical technology, and ferrous metallurgical technology.

Without regard to years of professional experience, Table 35 shows that in 1941 the range in median earnings among the 34 fields of specialization was from $243 a month for male regular members in the field of general chemistry (basic science) to $344 a month for those engaged in the motor vehicles field of specialization. Relative to the median earnings of $300 a month reported for gas and fuels, it is interesting to note that in 16 of the fields of specialization, median earnings were greater, and in 17 the earnings were less.

Again as was noted in the two analyses of earnings by source of employment and by occupational status, between 1929 and 1934, earnings in all fields of specialization declined, while between 1934 and 1941 they increased. In 1934 the declines in earnings ranged from 2 per cent to as high as 51 per cent. In 1941, on the other hand, the increases ranged from 5 per cent to as high as 131 per cent.

Section 15. Median Monthly Salary Rates of Male Regular Members by Geographic Division

Consideration of the earnings data reported for 13 geographical divisions (Table 36) shows that in 1941 these ranged from $230 a month in the Mountain Region to $308 a month in the Middle Atlantic Region. The approximate middle value among this series of earnings was that of $278 a month reported by male regular members located in the East North Central Region. Since the differential between this middle value and the highest was only $30 a month, and between the middle value and the lowest was only $48 a month, it is apparent that insofar as median earnings are concerned the inducement for male regular members to move from one geographic division to another was not very great. This observation, however, is qualified by the fact that the largest number of employment opportunities did exist in the Middle Atlantic and the East North Central Regions.

Earnings in 1929 in the several geographic divisions had uniformly decreased by 1934 from 3 per cent for male regular members then located in the District of Columbia, to 17 per cent for those located in 1929 in the West North Central Region. By 1941, however, earnings in every geographic division had increased. Between 1934 and 1941, the smallest relative increase of 7 per cent in median earnings was reported for United States territories and possessions, and the highest relative increase of 46 per cent covered male regular members in the West North Central Region.

TABLE 37.—COMPARISON OF MEDIAN MONTHLY SALARY RATES IN 1941 OF ALL MALE REGULAR MEMBERS REPORTING GEOGRAPHIC DIVISION, BY POPULATION OF COMMUNITY

POPULATION OF COMMUNITY IN THOUSANDS	UNDER 5	5 TO 25	25 TO 100	100 TO 500	OVER 500
GEOGRAPHIC DIVISION	MEDIAN MONTHLY SALARY RATE				
ALL DIVISIONS	$257	$270	$277	$285	$301
MIDDLE ATLANTIC	295	296	307	305	316
EAST NORTH CENTRAL	252	269	270	276	290
SOUTH ATLANTIC	253	265	288	329	275
NEW ENGLAND	255	298	271	294	277
PACIFIC	252	262	234	239	264
WEST NORTH CENTRAL	244	231	229	258	296
WEST SOUTH CENTRAL	250	258	268	252	265
EAST SOUTH CENTRAL	240	259	241	252	(1)
DISTRICT OF COLUMBIA	(1)	(1)	(1)	363	287
MOUNTAIN	228	215	330	240	(1)
U.S. TERR. & POSSESSIONS	(1)	(1)	(1)	310	(1)
FOREIGN COUNTRIES	(1)	(1)	(1)	(1)	280

1 FEWER THAN 10 MEMBERS REPORTED

TABLE 35.—COMPARISON OF MEDIAN MONTHLY SALARY RATES IN 1929, 1934 AND 1941 OF ALL MALE REGULAR MEMBERS REPORTING FIELD OF SPECIALIZATION

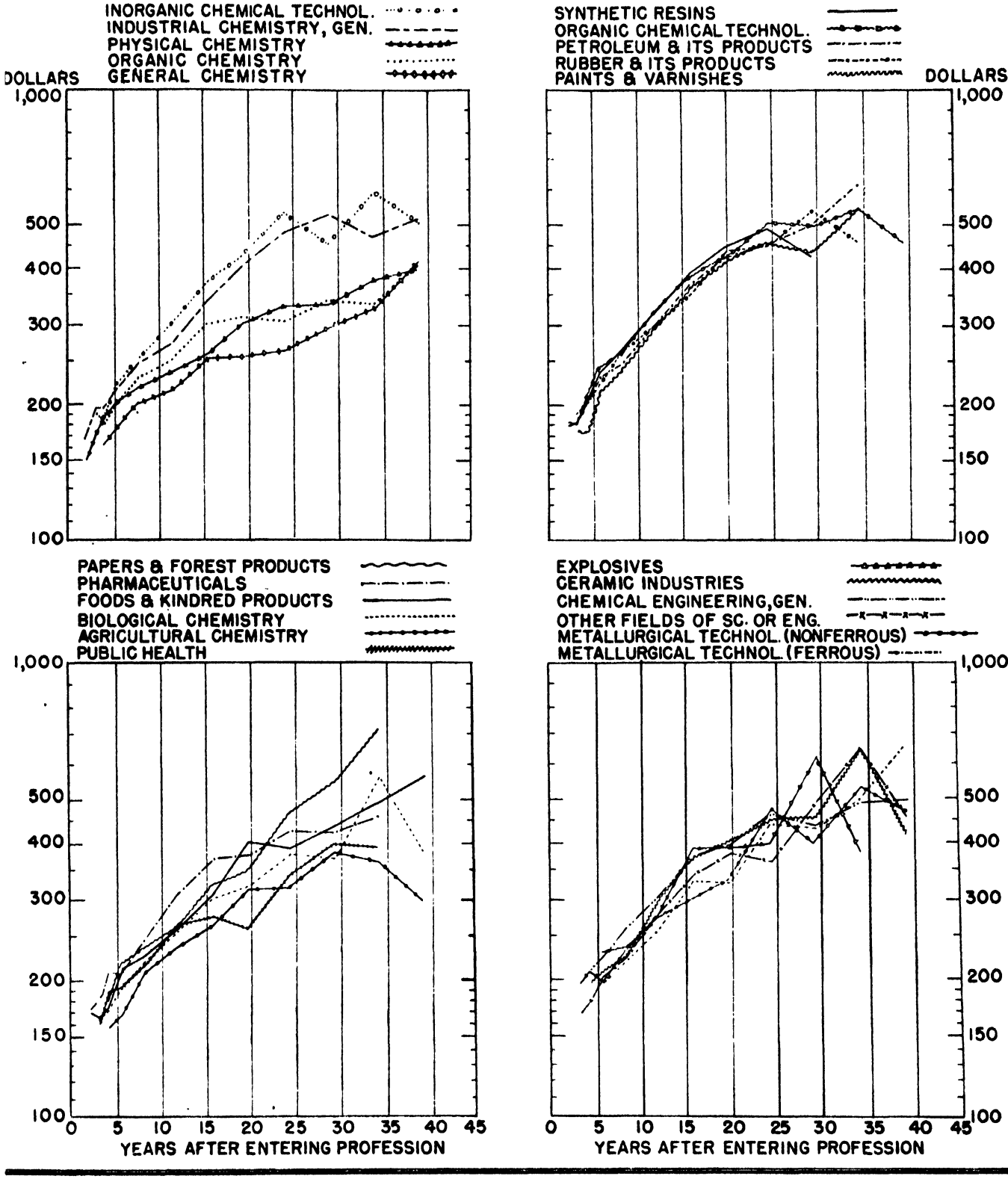
YEAR		1929	1934	1941
FIELD OF SPECIALIZATION		MEDIAN MONTHLY SALARY RATE		
PHYSICAL CHEMISTRY	(1)	$205	$165	$251
PETROLEUM & ITS PRODUCTS		258	225	284
FOODS & KINDRED PRODUCTS		259	236	276
INDUSTRIAL CHEMISTRY, GEN.		269	240	302
ORGANIC CHEMICAL TECHNOL.		279	245	308
ORGANIC CHEMISTRY	(2)	187	151	256
CHEMICAL ENGINEERING, GEN.		276	250	309
BIOLOGICAL CHEMISTRY	(3)	241	193	264
PHARMACEUTICALS	(4)	266	227	301
RUBBER AND ITS PRODUCTS		275	233	309
SYNTHETIC RESINS	(5)	290	231	288
PAINTS AND VARNISHES	(6)	297	250	297
OTHER FIELD OF SC. OR ENG.		254	230	299
GENERAL CHEMISTRY	(2)	202	183	243
INORGANIC CHEM. TECHNOL.	(7)	278	249	322
AGRICULTURAL CHEMISTRY		236	209	260
PAPERS & FOREST PRODUCTS	(8)	235	210	295
EXPLOSIVES		256	247	259
TEXTILES	(9)	308	241	307
PUBLIC HEALTH	(10)	262	223	248
METALLURGICAL TECHNOL.	(11)	306	266	312
GAS AND FUELS	(12)	262	230	300
SYNTHETIC FIBER TECHNOL.		252	248	322
CERAMIC INDUSTRIES	(13)	310	254	313
METALLURGICAL TECHNOL.	(14)	262	240	313
MEDICAL CHEMISTRY	(15)	255	222	283
FERTILIZERS	(16)	258	228	267
OTHER NON-PROFESSIONAL		217	106	245
MACHINERY & IMPLEMENTS	(17)	317	242	333
LABORATORY APPAR. & EQUIP.		237	198	253
EQUIPMENT (PROCESS INDUS.)		385	267	328
LEATHER & ITS MNFRS.		270	230	310
TRANSPORTATION EQUIP.	(18)	275	290	306
MOTOR VEHICLES		230	198	344

NOTE: SEE TABLE 22 FOR STUB FOOTNOTES 1 TO 18, INCLUSIVE

TABLE 36.—COMPARISON OF MEDIAN MONTHLY SALARY RATES IN 1929, 1934 AND 1941 OF ALL MALE REGULAR MEMBERS REPORTING GEOGRAPHIC DIVISION

YEAR	1929	1934	1941
GEOGRAPHIC DIVISION	MEDIAN MONTHLY SALARY RATE		
MIDDLE ATLANTIC	$273	$243	$308
EAST NORTH CENTRAL	244	208	278
SOUTH ATLANTIC	250	224	292
NEW ENGLAND	241	209	281
PACIFIC	221	193	255
WEST NORTH CENTRAL	209	173	252
WEST SOUTH CENTRAL	241	196	257
EAST SOUTH CENTRAL	230	194	252
DISTRICT OF COLUMBIA	265	258	296
MOUNTAIN	214	170	230
U.S. TERR. & POSSESSIONS	330	280	300
FOREIGN COUNTRIES	213	191	270

CHART II- MONTHLY SALARY RATES IN 1941 OF MALE REGULAR MEMBERS REPORTING IN SELECTED FIELDS OF SPECIALIZATION ACCORDING TO YEAR OF ENTERING PROFESSION



Section 16. Median Monthly Salary Rates of Male Regular Members by Size of Community

It is evident from the data shown in Table 37 that, in general, median monthly earnings of male regular members in 1941 increased directly with the size of the community. This generalization is borne out by the fact that for all geographic divisions combined, median earnings ranged from $257 a month in communities under 5,000 population, to $301 a month in communities with populations of over 500,000 persons.

Among the several geographic divisions, however, there were a few deviations from the general pattern. The most notable was that of the New England Region in which the highest earnings of $298 a month were reported for communities with populations of from 5,000 to 25,000 persons.

Within each size of community, earnings reported by male regular members from the several geographic divisions generally followed the pattern of distributions of earnings noted in the preceding section.

(The end)

ACTION ON THE AMERICAN CHEMICAL FRONT

[Continued]

American Contribution to Vitamin Production and Use

ROBERT R. WILLIAMS
Bell Telephone Laboratories,
463 West St., New York, N. Y.



MERCK & CO., INC.

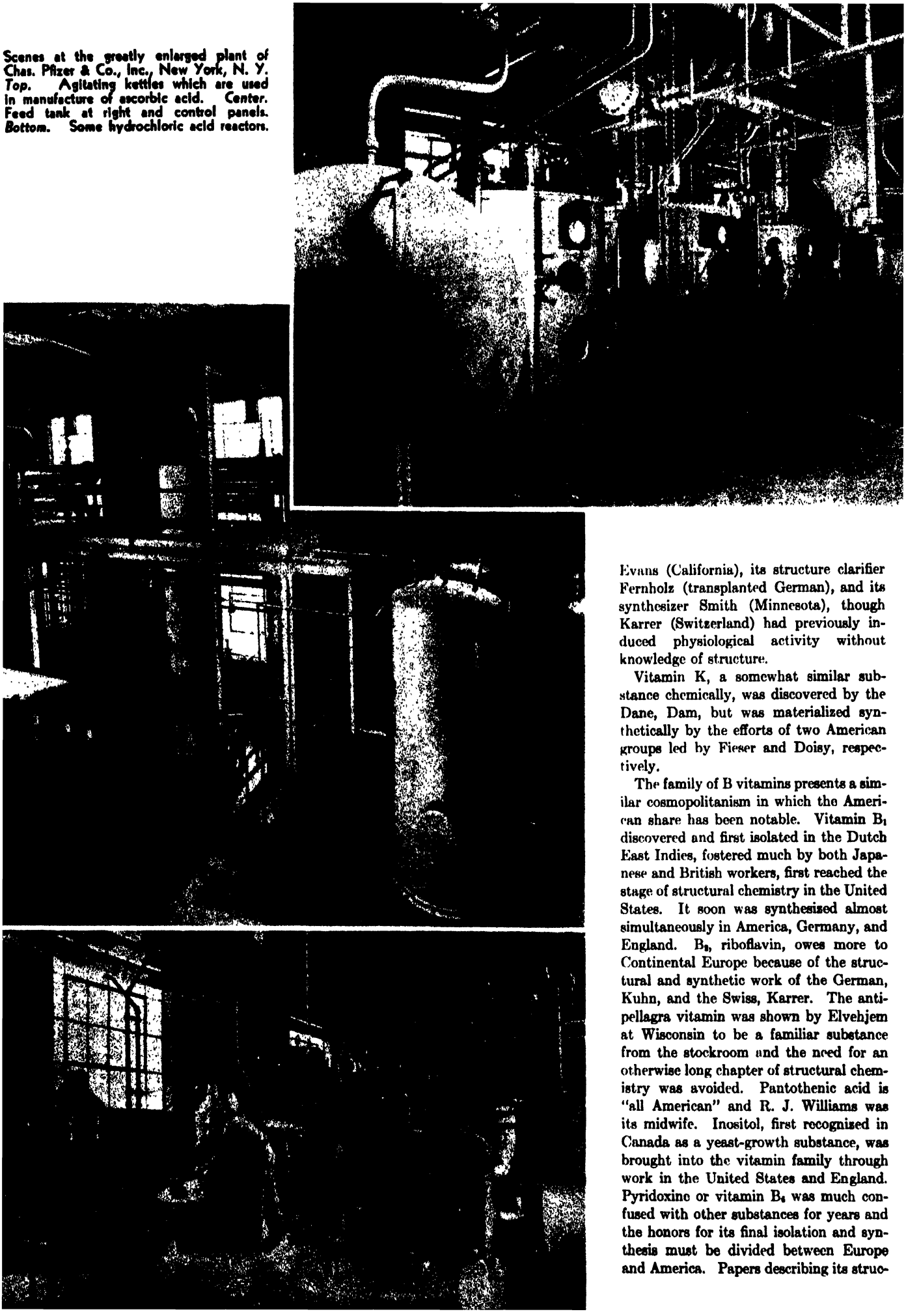
Equipment used in the manufacture of vitamin B1 hydrochloride

No country has contributed more to vitaminology than the United States. However, as in most fields of science, there has been international contribution toward the world store of knowledge. Happily, in normal times there are no tariff walls, no immigration laws to strangle the flow of ideas across political boundaries. Scholarship recognizes that any nation which would seek to make itself intellectually self-sufficient would soon and surely render itself intellectually inadequate in science.

The earliest vitamin (A) was indicated by the experiments of an Englishman, Hopkins, but reached more definitive recognition in the hands of Americans, Mendel and particularly McCollum. Carotene was recognized as its precursor in England (Moore), but for precise knowledge of its structure and an academic synthesis we are largely indebted to the Swiss, Karrer. A practical commercial synthesis is still to be achieved, wherefore we feel the pinch of the shutting off of fish liver oils from Norway and have turned to shark fishing, especially in California. An American, Wald, has developed much of our fundamental knowledge of the role of vitamin A in the eye.

Vitamin D, closely associated with and at first confused with A, came to the world's knowledge through the work of the American, Hess, as much as that of any one. It was he who enlisted the German, Windaus, in a study of its structure. This in turn has been useful for the interpretation and control of the reactions which occur when foods are subjected to ultraviolet radiation by the empirical but practically highly useful process of Steenbock (U. S. A.). However, an understanding of rickets and the relation of the disease to balance of calcium, phosphorus, and vitamin D was not attained without aid from every country of the Western World.

Vitamin E, the remaining long-established oil-soluble vitamin, was largely "made in America" by its discoverer



Scenes at the greatly enlarged plant of Chas. Pfizer & Co., Inc., New York, N. Y. *Top.* Agitating kettles which are used in manufacture of ascorbic acid. *Center.* Feed tank at right and control panels. *Bottom.* Some hydrochloric acid reactors.

Evans (California), its structure clarifier Fernholz (transplanted German), and its synthesizer Smith (Minnesota), though Karrer (Switzerland) had previously induced physiological activity without knowledge of structure.

Vitamin K, a somewhat similar substance chemically, was discovered by the Dane, Dam, but was materialized synthetically by the efforts of two American groups led by Fieser and Doisy, respectively.

The family of B vitamins presents a similar cosmopolitanism in which the American share has been notable. Vitamin B_1 discovered and first isolated in the Dutch East Indies, fostered much by both Japanese and British workers, first reached the stage of structural chemistry in the United States. It soon was synthesized almost simultaneously in America, Germany, and England. B_2, riboflavin, owes more to Continental Europe because of the structural and synthetic work of the German, Kuhn, and the Swiss, Karrer. The antipellagra vitamin was shown by Elvehjem at Wisconsin to be a familiar substance from the stockroom and the need for an otherwise long chapter of structural chemistry was avoided. Pantothenic acid is "all American" and R. J. Williams was its midwife. Inositol, first recognised in Canada as a yeast-growth substance, was brought into the vitamin family through work in the United States and England. Pyridoxine or vitamin B_6 was much confused with other substances for years and the honors for its final isolation and synthesis must be divided between Europe and America. Papers describing its struc-

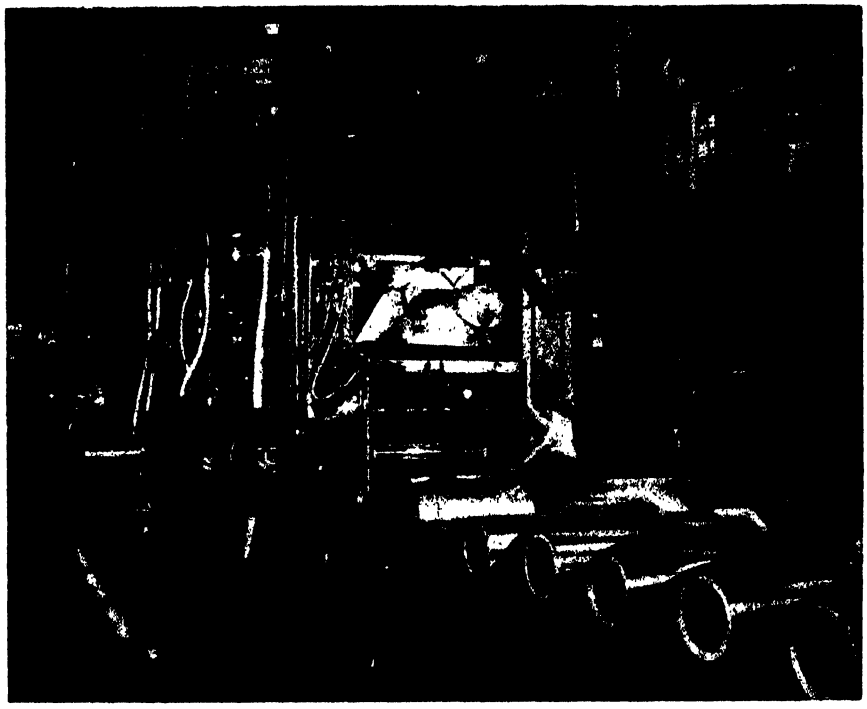
ture and synthesis emanated only a few weeks apart from Rahway, N. J., and Heidelberg, Germany. The story of biotin is not yet fully written, but honors are well divided between Holland and America.

Such also was the case with the long riddle of the antiscurvy vitamin, C. Isolated and recognized nearly simultaneously by Szent-Gyorgyi (Hungary) and by King (Pittsburgh), its structure was learned and its synthesis was achieved in British (Haworth) and Swiss (Reichstein) laboratories.

It is noteworthy that America has performed not only a great share of the groundwork leading to the discoveries of the vitamins but has also increasingly shown herself capable of the fine and highly specialized techniques of micro-isolation and micro-structural chemistry, as well as those of organic synthesis. In the field of the quantity production of synthetic vitamins, America leads the world, partly because the American public is very vitamin conscious and thus affords a good market. Such progressiveness in this difficult field is, however, evidence of the great competence of American chemical factories.

The Aluminum Industry

FRANCIS C. FRARY, Aluminum Co. of America, Pittsburgh, Penna.

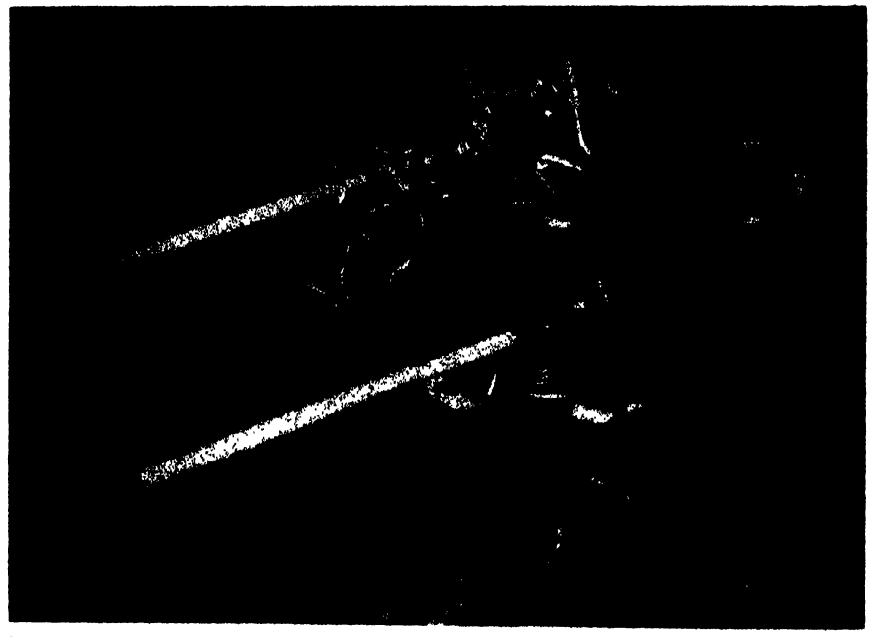


Rolling aluminum strip sheet

IN ALLOY and market development and production technique, the American aluminum industry not only has been independent of all foreign sources of information, but has largely anticipated foreign developments. Even in the case of the one alloy development which came from abroad (the German alloy Duralumin) the foreign information was substantially confined to meager patent statements, and the whole technique of production and control had to be worked out independently here.

Aluminum alloy developments began with casting alloys. The one containing about 8 per cent copper was produced in 1894 and is still designated abroad as "American alloy". The early "German alloy" containing a little copper and considerable zinc, was unable seriously to compete in this country and has largely died out abroad. The next important casting alloy developments occurred here shortly after the World War I, when Jeffries and Archer produced the heat-treated cast alloys containing about 4 per cent of copper, and the 5 per cent silicon casting alloy, and Aladar Pacz developed the modified 12 per cent silicon alloy (Alpax, Silumin) which later became very popular in Europe. The heat-treated sand-cast alloys containing 5 to 7 per cent of silicon and a little magnesium and the low-expansion alloys for automotive pistons were developed here about 1930 and have since spread to foreign countries.

Aluminum alloys containing 5 per cent or more of magnesium were investigated here as early as 1906, but were commercially impractical at that time. It was not until 1929 that we were able to work out for the first time casting methods which made it practical to use the 10 per cent magnesium alloy, and in 1931–33 the technique was developed to produce satisfactory heat-treated castings of this alloy having the highest strength of any heat-treated aluminum-base alloy castings. If the use of this alloy has spread to



The exellent machinability of the free-cutting aluminum alloys is shown by small chips which were produced here as a result of machining the rod in the foreground.

foreign countries, it has been only within very recent years.

In the field of wrought alloys, the one prewar alloy other than Duralumin which has stood the test of time is 3S (aluminum with 1.0 to 1.5 per cent manganese), developed here by E. Blough in 1906, and still the most popular of the unheat-treated alloys. It was 20 years before this alloy began to be manufactured to any extent in Europe, but alloys of this type have recently become deservedly popular there.

When the American industry took up the development of the heat-treated wrought strong aluminum alloys, Duralumin was found difficult to forge. Since it was evident that forgings would be essential if strong aluminum alloys were to go into general commercial use, two new alloys (25S and 51S) were developed here primarily to combine easy forgeability with good strength. Small forgings, such as connecting rods, began to be made of these alloys in 1921, and soon forged propeller blanks of 25S and aircraft engine crankcases of 51S began to be produced. It was another 10 years before foreign aluminum fabricating plants took up the manufacture of these large forged aluminum alloy articles.

Two alloys of the Duralumin type with considerably higher strength than the original Duralumin (24S and 14S) were commercialized in this country in 1931, and similar alloys were later developed and used abroad. These alloys are such an improvement on the original Duralumin that they have almost completely replaced it in our aircraft construction.

The idea of protecting corrodible aluminum alloys by a thin surface coating of pure aluminum had been thought of and patented so long before the other war that it had been forgotten. It was rediscovered by the National Bureau of Standards and commercialized in this country, the first Alclad strong aluminum sheet being rolled and tested here in 1926. Subsequently taken up and exploited abroad also, it has proved the complete answer to the protection of thin strong alloy sheet from corrosion by marine atmospheres.

One of the serious problems in the production of strong aluminum alloy forgings is the manufacture of a good forging stock. This was originally done only by the relatively expensive process of extrusion, still used abroad. As early as 1924, a large rolling mill was built here for the manufacture of large billets and structural shapes out of the strong heat-treated aluminum alloys, and in the same mill the technique of producing satisfactory rolled forging stock was shortly evolved. With many improvements that process is producing our present strong alloy forging stock.

Development of the free-cutting alloys of the 11S type in this country in 1932 made available for use on automatic screw machines high-strength aluminum alloy rod. This, in turn, made possible production rates and tool life at least equal to those realized with free-cutting alloys of other metals. Later, various free-cutting aluminum alloys were developed abroad, but so far none appear to have surpassed and few to have equaled 11S.



Forging a strong aluminum alloy propeller blade

The electrolytic refining of aluminum in a molten salt bath, first accomplished on an industrial scale in this country in 1921, produced the first high purity aluminum for metallurgical research. It was also the first time that the electrolytic refining of a metal in a fused salt bath had been accomplished commercially.

Aluminum conductors were first used to carry electricity to the Niagara Falls works of the Pittsburgh Reduction Co. in 1895. After many vicissitudes, the use of aluminum cable for high-tension electric circuits was placed on a firm foundation by the commercialization of aluminum cable steel reinforced in this country in 1907. Trial installations were not made in Europe until about the time of World War I, after the cable had already become an assured success in America.

In the field of anodic finishing, the merits of the sulfuric acid process (originally patented in England) were first recognized in this country and the process developed commercially, together with the necessary sealing and coloring procedures, so that it has now largely supplanted the competing chromic and oxalic acid processes developed abroad. The Alzak process for the electrolytic production of a specular aluminum surface having the reflectivity of a silvered glass mirror was developed here and commercialized in 1934. It was the first commercial use of electrolytic polishing.

In the more strictly chemical field, most of the American developments in the aluminum industry are confidential. As an exception the development in 1928 of activated alumina—a rocklike form of partially calcined aluminum hydroxide which has remarkable properties as a desiccant and as a catalyst carrier—may be mentioned.

The entire history of the aluminum industry is one of severe competition with other metals, wood, paper, plastics, etc. Technical progress in America made the United States the largest and most active market in the world for aluminum products until German war preparations forced the expansion of aluminum there. The present tremendous expansion of the domestic industry involves many improvements ascribable to American skill and ingenuity.

Research in the Service of Medicine

(Pictures on pages 1668-69)

OF INTEREST to physicians, chemists, druggists, and others associated with medical service in the health of the Nation are the new laboratories recently opened by G. D. Searle & Co., well-known manufacturers of ethical pharmaceuticals for more than 50 years.

Dictated by the firm's policy of "Research in the Service of Medicine" many outstanding innovations have been incorporated into the new building which represents a distinct evolution in the manufacture of medicinal preparations.

The heart of the modern, streamlined structure is the Research Laboratory which occupies almost the entire second floor. Functionally, this department consists of three divisions—organic synthesis, bioassay, and analytical—and for each division the equipment has been specially devised for its particular function.

The synthetic organic laboratories, which occupy by far the largest area, are separated by partitions of shatterproof glass to provide complete safety in case of fire or explosion and at the same time to afford perfect lighting. Other safety features include emergency showers over each door, a delayed action sprinkler system to diminish water hazard and dry-ice extinguishers for small or local flames. The laboratory furniture was all specially made, after extensive tests to determine the most perfect materials and design. Each laboratory has a built-in refrigerator for storage of perishable samples or chemicals, work hoods, and safety-glass fronts and remote-control valves.

One of the larger laboratories is devoted solely to the preparation of starting chemicals, so that valuable research time need not be lost in doing routine preparations of otherwise unavailable materials. A pilot plant is also included in this unit and serves the double function of providing large-scale apparatus for chemical preparations as well as acting as intermediary in working successful products up from laboratory scale to full chemical manufacture. Other laboratories, similar in design and equipment to the organic laboratories, are reserved for biochemistry, which deals with products isolated from natural or living sources. In such isolations, the pilot plant is also invaluable owing to the large volumes frequently encountered.

Once a compound has been synthesized or isolated from a natural source, it is necessary to evaluate it as a potential drug. For this purpose completely equipped laboratories have been provided for bacteriology and for pharmacology. Bacteriology consists of one laboratory devoted to more delicate operations, such as culturing, transferring, and observation, both macroscopic and microscopic. The adjacent laboratory is used for preparing, sterilizing, and storing culture media, as well as for washing glassware and incubating specimens. The function of this division is also two-fold—the bacteriologic evaluation of new compounds and the manufacture from the standpoint of sterility precautions.

The Pharmacology Department consists of three laboratories on the research floor, directly connected with animal rooms in the basement by means of a private dumb waiter. This department, like the others, has a dual function in that it performs routine assays of all biologically assayed materials marketed by the company. By far the major effort, however, is devoted to the systematic evaluation of all new compounds prepared within the Research Department and the follow-up of products until they are ready for clinical trial. Physically this division is replete with kymographs, muscle levers and warmers, microtome, and all specialized paraphernalia which makes evaluation of drugs a science rather than an art.

The Analytical Division occupies the west wing of the research floor and, because of the specialized nature of modern analytical procedure, is divided into a number of separate units. The largest is devoted to the analysis of all incoming materials and intermediates manufactured by the company, to be certain of identity and purity, and all out-going products.

A similar unit is found in the micro-analytical laboratory. This is a technique which has been developed during recent years, whereby with suitable equipment and specially trained technicians, the most precise analyses can be conducted upon unbelievably small amounts of materials. This is a real consideration when dealing with the tiny quantities which are frequently encountered both in biological isolations and as breakdown products in determining the structure of unknown compounds preliminary to their synthesis.

An optical room with its adjoining dark room completes the Analytical Division. This is included in the division because of the constant increase of new techniques and methods which employ optical and frequently photographic instruments for the perfection of the analysis, reduction of labor, or, most important, the precise measurement of smaller and still smaller amounts of material. It is such procedures that allow the pharmacologist to follow a drug in the animal body and to study the intimate mechanisms of its function and excretion.

A new feature of the manufacturing laboratories is that raw materials are delivered to the center of the building and from there distributed to the analytical, research, or manufacturing laboratories as requested.

The manufacturing process takes place under ideal conditions as to arrangement of apparatus, light, space, sanitation, air conditioning, and humidity control. Of particular interest is the extensive ampuls department. Examination of these laboratories by visitors is controlled by glass-walled passageways, where inspection can be made without interfering with operations and without danger of contamination.

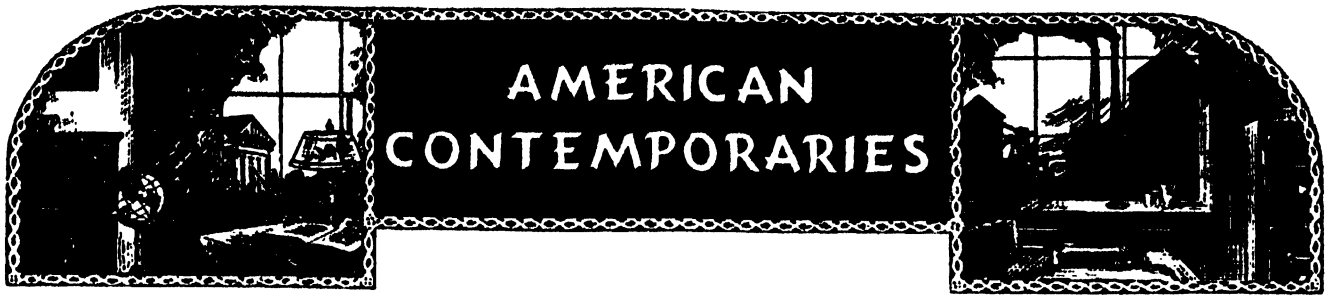
Friendly employee-management relations and the well-being of its workers have always been strong considerations of G. D. Searle & Co. This is evidenced by the spaciousness and beautiful appointments of the lounge, dining room, recreation hall, and auditorium, occupying the entire wing of the basement. The auditorium, in addition to being used by employees for meetings and entertainment, will also be made available to local medical and chemical societies which may wish to hold meetings there. A well-appointed hospital room is under the supervision of one of the physicians on the Searle staff.

The general offices are located in the upper tier of the building. In addition to the space and facilities for the office staff, there is a large lecture room devoted to the schooling of retail representatives.

The structure from the outside is unusually modern. There is no hint in its appearance of either factory or office building. It is what is popularly known as a streamlined building, and is considered an outstanding example of modern architecture where functional facilities are allied with simplicity and beauty.

The building is air-conditioned and humidity-controlled throughout. The various laboratories and offices are soundproofed. The fluorescent lighting is indirect and shadowless—approximating ideal daylight conditions.

The building is set on a tract of land in Skokie, which is a nonindustrial section on the northwest limits of Chicago.



William Flowers Hand

IF ONE is passing the Mississippi State Chemical Laboratory at midnight he should not be startled to hear a voice from a southwest window. At first he may think it is a radio giving the midnight news. However, in a few moments he will hear the voice say, "paragraph". It is merely the voice of the character of this sketch putting a few letters on the cylinder, for it would be a crime to take the secretary's time dictating at eight the next morning. Long before World War I, Dr. Hand bought an automobile for himself and a dictaphone for the office. He soon solved the simple mechanics of the former; so he sold it. However, it was a man-sized job to keep the old dictaphone going; so after wrestling with it for a third of a century, World War II found him trading it in for a new Ediphone.

While some chemists may dream of sudden inspiration or of fortuitous scientific prescience, others realize that through years of continuous service they may arrive at a goal which far surpasses the conclusions of any particular piece of work accomplished over a much shorter interval of time. That Dr. Hand has attained such a goal in the hearts of the people of Mississippi is shown by the fact that in May 1940, at an impressive ceremony, there was unveiled in the hall of the Mississippi State Chemical Laboratory a bronze tablet which reads, in part, as follows:

MISSISSIPPI STATE COLLEGE

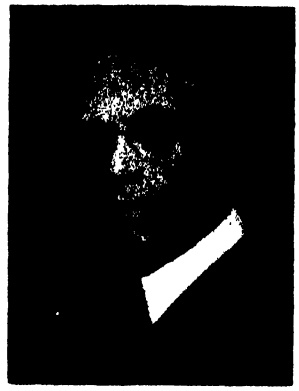
CHEMICAL LABORATORY

A Tribute To

DR. WILLIAM FLOWERS HAND, SCIENTIST,

Whose unselfish service, tireless energy, and devotion to the education of the youth of Mississippi, and whose distinguished activities as State Chemist, merit the naming of this building in his honor

With the exception of brief periods of study under Dr. Mallet at the University of Virginia, and under Dr. Bogert at Columbia, Dr. Hand's entire life has been spent in the State of Mississippi, where he was born on December 1, 1873. In 1899, Mississippi State College made him professor of chemistry and state chemist (membership in the AMERICAN CHEMICAL SOCIETY also dates from this year). He has more than doubled the combined tenures of his four predecessors. Since 1916 he has been dean of the School of Science and in 1935 he became vice president of the college. This long term of service proves beyond a doubt his love for and loyalty to the college, and we find this account interwoven with reference to the college and to his students.



HARRIS AND EWING

William Flowers Hand

One might well say that the sun never sets on Dr. Hand's students. They occupy positions all over the United States and its possessions. One of them devised a popular breakfast food, another has refined sugar in several countries, recently another took over a major oil company's largest refinery, and still another made a success in the field of television after serving his apprenticeship in Dr. Hand's tool room. Many have taken advanced work in large universities and all have been commended for their thorough background in organic chemistry and in chemical literature, taught by Dr. Hand.

When Dr. Hand first came to Mississippi State College as a student, there were only three books and no periodicals in the chemical library. Today it contains approximately 6,000 volumes and 50 journals, all carefully chosen. It serves as a substantial nucleus for Dr. Hand's goal, a new chemistry building equipped for chemical engineering, which he feels is essential for the South in bringing about the much needed balance of agriculture and industry.

The present laboratory was designed and built under his direction, and has been the object of much favorable comment. The students say that the halls were laid with hexagonal tiles which represented benzene rings that would aid Dr. Hand in arriving at a more difficult aromatic structure to give them for memory. In this laboratory is a well-equipped tool room. Here Dr. Hand has put to good use his hobby, which is the design and building of apparatus. Many an afternoon after a hard day he turns on the motor to his lathe. Products of his "relaxation" are almost masterpieces. The needle valves for fat extractors are precisely turned and well-buffed brass outshines the polish of cherry and mahogany. And, speaking of cherry and mahogany, one must mention the unique fat extractor which Dr. Hand built at a time when no extractors on the market gave almost complete recovery of ethyl ether. The extractor which he constructed meant drops of ether saved—representing not only an advance in scientific apparatus, but a saving of money which in turn meant more books or journals for the chemical library. This particular extractor was set in cherry wood which an old Englishman had hoarded for over a quarter of a century. He would not part with enough for all sections; so some were set in equally beautiful mahogany. The beauty of the apparatus did not interfere with its usefulness, for certain sections have been in daily use for over 20 years.

Many other pieces of apparatus have resulted from Dr. Hand's labors and a compact battery distillation for petroleum was finished and in operation in his petroleum laboratory before there was one on the market. Mississippi is believed to be the second State to purchase an A. S. T. M.-C. F. R. motor for the regulation of octane rating of gasoline, and now a cetane motor for fuel oils has been added.

Dr. Hand has not chosen to patent or capitalize on any of his apparatus, using it instead for the service and prestige that it might offer his school and state. On his office mantle are two beautiful silver cups, each won three times before becoming permanent possessions. These were the result of analytical success on a series of check samples sponsored by the American

Oil Chemists' Society. The apparatus used throughout the analyses was HAND built. When the society made the first award to him in 1927 and requested his photograph, he sent instead a picture of the laboratory. With all his success, he has never sent out one word of publicity for himself. Perhaps his mother, Florence Flowers Hand, who taught school until she was well past 70, taught him that self-praise was half scandal, or his father, Albert Powe Hand, may have told him that the boys would find the path to his laboratory if he built the right rat trap.

Despite his deliberate efforts towards self-effacement, Dr. Hand's work and worth have been widely recognized. He is listed in American Men of Science, Who's Who in American Education, Who's Who in America, and on the rolls of many honorary societies. In 1941 the Georgia Section of the AMERICAN CHEMICAL SOCIETY selected him as the recipient of the Herty Medal. When he received the unexpected telegram of award he was very much embarrassed, for he claimed to have "no consciousness of such praiseworthy achievement". Although this rendezvous, with the pilgrimage to Milledgeville, was kept under a great physical handicap, the day had not ended until everyone felt that the spirit of Charles Herty still lived.

The position of state chemist automatically made him an active member of the Association of Official Agricultural Chemists, and he has served on many of its important committees, including an eight-year term on its journal editorial board. In 1921 he was its president. He has also been president of the Association of American Feed Control Officials, the Association of South Central States Food, Feed, Drug, and Health Officials, and the Southern Feed Control Officials. He aided in revising the inadequate fertilizer laws of Mississippi and in preparing the original feed, paint, and petroleum laws. In his nearly half century as state chemist he has personally done considerable toxicological work, compiling forensic data on many a poison case, some of national note.

Dr. Hand has not been immune to the usual campus tales, so we hear of scrapes that he got in and out of while in college, and of his absent-mindedness and forgetfulness which equal those of the professor in fiction. However, those who work with him report that he remembers everything about everyone. He keeps up on the news of the day, too, and would easily stump the average person in a discussion of current events. Once in a while he spends an evening swapping yarns with the Sigma Alpha Epsilons or attends a college social affair. It is said that in his younger days he used to slip away from the formal dances, pull off his "tails", push up his cuffs, and work a little more on his intriguing "quinazolines"—while the band played on.

Dr. Hand's Chesterfield manner has become an example that could easily be used as an additional course for the four years of a college boy's life, for he always maintains poise and equanimity through storm and tempest, before friend or foe, superior or subordinate. He has always been a great lover of children and those of the Mississippi State College campus look forward to his Christmas gift with the same confidence they look to a visit from Saint Nick himself. Unfortunately his only child, Wiley Nash Hand—a U. S. Naval Academy graduate in 1921—died in 1936.

In 1940 Dr. Hand had a coronary thrombosis. The forced eight weeks' leave from the laboratory was more painful than the cardiac pain itself. Although the physician recommended additional weeks off and shortened hours on return, he immediately punched the clock along with the other faculty and the Ediphone and the lathe were soon getting their nocturnal workout. Early 1943 will see a new feed and fertilizer mill emerge which removes the imperfections of a former one that was superior to any stock mill for cutting and mixing samples.

This brief account reflects only in a small way his real tenacity and his failure to compromise with accomplishments which are not the best. It is not entirely luck that Mississippi State College students hold their own with those from larger institutions. Dr. Hand once told an analyst who suggested that he did not have the time to check samples from all over the United States that, "We shall always find the time to measure ourselves by the other fellow's yardstick." It is now realized that the unsaid portion of his sentence was—"and we'll see that our own measures with the best".

M. P. ETHEREDGE

Department of Justice Charges Monopolistic Practices

THE Department of Justice on December 9, 1942, filed a complaint in the United States District Court at Trenton, N. J., charging seven manufacturing companies, two trade associations, and a testing laboratory with monopolistic practices and restraint of trade in the fluorescent lighting industry.

Named as defendants in the complaint were: General Electric Co., International General Electric Co., Westinghouse Electric & Manufacturing Co., Corning Glass Works, Consolidated Electric Lamp Co., Claude Neon Lights, Inc., N. V. Philips Gloeilampenfabrieken, Reflector Lamp Manufacturers' Institute, Fleur-O-Lier Manufacturers, and Electrical Testing Laboratories.

National Safety Council Officers

THE following members of executive committe, Chemical Section, National Safety Council, have been elected for 1942–43:

General Chairman, Major R. C. Stratton, CWS, Office of the Chief of Ordnance, Safety & Security Branch, Chicago, Ill.
Vice Chairman in Charge of Program, James J. Duggan, Carbide & Carbon Chemicals Corp., South Charleston, W. Va.
Secretary, H. F. Gilbert, American Cyanamid Co., New York, N. Y.
News Letter Committee, Allen L. Cobb (Chairman), E. F. King, W. C. Shaw.
Engineering Committee, D. O. Mason (Chairman), E. G. Meiter, E. J. Sait.
Data and Instruction Card Committee, R. S. Mackie (Chairman), R. C. Hamilton, John W. Sawyer.
Health Committee, S. W. Gurney (Chairman), Leonard Greenburg, S. M. MacCutcheon, H. H. Schrenk.
Membership Committee, C. E. Sevrens (Chairman), W. L. Hammersley, James H. Hayes.
Poster Committee, M. R. Budd (Chairman) and P. C. Lamb.
Statistics and Contest Committee, M. A. Snell (Chairman), E. J. Riederer.
Advisory Committee, F. W. Dennis (Chairman), R. O. Keefer, R. L. Rogers, Jr., H. L. Miner, John Roach, John S. Shaw, A. L. Watson, S. E. Whiting.

Data Published on Selective Service

BECAUSE of the wide interest in this subject and the need for obtaining trained men for our Production Army, we give below references to information we have published on occupational deferments, including those of men in training, and the need for technically trained persons. Future developments will be brought to the attention of our readers.

Chemical and Engineering News

(NEWS EDITION previous to 1942)

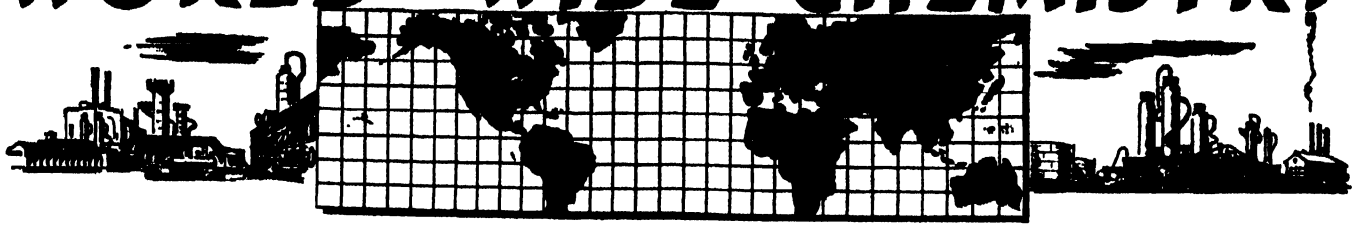
Vol. 18 (1940), pages 890, 1127
Vol. 19 (1941), pages 129, 311, 457, 459, 489, 520, 587, 681, 797, 1164, 1412, 1464
Vol. 20 (1942), pages 110, 157, 472, 579–80, 788, 812, 837–39, 985, 1099, 1100, 1219, 1294, 1392, 1514, and 1536.

Industrial and Engineering Chemistry

Vol. 33 (1941), pages 1, 135, 283, 561
Vol. 34 (1942), pages 2, 131, 259, 648, 1134



WORLD-WIDE CHEMISTRY



Pulp and paper production in Canada in 1939 amounted to 4,500,000 tons. The production of pulp and paper for export was 4,300,000 tons, including 2,900,000 tons of newsprint. Production value total was $208,000,000 and production for export was recorded as $201,000,000.

Dehydrated Food Supplies Controlled

Supplies of dehydrated fruit, vegetables, and eggs processed in Canada are controlled by the Special Products Board of the Department of Agriculture. This board was established to provide a central agency for obtaining and exporting to the United Kingdom's food ministry any "special product" that may be required. Dehydration processing of eggs in Canada has reached a high stage of efficiency under skilled scientific control.

Fisheries Experimental Station Is In New Quarters

The Experimental Station of the Fisheries Research Board, located at Prince Rupert, B. C., for many years, has been officially transferred to Vancouver, partly in order to take advantage of facilities offered by proximity to the University of British Columbia.

Drawn Glass Is Made In Canada

Prior to the war 70 per cent of the window glass used in Canada was imported from Belgium. With the usual sources of supply cut off, the continuing demand for this, as for so many war materials, has been met by the establishment of a new industry in the Dominion. The method used in the Canadian plant is one of two mechanical systems in general application in the glass industry in both Europe and America—namely, the Fourcault vertical drawing process using asbestos-covered steel rollers. Minor modifications in the process have been introduced to meet domestic requirements. In addition to the usual single and double thickness window glass, two other grades are being made. A thin glass provides suitable material for watch crystals and a heavy product serves as safety glass when combined with a filler of plastic sheeting for table tops and many other purposes.

Brewing Industry Is Being Restricted

An order curtailing operations of the brewing industry in Canada became effective November 1, 1942. From that date no brewer is permitted to use more malt for producing beer in any quarter than the amount used in the corresponding quarter of the preceding year. A substantial saving in manpower is expected through the resulting reduction in distribution and sales promotion operations, in which the brewing industry has a large employment.

Beet Sugar Production Declines

Returns for 1941 show that production of sugar of all kinds in Canada amounted to 1,212,550,000 pounds including 1,010,873,000 of cane sugar and 201,677,000 pounds of beet sugar. This represented a gain of 67,669,000 pounds in cane sugar over 1940 but a decrease of 11,924,000 pounds in beet sugar output. Establishment of a new beet sugar plant in Manitoba in 1940 resulted in a rise in production to 213,602,000 pounds in that year representing 18.5 per cent of the total sugar output. Plant breeding studies are in progress in western Canada looking to the betterment of sugar yield and increased tonnage per acre of sugar beets.

Pulp and Paper Making Is Important Economic Factor

In 1940 newsprint made up 64.5 per cent of the volume of output; pulp, 20.5 per cent; paper boards, 9.2; wrapping paper, 2.6; book and writing, 1.9; tissue paper, 0.6; and other papers, 0.7 per cent.

An electrical power conservation program, involving 36 Ontario and Quebec mills where 82.5 per cent of production capacity of the industry is located, has been announced. The power saved by this plan will be diverted to war plants in areas where a power shortage threatens.

The growth of the pulp and paper industry has been phenomenal. In 1913 Canadian mills converted 1,000,000 cords; in 1940, 7,000,000 cords. Employment has more than doubled and now stands at 35,000 persons; wages paid have increased from $11,000,000 to $56,000,000. The purchasing power of the industry is very great. Chemicals used cost $13,000,000 a year. It is the largest user of sulfur in Canada. Liquid chlorine, lime, salt cake, caustic soda, limestone, common salt, and alum are among other chemical products used.

To ensure a continuous supply of wood, the industry is endeavoring to operate the forests on a "sustained yield" basis. By scientific cutting it is not only possible to ensure that the forest will regenerate itself but that the new forest will be even more valuable than the original virgin stands.

Research on utilization problems is being pursued steadily. Work on tree-breeding is making good progress.

Chemical Control In Canada Coordinated with U. S. Program

Closely coordinated with the United States program, Canada's control of chemicals and allied products is being exercised on a common-sense basis, the Chemical Controller told a local group of chemists at a recent meeting. Plenty of authority has been provided for any necessary action but cooperation of producers and consumers has been so effective that it has not been necessary to take drastic action.

The use of chlorine as a bleaching agent in paper making has been reduced in line with similar action in the United States; use of glycerol except for explosives is limited; synthetic resins and lacquers are subject to control; the number of colors of certain condensation type products has been reduced; importation of specified chemicals has been put under license; molasses, natural gas, gums, resins, balsams, dry colors and pigments, crude drugs and their derivatives, and albumin have been defined as chemicals;

EDITOR'S NOTE. Those interested in further details should address the correspondent whose name and address appear for each country, and enclose sufficient international coupons to prepay the reply. United States stamps should not be sent.

use of coal tar for road construction is possible only under permit; and the disposal of spent lye is controlled. Sal-ammoniac skimmings are being conserved. A plastics advisory committee and a dyestuff advisory committee have been appointed.

Prices Order Freezes Business to Present Lines

Conservation of materials and manpower is one aim of an order restricting the establishment of new businesses or the expansion of existing retail, wholesale, and manufacturing concerns.

The order is also aimed at the maintenance of a greater degree of stability for those engaged in trade and industry amidst the difficulties imposed by wartime conditions.

War Regulations Limit Use of Chemical Products

East of the Manitoba-Ontario boundary the manufacture, import, packing, mixing, storage, sale, delivery, and use of fertilizer are under control and the composition of fertilizers is limited to specified mixtures.

Natural varnish resins may not be used in the manufacture of paints for barns, freight cars, or road marking. An exception is made in the case of Batu gum of which one-half pound per gallon of solids may be used in road-marking paint.

Supplies of rotenone-bearing materials are restricted to certain specified uses.

Synthetic Rubber to Be Produced

Canada has undertaken to supply its own needs of synthetic rubber for tire treads by the construction of a plant with a production capacity of over 30,000 tons per year. The type of synthetic rubber to be manufactured is Buna S.

The use of natural rubber for strictly civilian needs has been stopped and the National Research Council's rubber laboratory, in cooperation with government departments, has carried out and is still working on numerous investigations looking to the reduction of the percentage of rubber required in war products. As the new synthetic rubbers arrive the rubber laboratory will be used to determine which is the best synthetic to use instead of natural rubber. The National Research Council and the Dominion Experimental Farm are collaborating on the problem of cultivating rubber-bearing plants in Canada and extracting the rubber from them.

S. J. Cook

140 Broadway Ave.
Ottawa, Canada
November 14, 1942

Continental Europe



A new company, Standard-Kuhlmann, has been formed in Paris with a capital of 5,000,00 francs. The shares have been taken over by the chemical combine Kuhlmann, Standard Française des Pétroles, Société Immobilière Chimique, and Société Commerciale pour Agriculture et Industrie.

Kuhlmann Enters Motor Fuel Field

The new company will engage in the production and sale of chemical products, particularly fuels, lubricants, and substitute fuels. Evidently it is intended to make use of Kuhlmann's experience in the chemical field and Standard's experience in the sale of motor fuels and lubricating oils.

Collaboration of Rubber Manufacturers

French rubber manufacturing companies are reported to be supplied with limited quantities of synthetic rubber of German origin. The first of these supplies were received at the beginning of 1942. A closer collaboration of German and French rubber manufacturers is sought. About five French firms are usually brought into closer contact with one German firm which hands over to the French manufacturers its patents and experience in return for financial advantages. Thus Etablissements Hutchinson report that they are collaborating with Semperit Gummiwerke A.-G. of Vienna and have transferred to that company half of their financial interests in Spain and Italy. Hutchinson will, on the other hand, dispose of Semperit processes to about 20 smaller firms in France.

Oil Refineries Damaged in Raids

Compagnie Française des Pétroles reports that it has received the sum of 24,000,000 francs for war damage, and hopes to receive further payments during the current year to compensate for the considerable damage to the company's refineries in Normandy. Of the four French oil refining centers, three are in occupied France, and while none of these is in a position to continue operations on anything like the normal scale, further damage seems to have been caused in at least one of them—Le Havre—by air raids which prevent even operations on the limited scale possible with substitute fuels.

Magnesium Production Financed by German Bank

Thanks to her large deposits of first-class bauxite, France plays a prominent part in the continental aluminum industry, and according to German press reports, full use is being made of these possibilities. Meanwhile the production of magnesium is said to have been increased also. The two leading producers are Péchiney and Ugine, and the raw materials are dolomite (ample supplies of which are available in various parts of the country) and salt precipitations on the Mediterranean Coast. The funds required have been obtained through the agency of Aero-Bank, the Paris branch of the German Bank für Luftfahrt A.-G.

Oil Prospecting Work Unsuccessful

Oil drilling has been continued in the Haute Garonne (southwest France) since gas was found at Saint Gaudens, but no oil has been found in the wells, and the prospectors have moved somewhat to the west, to the region of Boulogne-sur-Gesse. In the meantime a gas pipe line is being laid from Saint Marcet to Toulouse where the natural gas is to be utilized.



Special attention has been paid of late to transferring to war-essential production surplus labor in industries catering to civilian needs. Several chemical trades have been affected by this new policy, which is the special task of the Reich Minister for Armaments and Munitions. The desired concentration has not in all cases been effected without opposition from the manufacturers concerned. While it is intended to take as many workers as possible from civilian manufacture, the firms which specialize in these products are apparently to be preserved. Plants which are closed down usually receive a quota which they are entitled to sell. The goods are supplied by other firms which have been allowed to continue operations, and the owners of the closed plants act as wholesalers, selling goods at specified prices to their old customers. Arrangements of this kind have been made in the soap, acetic acid, and vinegar industries. Settlement of accounts is undertaken by a central organization such as Efag Essigfabrikanten G. m. b. H., a company established for this purpose

by the acetic acid and vinegar manufacturers. At the same time, however, a genuine concentration of production in efficient plants with corresponding changes in financial control is also taking place. Thus Kohlensäure-Industrie A.-G. has been formed with a capital of 5,200,000 marks for the amalgamation of several manufacturers of carbonic acid.

New Uses for Lignite Briquets Developed

Lignite briquets have always been a favorite household fuel in central and eastern Germany, and they have also been used on a large scale as an industrial fuel in these districts. Lately, however, several new applications have been developed. Briquets made of lignite which has been dried at raised temperatures are said to provide an improved low-temperature carbonization coke which, owing to its better physical properties, can be used for metallurgical purposes for which coke made from ordinary lignite is not suitable. In the Rhineland special lignite briquets are now being made for use as a fuel in mobile gas producer plants. These briquets can be used as the sole fuel in specially designed generators or in a 1 to 3 mixture with ordinary wood in all other generators.

Loss of African Phosphates Means Fall in Fertilizer Production

North Africa has been an important source of minerals such as iron ore, molybdenum, antimony, and cobalt for the Axis ever since the collapse of France, but more important still has been the supply of rock phosphates from Tunisia and Morocco. The total amount of rock phosphates shipped from French North Africa in January–August, 1942, was 1,600,000 metric tons, and a substantial part of this is believed to have reached Germany. Recent reports by superphosphate manufacturers in Germany showed a surprising contrast between firms operating in the north and those with factories in the southern parts of the country. While those on the North Sea and the Baltic Sea which normally obtain rock phosphates by sea through the Atlantic reported that their manufacturing activities were almost completely interrupted, firms in Bavaria were able to present somewhat more satisfactory reports. It is possible that firms nearer to Mediterranean ports received African rock phosphates via Marseilles or Genoa. These imports have now been stopped, and Germany must in future depend entirely on bone products and basic slag in so far as phosphatic fertiliser materials are concerned, as the Continent of Europe possesses hardly any natural sources of phosphates, with the exception of Swedish apatite. The Axis must also feel the loss of oil seeds and vegetable oils from North Africa.

Study Group Formed for Medicinal Plants

A Study Group for Medicinal Plants has been formed by German pharmacists, physicians, and scientists, to investigate properties, possibilities of cultivation, and applications of medicinal plants which can be grown and collected in Germany. For some years the German authorities have paid attention to the possibility of growing in other European countries, especially in southeastern Europe, medicinal plants and herbs of a kind which used to be imported from overseas before the war. German machinery and finance were provided for the cultivation of poppies, for the manufacture of opiates, in Slovakia and Hungary, and only recently Germany placed an order for 7,500 tons of medicinal herbs with Bulgaria where, on German initiative, a state control office for the export of medicinal plants was established as early as 1940. These efforts to obtain large quantities of medicinal plants from other European countries do not seem, however, to have been entirely successful, for in the inauguration meeting of the Study Group it was stated that the opportunities for cultivating medicinal plants in Germany were more variegated than in other countries and that the neglect of indigenous medicinal plants was to be made good by systematic research and propaganda among the public.

New German Interests in Southeastern Europe

The Uljanik Petroleum A.-G., Zagreb, has increased its capital from 15 to 30 million kuna. As only half the old capital has been paid in, it appears that a considerable extension of activities is intended. The company is interested in the exploitation of oil and gas deposits in Croatia and is connected with the Methan A.-G., Zagreb, which makes carbon black in two factories at Bujavica and Kutina and is controlled by the German Rütgers interests.

The Titanit Co. at Mahicno near Karlovac in Croatia has changed its name to Company for Explosives and Chemical Products and increased its capital from 4 to 8 million kuna. The Juganil Co. is a new company which sells aniline dyestuffs and chemical products in Serbia. Both these companies are believed to be under the control of I. G. Farbenindustrie. The Chemikal A.-G. of Vienna is reported to intend the erection of a factory for chemical products, including saccharin, in Bulgaria.

Fibers Made from Mulberry Tree Bark

The German Mulberry Raw Material Study Society has developed a process for the manufacture of a new fiber, said to possess great tensile strength, from the bark of the mulberry tree. It is reported that the Bulgarian Government intends to erect a state factory for processing the bark at Harmanlii. The collection of bark is to begin this year, and 2,000 tons of mulberry cell-wool are to be produced annually. The finished product will presumably be sent to Germany for use in the textile industry there.

Rumanian Crude Oil Exported to Germany

Contrary to earlier plans which found expression in the new Rumanian Petroleum Law, it has now been decided to permit exports of crude oil from Rumania, subject to certain conditions. (1) Exports of crude oil are permitted only if the crude oil has an octane number of 66 or less. (2) Exports will not be allowed to reach proportions which would endanger the supply of adequate quantities of crude oil to domestic refineries. (3) Exporters must deposit the difference between the domestic and the export price for the best crude oil qualities, so that the price advantage in favor of the exportation of crude oil is eliminated. (4) The exports of crude oil must not exceed an absolute maximum which is fixed for every month.

The principal buyer of Rumanian crude petroleum, as well as of Rumanian oil products, is Germany under present circumstances, and it would appear that the alteration of the original plans is due to pressure from German refineries which rely on Rumanian oil to provide raw material not only to keep their plants in operation but also to blend with inferior products obtained from other raw materials. This aspect of Rumanian oil supplies for Germany has increased in importance, but it is certain that considerable quantities of petroleum products refined in Rumania are dispatched directly to the German armies in Russia.

Karpathen Oel A.-G. Formed to Develop Polish Oil Deposits

A new company—Karpathen Oel A.-G.—has been formed at Lwow (Poland), with a capital of 30,000,000 zloty. The amount of capital indicates that the new company is to play a prominent part in the European petroleum industry, and practically all firms with important interests in the German oil industry have participated in financing the new enterprise. The founders include Kontinentale Oel A.-G. (a joint company of German oil producers for participation in foreign oil ventures),

Deutsche Gasolin A.-G. (a subsidiary of I. G. Farbenindustrie), Wintershall A.-G. (the leading potash, magnesium, and oil combine), Gewerkschaft Elwerath (a successful German oil producer), Preussische Bergwerksund Hütten-G. m. b. H. (the state-owned mining company with important interests in the oil, metal, and chemical industries), and Grossdeutsche Schacht-und Tiefbau A.-G. (the leading oil well-drilling company). The Karpathen Oel A.-G. is authorized to search for oil, produce, refine, and export it, and also to deal with natural gas and other bituminous substances. It may take over existing producing and refining installations, but its sphere of activities is limited to the Government-General—i. e., that part of Poland which has been neither incorporated into the Reich nor included in the Ostland region. It will devote special attention to the known oil deposits at the foot of the Carpathian Mountains, which have given the new company its name. Most of these were taken over by the U. S. S. R. in 1940/41, and after the withdrawal of the Soviet forces most of the wells and refining installations were destroyed, so that the Germans have been faced with great difficulties in their attempts to resume operations.

Chemical Industries in Eastern Provinces Expanded

Ostschlesisches Holzimprägnierwerk Guido Rütgers G. m. b. H. has been formed at Vienna with a capital of 300,000 marks. It is a subsidiary of the Rütgers company which holds large interests in the tar and asphalt industry. The new company is to engage in the impregnation of wood in East Silesia and to manufacture asphalt and tar products and impregnation materials.

Glanzstoff-Fabrik Lobositz A.-G., a rayon producer of Czecho-Slovakia, reports that extensive conversion and renovation work is going on in its plant. Stolberger Zink A.-G. reports that its production program was on the whole fulfilled last year.

Economies in Alloy Metals Effected by Standardization

Standardization as a means of effecting economies in the use of metals and chemicals has made considerable progress during the war, and the number of similar articles now made by German manufacturers of metal products has been so greatly reduced that on an average only 20 or 30 per cent of the prewar selection is now available. Often the standardization has been accompanied by a distribution of the permitted types of production among certain factories, with a view to further savings in material and labor, but this division of production cannot go beyond certain limits because of transportation problems. As far as metals are concerned, the Reich Board for Iron and Metals has been particularly thorough in reduction of the number of qualities that can be produced, and in the case of aluminum and zinc alloys, which now account for the greater part of German nonferrous metal consumption, as well as scrap metals derived from these metals, the entire German production now consists of comparatively few alloys. The stocks of other alloys cannot be large, but it is likely that substantial quantities of manufactured metals are held in storage at various works. In order to "mobilize" these for armament production, the Reich Minister for Armaments and Munitions has ordered them to be scrapped, even though new and unused, if they cannot be used directly for the production of armaments in the near future. While the standardization has caused some inconvenience it is claimed that it does not weigh heavily compared with the great savings in labor and raw material resulting from the restriction of production to a few types of alloys only. Similar results have been achieved in the manufacture of chemicals for direct consumption. Here also the consumer's choice has been limited to a few carefully selected items, and under prevailing conditions buyers are glad to avail themselves of whatever materials are offered to them. Standardization has also been found the best means of overcoming difficulties resulting from rationing.



The Italian Ministry of Corporations reports that mining activity is being intensified in the entire country. Special attention is devoted to the search for new deposits. The production of solid fuels, gas, oil, and asphalt is said to have increased. There is a surplus of zinc ore, mineral salt, pumice, boric acid, and borax which is being exported. Appreciable progress is claimed in synthetic rubber production and the manufacture of cellwool and artificial fibers. A remarkable output level is said to have been reached in the production of synthetic nitrogen and sodium compounds. Even greater achievements are claimed for the production of synthetic resins. Lead and magnesium are no longer imported, and imports of antimony, tin, and manganese have been reduced. Rather surprisingly, no reference is made to mercury, bauxite, and sulfur, which used to be of considerable export interest before the war. It is known, however, that German interest in Italian bauxite and sulfur has declined considerably because of transport difficulties. Germany prefers to buy bauxite from France and Hungary, while sulfur requirements are largely met by reliance on sulfuric acid from sulfide ores.

Montecatini Employs 80,000

Montecatini, the leading Italian mining and chemical combine, is reported to employ more than 80,000 men in 32 mines and quarries, 18 marble quarries, 143 industrial plants, 14 metallurgical works, 23 power stations, 5 coke and fuel plants, 5 jute spinning mills, and 3 laboratories, the largest of which employs 550 scientific workers.

Methanol Made from Methane

A process for the catalytic conversion of methane into carbon monoxide and hydrogen, which should be useful for both the synthetic production of motor fuel and the manufacture of methanol, has been developed by C. Padovani and A. Lotteri. For the time being the carbon monoxide–hydrogen mixture will be used only for the production of methanol, and even here very great difficulties are being encountered. The principal technical obstacles have occurred in finding suitable catalysts of sufficient thermal resistance, in temperature control, and in the elimination of secondary reactions. The available methane deposits are mostly small, there are no adequate storage facilities, and little is known about the extent of the underground reserves. Apparently the process cannot be carried out economically unless a sufficiently large throughput of methane is assured. The conversion plant may have to be taken down and re-erected elsewhere. It is stated that 1 cubic meter of 95 per cent methane yields approximately 2.5 pounds of 98 to 99 per cent methanol.

Iron Sands Are to Be Exploited

The shortage of iron and steel and the difficulties in the way of imports have awakened interest in the deposits of ferrous sands found on the coast of central Italy, especially in Latium, though in part under the sea. The sands contain about 5 per cent of iron, and can be briquetted to facilitate handling. The briquets are burnt in electric furnaces together with lignite coke. For the production of 1,000 pounds of iron, 1,800 pounds of briquets, 560 pounds of lignite coke, 215 pounds of limestone, and 14 pounds of electrodes are required. The pig iron produced contains 4.01 to 4.40 per cent of carbon, 0.47 to 0.99 per cent of silicon, 0.82 to 1.48 per cent of manganese, and 0.48 to 0.76 per cent of titanium. A plant for a daily production of 600 tons of con-

centrates is to be set up by the Terni company, while the Cogne company has been conducting trials at Aosta.

Turin Company Produces Substitutes for Copper Sulfate

Romianca Società per l'Industria Chimica e Mineraria of Turin is producing substitutes for copper sulfate. It is claimed that encouraging results have been obtained. The manufacturing plant has been adapted to the changed conditions of production in spite of great difficulties.

Shortage of Oil Stimulates Research

The shortage of vegetable oils has given rise to various measures for increasing supplies. All bones must now be sent to factories equipped with facilities for extracting fats with solvents. Extraction by means of water or steam is no longer permitted, and bones which have not been subjected to fat extraction must not be used for fertilizing. A research station has been set up in Rome for investigating the cultivation of oil-yielding trees in the Mediterranean area. In Croacia, tobacco planters have been instructed to pay particular attention to the production of seeds which, it is claimed, would yield 500 tons of oil from an average crop.



The difficulty of obtaining chemical and pharmaceutical products from the usual sources in Continental Europe has stimulated development of the local chemical industry, and frequent reports have come from Spain during recent months of the authorization of new chemical ventures by local companies.

New Chemical Factories Are Authorized in Spain

Little is known about the progress actually made under these authorizations, but it seems that most of these new ventures are concerned with products of daily use which can be easily produced in small apparatus and do not require large investments. Thus the Fabrica Española de Productos Químicos y Farmacéuticos S. A. is to engage in the manufacture of saccharin at its factory at Lamiaco in the province of Viscaya, but the products must be sold exclusively through authorised pharmacists.

New Shale Oil Producer Formed

A new company, Empresa Nacional de Combustibles Liquidos y Lubrificantes S. A., has been formed in Madrid for the production of motor fuel by the distillation of oil shale. The name of the firm indicates that the company also considers entering the field of lubricants.

Asturian Zinc Plant Extended

Real Compañia Asturiana de Minas, the famous Spanish lead-mining company, has greatly extended its smelting plant at Arnao (Oviedo) and will have an annual capacity of 18,000 tons of zinc, including 3,000 tons of 99.9 per cent metal. The former capacity was 7,600 tons. With the new plant the Royal Asturian will be able to supply the entire home demand and still have a small quantity available for export.



The situation in the British chemical industries continues to be characterized by steady employment, an increasing demand for many essential products, and consequent restrictions on nonessential uses. Every week brings new control measures either in home or in foreign trade.

New Control Measures Are Being Instituted

The coal-tar control order has been modified so as to make the treatment, use, and blending of coal-tar products by distillers and importers subject to license. In order to conserve sulfur supplies, users for stoving purposes in the wool textile and hosiery industries will in future require a license. The treatment, use, and consumption of pyrethrum flowerheads and products manufactured therefrom is also subject to license. Importers of essential oils have been informed by the Ministry of Food that the quota system of importation on the basis of previous import values will be discontinued. For the time being import licenses are being issued for essential oils for approved purposes only, and this will be replaced later by a scheme for regulating imports and distribution. Export licenses have been required since November 2 for crucibles, graphite, cellulose nitrate (and products), cinchonidine, cinchonine, nickel compounds, sodium sulfide, water-treatment compositions containing phosphates, insecticides, fungicides, weed-killers, animal dips, disinfectants containing arsenic compounds, chlorinated naphthalenes, cyanides, fluorides, metaldehyde, nicotine, petroleum oils, pyrethrum, resinates, rosin, tall oil, silicofluorides, sulfides or sulfur, lubricating or greasing compositions, mineral jelly and mixtures, oils, fats, and greases and mixtures, and waxes and mixtures. Maximum prices have been fixed by the authorities for citric acid.

Effects of War on Industrial Health

The Chief Inspector of Factories points out in his annual report that despite all wartime influences expected to affect adversely the health of the worker, there is no reason to think that it has been so affected. Moreover, when the increase in the number of persons exposed to risk is taken into account, the incidence of the cases of poisoning is lower than might have been anticipated. The maintenance of health is believed to be largely attributable to the steps taken to provide meals in canteens for the worker at a reasonable cost. No statistical evidence has yet been produced in favor of the wholesale distribution of synthetic vitamins. There is no indication that the work which women have taken up in industry has adversely affected them.

Combination Process for Sulfur Reduction

A committee to make recommendations on the removal of sulfur from coal gas was appointed by the Council of the Institution of Gas Engineers in July 1940 and has now presented its report. Three processes for the reduction of the sulfur content of coal gas to 10 grams per 100 cubic feet are used in Great Britain: the active carbon process, the oil washing process, and the catalytic process. While the two former processes are used in some 25 plants with a total rated capacity of 190,000,000 cubic feet, the catalytic process, though tested on a large working scale over a period of several years, has not yet been installed at more than one works. The committee states that by a combination of the catalytic process with either the active carbon or the oil washing process, the sulfur content can be reduced to about 3 grams per 100 cubic feet. The catalytic process is said to be particularly suitable for treatment of water gas or producer gas, since it is the most effective means of removing carbon oxysulfide, which forms a fairly large proportion of the total organic sulfur contents of such gas, but this has not yet been tried on a commercial scale. As soon as circumstances permit, the Gas Light and Coke Co., which has developed the catalytic process, intends to erect another catalytic process plant to incorporate certain modifications in design resulting from the ex-

perience gained in the successful operation of the present plant. Meanwhile the committee has arrived at the recommendation that at first the organic sulfur compounds in all supplies of town gas should be reduced to 10 grams per 100 cubic feet before distribution to the public. Undertakings should further be encouraged to reduce the sulfur content to 3 grams per 100 cubic feet, and the possibility of the attainment of a still lower limit should be kept under review.

Cellulose Derivatives for Protecting Airscrew Blades

Various processes are now in practical use for the protection of airscrew blades by cellulose materials. The blades may first be protected by a coating of clear cellulose, and plastic cellulose may then be used to seal up any space left after both sides have been covered. The main protection, however, is generally provided by cellulose nitrate or acetate sheets which are attached to blades and made to penetrate the surface of the compressed wood after reduction to a pliable state in a plasticizing bath, or by heating under pressure in an autoclave. There are differences in details between the different processes, but cellulose derivatives have generally assumed considerable importance, for this purpose.

Gas Research Board Investigates Methane Production

If hydrogen under pressure is passed through a bed of coal in which carbonization has just started, a reaction commences between the hydrogen and the coal substance undergoing decomposition whereby methane is produced. E. V. Evans, president of the Institution of Gas Engineers, in a recent speech told of the work carried out in this connection by the Gas Research Board. The amount of heat evolved per pound of carbon when hydrogen is converted to methane is about one fifth of that produced when that carbon is burned in air or oxygen. The methane reaction, therefore, has to be controlled. There are known methods of controlling the reaction, but it is a new technique and the work of taking the laboratory conditions to the next stage of an exploratory small-scale plant is soon to be started. Arrangements for the erection of such a plant have already been made. It is thought that if about half the coal can be converted to methane and a primary tar suitable for hydrogenation, the remaining half, which is more difficult to treat with hydrogen, may be induced to react with steam to produce the hydrogen required in the first stage of the process. It is proposed to add a proportion of oxygen to the steam so that the necessary heat is liberated internally where it is required. The preparation of oxygen is part of the plan, and it is hoped to produce oxygen even more cheaply than is the practice today by taking advantage of the high pressure of the gases leaving the methane reaction vessel.

The Gas Research Board is collaborating with the Fuel Research Board in the synthesis of methane from hydrogen-carbon monoxide mixtures in the presence of a catalyst. Extensive investigations have been carried out on the removal of sulfur compounds from water gas and from coal gas. The information acquired may lead to a simplified method of removing sulfur compounds from normal coal gas.

British Chemical Manufacturers Cooperate with Government Departments

The Association of British Chemical Manufacturers reports in its annual survey that it continued to work in the closest contact with the government departments concerned with the control, supply, and use of chemical products and with the departments operating the import and export licensing procedure. During the year the Board of Trade decided not to reimpose the Key Industries Duty on chemicals hitherto exempted on the grounds of nonmanufacture in Great Britain, even though manufacture might be started on a scale commensurate with the requirements. The new principle is intended to apply only so long as import control by license continues. The Key Industries Duty was abolished for a short list of products which are imported wholly or largely on government account. Changes in the import duties of this kind are for obvious reasons viewed with some apprehension by the association, but it is realized in the British chemical industry that both war and postwar considerations require special measures. The scheme for the manufacture in university laboratories and research institutes of fine chemicals needed in comparatively small quantities, has not been carried out extensively since the British fine chemical industry has been able to supply most of the needs of the country. In order to avoid duplication of production effort, particularly in the heavy and fine chemical sections, members have been asked to keep the association informed of their development plans. Moreover, it is intended to consider the whole structure of the chemical industry and determine whether it is organized to operate on a basis which will give, after the war, the most efficient service to the community at home and a satisfactory contribution to the export trade of the country. Such a survey would include an examination of their position by individual manufacturers and sections of the trade making the same products. A beginning on these lines has been made already in the coal-tar industry where a survey is being made with a view to coordinating policy throughout the industry.

Scientific Workers Favor Industrial Research Cooperation

The Association of Scientific Workers is supporting cooperative methods in industrial production and research. There are complaints that in textile research (e. g., on nonfelting wool), in the manufacture of synthetic substitute products for imported drugs, and in similar fields not all opportunities for an exchange and pooling of knowledge have yet been taken. British chemical manufacturers are also more sympathetic to the idea of cooperative methods than in peacetime. The enforced concentration of production in fewer plants and the amalgamation of smaller firms to larger, and therefore more economical, production units has had the effect of facilitating the exchange of knowledge and pooling of experience. It seems likely that these gains in organization and efficiency will be maintained after the war since the authorities have made it clear that a large measure of control will be retained even when the most urgent reason therefore has disappeared.

Parliament Discusses Methane Experiments

Progress is being made with the use of mines refuse and town sewage, it was stated in answer to a question in the House of Commons. Some local authorities whose sewage digestion plants yield a surplus of this gas are already using it in their vehicles. Certain others are exploring, at the request of the Minister of War Transport, the possibility of installing the necessary equipment, which can now be made available. Experiments in the liquefaction of methane are taking place at one colliery.

Anti-Fire Foam from Horse Chestnuts

Manufacturing chemists have been buying horse chestnuts at a price of 8 s. per cwt. through the Red Cross, reports *Chemical Age*. From this raw material they are making anti-fire foam, as well as glucose. The protein residue is used as a cattle food.

Government to Approve Pest-Control Preparations

An important scheme which may be copied in other spheres of chemical production is being prepared by the Ministry of Agriculture and Fisheries. It

provides that official approval can be given to proprietary insecticides and fungicides for the control of plant pests and diseases. An expert committee has been appointed to advise the ministry on applications from manufacturers for the approval of their products.

G. ABRAHAMSON

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November 14, 1942

Australia Builds Plant for Vitamin Oil Extraction

A NEW plant for the extraction of vitamin oils, particularly vitamins A and D, has been founded in Melbourne by an American firm and a group of Australian businessmen. Fifty per cent of the capital is held by the American firm and the remainder by Australian firms. The value of the present annual production, based upon current world prices, is between $31,900 and $63,800, and productive capacity of the new plant is estimated at 20,000 gallons of oil annually.

Machinery for processing shark livers has been imported for the venture, but many small boats ordinarily used in shark fishing have been diverted to other uses. Output is limited to about 7,000 gallons yearly because of lack of raw materials.

Last year exportation of shark livers was prohibited by the Australian Government, since it was contended that the entire catch was needed at home to replace cod liver oil formerly imported from Norway. Now the government, because of increased overseas needs for Vitamin A units, is permitting shipment of surplus shark liver oil (or about five-sixths of present production) to England and the United States in equal shares.

Sulfur Production Meets Setbacks in Italy

ITALIAN sulfur production during the fiscal year 1940–41 was 7 per cent less than in 1939–40, according to an unofficial report to the Department of Commerce. There were substantial sales of carbon disulfide, but exports of sulfur declined. Therefore total sales of the refineries were smaller.

Subsidies were not received from the government because of a satisfactory financial condition, but the industry has had difficulties with transportation, labor, and raw materials. It is reported that the sulfur mines are to be modernized.

THE Reich chemical authority has issued a decree restricting the production and processing of polyvinyl chloride to firms who were making this material between January 1940 and April 1941, the Department of Commerce reports.

Brazil's Glass Industry Expands

EXPANSION of Brazil's glass industry is receiving fresh impetus from the wartime need of developing substitutes for scarce metals and the difficulty of importing glass products from abroad. This trend is evident in 1941 figures, showing that 13 additional glass factories went into operation. Brazil now has a total of 71 factories.

The increase in the value of the output of the industry rose from $300,000 in 1930 to $6,267,000 in 1940 when employment in the industry totaled 10,183. Although several of the larger factories are equipped with machines, the smaller factories use hand labor exclusively.

Glass factories make containers for beer, soft drinks, milk, medicines, and table glassware of all sorts. There is no flat glass industry for the manufacture of window glass with the exception of one small plant and almost all window glass must be imported from abroad.

Liquid Rosin Produced in Sweden

PRODUCTION of liquid rosin, a by-product in the manufacture of sulfate pulp from pine, has taken an important place in the Swedish chemical industry since the war, the Department of Commerce reports.

A soap is separated from the waste liquor and is then precipitated with sulfuric acid or sodium bisulfate to obtain liquid rosin. The product is a thick, dark brown oil, sometimes cloudy. The resin, usually purified through distillation, is separated into the following approximate fractions: fuel oil, 5 per cent; fatty acids (refined tall oil), 45 per cent; solid rosin, 20 per cent; and pitch, 30 per cent. Quantity and quality vary according to the composition of the crude rosin and the type of distillation.

The products obtained have many uses in industry. Tall oil is used in making hard and soft soaps and is an excellent raw material for producing sulfonated oils of the type used in the textile and linoleum industries. It also produces an oil of the linseed type by esterification with glycerol. When a siccative is added, this oil will dry easily and can be used as a substitute for linseed oil in varnish.

The rosin obtained through distillation produces rosin size. The liquid rosin is used in making asphalt emulsion, core-oil, disinfectants, and sheep and cattle soap. The pitch has many uses, in the manufacfacture of lac varnish and printers ink, and as a substitute for asphalt in road-building. Phytosterine, an alcohol compound generally found in animal fats, is an important ingredient of liquid rosin. It can be obtained in crystalline form and is a valuable agent for refining petroleum jelly and grease. It is also used in medicinal and cosmetic preparations and in the manufacture of marine oil.

Finnish State Monopoly Purchases Alcohol Output

THE Finnish State Alcohol Monopoly has purchased the entire alcohol production of sulfite cellulose factories in Finland for the next five years, according to a report to the Department of Commerce. At the normal rate of production about 40 per cent of the country's motor fuel requirements would be met by these factories. However, because of export difficulties the cellulose output has declined, and this has resulted in a proportionately lower production of alcohol, even though all sulfite cellulose plants are now equipped with apparatus for the recovery of alcohol. It is now planned to produce alcohol direct from wood by a saccharification process.

Indian Plant Extends Operations

THE plant of the Lister Antiseptic and Dressings Co., Ltd. (Cossipur, India), has expanded its operations considerably, according to a report to the Government. Recently this firm, deciding to manufacture its own requirements of basic chemicals, added new equipment and began production of ether and carbolic and cresylic acids.

The company formerly limited its output chiefly to surgical dressings, but is now turning out biological products and has installed a distillation plant to make antiseptics.

ITALY is using considerable amounts of aluminum arsenate, lead arsenate, and calcium arsenate to replace copper insecticides rendered scarce by war conditions. Insecticides based on barium fluosilicate and barium polysulfide are being more widely used, and in cases where the use of copper is still considered essential, products containing as little as 1.8 per cent of the metal have been employed successfully, together with adhesives and activators.

A new insecticide of Italian manufacture is based on mercury chlorophenate.

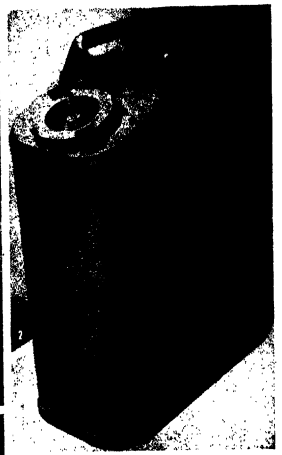
HIJOS de Orbea y Compania of Spain has been authorized to build a plant near Vittoria which will have a daily capacity of 5,000 kg. of sulfuric acid, 3,000 kg. of nitric acid, 1,000 kg. of nitrocellulose, and 1,000 kg. of intermediates for dyestuff, according to an unofficial report to the Commerce Department.

MANITOBA'S 35 plants producing chemicals and allied products almost doubled their output in 1941 as compared with 1940, according to a recent report from the Dominion of Canada. The gross value of 1941 production was $9,215,936, and the combined staff of these factories more than tripled, increasing from 603 to 2321.

New Containers for Old

O. W. I. PHOTOS













1. Fiber cartons replace nail-bound wooden boxes for packing apples. 2. The new army "blitz" can, a five-gallon metal container for water, oil, or gasoline, is constructed with air spaces to prevent sinking. 3. Wartime tobacco containers include one-pound fiber container at left and two-ounce fiber container, center. At right, old two-ounce metal can. 4. Fiber shell containers with metal rims are being experimented with for shells, howitzers, and hand grenades. 5. Old square metal powder container shown beside fiber package. 6. Metal cans at left were introduced by brewers, but beer is back in bottles, as at the right, for the duration. 7. New and old oil cans include, left to right, metal can, fiber container with metal ends, all-fiber container, proposed glass model, and glass container with metal cap.





8. Paint containers shown are one-quart metal can on one-gallon metal can, one-gallon fiber container, two-quart bottle, one-gallon bottle, and pint glass.

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CREOSOTE OIL
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RUBBER COMPOUNDING MATERIALS
BARDOL*
XYLOL
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By-Products of the Meat-Packing Industry

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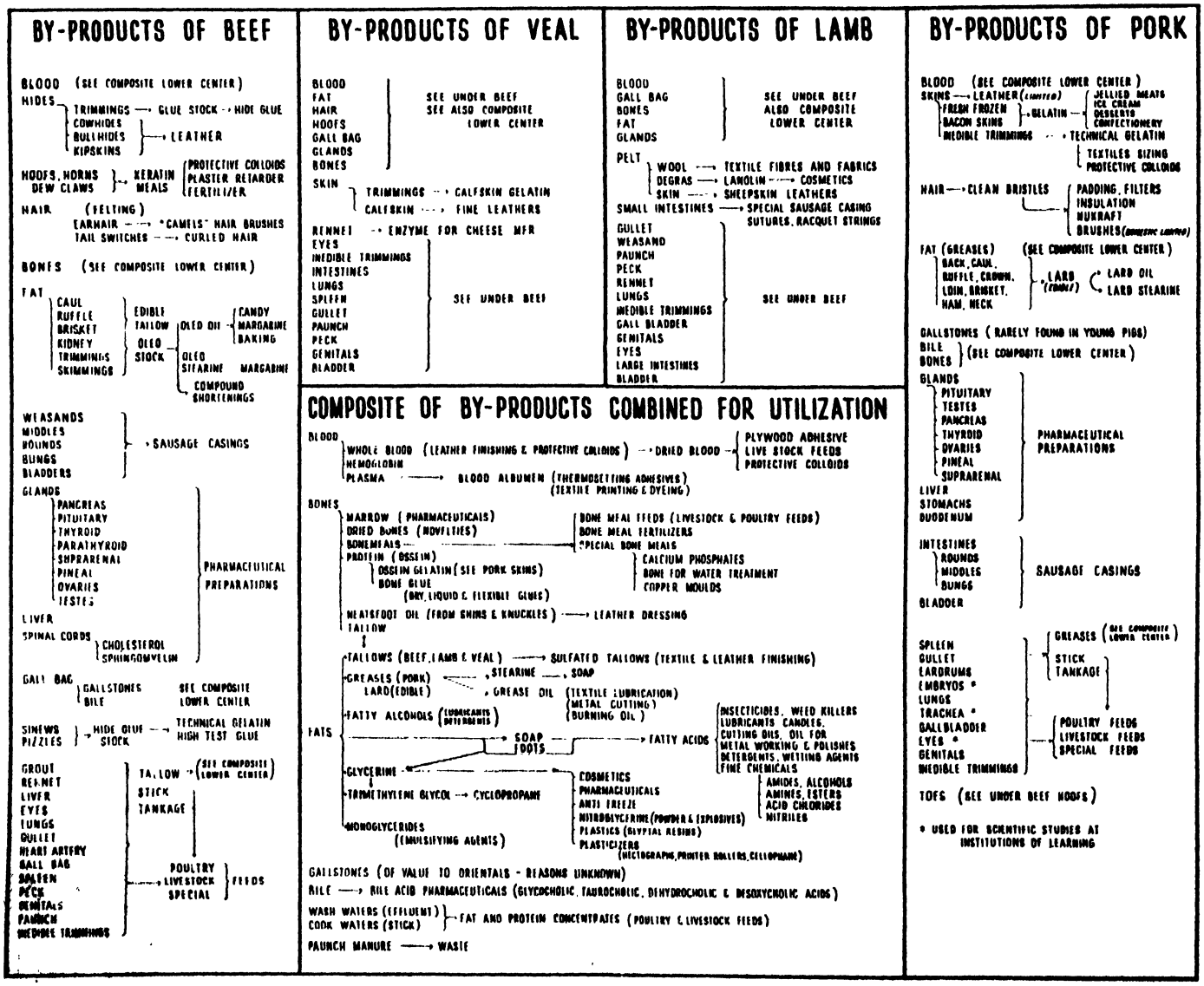
MUCH has been written and still more said about the wonders of by-product utilization in the meat-packing industry. Analysis of the data reveals that all these developments are inevitable; they take place automatically. This statement at first rings of heresy, yet it is substantiated by a number of facts.

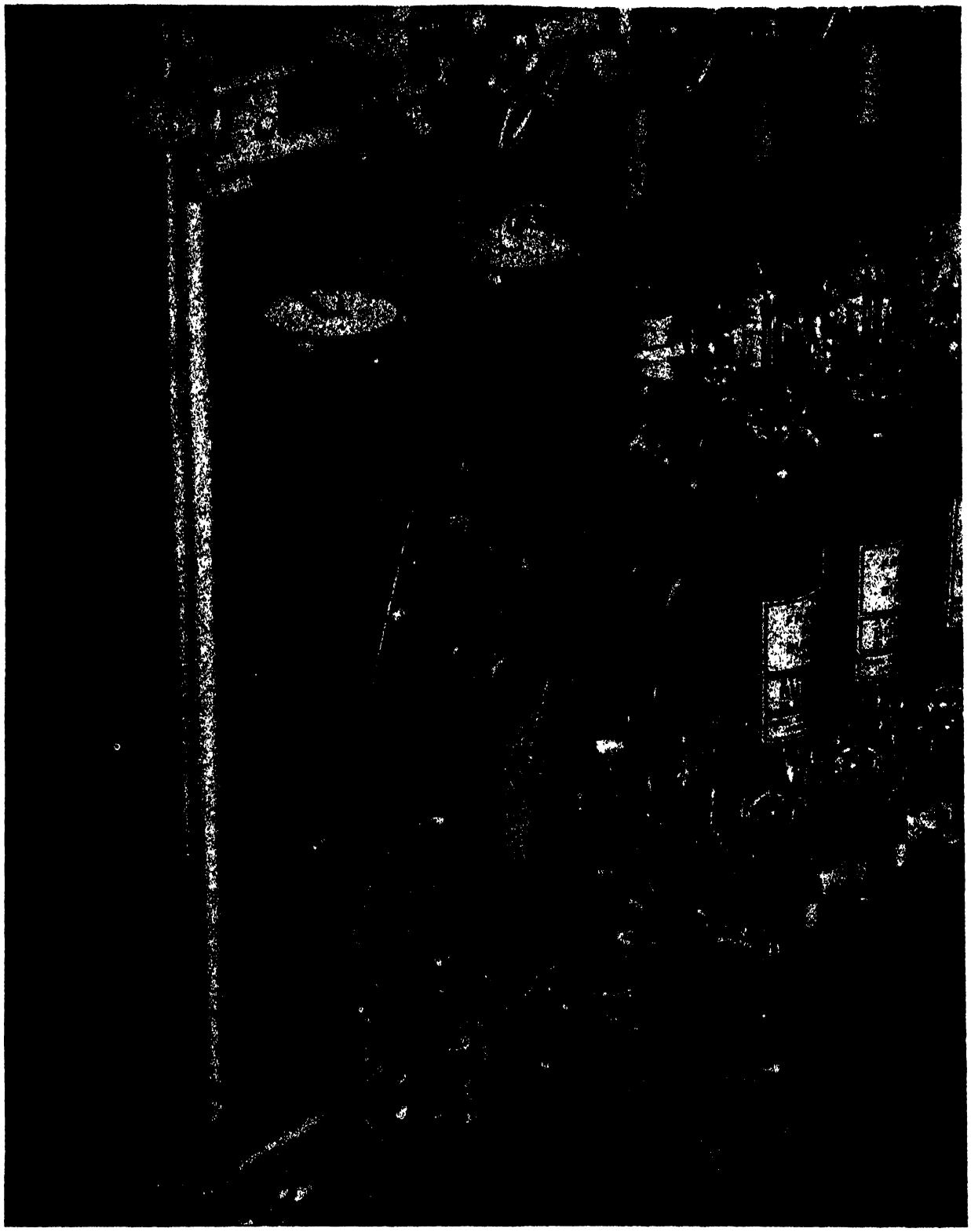
The meat-packing industry has been responsible to a certain extent for the utilization of its by-products, yet many other industries have contributed substantially to this development. The meat-packing industry was not the first to manufacture lard, soap, glycerol, glue, and gelatin, although it has contributed many improvements and innovations to many, if not all, of these related industries. Other industrial firms not infrequently conduct experimental studies with by-products of the meat-packing industry and in many cases develop new uses for these materials. Such research may be done independently or in cooperation with the laboratories of the meat-packing companies. Cases in point are the development of whole blood as a protective colloid stabilizer for asphalt emulsions and the use of keratin hydrolyzates as plaster retarders.

The important point is that the meat-packing industry has capitalized upon and contributed substantially to by-product recovery and utilization but has not invented it. The coal and coke industry was one of the earliest to promote recovery and utilization of its by-products. So long as necessity shows the proper parental responsibility for invention, we shall find increased utilization of meat-packing by-products—if not within that industry, then within some other. When a product becomes plentiful it becomes cheap, and when cheap enough it is worth while to do research in order to enhance its value. Gelatin from pork skins is one excellent case in point. Conversely, approximately 35 pounds of paunch manure are obtained from every head of cattle and money is spent to discard it as waste; it may offer an interesting reward for any research expended.

The chart lists every by-product for which we have been able to trace the history. The total numbers of items under beef, veal, lamb, and pork are 41, 27, 28, and 31, respectively, a grand total of 127 kinds of by-products derived from dressed livestock. This number is large, but includes eight kinds of beef, veal, and lamb glands, and seven kinds of pork glands—a total of 31 by-products representing

CONTINUED ON PAGE 1664





SOMETHING NEW—

Catalysis Supersedes Slow Combustion

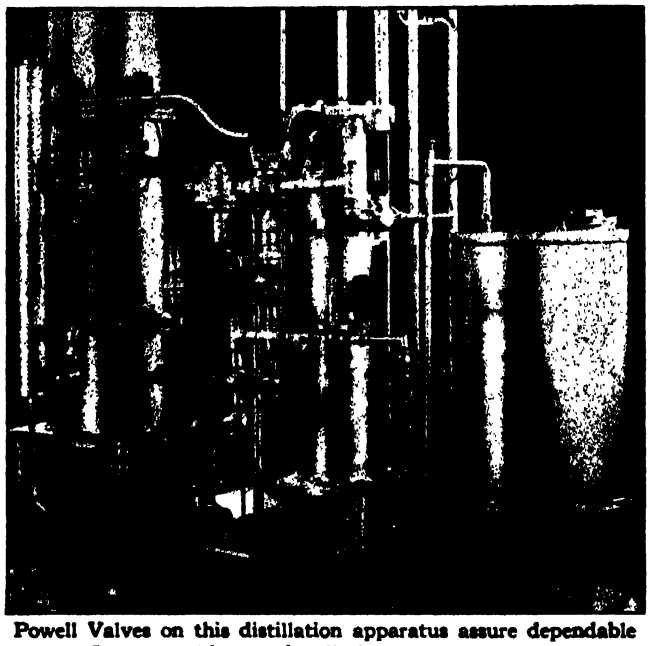
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Shown here are a few examples of the Powell Corrosion-Resistant Line.

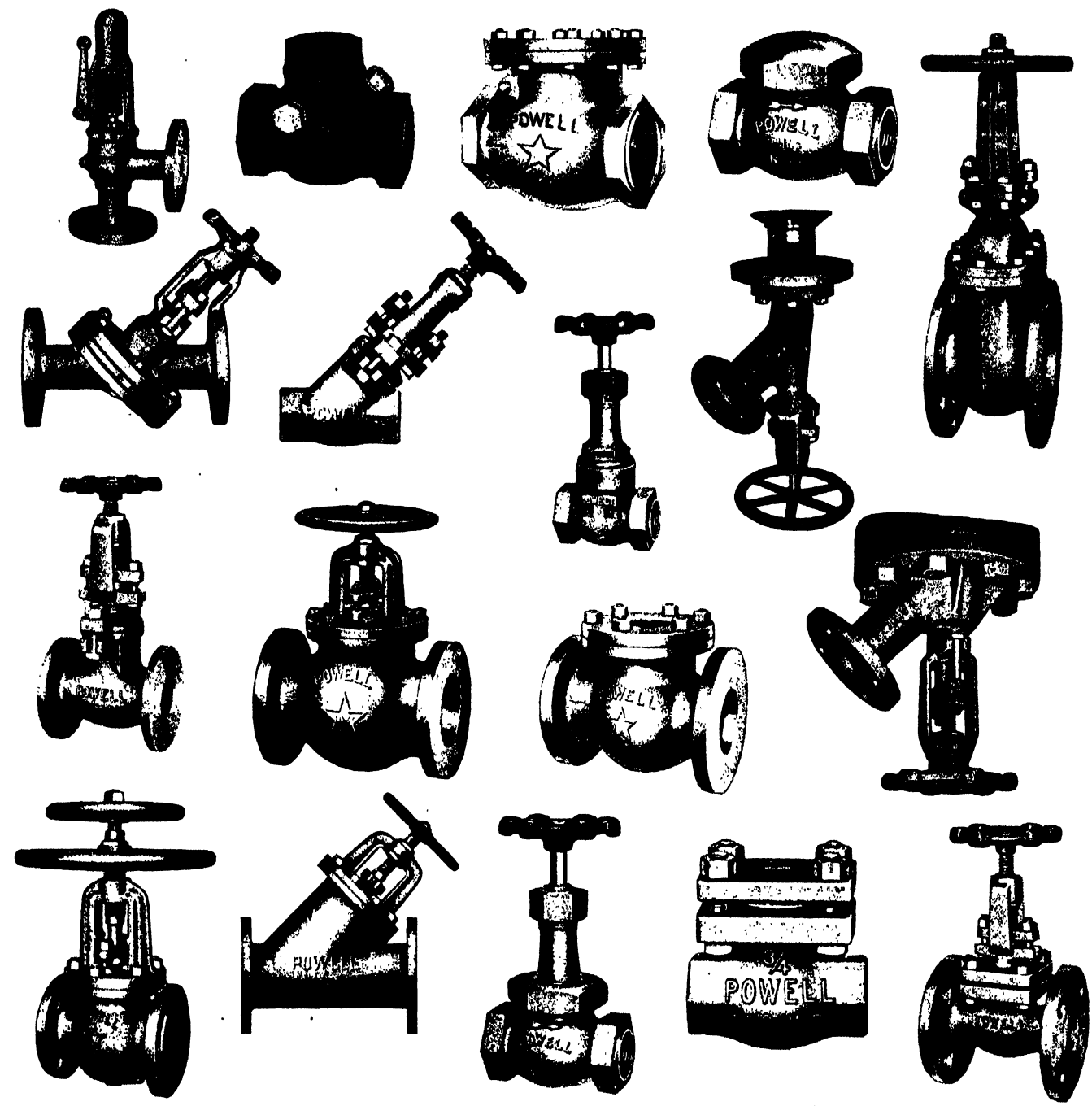
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Meat-Packing By-Products

CONTINUED FROM PAGE 1660

eight different glands. It becomes evident then, that, when counting the number of by-products, one must choose his basis carefully. To include the very large number of articles which are manufactured from primary by-products of the meat-packing industry would carry the by-product hypothesis beyond comprehension.

Lard, compound shortenings, and margarine are listed as by-products, whereas sausage products are omitted. Glands are listed as one item because they make up a class of raw materials from which the same general type of commodity is manufactured. In other words, the basis preferred is one in which the ultimate usage is the controlling factor. Any definition of by-products is subject to just criticism. Webster defines a by-product as "a secondary or additional product, something produced, as in the course of manufacture, in addition to the principal product". Such a definition precludes the possibility that a by-product might be a principal product—for example, lard, compound shortening, margarine, and soap. For this reason, we prefer the descriptive definition found in the Dictionary of Political Economy: "materials which, in the cultivation or manufacture of any given commodity, remain over—and which possess or can be brought to possess a market value of their own". The dash aptly divides this definition into primary and manufactured by-products. The research involved is denoted by the phrase "brought to possess".

Primary by-products, whether from beef, veal, lamb, or pork, number 28:

Blood	Intestines	Eyes
Hides	Glands	Embryos
Skins	Liver	Lungs
Hoofs	Spinal cord	Gullet
Horns	Bile	Heart artery
Dewclaws	Gallstones	Gall bag
Hair	Sinews	Spleen
Wool	Genitals	Inedible trimmings
Bones	Stomachs	
Fats	Bladder	

Primary by-products may be sold as such to other manufacturers who further process them into useful commodities, or they may be processed by the packer, being converted into secondary or manufactured by-products. These latter are relatively few in number:

Poultry feeds Livestock feeds Special feeds	from by-products grouped in the lower portion of each column shown in the chart
Soap Grease Glycerol Tallow Lard Compound shortening Margarine Fatty acids	from animal fats and oils
Sausage casings Sutures Strings	from intestines, bungs, and bladders
Blood albumen Hemoglobin Whole dried blood	from liquid whole blood
Pharmaceuticals	from glands, livers, spinal cords, and gall
Keratin meals	from hoofs, hair, horns, dewclaws, and toes
Glue	from bones, hide, and skin trimmings
Gelatin	from skins and bones (ossein)

In the lower center portion of the by-products chart is inserted a composite tabulation. The primary by-products at the left of this composite table are segregated only as to kind—blood, bones, fats, bile, wash waters, cook waters, and paunch manure. These materials are combined for handling, whether derived from beef, veal, lamb, or pork.

The meat-packing industry further processes blood, bones, fats, cook waters, and wash waters into manufactured by-products and these serve as raw materials for still more industries. It is impossible to fix, for example, the number of items made from fats, but the composite chart illustrates the potential ramifications suggested. The concept of tennis racquets, shoes, and bolts or screws as by-products of the meat-packing industry would appear to be somewhat extreme, even though gut, leather, and lard oil, respectively, are used in their manufacture.

The meat-packing industry produces 28 primary by-products, and 29 manufactured by-products or a grand total of 49 by-products.

Industrial Toxins and War Production

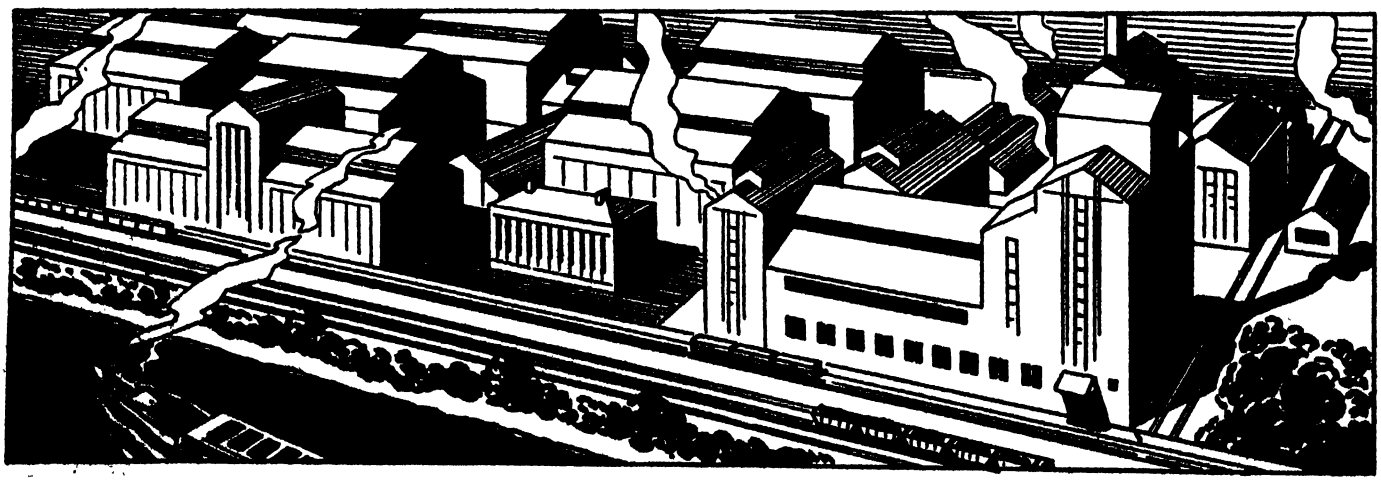
MANUFACTURERS using such defense chemicals as toluene and benzene and, for that matter, TNT itself, may well be interested in a report by Harry N. Holmes [*Science*, 96, 384 (1942)].

He contributes evidence from Germany, Britain, and the United States indicating that these substances destroy vitamin C (ascorbic acid) in the bodies of workmen exposed to vapors or to skin contact. Already some organizations give such workmen 100 mg. of vitamin C daily to replace that lost. The results in general health and vigor have been encouraging. Since a lowered level of this vitamin results in weakness, its loss cannot be tolerated in war industries.

G-E Workers Win $115,000 for Suggestions in 10 Months

GENERAL ELECTRIC workers this year have shattered all company records for worthwhile suggestions.

During the first 10 months of 1942, employees were paid $115,000 for 12,250 ideas for saving materials or time in war production. This surpasses by a wide margin the best previous annual mark, $104,000 paid for all suggestions adopted in the full year of 1929.



Old du Pont Powder Wheels Scrapped for War

HUGE iron wheels that ground out gunpowder in the Civil War, and later helped free Cuba and win the First World War, are now to be hurled at the Axis in their final smash for America.

The du Pont company is sending the ponderous old powder wheels of its Eleutherian Mills, founded 140 years ago on historic Brandywine Creek, to the Nation's mounting scrap pile as fast as dynamite can blast them apart.

There are 28 of the old wheels, each weighing 7.5 tons. Fourteen base plates, weighing 10 tons apiece, as well as supporting gudgeons and operating cogs, are to be shipped to waiting steel mills.

Some of the equipment, believed to be the oldest of its kind in America, was installed as early as 1814. A single set of the wheels will be preserved in its original mounting as a memorial to one of the country's first ventures in gunpowder making.

The Eleutherian Mills were abandoned as an operating powder works in 1923, when smokeless powder, used first on a large scale during World War I, pushed black powder out of a leadership it had held for centuries.

Synthetic Rubber in Army Pontons

THE Army Engineers corps now is ordering only pontons or pneumatic floats made of synthetic rubber, it was revealed by Brigadier General Raymond F. Fowler, chief of the supply division, in citing examples of the production speed and ingenuity which won for all Akron workers of the B. F. Goodrich company the Army-Navy "E" award.

Gen. Fowler told how the company reduced drying time for the floats from 3 days to 3 hours by adopting a kiln-dry method; saved still more time by vulcanizing them instead of cementing; pioneered in the use of synthetic rubber in these huge articles because natural rubber was getting scarce; and "threw open its doors to other manufacturers, permitting them to use these time- and rubber-saving methods.

Who Makes It?

THE following rare chemicals are wanted by The National Registry of Rare Chemicals, Armour Research Foundation, 33rd, Federal and Dearborn Sts., Chicago, Ill.: thiónalide (thioglycolic β-amino naphthalide), ketene, dimethyl acetylene, protocatechuic acid, tribromocaffein, diamino diborane, trimethyl borine amine, indican, 2-desoxyribose, α-tetralone.

Heavily Loaded Liquids *Do Not Faze These Pumps* . . . . . .

While they handle clear liquids, Amsco-Nagle Centrifugal Pumps just as effectively handle heavily loaded liquids. Wide impeller clearance and slipstream impeller design reduce friction and are responsible for the high degree of hydraulic efficiency in both the horizontal and vertical shaft types.

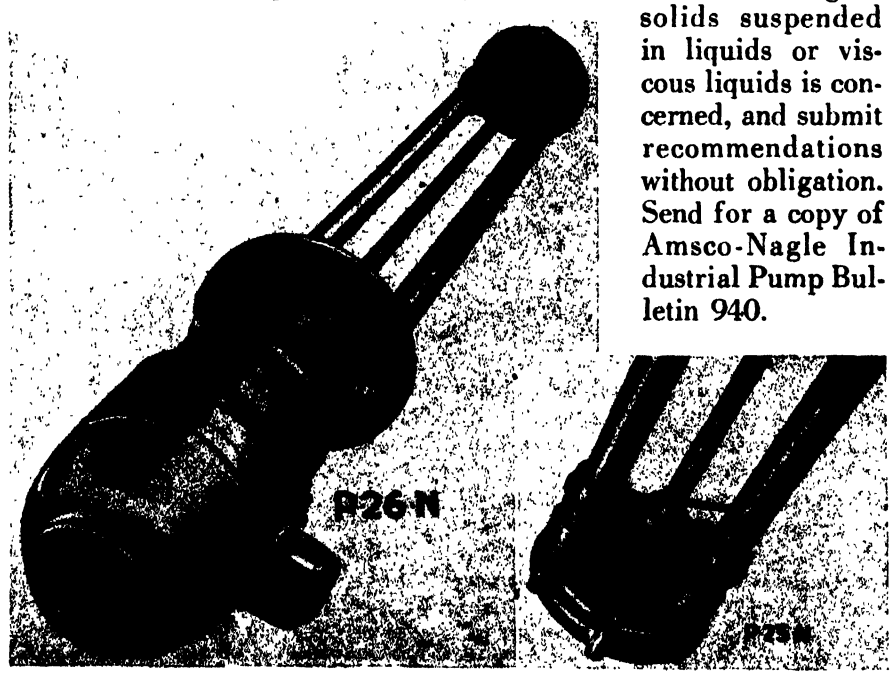
Particularly noteworthy is the performance of Amsco-Nagle vertical shaft pumps. In installations calling for this type of unit, vertical shaft pumps have a chance to prove their efficiency and Amsco-Nagle Pumps have proved their worth on numerous occasions. A 1½" type "SD" dry-pit pump with overall length of 25 ft. and total operating head of 48 ft. is satisfactorily handling sand-laden locomotive boiler makeup water to a settling system, for a western railroad.

Another Amsco-Nagle Pump, a 2" type "SW" wet-pit unit, shown, is performing admirably handling syrup in a raw sugar refining process at a Michigan beet sugar refinery. Like all Amsco wet-pit pumps, it has an inverted inlet. That is, liquid enters the water end from the top. This design eliminates air or gas binding and utilizes hydraulic thrust to counterbalance the weight of the revolving parts.

The supporting structures between water-end and floor plate both have an added purpose; one serves as a discharge pipe and the other serves as a conduit for lubricant to the submerged bearing, which is retained in a split yoke.

This particular pump is equipped with a screen on the entrance side to keep back large lumps of sugar from the dissolver.

Many processing plants have found that Amsco-Nagle Pumps are designed to eliminate pumping problems frequently experienced. The present wartime need for smooth, constant operation suggests their use. We will be glad to review your pumping problems where the handling of solids suspended in liquids or viscous liquids is concerned, and submit recommendations without obligation. Send for a copy of Amsco-Nagle Industrial Pump Bulletin 940.

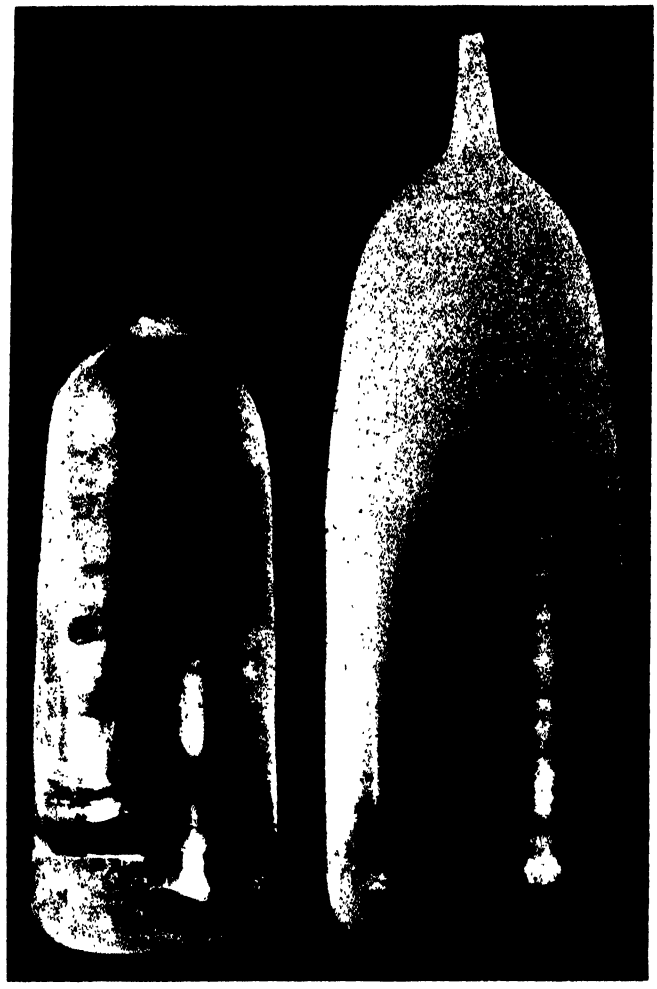


Amsco

AMERICAN MANGANESE STEEL DIVISION
OF THE AMERICAN BRAKE SHOE & FOUNDRY CO.
Chicago Heights, Illinois

Genuine Manganese Steel, "The Toughest Steel Known"
Chromium-Nickel Alloy Castings for heat and corrosion
Power Shovel Dippers, Dredge and Industrial Pumps
Welding Materials for reclamation and hard-surfacing

FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL., DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO
OFFICES IN PRINCIPAL CITIES



Sapphire boules made by the Linde Air Products Co. On the left is a 200-carat boule which is typical of present commercial material. The other, a 1943 model and one of the largest yet made, weighs about 350 carats, measures 2 3/4 inches long.

Domestic Synthetic Sapphires

A RELIABLE source of supply for synthetic white sapphires has recently been created by The Linde Air Products Co., a Unit of Union Carbide and Carbon Corp. Until the war, synthetic sapphires and rubies were imported from Europe. With this supply cut off, however, America has had to develop its own sapphire-production facilities. This has now been accomplished to such an extent that the Linde company is producing enough synthetic sapphires to satisfy the war demands of all the United Nations.

Synthetic sapphires are the same as natural sapphires in every respect except color and the method of their formation. The synthetics are made from aluminum oxide powder. To produce gems from this refractory material, it is necessary to melt highly purified powder in an oxygen-hydrogen flame and allow it slowly to solidify in the form of a large single crystal, a process that must be under careful and rigid control at every step. Not only must the high-purity material be fed at an exact rate, but the high temperature must be maintained to an accuracy within only a few degrees. Production problems have been solved so satisfactorily, however, that jewel cutters can be assured of large, flaw-free, and uniform "boules" that are economical to cut and finish.

The synthetics are removed from the furnaces as boules, each the general shape of a cylinder with a rounded end. Their weight usually exceeds 150 carats. White sapphires, which are the desired industrial product, are crystal-clear, being pure aluminum oxide (Al_2O_3). To facilitate cutting, each boule is split longitudinally before shipment. This operation releases locked-up stresses and assures that the material acquires its normal good resistance to shock. As the half-boules are uniform in size and shape, they can be sawed, drilled, and ground by the same established jewel-cutting procedures as employed with irregularly shaped natural stones, but much more economically.

The principal advantages of synthetic corundum for wear-resistant bearings develop from its great hardness. According to Mohs' scale it is next to the diamond in hardness. In turn, the hardness of synthetic white sapphires, as measured by a special technique, indicates that the material is among the hardest of all types of corundum, synthetic or natural. For all practical purposes, the synthetic material is perfect, the flaws being of a microscopic nature. This uniformity of structure is highly desirable on bearing surfaces.

At the present time the boules are under mandatory allocation for distribution to cutters for essential industrial or military uses, such as jewel bearings of chronometers, compasses, electrical, and fire-control or aircraft instruments. In such instruments they are used in the form of ring, V-type, and cup-type bearings.

Other uses wherein the gems have been tested and appear to have possibilities are as thread guides in textile manufacturing operations, as orifices for flowmeters and oil-burning equipment, and as insulators in gas-filled or vacuum thermionic devices. Indications are that they are also suitable for use as Diesel engine injector nozzles, as rollers for small needle bearings, and for brazed-tip metal cutting tools, particularly for taking light finishing cuts on metals such as brass, aluminum, and magnesium.

Engineering College Research Association Formed

THE formation of the Engineering College Research Association by 73 engineering colleges from all parts of the country to cooperate with the war agencies of the Government and with war industry in the prosecution and promotion of research needed for the war effort has been announced.

Headed by W. R. Woolrich, College of Engineering, University of Texas, the council of the association held its first meeting in Washington, November 27. A close degree of liaison between the Office of Production Research and Development and other governmental and private agencies dealing with wartime research will be maintained by the association in an effort to utilize to the fullest possible degree the vast research facilities of the engineering colleges of the nation.

The association will coordinate the research activities of the engineering college laboratories and personnel for the task of conducting vital studies affecting war materials and production.

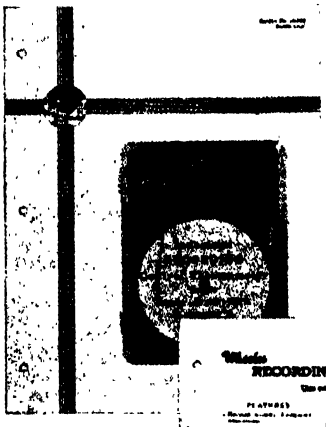
In addition to Dean Woolrich other officers are: Earle B. Norris, Virginia Polytechnic Institute, first vice president; C. C. Williams, Lehigh University, second vice president; R. L. Spencer, University of Delaware, treasurer; Ivan C. Crawford, University of Michigan; Thorndike Saville, New York University; Samuel B. Morris, Stanford University; F. M. Dawson, University of Iowa; N. A. Christensen, Colorado State College; and G. M. Butler, University of Arizona, council.

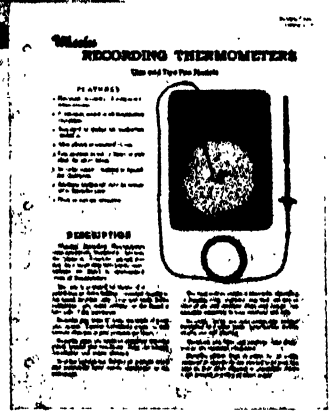
These BULLETINS *tell you*

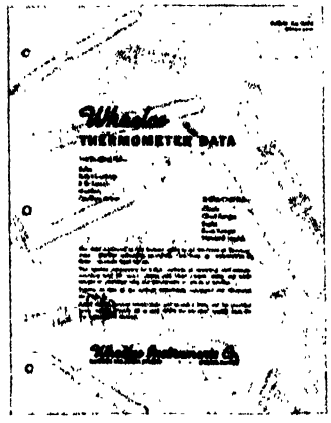
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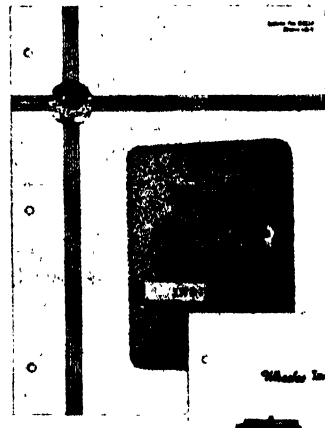
THE RIGHT THERMOMETER

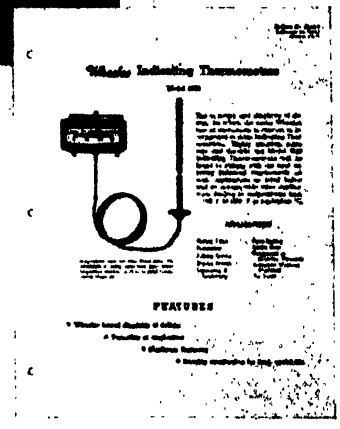
for your Process











Selection of the correct Thermometer for your specific application is as vital as your choice of process equipment, if maximum production is to be obtained.

Wheelco has published five new bulletins, which illustrate and describe various types of Thermometers and explain their function in relation to their intended applications.

You will find a wealth of information in these Bulletins on Indicating Thermometers, Indicating Therm-otrols (Indicating, "Electronic Principle" Thermometer Controllers), Recording Thermometers and Recording Therm-otrols (Recording, "Electronic Principle" Thermometer Controllers), all of which are available in ranges from —100°F. to +1000°F., or —70°C. to +550°C. Also illustrated and described are Thermometer Bulbs, Bulb Sockets, Capillary, Capillary Armor, Charts, Chart Ranges, Scale Ranges, etc. Explanation of how the Flame-otrol (combustion safeguard), Purging Timers, Program Control and Proportioning Control can be integrally incorporated in the various Thermometers is given.

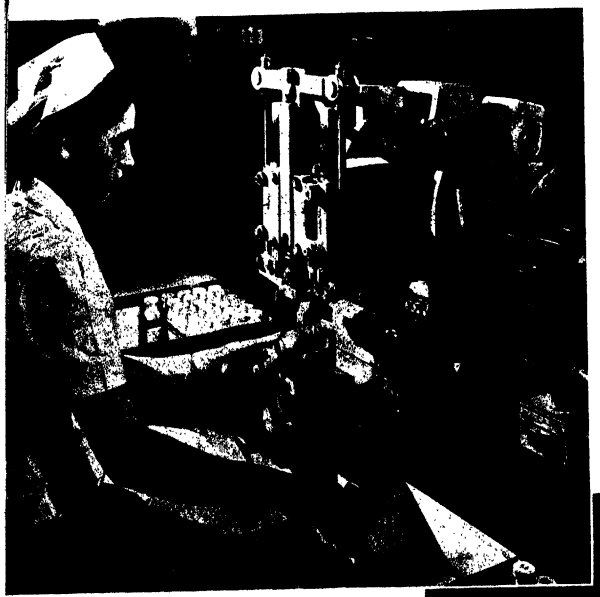
Write for any one, or all, of these Bulletins without obligation.

Wheelco Instruments Co.

851 W. HARRISON STREET, CHICAGO, ILL.

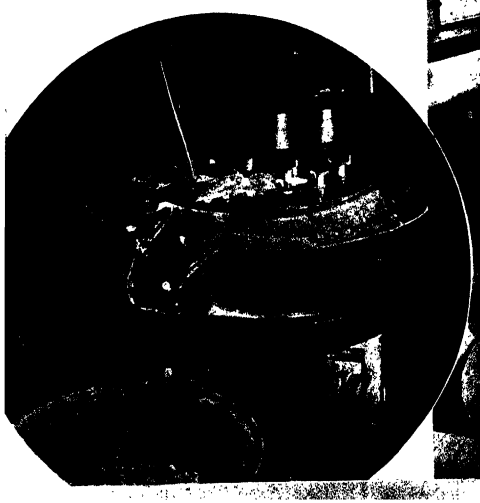
Originator of "Electronic Principle" Temperature Controls

CHEMICAL NEWS PARADE



Above. Exterior view of the new laboratories of G. D. Searle & Co., Chicago, Ill., where pharmaceutical research is carried on. Incoming materials are routed to the huge pharmacy in the heart of the building, where samples of each are taken by the analytical department to be investigated for purity and identity before they are labeled.

Left. Girl applies labels by machine to approved lots, thereby releasing them for use. They are measured out with extreme accuracy for assembling, granulating, drying, tableting, coating, and similar processes. Each individual label is printed in the Searle print shop, then hand-inspected, and finally, stamped with both batch and assay number.



Below. Rotary tablet press produces more than 500 tablets per minute. Precise inventory methods check weight and accuracy.





Above. Clinical research includes such activities as grinding purified psyllium seed. This machine automatically classifies the particles as to size. Those which are too small are thrown away; those which are too large are separated for regrinding.

Left. A glandular extraction unit has been set up in one section of the new laboratories. Because of the labile nature of the hormones every operation is conducted at or near the freezing point. In this way the full activity of the gland may be retained.

Right. An operator examines ampul solution under the brilliant light and against white and black backgrounds, which will reveal the tiniest of suspended particles. Confirmation of sterility is a separate test. Ampuls must be both air-tight and water-tight, therefore the autoclave and blue bath are used. The ampul department, which is composed of glass-walled passageways and rooms, has its own individual air-condition system, as well as dust-removal, humidity-control, and sterilization units.



Story on page 1449



American Chemical Society[1]

105TH MEETING. Detroit, Mich., April 12 to 16, 1943.

106TH MEETING. Minneapolis, Minn., September 6 to 10, 1943.

CHEMICAL ENGINEERING SYMPOSIUM. Palmer House, Chicago, Ill., December 28 and 29, 1942. "The Application of Kinetics to Design and Operation of Chemical Engineering Equipment". Ninth Annual Symposium.

ORGANIC CHEMISTRY SYMPOSIUM. Boston, Mass., December 28 to 30, 1943. Tenth National Symposium.

Other Scientific Societies

AMERICAN SCIENCE TEACHERS ASSOCIATION. Hotel Pennsylvania, New York, N. Y., December 29 and 30.

ELECTROCHEMICAL SOCIETY. Hotel Roosevelt, Pittsburgh, Penna., April 7 to 10, 1943.

PULP AND PAPER INDUSTRY, TECHNICAL ASSOCIATION. Commodore Hotel, New York, N. Y., February 15 to 18, 1943.

[1] The list of the SOCIETY's National Officers and Directors, Editors, members of Council, Divisional and Local Section Officers, Committees, and Chapters of Student Affiliates appears in CHEMICAL AND ENGINEERING NEWS three times a year—usually February 10, May 10, and October 10. The latest list is printed on page 1239 of the October 10 issue.

Local Sections

SECTION AND PLACE	JAN.	SPEAKER	SUBJECT
Akron, Women's City Club	12	**Donald K. Tressler**	Frozen Food Chemistry
Cincinnati, Old Auditorium, Chemistry Building, University of Cincinnati	13	**J. B. Brown**	The Preparation of Pure Fatty Acids
Cleveland, Engineering Society, 2136 East 19th St.	11	**Donald K. Tressler**	Chemical Problems of the Frozen Food Industry
Dayton, Engineer's Club	12	**J. F. Kahles**	Alloys from Powdered Metals
Detroit, E. S. D. Auditorium, Rackham Memorial Building	12	**S. S. Kistler**	The Measurement of Surface Area in Microporous Solids
Indiana, Indianapolis	8	**J. F. Kahles**	
Kalamazoo, 301 Olds Hall, Kalamazoo College, Kalamazoo, Mich.	12	**G. F. Cartland**	The Chemistry of Hormones
Kanawha Valley, Charleston, W. Va.	14	**J. F. Kahles**	
Lexington, Room 201, Kastle Hall, University of Kentucky	7	**J. F. Kahles**	Production of Alloys from Powdered Metals
Louisville, Ky., Auditorium, Public Library	6	**J. F. Kahles**	Alloys from Powdered Metals
Memphis, University Club	15	**F. N. Peters**	Furfural, Its Manufacture and Uses
Michigan State College, Kedzie Chemical Laboratory, East Lansing	14	**S. S. Kistler**	The Measurement of Surface Area in Microporous Solids
Midland, Mich.	13	**S. S. Kistler**	The Measurement of Surface Area in Microporous Solids
New York, The Chemists' Club, 52 East 41st St.	8	**Robert E. Wilson**	Perkin Medal Award
North Jersey, Hotel Winfield Scott, Elizabeth	11	**R. M. Burns**	Corrosion and War
Northeastern, Huntington Hall, M. I. T., Cambridge, Mass.	14	**Milton Harris**	New Concepts of Textile Fibers
Purdue, Lafayette, Ind.	11	**J. F. Kahles**	
Rhode Island, Metcalf Auditorium, Brown University, Providence	15	**Milton Harris**	New Concepts of Textile Fibers
Rochester, Cutler Union, Prince Street Campus, University of Rochester	4	**H. F. Johnstone**	Some Engineering Problems in the Treatment of Waste Gases
Toledo, University of Toledo	11	**S. S. Kistler**	The Measurement of Surface Area in Microporous Solids
University of Illinois, Urbana	7	**Frank H. Reed**	Illinois Minerals as Chemical Raw Materials
University of Michigan, Room 303, Chemistry Building	15	**S. S. Kistler**	The Measurement of Surface Area in Microporous Solids
Virginia, Richmond	8	**Gustav Egloff**	Substitute Fuels in a World at War
Virginia Blue Ridge, Hotel Roanoke, Roanoke	9	**Gustav Egloff**	Substitute Fuels in a World at War
Washington, D. C., Cosmos Club	14	**Pieter Honig**	
Western Vermont, Burlington	13	**Milton Harris**	New Concepts of Textile Fibers

Conference on War Service

THE Association of Consulting Chemists and Chemical Engineers, Inc., held a dinner meeting on December 7, 1942, at the Electrical Testing Laboratories, Inc., New York, N. Y. The purpose of the meeting was a "Conference on War Service" by independent consulting chemists and chemical engineers and privately owned laboratories. Besides a fully represented membership and their invited guests there were present representatives of the Chemical Warfare Service and Ordnance Department, Services of Supplies, U. S. Army; Bureau of Ships, Bureau of Supplies, and Accounts and Navy Purchasing Office, U. S. Navy; and representatives of the War Production Board. The technical press was also present by invitation.

Copies of the association's Directory of Members, setting forth in detail their qualifications and specialties, were given guests to assist them in securing expert consultants. Copies are available on request to the association, 50 East 41st St., New York, N. Y.

Foundation for Pharmaceutical Education

THE American Foundation for Pharmaceutical Education was incorporated in the State of New York in August. The organization meeting was held October 1, at which time the following officers were elected: president, Ernest Little; vice president, Charles S. Beardsley; secretary, E. L. Newcomb; treasurer, S. B. Penick; executive committee, Hugh P. Beirne, Harry Noonan, and Robert L. Swain.

The purpose of the foundation is to receive, administer, and allocate a fund, or gifts, to improve and broaden the profession of pharmacy through educational processes. It will uphold and improve pharmaceutical education by aiding and strengthening colleges of pharmacy through appropriate means to provide an adequate, well trained, and reliable personnel for retail pharmacies and to furnish technically and scientifically trained personnel to the pharmaceutical industry and allied manufacturing concerns, hospitals, college faculties, and other professional fields.

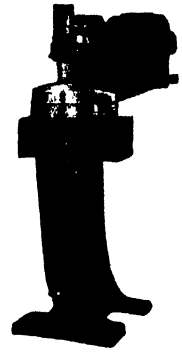
Army-Navy E Awards

RECENT recipients of the Army-Navy E Award include the Owens-Corning Fiberglas Corp., Toledo, Ohio, the B. F. Goodrich Co., Akron Ohio, and the Jessop Steel Co., Washington, Penna.

The Chemical Industry requires a wide variety of centrifugal machines to accomplish its various purposes.

Here are the general types of centrifuges

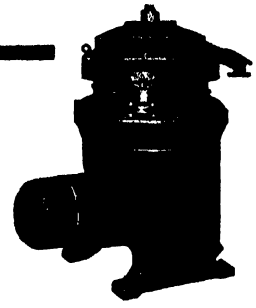
SHARPLES PRODUCES



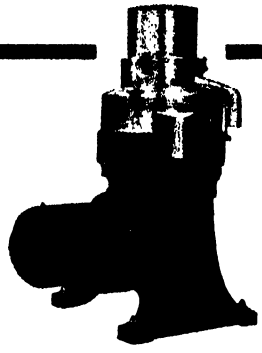
1 **The tubular solid bowl "Super-Centrifuge." Highest centrifugal force commercially produced. Clarifiers. Separators.**



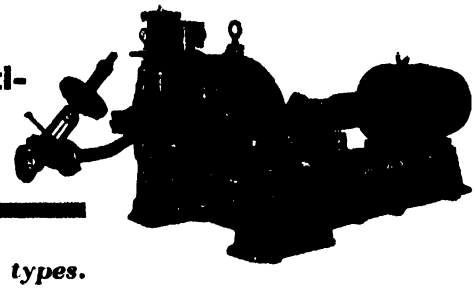
2 **The disc type bowl. Lower speed, large volume, largest capacity, clarifiers, separators.**



3 **The valve type bowl. Clarifiers and separators. Discharges solids as a cake automatically at full speed.**



4 **The nozzle type bowl. Clarifiers and Separators. Discharges solids as wet slurry continuously at full speed.**



5 **The extractor type bowl. A crystal dryer. Automatically loads, rinses, dries and discharges crystals.**

We would be glad to send full information on any of these types.

THE SHARPLES CORPORATION

Centrifugal and Process Engineers

ARMY E NAVY

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SHARPLES

Representatives throughout the world

New Members Elected November 1 to December 1, 1942

Total Membership December 1—31,682

California Section. Dwight M. Kimble[1].

Central Pennsylvania Section. Jerome H. Ottenweller, Thomas A. Williams[1].

Central Texas Section. H. Zeh Hurlburt[1].

Chicago Section. Nils K. Anderson, Everett G. Rauh[1].

Cleveland Section. William F. Acks, Jr.[1].

Connecticut Valley Section. Alexander Murdoch, Jr.[1].

Kanawha Valley Section. Blaine C. Mayes[1], Harry Persinger[1].

Louisville Section. Milton J. Szulinski[1].

New York Section. Hien-houo King[1], Silvio Giolito[1], Ernest R. Panser, Mary E. Wright.

North Jersey Section. Richard H. Dudley.

Northeastern Section. Avon Sole Co.

Panhandle Plains Section. Earl W. Jordan[1].

Philadelphia Section. William H. Rakita[1].

Pittsburgh Section. Gordon S. Black[1].

Rhode Island Section. Robert Zametkin.

Rochester Section. Roy E. Hunt[1].

St. Joseph Valley Section. F. J. Erickson.

South Carolina Section. Avery Patton, Jr.

University of Michigan Section. Nelson Ging.

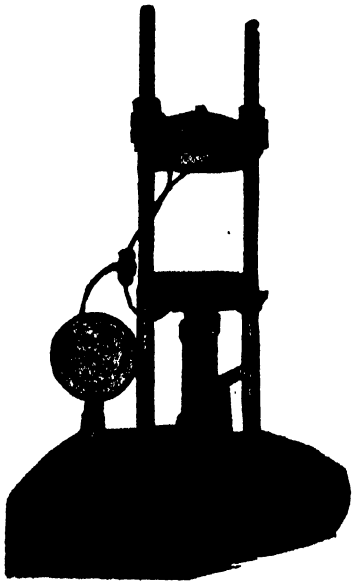
Wisconsin Section. Merrill A. Millett.

No Section. Drogueria Sarra, Otto H. Fenner.

[1] Junior member.

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TAPPI Bulletin

THE Technical Association of the Pulp and Paper Industry, 122 East 42nd St., New York, N. Y., has issued No. 1 of the Tappi Bulletin, devoted to the war effort of the pulp and paper industry. The following fields are to be covered:

Problems or projects coming to the attention of the paper industry and not specifically covered by bulletins from the War Products Development Section, Pulp and Paper Branch, War Production Board.

Methods of testing or evaluating properties of various products.

Descriptions of materials that may be used in paper products to give them specialized properties.

Abstracts of articles from magazines and trade journals.

Question and answer section.

Arno W. Nickerson is to work with R. G. Macdonald, secretary of the association, in the collection and dissemination of this material. Nonmembers of the association may subscribe to the service at $5.00 per year.

Heating Your Home in Wartime

THE Minnesota Resources Commission, State Capitol, St. Paul, Minn., has issued a 32-page booklet entitled "Heating Your Home in Wartime for Comfort, Economy, Health". This was prepared by the Scientific Advisory Committee to Minnesota War Industries, and is available without charge from the commission.

Storage of Butadiene, Isobutylene, Styrene, and Acrylonitrile

REPRINTS of an article entitled "Storage and Handling of Butadiene, Isobutylene, Styrene, and Acrylonitrile", by J. B. Garner, Ludwig Adams, and Robert M. Stuchell, are available without charge from the Mellon Institute of Industrial Research, Pittsburgh, Penna.

Du Pont at War

THE *Du Pont Magazine* in its 140th anniversay number, for August-September-October 1942, gives 36 pages, with numerous illustrations, to the story of the role chemistry is playing in the war effort, and the contribution of du Pont employees to war and civilian needs.

Proceedings of the Photoelasticity Conference

THE Proceedings of the Fourteenth Semiannual Eastern Photoelasticity Conference are now available from E. O. Waters, Room 111, Winchester Hall, Yale University, New Haven, Conn., at $1.50 per copy.

Grading of Mica

A NEW and more efficient process for sorting small flake mica, an essential ingredient in much of the electrical equipment being manufactured for the Nation's armed forces, has been developed by Bureau of Mines engineers and is available to commercial producers. The method already has produced test batches of closely graded mica flakes which were used by a large commercial manufacturer of electrical equipment in producing radio parts. The process is known as electrostatic grading.

Details are explained in Report of Investigations 3662, "Lamellar Grading of Powdered Mica", by Oliver C. Ralston and Foster Fraas which may be obtained free of charge from the Bureau of Mines, Department of the Interior, Washington, D. C.

A. S. T. M. Standard Specifications

THROUGH action of its Committee E-10 on Standards, the American Society for Testing Materials has recently issued some 32 new standard specifications and test methods on thermal insulating materials, paints, plastics, and malleable iron. Of these, 13 are emergency specifications and tests designed to expedite procurement or conservation of critical or strategic materials. All of these new specifications are being printed in separate pamphlet form (the emergency specifications on pink stock) and copies can be obtained at 25 cents each from A. S. T. M. Headquarters, 260 South Broad St., Philadelphia, Penna. They will also be bound in the 1942 A. S. T. M. Book of Standards now in preparation.

Saving Coal in Household Heating

PRACTICAL and timely advice on how to save coal in household heating is offered in a new circular compiled by the Bureau of Mines, "How to Save Fuel at Home", by J. F. Barkley, chief of the Division of Solid Fuels Utilisation for War. Copies may be obtained free of charge by writing to the Bureau of Mines, Washington, D. C., for Information Circular 7229.

Wages as Cost and as Market

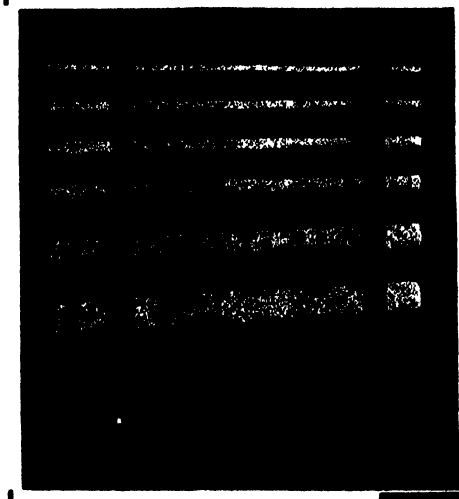
A 44-PAGE booklet entitled "Wages as Cost and as Market", Chapter IX of the forthcoming book "Price-Making in a Democracy" has been issued by the Brookings Institution, Washington, D. C. This is pamphlet No. 44, by Edwin G. Nourse, and is sold at 25 cents a copy.

VITREOSIL

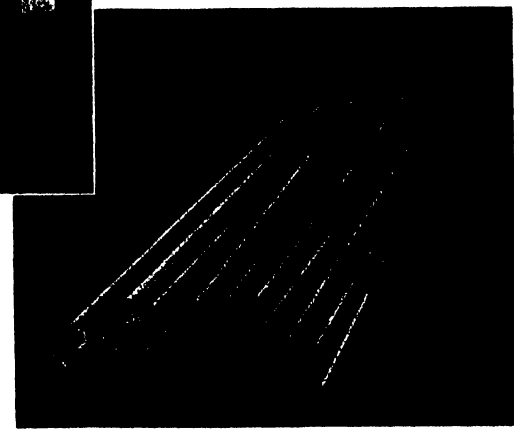
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NECROLOGY

Frederick M. Becket



FREDERICK M. BECKET, a consultant to the Union Carbide and Carbon Corp., died December 1 at New York, N. Y. He was formerly president of Union Carbide and Carbon Research Laboratories, Inc., and former vice president of Union Carbide Co., Electro Metallurgical Co., and Haynes Stellite Co., all units of Union Carbide and Carbon Corp.

Dr. Becket was born in Montreal, Canada, in 1875. He attended McGill University, graduating with a bachelor of science degree in 1895, and received a master of arts degree from Columbia University in 1899.

Dr. Becket was a pioneer in the electrometallurgical industry. In 1924 he received the Perkin Medal. He was president in 1926 of The Electrochemical Society, was elected an honorary member in 1934, and in 1937 received the society's Acheson Medal Award. He is also a past president of the American Institute of Mining and Metallurgical Engineers (1933) and of The Chemists' Club (1939). In 1940, the Franklin Institute presented Dr. Becket with the Elliott Cresson Medal. In 1940 he received one of the Modern Pioneers Awards of the National Association of Manufacturers. In 1929 Columbia University bestowed upon him the honorary degree of doctor of sciences, and in 1934 McGill University conferred upon him the honorary degree of doctor of laws. For many years, he has been a contributor to technical publications in the chemical and metallurgical fields.

Shortly after the turn of the century Dr. Becket originated and commercialized the fundamental principle of producing low-carbon ferroalloys and alloying metals by reducing ores in the electric furnace with silicon instead of carbon. Although such products had earlier been made by reduction with aluminum, the more costly aluminothermic method was discontinuous and accordingly not appropriate to large-scale production. In his hands, silicon reduction yielded the first electric-furnace ferrovanadium produced in this country, and probably in the world; ferrotungsten of commercial quality from the high-phosphorus domestic ores; ferromolybdenum direct from the natural sulfide; and low-carbon ferrochromium. It was in 1918 that he developed the electric-furnace technique of producing ferrozirconium, used at that time for light armor plate, and now widely employed for improving quality steels.

Dr. Becket early applied silicon reduction to the electric-furnace production of chromium and manganese metals, almost free from iron and thus suitable for many alloys based on copper and nickel. His efforts also led to the tonnage production of silicon metal, a prime factor in the strong alloys of aluminum so necessary to aviation.

Dr. Becket early joined steel makers in the pioneer domestic promotion and development of vanadium and molybdenum engineering steels; he projected the high-chromium steels and irons; to the chromium-nickel stainless steels he contributed stabilization with ferrocolumbium; and for the joining of steels, irons, and copper alloys, he devised welding rods of correct metallurgical properties.

Dr. Becket was a fellow of the American Association for the Advancement of Science, a member of the American Institute of Mining and Metallurgical Engineers, AMERICAN CHEMICAL SOCIETY since 1902, Electrochemical Society, Mining and Metallurgical Society of America, American Society for Metals, Iron and Steel Institute of London, American Institute of Chemical Engineers, and New York Academy of Sciences.

Archie W. Bray

ARCHIE W. BRAY, head of the Department of Biology, Rensselaer Polytechnic Institute, died in Troy, N. Y., on November 18 at the age of 59. He had been a member of the faculty for 17 years. He was known for research dealing with the thymus gland, ultrashort wave therapy, and vocational guidance, and had also investigated the biological methods for the detection of chemical warfare gases and their effects and the fouling of ship bottoms by marine growth.

Bennet B. Bristol

BENNET B. BRISTOL, who with his brother Edgar H. Bristol founded the Industrial Instrument Co., in 1908, which later became The Foxboro Co., died at his summer home at Falmouth Heights, Mass., on November 10. Mr. Bristol was born in Naugatuck, Conn., May 3, 1868. In 1893 he was graduated, M.E., from the Stevens Institute of Technology. Throughout the history of The Foxboro Co., he served as its treasurer and clerk.

William S. Farish

WILLIAM S. FARISH, president and executive head of the Standard Oil Co. of New Jersey, died November 29 at the age of 61. Mr. Farish was a pioneer in the oil industry, organizer and president of the American Petroleum Institute, and since 1933 head of the Standard Oil Co. of New Jersey.

Charles W. Frederick

CHARLES W. FREDERICK, pioneer in the design of aerial photography lenses and nonsilica optical glass, died in Rochester, N. Y., November 29, at the age of 72. Mr. Frederick was designer of aerial lenses used for military photography during the first World War, and during the past three years had evolved a new type of lens now used by our armed forces. His study of nonsilica glass led to the development by the Eastman Kodak Co. of the first new optical glass discovered since the 1880's.

A. B. Gerber

A. B. GERBER, chief chemist of the Trenton, Mich., plant of the Monsanto Chemical Co., died November 22. He was 50 years old.

After receiving a degree in chemical engineering from Purdue University, Mr. Gerber joined the Anniston, Ala., Ordnance Works as a chemist in 1918 and remained as chief chemist after the plant was taken over successively by the Southern Manganese Corp., Swann Chemical Co., and Monsanto. He was transferred to the Trenton plant in the spring of 1942.

Cornelius Magee

CORNELIUS MAGEE, for 27 years foreman of the rubber department of A. Schrader's Son Division of the Scovill Mfg. Co., died August 29 at the age of 66. Mr. Magee had been engaged in rubber manufacturing for 47 years and was one of the founders of the Corning Rubber Co., Brooklyn, N. Y.

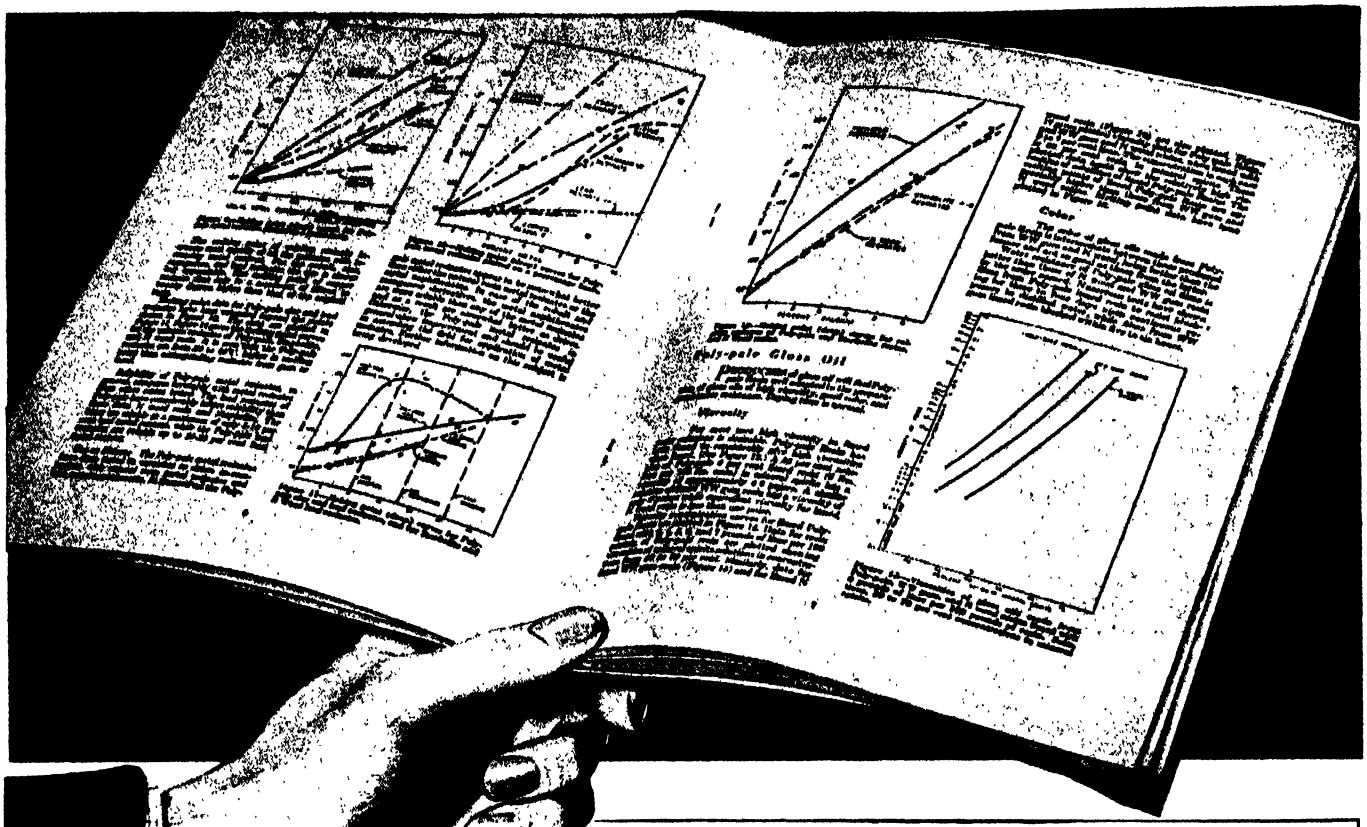
Stephen S. Krayer

STEPHEN S. KRAYER, head of the Krayer Chemical Co., died November 27 in Elizabeth, N. J., at the age of 72. Mr. Krayer was born in Germany and was graduated from Heidelberg University. He had resided in Elizabeth 51 years.

Oliver C. Martin

OLIVER C. MARTIN, metallurgist, died November 17 at Plainfield, N. J., at

CONTINUED ON PAGE 1676



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Necrology

CONTINUED FROM PAGE 1674

the age of 68. In 1908 Mr. Martin worked for the American Smelting and Refining Co. in Denver, and from 1914 to 1923 was manager of the Nichols Copper Corp. plant at Laurel Hill, L. I. He then returned to the American Smelting & Refining Co. as manager of the Perth Amboy plant. In 1925 he went to Belgium, where he was commissioned by the Société Générale de Belgique to build and develop the copper industry. In 1932 he returned to the United States, joined the Phelps Dodge Refining Corp., and in 1936 was sent to manage its plant at El Paso, Tex. He retired in 1940. In 1931 he was given an honorary degree of LL.D. for achievements in the copper industry.

Harry J. Schnell

HARRY J. SCHNELL, president of the Schnell Publishing Co., died November 29 at the age of 67.

At the age of 15 Mr. Schnell went to work for William O. Allison, publisher of the *Oil, Paint and Drug Reporter*, became general manager before Mr. Allison's death in 1925, and as executor of his estate continued the publications. In 1941 he organized the Schnell Publishing Co. Mr. Schnell was a trustee of the New Jersey College of Pharmacy, former president of the Drug and Chemical Club of New York, and of the New York Paint, Varnish, and Lacquer Association.

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Paul B. Seydel

PAUL B. SEYDEL, founder and senior partner of Seydel-Woolley and Co., died October 20, 1942, in Atlanta, Ga.

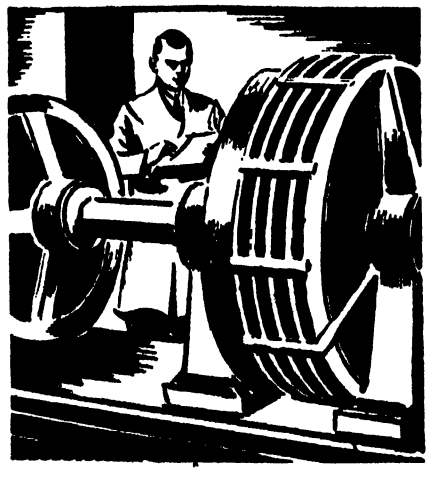
Dr. Seydel was born in Belgium, January 22, 1884, and received his doctorate in chemistry from the University of Brussels in 1904. He had been active in the Georgia Section of the AMERICAN CHEMICAL SOCIETY, which he joined in 1905, serving as Local Section Chairman and Councilor. At the time of the Atlanta meeting of the AMERICAN CHEMICAL SOCIETY in 1930, he was chairman of the Publicity Committee.

George L. Teller

GEORGE L. TELLER, president of the Columbus Laboratories, Chicago, Ill., died November 13 at the age of 75. Mr. Teller had been associated with the laboratories since 1902 and had been its president since 1926. He had been a member of the AMERICAN CHEMICAL SOCIETY since 1908.

Edward P. Thompson

EDWARD P. THOMPSON, patent attorney, died November 3 at Elizabeth, N. J., at the age of 86. Mr. Thompson was a graduate of the Stevens Institute of Technology, author of "The Science of Invention" and "Roentgen Rays", and had been instructor in chemistry at the Pingrey School. He was associated with W. P. Stanley, Jr., in the invention of an early electric lamp, developed in the laboratory of Thomas A. Edison, and sold to the Westinghouse Co.



Specific Heats of Gases

THE Specific Heats of Certain Gases Over Wide Ranges of Pressures and Temperatures" is the title of Bulletin 30, by Frank O. Ellenwood, Nicholas Kulik, and Norman R. Gay, Cornell University Engineering Experiment Station. The gases are air, carbon dioxide, carbon monoxide, ethylene, hydrogen, methane, nitrogen, and oxygen; the temperature range is from 0° to 4,000° F.; and the pressure range is from 0 to 10,000 pounds per square inch.

This bulletin gives the general equations which determine the effect of pressure on the specific heats of the gases, within ranges of temperature and pressure encountered most frequently in engineering practice. For the gases considered in this paper, the variations of specific heats with temperature and pressure are also shown graphically.

Single copies may be secured without charge by writing to the Engineering Experiment Station, Cornell University, Ithaca, N. Y. The price for additional copies sent to the same person is 50 cents.

Report on Naval Stores

THE 1942 Semiannual Naval Stores report on production, distribution, consumption, and stocks of turpentine and rosin of the United States by crop years, April 1, 1942, to September 30, 1942, has recently been issued as an 11-page mimeographed report. It was compiled by C. F. Speh and M. C. Lawrence, of the Naval Stores, Research Division, Bureau of Agricultural Chemistry and Engineering, U. S. Department of Agriculture, Washington, D. C.

Coal Miners' Safety Manual

THE Bureau of Mines has published the "Coal Miners' Safety Manual", a 218-page book dedicated to the promotion of safety among the men who work in the 14,000 coal mines of the United States.

Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 25 cents each.

Sweden Industrial Progress

A BOOKLET entitled "Industrial Progress in Sweden", by Ingvar Svennilson and Erland Waldenström, has been published by the Swedish Institute of Industrial Research, Stockholm, established under the auspices of the Federation of Swedish Industries for research into questions relating to industrial economics.

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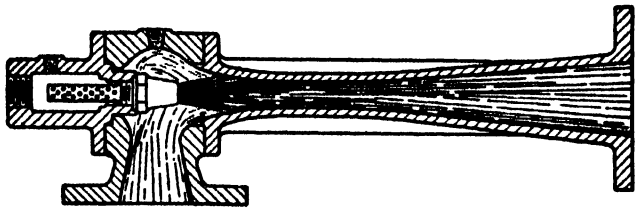
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INDUSTRIAL CHEMISTRY
By Emil Raymond Riegel, Professor of Industrial Chemistry, University of Buffalo.
Completely revised and enlarged, this FOURTH EDITION (1942) of Industrial Chemistry contains many new additions for those who wish to familiarize themselves with the rapid changes that new products and processes are bringing about in established industry. Includes the latest developments in such strategically important fields as synthetic rubbers, synthetic fibers, explosives, chemical warfare, and petroleum, and other elements of industrial chemistry bearing on the war effort. At the same time, the author describes thoroughly standard practices throughout the entire industrial chemical field and the content of the book has in no sense been diminished. Also gives complete tables, product figures, and prices.
861 Pages, 275 Illustrations, 50 Chapters.....$5.50

Reinhold Publishing Corp., 330 W. 42nd Street New York, N. Y.



Industrial Research. *F. Russell Bichowsky.* 126 pages. Chemical Publishing Co., Inc., 234 King St., Brooklyn, N. Y., 1942. Price, $2.50.

NEAR the end of the book the author says: "It was fun to write this paragraph * * * *".

It is the reviewer's judgment that the entire writing of the book was fun for Dr. Bichowsky, and when a man does a job for which he is well equipped and which is fun for him, that job is likely to be extremely well done, as it certainly has been in this instance. In fact, it has been so well done that it probably will discourage some prospective authors who have been experiencing a yen to publicize their views on this same subject.

Dr. Bichowsky writes in a delightfully informal and informing fashion that makes the reading of his book a very pleasant as well as profitable experience. One may disagree violently with some of the views he expresses, as for example his somewhat Thurman Arnoldish statements early in the book regarding the possible (or even probable) misuse of patents which, incidentally, seem utterly at variance with his highly realistic treatment of patents later on when he finally comes to grips with this important subject.

His use of stories taken from his own experience is especially deft and clarifies otherwise obscure points in an efficient fashion.

The book is a must for researchers, research directors, executives of corporations financing research, in fact for everyone interested in industrial research for any reason whatsoever.

CARL S. MINER

Food for Thought. *Herman F. Willkie and Paul J. Kolachov.* 209 pages. Indiana Farm Bureau, Inc., Indianapolis, Ind., 1942. Price, $2.00.

THIS book is particularly timely and will be welcomed by bacteriologists, chemists, and engineers. "Food for Thought" deals with the production and utilization of power alcohol as a solution for the farm economic problem.

The authors have divided their book into two sections. The first, 49 pages, deals with the production, utilization, and agricultural aspects of the program. An entirely new approach to the problem is made, both from an economic and technological viewpoint. The power alcohol story is presented in a sane and logical manner without fanfare. A chapter is included in this section on the design of a typical community distillery incorporating the latest principles of operation developed in the laboratories of the authors. The design is flexible enough to permit the use of various carbohydrate crops. Cost analysis data of the construction and operation of these distilleries are included.

The second section, 160 pages, contains a wealth of scientific information. Recent improvements in the manufacture of alcohol, namely, the development of a continuous cooking and mashing system for cereal grains, the development of a continuous process for the production of pure culture distillers' yeast and a preliminary report on fast, continuous fermentation are given. Research and pilot plant work done in connection with these developments are described in detail, and all of the pertinent experimental data are included.

The reviewer is pleased to see these recent improvements and advancements in processes involving the enzymatic method of organic synthesis.

The authors have had wide experience in the manufacture of ethyl alcohol and deserve a great deal of credit for their originality and foresight.

V. IPATIEFF

Minerals in Nutrition. *Zoltan T. Wirtschafter.* 175 pages. Reinhold Publishing Corp., 330 West 42nd St., New York, N. Y. Price, $1.75.

THIS book is a brief and interesting account for the layman of what the author in his dedication calls "the efficient handling of mineral commodities and their transportation in the body".

After an introductory chapter explaining what minerals are and making use of classical experiments such as those by Sydney Ringer and Rubner, a chapter each is devoted to common salt, potassium, calcium, magnesium, phosphorus, sulfur, iron, iodine, and "other minerals", comprising what are often called the trace elements.

In general the statements are authoritative, but, as not infrequently happens in books written for the lay reader, the text suffers occasionally in scientific accuracy from the attempt to simplify too much, as when the author (p. 9) speaks of blood cells as "spherical bodies" and (p. 24) when he says that "proteins function as anions in the blood plasma". But these are minor errors and are amply compensated by the general excellence of the presentation as well as scientific accuracy, and they will not detract from the usefulness of the book. Many interesting and effective statements occur throughout the text serving to fix them in the reader's mind. For example, (p. 97) the author states that "wool contains 3.55 per cent and human hair, especially red hair, contains over 5 per cent of sulfur".

The chapters on "What Salt Does in the Body" and on "Calcium" are particularly well written and the latter is illustrated by roentgenograms of the spine in normal and calcium-deficient states.

Each chapter dealing with the principal minerals ends with a useful table of foods in which the particular element treated occurs in greatest proportion and a bibliography which serves as a good introduction to the literature.

This book should prove useful not only for the lay reader for whom it was primarily intended, but for students of the science of nutrition and others who desire a short statement of the functions of minerals in the body.

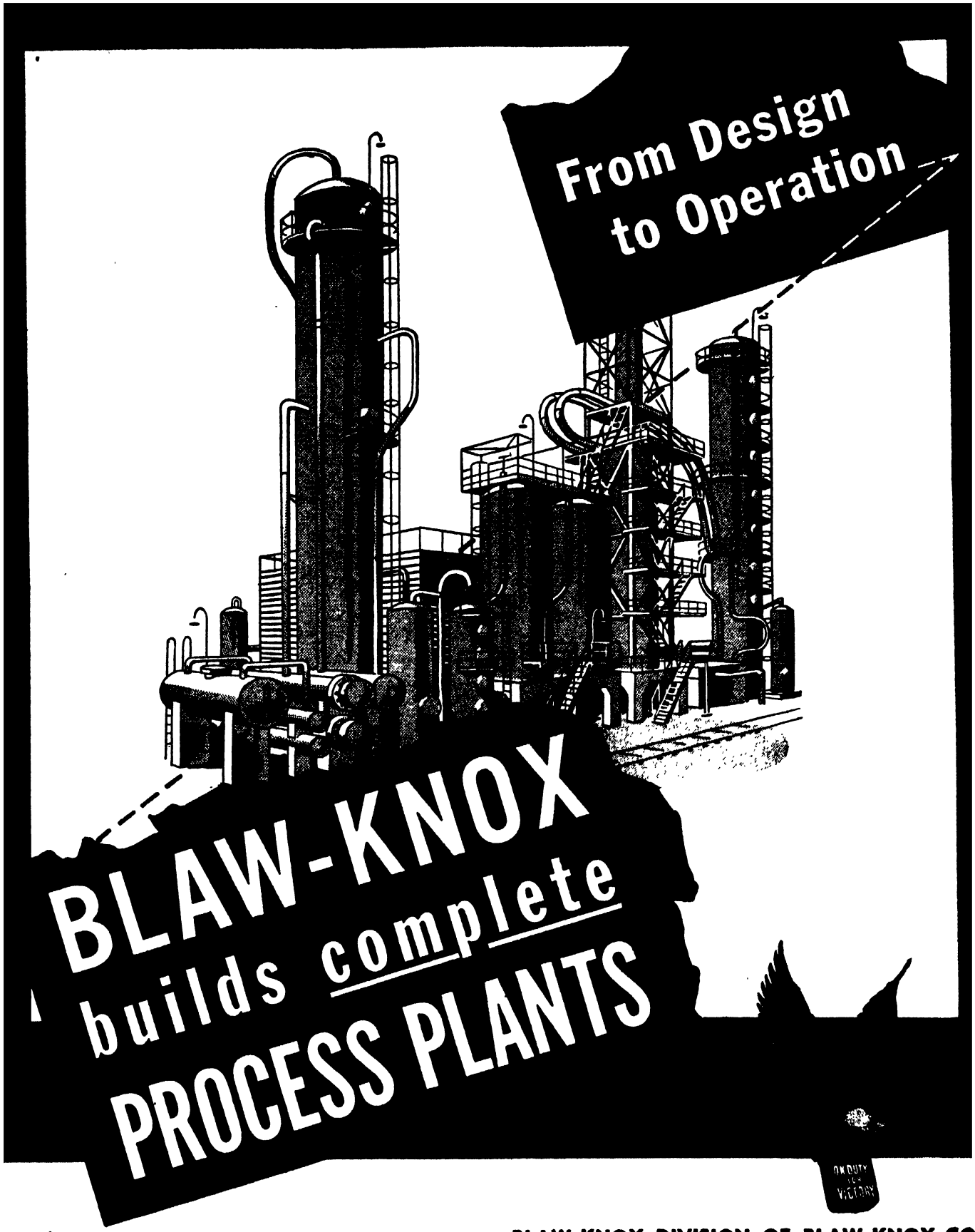
JOHN R. MUELIN

Strategic Materials in Hemisphere Defense. *M. S. Hessel, W. J. Murphy, and F. A. Hessel.* xv + 235 pages. Hastings House, 67 West 44th St., New York, N. Y., 1942. Price, $2.50.

A RESEARCH executive, his journalist wife, and the editor of *Chemical Industries* have dug up an extensive array of significant statistics, which they have proceeded to build into an excellent presentation of the problem of wartime supplies for America. The volume is much more than a dry Commerce report. Just enough good journalism, with attractive humanized graphic representations of production and import quantities, has been introduced to hold the attention of the casual reader with technical interests. Scientific information has been accurately checked.

The first 153 pages are devoted to a straightforward presentation of facts, figures, and advice classified by materials. Rubber and tin, of course, lead off, followed by 24 other strategic materials, in-

CONTINUED ON PAGE 1680



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Beyond the Flyleaf

CONTINUED FROM PAGE 1678

cluding such items as quartz crystal and opium, down to jute and hemp.

Part II, 27 pages, deals with Latin America, the several republics and dependencies being taken up successively all with an eye to emergency supplies for the United States. Part III, 47 pages, is devoted to Additional Materials, meaning principally those which have presumably been in abundance and thus were not supposed to be strategic, such as copper and petroleum. An 11-page bibliography, largely classified by material, concludes the work.

The reviewer suspects that the men folk of this group of authors have initiated this work in self-defense, after being overwhelmed with technical inquiries from bewildered clients. Certainly the volume will be of great service to a prospective producer or consumer of basic raw material. It should be a valuable addition to high-school and college libraries, not only for general timely interest, but as a source book for lyceum speeches, term reports, debates, etc.

G. Ross Robertson

Chemistry of Insecticides and Fungicides. *Donald E. H. Frear.* 300 pages. D. Van Nostrand Co., Inc., 250 Fourth Ave., New York, N. Y., 1942. Price, $4.00.

This textbook is designed for chemists, biochemists, economic entomologists, and plant pathologists to facilitate a better understanding of the chemistry of those products used as insecticides and fungicides. It is divided into five parts. Part I deals with "Stomach Poisons or Protective Insecticides"; Part II, "Contact Poisons or Eradicant Insecticides"; Part III, "Fungicides"; Part IV, "Spray Supplements and Residue Removal"; and Part V, "Analytical Methods". Appended to each chapter are numerous references to the more important recent literature as source material for those who wish to pursue any particular subject further. The classification of insecticides into contact and stomach poisons, which is the division generally used by the economic entomologist, brings together in the same chapter a discussion of inorganic fluorine compounds and miscellaneous organic compounds. From the chemical viewpoint a classification of insecticides into organic and inorganic products would seem preferable.

The value of the book is marred somewhat by numerous errors. For example, the use of calcium arsenate in this country is not declining (p. 12), but the consumption may vary widely from year to year, depending upon the degree of infestation of the boll weevil, against which it finds its principal use; the formation of phenothiasone from phenothiasine precedes that of thionol (p. 43); the dinitrocresol used as an insecticide for more than 50 years does not have the structural formula shown (p. 43); there are six position isomers of nicotine, not two (p. 54); the statement that quassin, neoquassin, and picrasmin are possibly related to rotenone is incorrect (p. 88); and the statement, "Both compounds (quassin and neoquassin) have the same empirical formula $C_{28}H_{30}O_6$, contain two methoxyl groups, and are apparently isomeric", is apt to be confusing, especially to the reader for whom this book is intended. Nevertheless, in spite of these defects, the book is one that should be useful both as a text and reference book to anyone seeking a better chemical knowledge in this field.

H. L. Haller

Chemical Engineering Catalog, 27th ed. 1336 pages. Reinhold Publishing Corp., 330 West 42nd St., New York, N. Y., 1942.

The chemical process industries will welcome the new edition of the Chemical Engineering Catalog with its up-to-the-minute information about available equipment. Seldom, if ever, have demands for new manufacturing units topped today's levels and the engineers will find a helpful guide in the 27th edition of C. E. C. for their choice.

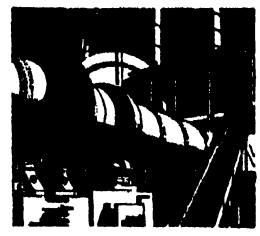
The new volume follows closely its familiar predecessors as to scope and order.



Hydrogenation of Coal

Continuing a long-range study of the hydrogenation of coal to produce gasoline, lubricating oil, and other related products, Bureau of Mines chemists are engaged in analyzing the crude oils made from coal to determine their possible uses in various fields of American industry.

Technical Paper 646, "Hydrogenation and Liquefaction of Coal, Part 3, Characterization of Assay Oils", may be obtained for 20 cents from the Superintendent of Documents, Washington, D. C.



Origin of "Bakelite" Plastics

THERE is much need for a better understanding of our patent system. Even intelligent and otherwise well-informed people believe that patents are granted in perpetuity. They have no idea that the great majority of our patents have expired and are expiring daily.

An inventor buys his patent from the Government by disclosing his invention. The disclosure is the consideration for which the patent is granted so that the advance he has contributed in the art is dedicated to public use upon the expiration of the patent. Every patent is a contribution to the sum of human knowledge.

Among many examples that could be cited is L. H. Baekeland's now famous research which resulted in the first successful process for the commercial production of phenol-formaldehyde resin. Baekeland's research permitted control of the properties of the product—the original Bakelite resin—at all stages of reaction and condensation.

Few will deny that the influence of this research and its outcome in the world of materials and product design have been far-reaching. It greatly stimulated scientific interest and activity in the general subject and possibilities of synthetics, thus giving rise to further discoveries in this little-explored domain.

Thirty-five years before Doctor Baekeland began his research in 1906, Adolph Baeyer had observed and written about the behavior of phenols and aldehydes when heated together. Twenty years after Baeyer, another scientist, Kleeburg, experimented with the same materials. Both Baeyer and Kleeburg devoted much effort to the attempted production of an artificial shellac base, but they failed. The substance they made was a shapeless, inert, hard, insoluble, seemingly useless mass, incapable of being formed, and so porous as to be worthless even if it could be worked.

Baekeland, too, sought a shellac base, and found a sirupy resin which heat-hardened into a permanent solid. Unlike the products of Baeyer and Kleeburg, Baekeland's resin was dense and strong, porosity having been prevented by the simple device of maintaining air pressure in the autoclave, which suppressed foaming during the critical thermosetting stage of the final reaction. By studying the failures that had gone before, and supplying the necessary controlling factors, Doctor Baekeland turned to advantage the same characteristics that had defeated his German predecessors, and obtained a product, the properties of which could be assured and stabilized at every stage of both the fluid and solid phase.

Before Pearl Harbor Bakelite resins in various forms were known the world over for their wide variety of applications—telephone handsets, electrical appliance plugs and outlets, radio cabinets, washing machine agitators, brakelinings, abrasive wheels, steel mill roll neck bearings, automotive ignition parts, and a thousand other diverse uses for peaceful living. Today, they are even more important to the war effort on land, sea, and in the air. Tomorrow, they will again play their important role in peacetime products.

After 36 years, new uses for Bakelite resins are being uncovered and developed at as rapid a pace as ever. To use an old phrase, their field of service is hardly scratched.

Founders' Day of Alpha Chi Sigma

CARL F. PRUTTON, head of the Chemical Engineering Department at the Case School of Applied Science, was the main speaker at the Founders' Day banquet held at the Cleveland Engineering Society on December 4 by the Akron Professional, Case Collegiate, and Cleveland Professional chapters of Alpha Chi Sigma. Speaking on "The Chemical Profession and the War", Professor Prutton pointed out the increasing demands for chemically trained personnel in essential industries and outlined the steps that must be taken to ensure using chemists and chemical engineers where their training is of greatest value.

New Type of Scrap Drive

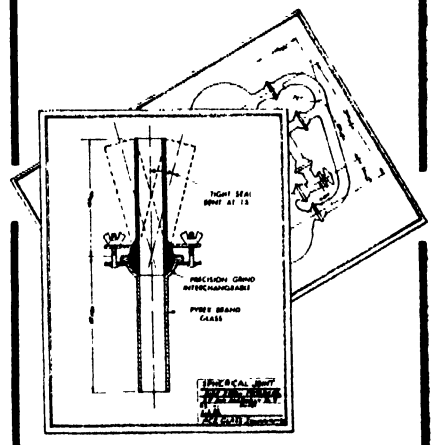
IN HIS address accepting the Edward Goodrich Acheson Medal of the Electrochemical Society, C. F. Burgess urged a new kind of scrap drive to find, collect, and use the hidden treasure of scientific discoveries laid aside and forgotten in laboratories, libraries, and old reports and records.

Heat Flow through Wet Walls

R. H. DEARBORN, dean of the School of Engineering at Oregon State College, Corvallis, and F. C. McIntosh, Pittsburgh, Penna., chairman of the Committee on Research of the American Society of Heating and Ventilating Engineers, announce the consummation of a cooperative agreement to investigate the heat flow through wet building walls.

The research program will be carried on in the domestic heating laboratory of the College at Corvallis by means of a specially constructed apparatus in a study jointly planned by Earl C. Willey of the college and the research committee of the Oregon Chapter of the Society, of which Edwin W. Neubauer of Portland is chairman.

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Unity[1]

The upsurge of labor unionism which has marked the past decade, has not failed to involve the chemical profession in the general controversy of "to be or not to be"—organized. No extensive survey is yet available to indicate the attitude of the chemists themselves on this question. In fact, it is doubtful that many chemists have given the matter serious consideration, unless definitely faced with this issue in connection with their employment. Where this latter condition has arisen, chemists have usually resisted all attempts to include them in the labor unions—e. g., the case of the Shell Development Co.'s Chemist Employees *vs.* the International Federation of Architects, Engineers, Chemists, and Technicians [Chem. Eng. News, 20, 165 (Feb. 10, 1942)]. Whether or not their decision was in their own best interests and those of the chemical profession is not a question to be lightly or quickly decided. Future events may give a definite answer, but we can make an intelligent approach to this question only by carefully considering the data available, both pro and con.

Undoubtedly, the industrial laborer in some respects has benefited from unionization. It has provided him with a more or less equal basis for bargaining with the employer. It has in many cases secured for him higher wages, better working conditions, protection from arbitrary decisions of management and high-handed action of supervisors contrary to his interests—as judged by the union. While some may, with justice, point out the injuries accruing to both labor and management through the strife and strikes which have attended unionization of most major American industries, industrial history leaves no doubt as to the fact that unbridled control of industry by management several decades ago wrought much worse injustices to labor and society in general, for such words as "tenement slums" and "sweat shops" first appeared to disgrace our society with the advent of the Industrial Revolution when the industrialists were in complete control. In brief, while we may consider some labor leaders to be radical crackpots and some actions of unions, irrational enigmas, we cannot doubt that the labor union offers the mass of industrial workers the most effective means of obtaining industrial justice. Such are the benefits which the labor union offers to any who join it. What then does a scrutiny of the reverse surface of the two-dimensional representation show?

It is to be noted that labor unions, in general, have given precious little evidence of balancing the protection of workers' rights with an awareness of duty—namely, that a fair wage calls for an honest effort to meet fair quality and quantity standards of production. In fact, there can be but little argument that this overemphasis on rights has not been offset by any notable emphasis on duty. The backing of all-out war production, outlawing of strikes, etc., by the unions does not invalidate these observations for they are sacrifices qualified by "for the duration only" tags.

As scientists and members of a profession, chemists must be (and are) more interested in doing the job well than in seeing that all their rights are immediately accorded exact and proper respect. Of course this does not mean that the chemist does not desire and strive for financial advancement, proper working conditions, reasonable supervision, etc. But it does mean he recognizes the important relation between rights and duties, and that adhering to a high personal standard of workmanship is at least as important as receiving a high salary. Consequently, union membership can, at best, exert no influence for the professional advancement of the chemist; and may, at worst, cause him to lose sight of the hard and careful labor required to attain the better rewards available to the chemist, by focusing his attention all too fully on his right to such remuneration. But we need not labor this point, for most chemists realize that failure to keep the eyes on the ball has turned many an opportunity for a double play into a costly error. More briefly, membership in the current labor unions offers the chemist, at best, some economic protection in his job but no prospects of professional advancement.

As to the matter of a separate union for chemists, which would recognize professional aspirations—first, current labor laws as enforced by the NLRB allow only one union to be the collective bargaining representative for the workers in any one plant; second, it is doubtful that membership in such a union could offer any really concrete advantages over membership in the A. C. S. While the Society has not been primarily concerned with the economic status of chemists in the past, it has recently shown increasing awareness of the possibilities for real service to the chemical profession, which lie in that direction. Witness, the current report on the "Economic Status of the Chemist"; the employment services; and the statement on "Employer-Employee Relationships" by the A. C. S. While an even more definite stand on the general and economic rights of the chemist is probably desirable, there can be no doubt that it will be forthcoming if the A. C. S. membership actually and actively desires it.

There are also more concrete and obvious reasons against union membership

CONTINUED ON PAGE 1684

[1] Reprinted from *The Detroit Chemist*, page 230 (Oct. 1942).

SALVAGE

— — — A BIG WORD IN THE CHEMICAL PROCESS INDUSTRY



WITH the word "salvage" uppermost in the minds of all of us on the home front, let's make sure that the Chemical Process Industry is doing its share in "salvaging" and conserving war-essential chemicals. Many companies are saving untold gallons and pounds of chemicals by the recovery or reclamation of acid, alkali, dye, and other liquors by treatment with NUCHAR Active Carbon.

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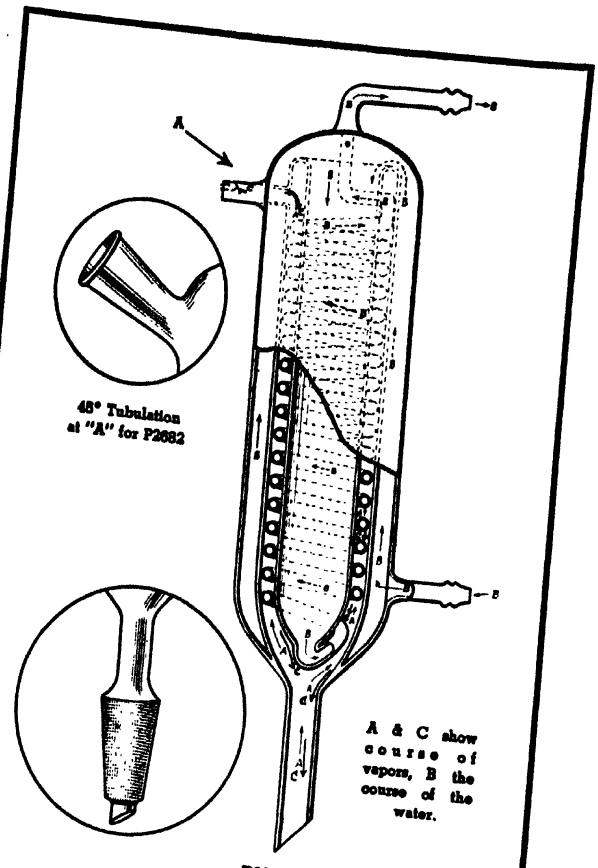
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Especially recommended in the refluxing or distillation of volatile liquids to eliminate the use of extra long condenser of the usual type.

Experiments carried out with ether, alcohol and steam under intensified conditions not normally encountered, showed exceedingly fine results.

To test its performance as a distillation condenser, live steam was entered directly into the tubulation at the top of the 800 mm size, with the result that the condensate ran cold.

Both the reflux and distillation condenser are identically constructed, in the lengths listed below. Vapors to be condensed travel along a system of water cooled coils which are wound about a water cooled internal cylinder, all of which are finally encased in another large surfaced water cooled external cylindrical jacket. The construction permits cooling of the entire unit with one single continuous circuit of water.

Invented by Mr. W. Ekert of Fritzsche Bros., who has had long experience in reflux condensing, this condenser has already found immediate acceptance by chemists in the essential oil and soap laboratories, both for its compactness and its efficiency.

Obtainable in the following sizes:

P2681	Condenser, Ekert Reflux, Made of Pyrex glass, Pat. Pending, 200 mm Jacket	$15.00
P2682	Condenser, Ekert Distillation, Pat. Pending, 400 mm Jacket	30.00

These condensers can be supplied in larger or intermediate sizes; also with standard taper or spherical connections as ordered at additional cost of the joints only.

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NEW YORK, N. Y.

Unity

CONTINUED FROM PAGE 1682

for chemists. In general, the chemist is often engaged in doing confidential work for his employer; even more often in doing work which involves the direction of other workers. In either capacity, it would scarcely behoove him to hold active membership in an organization whose attitude often is essentially "antimanagement". Because his work usually is of a nature requiring cooperation with management, the chemist might well find it impossible properly to discharge his duties and remain loyal to a union. In addition, advancement usually comes to the chemist through recognition by the *management* of work well done; hence, union membership could scarcely further such advancement.

While the foregoing does not constitute any exhaustive consideration of the subject, it should indicate why chemists have, to date, been unresponsive to the "call of the union". Before closing, it should be pointed out that the above remarks apply only to those who possess or seek to acquire those attributes of mind and knowledge which are the stamp of the professional chemist. No doubt, if there are workers in routine chemical jobs who neither "possess nor strive thus", they would probably benefit from union membership even as other industrial workers have. —G. A. BURKART

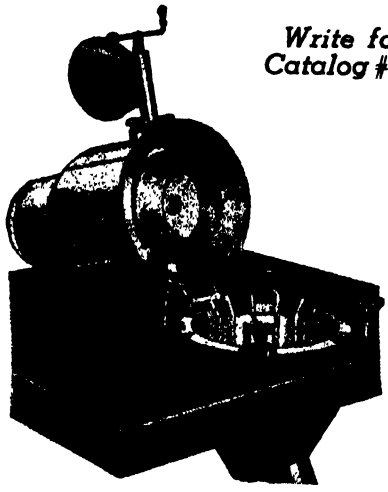
Detroit Chemist. EDITOR'S NOTE. *Two other objections often raised to unions as now run are the difficulty in firing a worthless man and the penalty inflicted by "seniority" on the young, ambitious man.*

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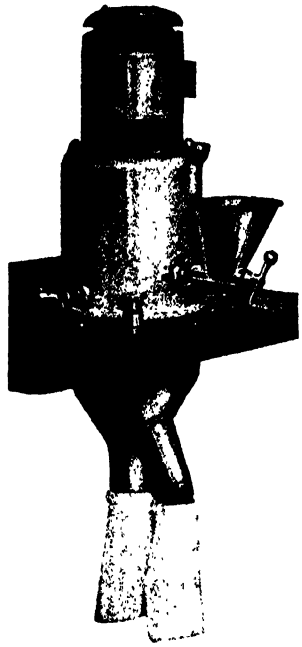
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Toast to the Flag[1]

John D. Barry

HERE'S to the Red of it;
There's not a thread of it
In all the spread of it
From foot to head
But heroes bled for it,
Faced steel and lead for it,
Slept with the dead for it,
Bathing it Red.

Here's to the White of it;
Who knows the might of it
But thrills at the sight of it
Through day and night.
Womanhood's care for it
Made manhood dare for it;
Purity's prayer for it
Kept it so White.

Here's to the Blue of it;
Heavenly hue of it,
Star-spangled view of it,
Constant and true;
And here's to the whole of it,
Stars, stripes, and pole of it,
Here's to the Soul of it—
Red, White, and Blue.

[1] Reprinted from the *Times-Herald*, Washington, D. C., November 11, 1942.

Soap as a Road Builder

Editor:

The November 10 edition of CHEMICAL AND ENGINEERING NEWS, page 1462, contains an article on the use of "Soap as a Road Builder". The intimation, presumably, is that this is an innovation.

There is available a series of articles on this subject, showing that the engineers who care for the New York State highways have employed stearates and related soaps for mixture with cement to resist scaling and other corrosive effects of calcium chloride, sodium chloride, and the other commonly used ice melters.

An interesting review of Herbert F. Kriege's talk on this subject before the Toledo Section of the AMERICAN CHEMICAL SOCIETY appears in the January issue of *Isotopics*. The talk was given in December, 1941.

H. W. DORN, *Section Editor and Vice Chairman, Toledo Section, A. C. S.*

4113 THORNTON AVE.
TOLEDO, OHIO
November 21, 1942

The L. S. O. G. Exchange

Edited by A. A. Ashdown, Ed. F. Degering, J. E. Hawkins, and S. L. Redman

Send items to Ed. F. Degering, Department of Chemistry, Purdue University, Lafayette, Ind.

IN ADDITION to the problems of other sections, the New York Section has responsibilities that come with its location and a large membership, now more than 2,800.

There are the problems of planning meetings that will appeal to a membership of widely diverse interests, bringing some members many miles from the outside research centers and institutions into the city, and keeping others downtown at night in spite of other numerous and seemingly compelling demands on their time.

To meet these requirements, programs are based in part on the proved common desire to see and hear famous men. Single programs often present three or four distinguished chemists, any one of whom alone would honor any platform. Such programs fill the meeting hall at the Pennsylvania Hotel. The programs are planned also on the belief that the meetings should provide not only information but also inspiration and renewed encouragement to each one who attends.

The *Indicator*, published in collaboration with the New Jersey and Western Connecticut Sections and edited by F. W. Zons, is a several thousand dollars a year business and returns a profit that, though small in percentage of the gross, is very helpful.

The Membership Committee is active and has obtained 280 members in the past two years under the chairmanship of William F. O'Connor. Secretarial work of the section is necessarily heavy but is handled ably by Cornelia T. Snell with the help of a part-time stenographer.

Another feature that has been found successful is the annual students' program which precedes a regular section meeting. A well-planned session with students presenting, listening to, and discussing papers achieves several objectives. The speakers gain the valuable experience of presenting technical papers to an eager, receptive audience. In addition to the information and inspiration it provides, the meeting marks for many the beginning of that professional contact and association which form the basis of the SOCIETY. It also affords the New York Section the opportunity of acquainting a large number of student affiliates, junior, and prospective members with the sort of symposia that they soon will endeavor to attend not only locally but, we hope, at the national meetings. The interest of chemistry teachers in the project is apparent.

Although the speakers present the results of experimental research, the content and presentation must not ignore the limited specialization of the audience. Senior research, a bachelor's, master's, and occasionally a Ph.D. thesis supply most of the material. An attempt is made to have all schools in the area represented on the program as well as in the audience. The meeting is held at 5:00 P. M. Three divisions, physical-inorganic, organic, and chemical engineering, simultaneously offer three papers each. The papers are scheduled for 15-minute presentation. Presiding at each section is a member of the faculty of a school not presenting a student speaker. Questions and discussion are encouraged. The proximity of the three meeting halls facilitates attendance at papers in different divisions. Following the divisional programs, a general paper is presented to the combined groups. The Chairman of the section then invites all to the regular evening meeting at which distinguished speakers provide the proper inspiration in addition to being helpfully informative.

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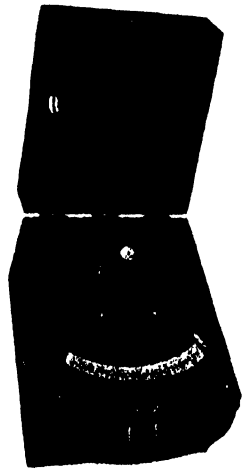
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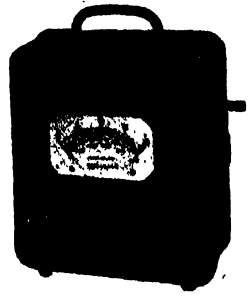
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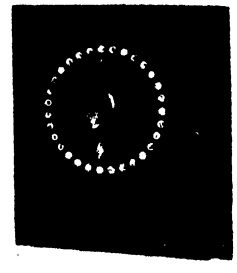
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THE WALL STREET OF CHEMISTRY

Securities and Exchange Commission has made public the second of a new series of advance releases of the Survey of American Listed Corporations. The four corporations comprising this group are manufacturers of fertilizers and include the American Agricultural Chemical Co., (of Del.), Davison Chemical Corp., International Minerals & Chemical Corp., and Virginia-Carolina Chemical Corp.

These reports give data for net sales, net profits, net profit as a per cent of sales, total dividends, and total assets for 1941 and 1942 for individual companies and for the group as a whole. Remuneration data for 1942 are shown for the recipient of the highest, second highest, and third highest individual amounts paid by these corporations and the total which each company paid to all its officers and directors. These data are presented in advance of the complete industry reports released by the Survey of American Listed Corporations and are compiled from annual reports for companies with fiscal years ending in the same calendar year.

For the four corporations, the combined sales amounted to $82,000,000 in 1942 against $67,000,000 in 1941. Net profit after all charges totaled $5,600,000 in 1942 compared with $2,500,000 in 1941, equivalent to 6.8 and 3.8 per cent of sales, respectively. Total dividends paid amounted to $1,500,000 in 1942 against $1,100,000 in 1941. The combined assets of these corporations totaled $100,000,000 at the end of 1942 compared with $88,000,000 at the end of 1941.

For 1942 the highest remuneration reported was $100,476, second highest $60,000, and third highest $50,500. The total remuneration reported paid by these companies to all officers and directors amounted to $766,480 during this year.

For the year ended September 30, 1942, the **Illinois Zinc Co.** and subsidiaries report net income of $464,763 after depreciation, interest, federal income taxes, and reserve of $60,000 for contingencies. This is equal to $4.88 a share on common and compares with $396,310 of $4.16 a share in the preceding year. Federal income taxes for the year amounted to $160,000, compared with $76,000 in the preceding year. During the year the company reduced its bank loans $100,000, reducing the total outstanding to $300,000, and as of November 30, 1942, paid $132,000, while current bank borrowings of subsidiaries aggregated $50,000. Three additional smelter blocks being erected at the Dumas smelter, leased to the American Zinc Co., are expected to be in operation shortly.

The **Canadian Industrial Alcohol Co.** for the fiscal year ended August 31, 1942, shows net profit of $554,860 after depreciation, income, and excess profits taxes of $556,879 and contingent reserve of $100,000. This is equal to 50 cents a share on combined voting and nonvoting capital stock, and compares with $383,658 or 35 cents a share in the preceding year.

Commercial Solvents Corp. has declared a 30 cent year-end dividend, bringing the total for 1942 to 60 cents, compared with 55 cents for 1941. This is one of the few companies to declare larger dividends in 1942 than in 1941.

Consolidated net income of the **Dow Chemical Co.** and subsidiaries for the three months ended August 31, 1942, was $2,147,705, equivalent to $1.66 per share on common. This compares with $2,104,282 or $1.79 per share in the third quarter of 1941.

The **A. O. Smith Corp.** and subsidiaries for the fiscal year ended July 31, 1942, show net income of $3,703,114 after depreciation and amortization of properties, reserve for taxes, etc. This is equal to $7.42 a share, and compares with $2,734,657 or $5.49 in the preceding year.

E. R. Squibb & Sons and subsidiaries report for the quarter ended September 30, 1942, net profit of $455,279 after charges and provision of $509,059 for federal and Canadian income and excess profits taxes. This is equal to 90 cents a share on common and compares with $520,236 or 95 cents per share in the September quarter of 1941.

Hiram Walker-Gooderham Worts, Ltd., has discontinued distilling for beverage purposes in its United States and Canadian plants and manufacturing facilities are now utilized 100 per cent in the production of alcohol. U. S. plants have a distilling capacity of approximately 22,000,000 wine gallons of 190-proof alcohol per year. For the fiscal year ended August 31, 1942, the net profit reported is $7,123,579 or $9.07 per share, compared with $6,921,969 or $8.78 in the preceding fiscal year. Sales set a new high at $150,492,421, compared with $102,156,227 in the previous year.

L. S. O. G. Exchange

CONTINUED FROM PAGE 1685

Another feature of the program which is received with enthusiasm is the group dinner, moderately priced at less than a dollar. This, taking place prior to the evening meeting, contributes to the continuity of the whole program.

Last year's meeting attracted well over 300 students from 12 schools. One meeting of this type is included on the section's yearly agendum.—RALPH H. MÜLLER, *New York Section.*

"ON THE SPOT" But Keeping Step

These are not times for ORDINARY performance by either men or equipment—they are all "on the spot". It's a case of PRODUCE—*or else!*

Thanks to the care in design and construction that has *always* gone into Roots-Connersville Rotary Positive and Centrifugal air and gas handling equipment, their performance and endurance under record-smashing production efforts have proved they can "take it".

Firms which can extend the necessary priorities should consider their future requirements now, since heavy war-time demands have caused delays in shipping which are unavoidable.



Rotary Positive Blower handling CO_2 gas in a mid-western chemical plant. Capacity 225 CFM, 5 lbs. pressure, 690 RPM.

ALL OUT for VICTORY

THROW YOUR SCRAP INTO THE FIGHT

ROOTS-CONNERSVILLE BLOWER CORP.
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Roots CONNERSVILLE SINCE 1854

Rotary Positive & Centrifugal AIR and GAS HANDLING EQUIPMENT

Fiber Conduit Has Wide Field of Potential Use

In view of the metal shortage great interest has been shown in the possibilities of fiber conduit such as Bermico, a product of Brown Company, manufacturers of wood cellulose products.

In the production of Bermico, wood cellulose fibers are scientifically built up and heat-treated to form rugged tubes with a solid homogeneous wall structure. These tubes are then impregnated by a special process to produce a chemically inert, light weight pipe with high mechanical strength and water resistance. Significantly, Bermico is made 100 per cent from noncritical materials.

Millions of feet of Bermico are put under ground each year for the installation of electrical cables. Lately Bermico fiber conduit has been used in place of critical metal conduit. Another new application is for inside drain pipe to carry off rain water. Bermico is also now being used as a protective jacket to prolong the life of metal pipe exposed to corrosive action of liquids or gases.

In addition to the uses already mentioned, certain types of Bermico seem to offer possibilities as a soil pipe, as well as for drainage lines and as casing in shallow oil wells. Other private experiments are being conducted to determine the adaptability of Bermico as a war time alternate for specialized applications. Samples of Bermico and complete information may be obtained from Brown Company's General Sales Office at 500 Fifth Avenue, New York City.

Farm Product Used by du Pont

A CARAVAN of 50,000 five-ton trucks, bumper to bumper, stretching over 236 miles of highway from Washington, D. C., to New York would be needed to haul the farm products purchased by du Pont in one pre-war year.

Today even larger tonnages of crops grown on American farms have been added to the colossal procession needed to meet wartime demands for chemicals. Vegetable oils, turpentine, cotton, cotton linters, and wood pulp, to name but a few, go daily to chemical factories in various sections of the United States, to be converted into products essential for peace—and war.

FERDINAND A. KERTESS, of the Chemical Marketing Co., Inc., New York, N. Y., and three others were accused on November 6 before a Federal Grand Jury of scheming to send to Germany strategic metals of the platinum group—rhodium, iridium, and palladium. During 1940 and 1941 it was said, the group had smuggled to Germany more than $14,000 worth of these metals. Dr. Kertess pleaded not guilty and was freed in $7,500 bail.

Swedish-Finnish Trade Pact

TERMS of the Swedish-Finnish trade agreement for the first six months of 1943, recently concluded, provide that Swedish exports to Finland are to be maintained at the 1942 level. In addition Sweden is to grant credit of 10,000,000 kronor (about $2,500,000 at par) for Finnish purchases from Sweden, as well as credit of 5,500,000 kroner (about $1,375,000) for financing Finnish imports of Danish butter. Under a trade agreement concluded in May and valid to December 31, this year, Sweden was to export goods to Finland in the amount of 35,000,000 kroner, or about $8,750,000 at par. In addition Sweden allowed Finland a credit of 35,000,000 kronor with which to purchase foodstuffs from Denmark. Finland, in return, was to export goods to Sweden to the extent her supplies permitted.

THE French Kali-Chemie A.-G. reports that sales showed a substantial increase in 1941, above the average of the last three years before the war. The company is negotiating for the purchase of an electrolytic plant in Alsace and a salt pit and chemical plant in Lorraine.

d-ribose

.....by a New Process

In response to the considerable demand for an economical source of d-ribose, Schwarz Laboratories, Inc., has developed a new and improved process for the production of this rare pentose.

•

For industrial purposes, Schwarz Laboratories, Inc., is prepared to discuss bulk production of d-ribose, in several grades of purity and physical state to meet specific requirements.

•

d-ribose of exceptional purity is available for research purposes

Inquiries are invited

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202 East 44th Street • New York, N. Y.

Advances in Starch Study

ERIC HARDY, 47 Woodsorrel Road, Wavertree, Liverpool 15, England

THE wartime importance of starch makes interesting some of the recent advances made in the study of this carbohydrate in different countries. In India, where the cowpea (*Vigna catjang*) is an important food crop, studies of its properties have been made (*2*). Analysis of seeds from the long-podded variety showed 39.2 per cent starch and 11.12 per cent soluble carbohydrate. Methods similar to those used commercially in producing cereal starches were applied to the cowpea in the laboratory, and the yields were 20 per cent white starch (87.3 per cent starch, 10.02 per cent moisture, and 0.14 per cent ash) and 74.4 per cent pulp (36.22 per cent protein, 23.1 per cent crude fiber, 27.55 per cent starch, 8.17 per cent moisture, and 4.4 per cent ash).

A 3 per cent cowpea starch paste heated to 90° C. had a viscosity somewhat higher than that of wheat starch, but lower than that of Indian corn starch. However, as the cereal starches decreased in viscosity upon continued heating, the cowpea starch had the highest viscosity after 30 minutes. Gelatinization was found to be slower in cowpea starch than in cereal starches. This relatively small viscosity variation over a wide temperature range renders cowpea starch useful in textile sizing and as a thickener in calico printing.

In America the physical nature of starch has been further studied by Schoch who, in a recent paper (*3*), dealt with degradation and other important points of starch behavior. Degradation into a mushy paste when it is peptized by an alkali or other peptizing agent and the agent then removed, is well known. This degradation is faster and more complete at low than at high temperatures. Surface degradation arises in the skinning of boiled starch paste by evaporation. Autoclaved starch solutions degrade on standing, and degradation is faster the higher the starch concentration. Alkali-peptized starch does not degrade on standing, nor by freezing or evaporation.

Degradation arises in the precipitation of starch from pastes or solutions, and this precipitated starch will not dissolve to its former degree of dispersion, even after being autoclaved. High acidity favors degradation, but when acidity is high enough (pH less than 3) hydrolysis of the starch lessens the quantity of precipitate by forming soluble products. Starches which have been solubilized by dextrinization, oxidation, or ethylation do not degrade readily. They do not skin easily, and if a skin does form it can be redissolved.

Such aspects of starch behavior indicate that the affinity of starch for water is opposed by the stronger association forces acting between starch molecules. Hydration, therefore, can be carried past the gel stage to the colloidal solution stage only with extreme difficulty, and such a colloidal solution degrades easily. A dissociating force stronger than that of water is needed to solubilize starch.

Reference should be made here to Radley's new book on "Starch and Its Derivatives" (*1*), especially because of the increased commercial interest in the manufacture of starch and its derivatives and the connection with potato starch, dextrin, and glucose.

More work must be done before the chemical structure of starch is finally and thoroughly understood, since much of the present literature is conflicting, and research and observations have been made under different conditions. The bacterial fermentation of maize made by Weizmann during the last war introduced a new source of acetone, but this process has been little used in Britain, where potatoes and horse chestnuts form the chief source of starch.

Starch now plays so important a part in the paper and textile industries that its importance as a food source may not always receive its share of attention. Doubtless the future will see greater importance attached to starch iodine, the ethers and esters of starch, the manufacture of starch sirup, glucose sirup or corn sirup, glucose, and commercial dextrose.

In America dustless starch grits have been made from raw starch and a small quantity of gelatinized starch, starch has been converted into a sugar mixture containing between 65 per cent and 70 per cent dextrose equivalent by use of molybdenum catalyst, and it has also been converted to paste with a relatively high starch solid content and low consistency through use of a strong solid acid salt of an amino acid. Thin boiling properties have been given by a water-soluble acid salt of an amide, and it has been made soluble by heating in the presence of water and persulfate.

Literature Cited

(1) Radley, J. A., "Starch and Its Derivatives", New York, D. Van Nostrand Co., 1940.
(2) Sarin, J. L., and Qureshi, M. H., *Ind. Eng. Chem.*, 33, 640 (1941).
(3) Schoch, T. J., *Cereal Chem.* 18, 121–8, (1941).

Liquid Carbon Dioxide in Fire Extinguishing

ENGINEERS saw liquid carbon dioxide on public display for the first time in the Cardox Corp. exhibit at the 31st Annual Safety Congress and Exposition in Chicago.

The liquid carbon dioxide was contained in a miniature, mechanically refrigerated storage tank of about 30-pound capacity, specially built for the exposition. For the usual all-steel construction thick trans-



Liquid carbon dioxide displayed by Cardox Corp. at Annual Safety Congress and Exposition

parent plastic ends were substituted on the tank.

A miniature, composite industrial plant was created for the Safety Exposition to show many times daily a small-scale replica of a typical Cardox engineered fire-extinguishing system in operation. A low-heat alcohol fire was used to activate the system, which automatically detected the fire within a matter of seconds and sounded an alarm bell. A short period was allowed for the imaginary workers to leave the plant before the automatic discharge of carbon dioxide began. While the fire was extinguished almost instantly, the discharge continued long enough to eliminate any possibility of reignition.

Sterilization with Gas

The Department of Agriculture has long employed methyl bromide and it has been used by private business concerns for disinfecting clothing, buildings, plants, etc.

Not long ago, a model gas sterilizer was set up by the Department of Agriculture and submitted to Camp Lee's Sterilization School for experiments in creating a standard mobile gas sterilization unit.

A complete new gas sterilizer was set up, which is now in the process of manufacture, for use with regular Army units in the field.

The new portable unit can be set up in 17 minutes, 20 seconds and can take care of from 65 to 75 men's clothes.

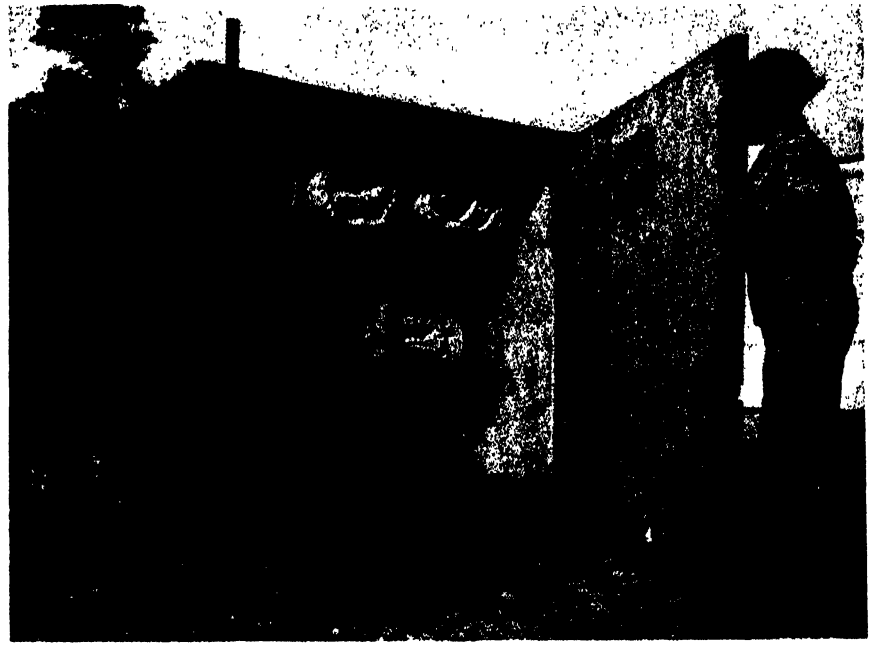
The entire unit is collapsible, and two units can be set up in a single large wall tent.

It is planned that a mobile sterilization company will use six units encompassing one run or cycle per hour. On that basis, one company consisting of six units can sterilize clothing for 450 men per hour; and in a 16-hour day the total amount of clothing sterilized will be sufficient for 7,200 men.

Taken apart, the equipment is so compact and light that two entire units can be carried together with motors, tents, and all other essential equipment, in one truck. A trailer carries shower equipment for bathing facilities.

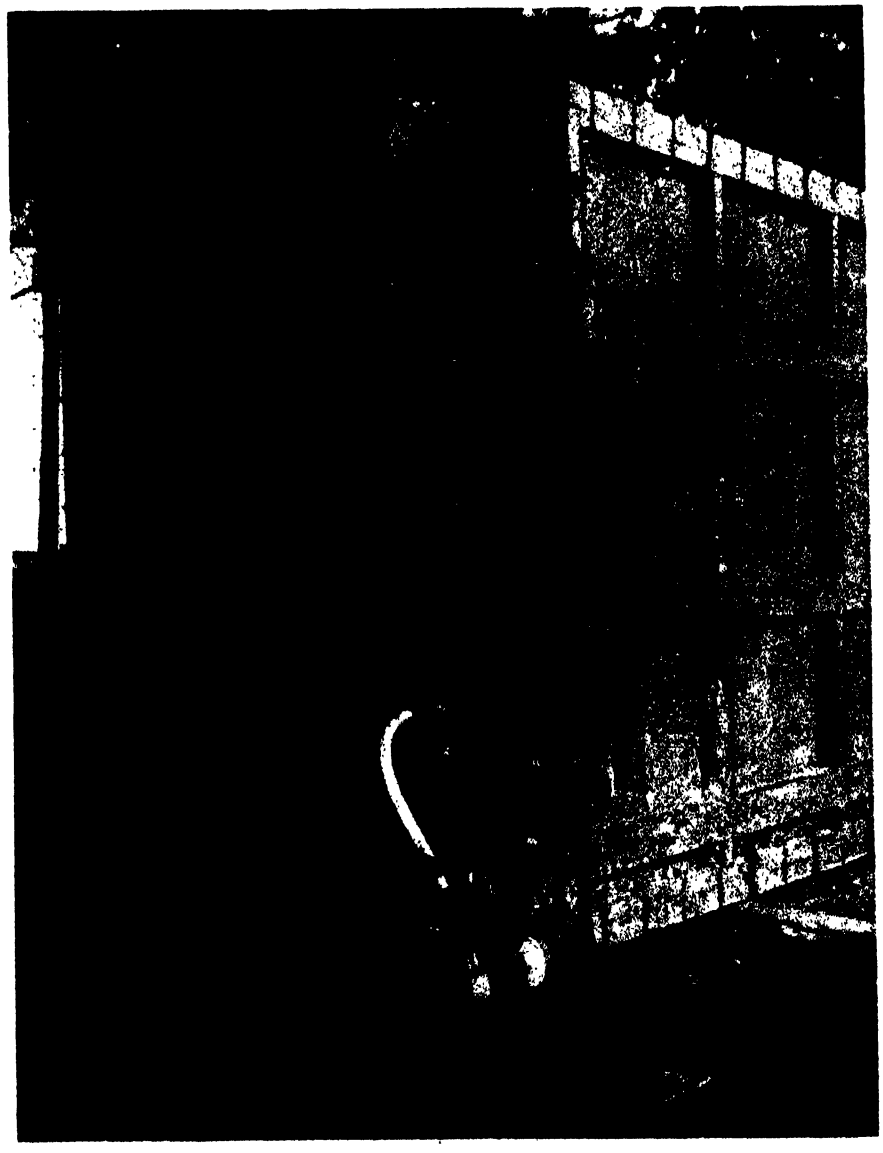
Methyl bromide comes as a liquid, and the equipment is set up so that it will drain through copper tubing, in the form of a coil, immersed in water heated above atmospheric conditions by the exhaust from the portable motor that operates the unit. The liquid turns rapidly to vapor because of the heat in the coils and the low boiling point. The gas is passed into the shaft and blown into the sterilizing chamber by an air circulator run by the air-cooled motor. A complete cycle or run takes 60 minutes.

Lloyd H. Wartman has joined the Research and Development Laboratories of the Bakelite Corp., Bloomfield, N. J.



U S ARMY NEWS PHOTO

Mobile gas sterilization unit from the rear



U. S. ARMY NEWS PHOTO

Mobile sterilization unit is about to be used in experiment in sterilizing mattresses. Ingenious "pivot bolts" hold sections together with edges tight, sealing the inside.



A general view of the plant layout at the Trenton Valley Distillers Corp., Trenton, Mich.

Ethyl Alcohol Operation by Trenton Valley Distillers Corp.

WAR has brought back into production the model distillation plant of Trenton Valley Distillers Corp., long an inexplicable "orphan" of the industry.

Under the active direction of B. Clark Boeckeler, widely known chemical and distillery engineer, this million-dollar whisky plant has been converted to the production of ethyl alcohol under government allocation for synthetic rubber and smokeless powder. Output was started in September and has now reached the rate of approximately 3,000,000 gallons annually. By early 1943 the rate will have been stepped up to between 5,000,000 and 6,000,000 gallons annually.

The million-dollar plant, located at Trenton, Mich., a down-river suburb of Detroit, was constructed shortly after Repeal. Plagued from the start by lack of working capital, it suspended operations in 1937 after manufacturing and marketing only a few million gallons of whisky. For the past five years the plant, one of the finest and largest in the Middle West, has stood idle.

The trouble was that the company had lavished too much money on fine equipment. After construction costs were paid, the original company, capitalized at $1,250,000, had only $100,000 left as operating funds. Efforts to get additional capital were complicated by the indictment in 1939 of a former president and former vice president of the company on charges of irregularities in the sale of the company's stock.

The company never has gone into receivership. Since 1927 its affairs have been entrusted by the stockholders to Glenn D. Curtis, of the Detroit law firm of Bulkley, Dickinson, Wright & Davis, who has recently been elected president and chairman of the board of directors. Curtis' efforts to effect a reorganization were fruitless, however, until the possibilities of the plant in the war-boomed industrial alcohol field attracted the attention of Boeckeler early this year.

Boeckeler at that time had been for 10 years with the Lummus Co., New York engineering firm which specializes in the erection of chemical plants, oil refineries, and distilleries, and was head of its chemical division. His duties familiarized him with the equipment of most of the country's modern distilleries. Previously he had been a research engineer for Commercial Solvents Co. from 1929 to 1931, working on the distillation of grains in that company's distilleries at Peoria, Ill., and Terre Haute, Ind.

Recognizing a rather peculiar value of the Trenton Valley plant as a possible producer of high-proof industrial alcohol, Boeckeler gathered together some capital in New York and formed the Boeckeler Associates, which now leases the plant from the Trenton Valley Distillers Corp. and is the actual operator. Boeckeler has brought in as his works manager Frank J. Smith, widely known in the distilling industry. Smith formerly was connected with the Seagram Distillers Corp. He was at one time manager of the Calvert distilling plant at Relay, Md., and also was in charge of Seagram's plant at Louisville. Also taking an active part in the new operation is William J. Hale, who has been elected to the board of directors.

The particular feature of the Trenton Valley plant is that it is equipped with rectifying columns with an unusually large number of plates, originally designed for the complete removal of the undesirable constituents of whisky with the idea of producing a whisky which would age quite rapidly and thus could be marketed in a short time. This equipment makes it possible for Boeckeler to produce 190 proof ethyl alcohol on whisky stills, whereas the majority of such alcohol now being turned out by whisky plants is of only 120 to 160 proof.

The normal capacity of the plant is 3,500 distillers' bushels of grain a day. However, some departments are equipped to handle up to 5,500 bushels a day, and Boeckeler hopes eventually to bring the entire plant up to this level, the ultimate capacity being close to 14,000 wine gallons a day.

Since the plant's production of alcohol is earmarked primarily for the synthetic rubber program, and secondarily for smokeless powder manufacture, it gets the highest priorities and Boeckeler has had no trouble getting necessary equipment to convert the plant.

To facilitate handling of the alcohol under government supervision, it was



A view of one of the stills at the Trenton Valley Distillers Corp., from above. These big stills, running up five stories through the plant, were unique in the whisky industry when they were built a few years ago, in that they could produce spirits as high as 192 proof.

necessary to build and equip a bonded warehouse and a denaturing plant. As an economy measure, the new management also constructed a new water-supply system which takes water directly from the Detroit River, about a mile away, eliminating the cost of city water.

Although the denaturing plant was required by the Government, the bulk of the alcohol is shipped undenatured in tank cars to storage depots designated by the Defense Supplies Corporation. Grain, incidentally, is supplied to the distillery by the Commodity Credit Corporation.

Boeckeler considers the distillery among the eight or ten finest in the country. It is amazing, he says, that it should have been allowed to sit idle for so long.

Boeckeler's lease is "for the duration", and he has no plans beyond that time. However, it is not likely that the plant will ever return to the production of whisky. Boeckeler believes synthetic rubber, particularly as it provides a vast market for farmers' grain, is here to stay, and that in peacetime it will require far more than the presently planned wartime facilities for converting grain to alcohol.

Even discounting synthetic rubber entirely, President Curtis points out that there should be a ready market for the company's entire alcohol production in the Detroit area after the war. Industrial users in this area normally consume between two and three times the annual capacity output of alcohol by the Trenton Valley plant, and the freight-rate advantage which the company would enjoy is not to be overlooked.

Bureau of Mines Projects Continued

A MAJORITY of the wartime construction projects of the Bureau of Mines, ordered suspended by the War Production Board, October 20, are to be continued.

Construction work on the bureau's helium plants, explosives research laboratory, synthetic oil project, and pilot plants and laboratories working on aluminum may continue to completion, subject to limitations contained in previously issued Preference Rating Orders. A decision on two additional projects was deferred.

Hormones for Soybeans

THE Glidden Co., Cleveland, Ohio, has developed a method of making sex hormones from soybeans. The company has been in limited production for some time, but demand has increased recently because these hormones are no longer available from Germany and Austria, where they were derived from animal proteins.

Chemical Manufacturers' Indexes

THE September index of the value of chemical manufacturers' inventories, according to the monthly industry survey of the Department of Commerce, was 161.5 compared with 164.4 in August, and 126.0 in September 1941, taking the average month of 1939 at 100.

September index of the value of chemical manufacturers' shipments, taking an average month of 1939 at 100, was 185, compared with 171 in August, and 175 in September of the previous year.

New Hemisphere Rubber Source

CRYPTOSTEGIA, a flowering vine in California, Mexico, and Central America may become one of the most important sources of natural rubber for the Americas. It is considered one of the best plant sources of latex.

Most important of the cryptostegia projects, contracted for by the United States Rubber Reserve Co., and the Haitian-American Development Corp., is the planting up to 100,000 acres of the vine in Haiti. In the United States 60 skilled horticulturists are being recruited, and it is estimated that about 100,000 Haitians will find employment when the work is fully organized.

In rainfall, soil and climate, Haiti is believed by agricultural authorities to be one of the more favorable areas for rubber-growing in the Western Hemisphere. Already small amounts of cryptostegia rubber from mature vines have reached the United States for testing. The quality of the rubber is said to be good, comparing favorably with rubber from Hevea and Castilla trees.

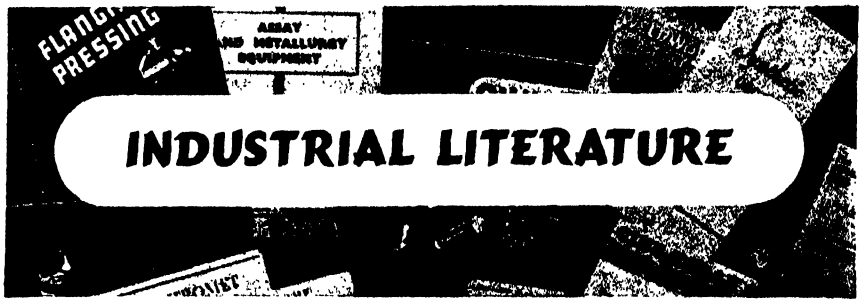
Experimental plantings will soon be under way in Cuba, Puerto Rico, Jamaica, Costa Rica, Honduras, and Mexico. These will augment test cultivations now under way in Florida, Texas, Arizona, and California, under the auspices of the Department of Agriculture.

Lacking previous commercial experience, the rubber yield from cryptostegia can only be estimated. Experimenters believe the plant can be safely cropped after the first year and mature plants may yield some 250 pounds of rubber per acre.

Rubber from cryptostegia cures well, the authorities say, has good tensile strength, and is comparable with Hevea rubber. Its resin content is suitable for mixing with synthetic rubber.

The plant also offers some possibilities for by-products—kapok from the floss found in the seed pods; fiber for rope from the stems; and alkaloids as drugs.

Production of cryptostegia requires little steel or other strategic materials and little skilled labor. It is estimated that one man per acre will be sufficient to harvest the leaves.



Listed publications should be requested directly from the company concerned. Use business stationery, mention bulletin numbers, and refer to this journal. Publications will be sent free unless otherwise noted.

Centrifugal Compressors. This catalog gives a full description of a line of compressors known as Design Nine. Excellent illustrations of the units, as well as of installations accompany the descriptive matter. More than 200 sizes are available. Cross section of the compressor, rating tables, dimensions, line drawings, and performance curves, complete the catalog. *Catalog 386-2 CEN.* B. F. Sturtevant Co., Hyde Park, Boston, Mass.

Chemical Mixing Tanks and Proportioner. A bulletin for industries interested in water softening. The mixing tank is of the vertical, cylindrical type, and embodies numerous improvements which contribute to its efficient and accurate operation. Disk and propeller type proportioners operated by remote control are illustrated and described with line drawings of layouts, specifications, etc. *Bulletin 312 CEN.* Graver Tank & Mfg. Co., Inc., East Chicago, Ind.

Cooling Water Circuits. This booklet, "Microbiological Deposits in Cooling Water Circuits", gives an outline and discussion of the theories offering explanations for some of the types of corrosion in water circuits and the chlorination of condenser waters. Photomicrographs of bacteria and fungi, as well as photographs of pipe sections, water screens, etc., illustrate the text. *Technical Reprint 474 CEN.* Wallace & Tiernan Products Co., Belleville, N. J.

Dehydrant. This bulletin describes Dri-Air chemical powder for the prevention of damage caused by humidity, condensation, rust, mold, mildew, etc., in industrial warehouses, food plants, refineries, confectionaries, etc. This powder will absorb moisture from 1,000 to 1,200 cubic feet of air with 10 pounds of material and is extremely simple to use. *Bulletin CEN.* Tamms Silica Company, 228 North LaSalle St., Chicago, Ill.

Drills and Reamers. This combination catalog and instruction book entitled "Hardsteel Drills, Reamers, Tool Bits and Special Tools" presents facts about Hardsteel, information on the units manufactured, tables of speeds, use of coolants, sizes of drills, counterboring, grinding, etc. *Catalog CEN.* Black Drill Co., 5005 Euclid Ave., Cleveland, Ohio.

Elevating Equipment. This bulletin describes the art of piling. Photographs and description tell how materials are stacked and moved and how paper rolls, crated goods, cans, barrels, etc., can be handled quickly and efficiently by the Revolvator, an elevating unit that has a revolvable base and telescopic features. *Bulletin 85 G CEN.* Revolvator Co., North Bergen, N. J.

Fire Extinguisher Maintenance. This pamphlet gives directions for inspecting, recharging, and maintaining portable fire extinguishers, and contains information on a number of different types of units. *Pamphlet AD274R CEN.* Pyrene Mfg. Co., 560 Belmont Ave., Newark, N. J.

Floor Patching. A pamphlet on "Instant-Use" resurfacing material, ready-mixed floor patch which allows use of floor immediately following repairs. No skilled labor is required to use this material. *Pamphlet CEN.* Flexrock Co., 23rd & Manning Sts., Philadelphia, Penna.

Graphite Lubricating Handbook. A booklet for all lubricating engineers. Cograph, a natural colloidal graphite, is described. Various formulas are presented. An indexed, alphabetical list of applications is also given. *Handbook, 2nd Edition, CEN.* Nassau Laboratories, Hackensack, N. J.

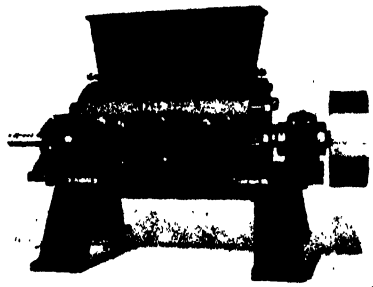
Instant Steam Generators. This loose-leaf booklet gives a full description of Vapor-Clarkson steam generators, permanent and portable types, hot water generators and spray cleaners, reducing and shut-off valves, safety valves, steam and retarder traps. Illustrations and schematic layouts help to present these units. Flexible metallic joints, heat exchangers, and other accessories are also described. Line drawings, dimension, size, and capacity tables complete the booklet. *Catalog 1010 CEN.* Vapor Car Heating Co., 80 East Jackson Blvd., Chicago, Ill.

Liquid Screens. "Vibrating Screens for Liquids" is the title of an 8-page pamphlet describing operations and applications in the process industries of shaker screens for liquid use. Illustrations of units and of examples of actual installations and performance are given. *Pamphlet CEN.* Robins Conveying Belt Co., 270 Passaic Ave., Passaic, N. J.

Lucite. Methods of fabricating Lucite methyl methacrylate resin into airplane enclosures and other products are described in detail in an illustrated manual on Lucite for Aircraft. Information on the care and handling, sawing, blanking and

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punching, drilling, threading and tapping, routing and shaping, sanding, scraping, finishing, cleaning, cementing, forming, mounting and installation, and repairing of Lucite is included. *Manual CEN.* PLASTICS DEPARTMENT, E. I. DU PONT DE NEMOURS & Co., INC., Arlington, N. J.

Mixers for Flocculation Tanks. This illustrated folder presents these mixers, in which the shaft is parallel to flow and the paddles rotate across the flow. Pivot paddles are available to increase the degree of agitation without increasing the speed of rotation. *Folder 2042 CEN.* LINK-BELT Co., 307 North Michigan Ave., Chicago, Ill.

Molding and Preforming Presses. This catalog describes and illustrates the semi-automatic toggle-type, compression presses, and single punch and high-speed rotary preforming presses for the plastic industry. It shows the improved Standard line of presses from 20 to 300 tons capacity as well as the Special, automatic equipment for molding closures and threaded parts, presses for buttons, toothbrush handles, and laboratory work. Examples of molded parts and press installations in a number of plants are shown. *Catalog 427 CEN.* F. J. STOKES MACHINE Co., Olney P. O., Philadelphia, Penna.

Paper as a Substitute for Critical Materials. Under the title, "The Development Possibilities of Paper for War Industry" this new 16-page booklet gives information and reference data valuable to those interested in paper as a factor in the solution of today's problems of materials and production. It deals with the various types of paper available and gives an illustrated description of the company's laboratory and production facilities. *Booklet CEN.* BYRON WESTON Co., Dalton, Mass.

Porcelain Products. A 12-page booklet on a wide selection of porcelain products including refractory electrical and dry and wet press electrical porcelains, forms for dipping rubber goods, tubing, and other units for process industries. Photographs accompany the descriptions. Stock items are included with those made to order. *Booklet CEN.* COLONIAL INSULATOR Co., 967 Grant St., Akron, Ohio.

Porcelain Renew. This pamphlet describes a cement, filler, and glaze for repairing industrial porcelain, glassware, enamel, ceramic, or other vitreous ware. This material does not crack, craze, check, or shrink. It is water-, acid-, alkali-, alcohol-, and gasoline-proof and acts as a bond between the broken or chipped surfaces. *Pamphlet CEN.* JOHNSON PRODUCTS Co., 507 Fifth Ave., New York, N. Y.

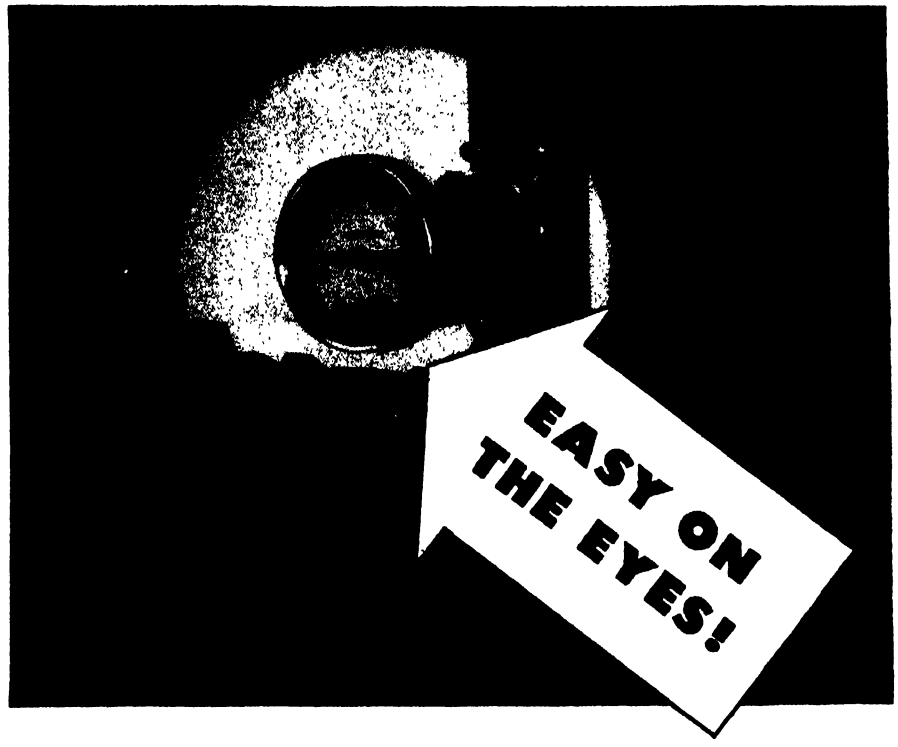
Presses for Process Industries. This illustrated bulletin gives a good description, with sizes of presses, attachments, etc., of presses for pulp materials, extracting liquids from fruits, laboratory work, compressing dry salts, forming clay products, compressing abrasive materials, molding of thermosetting resins and plastics, hot-plate pressing or curing, etc. The house organ gives a description of presses in war and other work. *Bulletin 4207, House Organ 84 CEN.* THE HYDRAULIC PRESS MFG. Co., Mt. Gilead, Ohio.

Proportioning Burners. This 16-page catalog gives complete information regarding these burners, together with diagrams for automatic hook-ups and illustrations of units with line drawings, charts, capacities, dimensions, etc. A section is devoted to installations in typical plants, and a list of users is appended. *Catalog 407 CEN.* HAUCK MFG. Co., 124-236 10th St., Brooklyn, N. Y.

Roller Gravity Conveyors. An illustrated pamphlet, giving specifications and diagrams of these conveyors. This pamphlet tells how the individual parts are designed and made, shows the various accessories, supports, switches, stops, etc., provides a table for selecting conveyors for various package sizes, and shows several actual installations. *Pamphlet Form 642 CEN.* LAMSON CORP., Syracuse, N. Y.

Sound Recorders. This pamphlet on automatic high-speed power level recorders for sound, published in 1940, gives a complete description of the recording units, their uses in testing the sensitivity of photoelectric cells and apparatus operated by them, sound absorption by insulating materials, street and factory noises, vibration of machinery, etc. A fast, continuous, permanent record is provided by these recording units. *Pamphlet CEN.* SOUND APPARATUS Co., 150 West 46th St., New York, N. Y.

Speed Prime Pumps. A folder on a series of pumps designed for the oil indus-



Ruggedness and dependable accuracy, too, distinguish the ALL-METAL THERMOMETER



Readability in an indicating thermometer is an outstanding advantage *if* full dependence can be placed on each reading. Thus the WESTON thermometer has been widely adopted throughout the process industries: because it provides both these essential factors . . . readability and dependability . . . without compromise. It's simple, all-metal temperature principle . . . minus gases, liquids, capillary and involved mechanisms . . . assures "on-the-dot" accuracy over a far longer period of time. In addition, this all-metal construction safeguards against failures due to vibration or over-ranging. *You're more certain of your reading . . . with a* WESTON.

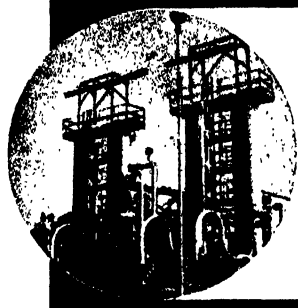
WESTON all-metal thermometers are supplied in types and diameters for most industrial applications and in stem lengths from 2½ to 24". Accuracy, over the entire scale, guaranteed within 1% for the industrial models . . . ½ of 1% for the laboratory model. Literature gladly sent on request, although production facilities are at present devoted solely to the war effort. Weston Electrical Instrument Corporation, 660 Frelinghuysen Avenue, Newark, N. J.

WESTON ALL-METAL *temperature Gauges*

STOP
GAS and ACID Leaks
with
CHARLAB
CHEMICAL PUTTY
Waterproof—Acid Resistant—Stays Plastic
20¢ per lb. F.O.B. CHARLOTTE, N. C.
5% discount for quantities of 200 lbs. Packed in Standard 50-lb. containers.
- Stops Gas and Acid Leaks at Flange Joints
- Packs Expansion Joints Excellently
- Makes Tight Joints at Bell and Spigot Connections

CHARLOTTE CHEMICAL LABORATORIES, INC.
CHARLOTTE NORTH CAROLINA

Specify Florite Desiccant



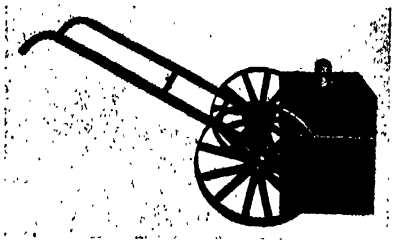
A NATURAL GAS PLANT is the illustration — might have been a unit for dehydrating propane, butane, gasoline, air, nitrogen, carbon dioxide, refrigeration compounds, or other fluids. All these are treated with superior drying efficiency by use of FLORITE. Hard, granular, stable, non-corrosive, non-poisonous, available in various mesh sizes. Selectively adsorbs 4 to 20% its weight of water — is regenerated by heating to 350°F. Write for literature — names of important users in your own field.

FLORIDIN COMPANY, INC.
ADSORBENTS
159 LIBERTY AVE. WARREN

try but applicable to other fields as well. These units are portable, have capacities from 3,000 to 125,000 gallons per hour. Capacity tables and photographs accompany the description of these pumps. More information is available in catalog form. *Folder 423 or Catalog 400 CEN.* CHAIN BELT Co., Milwaukee, Wis.

Valves. A catalog which contains 176 pages and 250 illustrations, with descriptions of bronze and iron valves and Dart unions. It also shows sectional views of most of the valves, illustrations of various parts of these units, gives the prices, and contains many tables of valuable information. The catalog is divided into six sections, and a general index is included, *Catalog 42 CEN.* THE FAIRBANKS Co., 393 Lafayette St., New York, N. Y.

Carboy Truck



THE Ipco carboy truck, designed to handle carboys with ease and safety, is made by the Industrial Products Co., 2820 North Fourth St., Philadelphia, Penna.

General Electric Clothing for Women Welders



TO MEET the needs of the many women welders now employed and being trained, the General Electric Co., Schenectady, N. Y., has announced a complete line of safety clothing designed especially for women welding operators. Safety, durability, and smart styling are combined in the new line which is based on the results of an extensive industrial survey of safety requirements for women welders.

Featured in the line are leather sleeves, aprons, jackets, leather gloves, and a special women's head and hair covering.

Rubber Covered Liquid Level Controller

A COMPLETELY rubber- or neoprene-covered liquid level controller has been designed by the Moore Products Co., Philadelphia, Penna., for installation in a standard rubber-covered tee fitting, or for direct mounting in a tank containing corrosive fluids. Rubber-covered steel flexible shaft eliminates packing glands and bearings and also provides a simple friction-free method of transmitting the float motion to an air pilot valve or microswitch as required.

Operating on the principle of force change due to buoyancy, rather than a float riding on a moving level, sensitivity is such that a buoyancy change of less than 8 ounces will result in full travel of the diaphragm-operated control valve. This permits the use of a small 4-inch diameter ball float and short float arm approximately 5.5 inches in length.

ACQUISITION of the Harmon Color Works, East Paterson, N. J., as a wholly owned affiliate, will enable American Home Products Corp. to increase materially its capacity to meet war demands for sulfonamides and other pharmaceuticals.

The arrangement calls for the exchange of 18,000 shares of American Home Products stock for 100 per cent of the stock of the Harmon Color Works.

EDWAL Special Chemicals

Hexamethylene Tetramine Anhydromethylene Citrate
Methylene Iodide o-Iodobenzoic Acid
Uric Acid

NOW READY! . . . Edwal's New Catalog No. 36N describing many new chemicals with prices. The above are only a few of the many special items listed. Write for the catalog and for quotations on your requirements.

The EDWAL Manufacturing Division
Laboratories, Inc.
737 FEDERAL STREET CHICAGO, ILLINOIS

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The "Alnor" controller accurately and dependably controls the temperature of any industrial furnace, melting pot, oven, or other heating device whether heated electrically or by gas or oil within 0.2% of the scale length. Furnished for either A. C. or D. C. operation.

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ILLINOIS TESTING LABORATORIES, INC.
420 N. LaSalle St. Chicago, Illinois

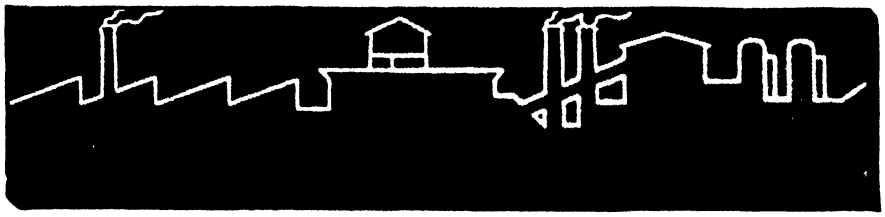
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Sure we're bragging, but—when companies like duPont, Socony-Vacuum, Shell Oil and Warner Quinlan use our tachometer we've got a right to be proud. Portable—less than 2 lbs. in weight, Jones Hand Tachometers are ideal for speed and rating checks on revolving platens, generators, turbines and motors of all types.



Write today for further information.

JONES•MOTROLA
432 FAIRFIELD AVENUE,
STAMFORD, CONN.



Welded Manifold Valves



Simplification of valve-and-piping hook-ups is made possible through the use of welded manifold valves, manufactured by Zallea Bros. & Johnson, Wilmington, Del. Any number of valves of any type in any size of carbon or stainless steel, chrome iron, nickel, Monel, or other alloys can be combined in an integrated unit. Advantages claimed for welded valves include greater strength with less weight, economy of space, ease of installation, minimum pressure drop, and elimination of bolts, gaskets, and flanged fittings between individual valves.

Brown Fintube to Build Heat Exchangers

The Brown Fintube Co., Elyria, Ohio, is to build and sell complete ready-to-use heat exchangers for the duration.

Exchangers will be built in all standard types, including the twin section unit pictured, and in any capacity desired to meet practically any heating and cooling requirement. Brown Fintubes, with the welded construction that provides an integral bond of metal between the fin and the central member, said to result in high thermal efficiency and trouble-free operation, will be employed as the heat transfer tube in all cases.

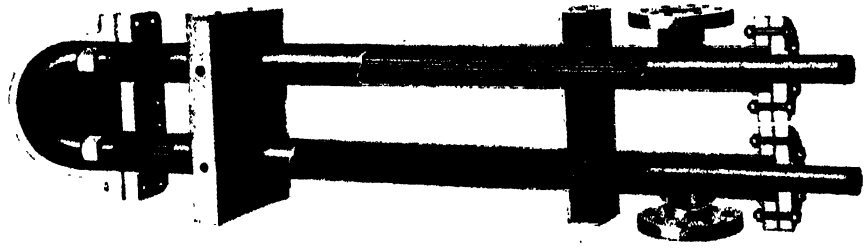
Refrigeration

Refrigeration equivalent to the cooling effect produced by the melting of millions of pounds of ice every 24 hours is achieved by a compact unit in a new Du Pont synthetic rubber plant, where temperatures of many degrees below zero are required for the manufacture of an essential ingredient.

A relatively small amount of refrigerant in efficient refrigeration and air-conditioning units not only replaces fantastic quantities of ice but gives the control of heat and humidity without which much vital war production would be slowed or stopped.

Refrigeration is required today in the manufacture of powders and explosives, drugs and pharmaceuticals, chemicals and plastics, communications equipment, military vehicles, wherever atmospheric conditions must be controlled within narrow limits.

Refrigeration and its partner, air conditioning, have assumed new industrial roles in mechanized war which will open untold fields when hostilities cease.



Ammonia
Argon
Boron Trifluoride
Butadiene
Butane
Butene 1
Butene 2
Carbon Dioxide
Carbon Monoxide
Chlorine
Dimethylamine
Dimethyl Ether
Ethane
Ethyl Chloride
Ethylene
Ethylene Oxide
Freon (12)
Helium
Hydrogen

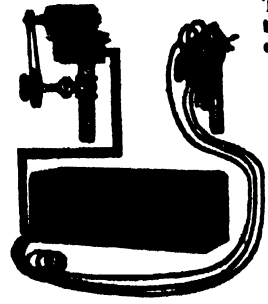
The Matheson Co.

38 Rare & Common
GASES
in six different sizes of cylinders from ½ pound to 150 pounds.

The MATHESON CO.
East Rutherford, N. J.

Hydrogen Chloride
Hydrogen Fluoride
Hydrogen Sulphide
Isobutane
Isobutylene
Methane
Methyl Bromide
Methyl Chloride
Monoethylamine
Monomethylamine
Nickel Carbonyl
Nitrogen
Nitrous Oxide
Oxygen
Phosgene
Propane
Propylene
Sulphur Dioxide
Trimethylamine

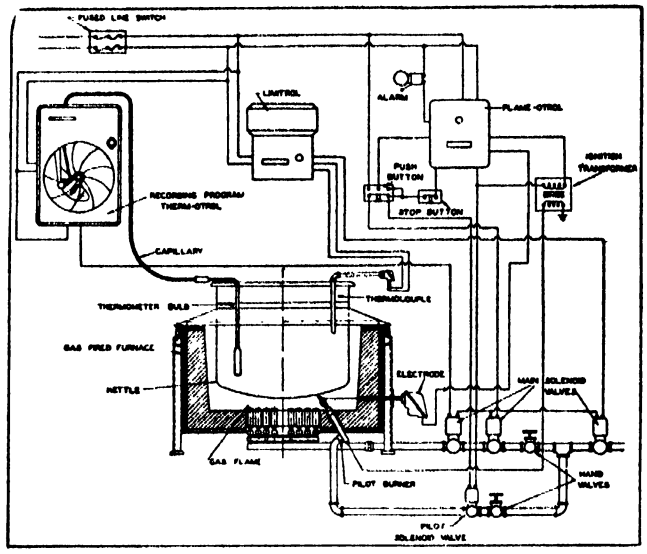
DENSITY CONTROLLER for PULPS



The Masseo-Adams Density Controller, first used in ore classifiers, now has many applications in non-metallic and chemical plants—including potash and phosphate plants, washing coal, etc. Maintains *visual* control of density by motor-operated regulation of dilutant supply valve. Also available with standard chart recorder or with arm and weights for sink and float process. Widely optional location. *In writing, please describe your problem.*

The MINE AND SMELTER SUPPLY CO., Denver, Colo.

Temperature Control for Processing Kettles



AN AUTOMATIC temperature cycle or program control application for a processing kettle, salt bath heat treatment, or a pot-type furnace, incorporating excess temperature shut-off and combustion explosion protection has been developed by the Wheelco Instruments Co., 851 West Harrison St., Chicago, Ill.

The instrument installation is designed to control fuel so as automatically to provide the desired temperature at any period in the process regardless of temperature variations required; to provide a record of temperatures experienced during the cycle; to give excess temperature shut-off protection and protection against burning materials with low flash points, or in the event of fuel valve or instrument failure, and to eliminate combustion hazards. It may be applied to gas- or oil-fired equipment.

Industrial Finishing Progress for 1942

SPEAKING for the Maas & Waldstein Co., Newark, N. J., the more important advances made during 1942 include:

Glossy and matte lacquers, lacquer-enamels and enamels for all purposes formulated from materials that are readily available in the United States and are not likely to be pre-empted by the war industries. A line of wrinkle enamels made from domestic materials.

The metallic-luster lacquers and enamels formerly made with aluminum powders have been replaced with the V-Metalustre line, which contains a nonmetallic lustrous material.

An acceptable substitute for electroplatings was found in a transparent lacquer enamel, known as Platelustre, which simulates brass, copper, bronze, color-treated aluminum and steel, and other metals.

Products developed especially to meet wartime demands include:

Plydur, a clear or pigmented finish for resin-bonded plywood, used in making airplanes and speed boats. Durad luminous paint, used to make objects visible during blackouts. Glasshield, a transparent coating which keeps ordinary glass from shattering when broken by severe vibration.

Solvent Removes Salt and Bunker Fuel Oil

GUNK P-96, concentrated self-emulsifying degreasing solvent made by the Curran Corp., Malden, Mass., is said to be able to dissolve, emulsify, and remove heavy accretions of bunker C fuel oil in the presence of salt water. The degreased surfaces are particularly compatible for the application of red lead undercoat.

Drum Plug Wrench

A DRUM plug wrench designed for removing and tightening plugs or bungs in steel drums has been designed by the Industrial Products Co., 2820 North Fourth St., Philadelphia, Penna.

"Once Used—Always"

No. 488

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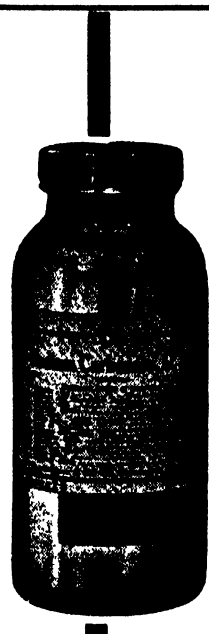
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EMPLOYMENT INFORMATION

RATES to be paid in advance. Standard setting 5c a word, minimum charge $2.00 each; include 8 words for box address. Exceptions see → Display, $10.00 per column inch. 2 inches maximum, larger units at regular display unit rates. No discounts or allowances.
SEND advertisements with remittance to INDUSTRIAL AND ENGINEERING CHEMISTRY, 332 West 42nd St., New York, N. Y., to reach there not later than 10:00 A.M. on the 5th and 20th, closing dates for editions of CHEMICAL and ENGINEERING NEWS of the 25th and 10th, respectively. Insertions made in order of receipt provided necessary remittances are complete. EMPLOYERS are requested to mention in their announcements the section of the country in which the open position is located to ensure replies only from those who are geographically available.
In printing these advertisements the SOCIETY assumes no obligations as to qualifications of prospective employees or responsibility of employers

UNEMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking employment for themselves are allowed in one calendar year 3 announcements free (one per issue) set in standard style and limited to 50 words each, including 8-word box address, and 3 additional standard announcements at 50% of regular rate. Further announcements and excess words at full rate.

EMPLOYED members of the AMERICAN CHEMICAL SOCIETY seeking new positions are permitted 3 standard announcements during the calendar year at 50% of the regular rate—include 8 words for box address

EMPLOYERS seeking chemists and chemical engineers are permitted 3 standard announcements, not to exceed 50 words each including box address and not more than one per issue, during the calendar year without charge, provided they agree in writing to acknowledge all replies (excess words 5c each), otherwise full rate applies

The AMERICAN CHEMICAL SOCIETY is vitally interested in the welfare of its members and in seeing that the chemical industry is manned with competent chemists and chemical engineers. These pages are part of our service in that connection. In addition most of the larger sections of the AMERICAN CHEMICAL SOCIETY and several of the smaller ones have active employment committees. Local section secretaries in your area will inform you as to any employment aids that may be available locally

An Employment Clearinghouse is operated at each national meeting of the SOCIETY for the purpose of bringing together representatives of industry looking for chemists and members and student affiliates in attendance wishing to make such contracts. For further details, consult the preliminary and final programs as printed in the NEWS EDITION prior to each meeting.

In the New York area, special employment facilities are offered by the Employment Bureau of the Chemist's Club, 52 East 41st St., New York, N. Y. In the Chicago area, the Chicago Section maintains an employment service at 505 N. Michigan Avenue, Chicago, Ill.

Those replying to announcements should be careful to send copies and not original documents. Advertising circulars will not be forwarded and to that end all letters will be opened at the forwarding office

SITUATIONS OPEN

Those announcements in which the letter "P" is part of the address key have paid in full and are not committed to acknowledge replies. The Society regards acknowledgment by employers of all applications as an act of common courtesy but can assume no responsibility for their failure to do so.

WANTED: Instrument Expert by leading aircraft engine manufacturer in East. Engineering training and calibration experience required, not necessarily in aircraft engines. Must be able devise new and note nearly accurate methods of temperature and pressure measurement and improve existing methods. No application sought from persons employed in war production.
Box 11-N-12, Ind. & Eng. Chem., Easton, Pa.

RESEARCH ASSISTANT, preferably college graduate familiar with chemical operations, to assist in physico-chemical investigations in laboratory located in Washington, D. C. Salary and advancement commensurate with ability. Give full particulars; education, experience, race, religion, age and draft status. Enclose recent photograph. An especially good opportunity for a man of some technical ability who is not subject to draft.
Box 21-N-12, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, man (with deferment) or woman with basic training in analytical and organic chemistry for laboratory work. Research opportunity probable. War industry, Metropolitan area. Give details of education and experience, salary desired.
Box 27-N-12, Ind. & Eng. Chem., Easton, Pa.

METALLURGIST—acquainted with metallography, industrial radiography, alloy preparation and treatment, and physical testing. Excellent opportunity in light metals field. Give full details in first letter, including minimum salary and photograph. Location Southwest.
Box 31-N-12, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER or Chemist. Recent graduate with some experience, as assistant in research and development along chemical engineering and metallurgical lines. Should be capable analyst and handy with tools. Location in East. Give full details, scholastic record, experience, salary desired and recent photograph.
Box 32-N-12, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER with experience in chemical plant design, mechanical engineering and product design, to work for plant in East. Must be draft exempt and not employed at your highest skill in any other war plant.
Box 35 N-12, Ind. & Eng. Chem., Easton, Pa.

BACHELOR, recent graduate with good organic training for synthetic work in new organic research laboratory in essential industry. Chicago area (interviews in New York City possible). Submit complete details on education, experience, personal data, salary expected, recent photo.
Box 51-N-12, Ind. & Eng. Chem., Easton, Pa.

CHEMIST or CHEMICAL ENGINEER—not older than 30 years. Experience in paint formulation advantageous but not essential. Excellent future for qualified man. Submit complete personal, scholastic, and professional data. State draft status and salary expected. All replies confidential. Location Middle West.
Box 55-N-12, Ind. & Eng. Chem., Easton, Pa.

CHEMIST with some petroleum experience. Needed in Chicago area for development of petroleum products and rust preventatives. State age, draft status, degree, and salary desired.
Box 70-NP-12, Ind. & Eng. Chem., Easton, Pa.

ASSISTANT PROFESSOR of Chemical Engineering desired by technical institute in Metropolitan Area. Full-time; teaching Thermodynamics and Chemical Engineering. Applicant should be Protestant and active member of A.I.Ch.E. Send information, together with photograph.
Box 84-N-12, Ind. & Eng. Chem., Easton, Pa.

PLANT DEVELOPMENT: Up to three recent graduates with Ph.D. degree for technical supervision of production departments. Prefer engineering major but physical, inorganic or organic training with practical viewpoint satisfactory. Submit full details of education, references, salary expected and recent photograph.
Box 10-T-12, Ind. & Eng. Chem., Easton, Pa.

CHEMIST or CHEMICAL ENGINEER. Male or Female, with research, testing and development experience in automotive greases and lubricants. Applicant should give age, educational history, experience, and record of previous employment. Location, Metropolitan New York.
Box 11-TP-12, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL ORGANIC Chemists with college degree. Can use both routine analysts trained in organic chemistry and men capable of doing organic research to devise new methods of organic analysis. Metropolitan location in Eastern Pennsylvania. Information regarding draft status required.
Box 13-TP-12, Ind. & Eng. Chem., Easton, Pa.

ORGANIC RESEARCH Chemists with thorough training in organic and physical chemistry. Bachelor's, or higher degrees received within the last few years. Real opportunity for advancement for men of proper qualifications in the research laboratory of a large chemical company located in the East. State draft status.
Box 14-TP-12, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMISTS for analytical laboratory of Research department. Applicants should be graduates in chemistry with their background in organic. Later opportunity for research work for those with good training in organic chemistry. Metropolitan location in East.
Box 15-TP-12, Ind. & Eng. Chem., Easton, Pa.

EXCEPTIONAL OPPORTUNITY for man or woman. Research Chemists and Assistants in progressive organic development laboratory located in New York area. Give training, experience, draft status if male, personal data, salary expected and recent photograph.
Box 17-TP-12, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST: For research work in laboratory in Rhode Island. Apply giving full details.
Box 19-TP-12, Ind. & Eng. Chem., Easton, Pa.

CHEMISTS WANTED, Male or Female, by large company operating in the New York area. Several openings, permanent, available. In some cases, experience or knowledge synthetic resin chemistry and/or paint technology prerequisite. For other openings, basic chemical theory sufficient. Write giving age, draft status, experience, education and salary desired. Your application will be kept confidential.
Box 20-TP-12, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER Wanted, preferably with intermediate and dyestuff experience, is offered permanent position in process development department. Salary based upon qualifications. Please address reply to: General Aniline Works, Process Development Dept., Albany, New York.

WANTED

SUPERINTENDENT of Plant Operations

Chemical Engineer with knowledge of synthetic fibre manufacturing preferred. Specify salary desired.

Box 23-TP-12,
Ind. & Eng. Chem., Easton, Pa.

SYNTHETIC ORGANIC Chemist: Recent graduate, M.S. or Ph.D., wanted by progressive New England firm. Some experience in the synthesis of surface active compounds desirable. In reply, state salary expected, draft status, and experience.
Box 24-TP-12, Ind. & Eng. Chem., Easton, Pa.

CHEMISTS and Chemical Engineers wanted by southern research laboratory. Experience in lignin and cellulose research developments, production and evaluation of paper and chemical pulps, or, production of plastics desirable. Salary commensurate with ability. Write giving full details of experience, draft status and salary desired. Our own staff know of this advertisement. Replies held in strict confidence.
Box 30-TP-12, Ind. & Eng. Chem., Easton, Pa.

RESEARCH FELLOWSHIP available at a large hospital in Brooklyn at $1500 to $1800 per year to develop micro-methods for the estimation of vitamins and hormones. State in detail experience and training.
Box 37-T-12, Ind. & Eng. Chem., Easton, Pa.

CHEMIST WANTED for our Newark laboratory, state experience and salary expected. Bensol Products Company, 237 South Street, Newark, New Jersey.

WELL ESTABLISHED and Modern Instrument House wants sales and/or service engineers for middle west and east. Technical education or similar experience important. Should be reasonably draft deferred. Salary and bonus.
Box 39-T-12, Ind. & Eng. Chem., Easton, Pa.

WANTED, CHEMIST for assay control and research work, with some knowledge of ampule manufacture. When answering, state qualifications, education and experience. Concern located in Detroit.
Box 40-TP-12, Ind. & Eng. Chem., Easton, Pa.

EXCEPTIONAL RESEARCH Opportunity for man or woman willing to spend a year in Texas on a new and difficult rubber problem. Should have solid organic background and some knowledge of colloids. Experience less desirable than curiosity and resourcefulness. State draft status, expected salary. Prefer young person now unemployed and available for interview in New York City area. This is field research and applicant should be able to take charge of laboratory, may have assistants.
Box 49-TP-12, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 1698)

Address communications to the box number indicated and Mail to Easton, Penna.

The American Chemical Society has no information concerning the position advertised, or in regard to those seeking employment.

(Situations Open Continued)

MIDWESTERN RESEARCH Institute, active in war work, has openings for two chemical engineers, M.S. or better, and two young women, B.A. or M.A., for analytical work. Reply should include information on education, industrial experience, personal data, salary expected, and photograph.
Box 50-TP-12, Ind. & Eng. Chem., Easton, Pa.

ORGANIC TEXTILE Chemist experienced in research and development of synthetic for textile processing and capable of field application of same. Knowledge of hydrocarbons, fats, resins, surface-active agents, etc. Give full particulars as to age, education, previous employment, etc.
Box 51-TP-12, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER: To take complete charge of small plant manufacturing organic chemicals for war and civilian purposes. Salary, $4,000-$5,000 yearly. Write giving full details, experience, etc.
Box 68-TP-12, Ind. & Eng. Chem., Easton, Pa.

PHARMACEUTICAL CHEMISTS wanted for development of drug and cosmetic items for department store sale. Applicants should have sound chemical background and experience in development of formulas and their adaptation to production and packaging. Laboratory and factory in metropolitan New York. Reply by letter stating age, education, experience, marital status, and salary expected.
Box 72-TP-12, Ind. & Eng. Chem., Easton, Pa.

EXPERIENCED CHEMICAL Engineer: Excellent opportunity for man of outstanding qualifications in research laboratories located in the East, occupied with essential activities. Please submit college record, experience, accomplishments and small photo.
Box 73-TP-12, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, Analyst, woman for analytical testing of inorganic chemicals used in important war industry. New York metropolitan area. Please write details as to education, experience and expected salary. Include small photo.
Box 74-TP-12, Ind. & Eng. Chem., Easton, Pa.

FOOD TECHNOLOGIST

Applications will be welcomed from men with outstanding records to serve as junior chemists in eastern research laboratories, engaged in essential work. Prospects for advancement excellent for men of right qualifications. Please submit record of training and experience, personal history and recent photo.

Box 77-TP-12, Ind. & Eng. Chem., Easton, Pa.

SOUTHWEST LABORATORY requires the services of a thoroughly trained graduate chemist broadly experienced in general analytical work, food analyses and vitamins by chemical, physical, and biological methods. Must be able to meet the public and take complete charge of laboratory if required. Unusual opportunity for rapid advancement. Write complete details, salary required, and include an inexpensive snapshot. Replies kept in strictest confidence.
Box 78-TP-12, Ind. & Eng. Chem., Easton, Pa.

CHEMISTS

With Bachelor or Master degrees for positions in laboratories of Analytical chemistry, Biochemistry, Organic chemistry and Physical chemistry in eastern organization engaged in essential activities. Opportunities for qualified men. Submit details concerning training, experience, personal history, and small photo.

Box 80-TP-12, Ind. & Eng. Chem., Easton, Pa.

OUTSTANDING February or June graduates with a B.S. or M.S. degree are offered graduate assistantships and junior research fellowships at $500 for the college year of ten months with a $180 tuition allowance and exemption from laboratory fees stipend increased annually. The applicant shall have completed at least one year each of inorganic, organic, analytical and physical chemistry, physics and calculus. Send official transcript of college record with photograph and indicate whether available February 1 or June 1. Department of Chemistry, University of Pittsburgh, Pittsburgh, Pennsylvania.

CHEMIST OR CHEMICAL ENGINEER with graduate training in organic and physical or colloid chemistry, for opening with large chemical research laboratory near New York City. Must have ability and initiative for conducting responsible development work. Experience in synthetic resin or paper industries helpful but not required. Give full details, including photograph.
Box 85-TP-12, Ind. & Eng. Chem., Easton, Pa.

ORGANIC RESEARCH Chemist, Ph.D. Excellent opportunity for vigorous and imaginative man with eastern company. Recent graduate preferred. $250 per month. Give full details, including recent snapshot, with letter.
Box 86-TP-12, Ind. & Eng. Chem., Easton, Pa.

WOMEN CHEMISTS: Openings for chemists in defense plant control laboratories for the production of alcohol from grains. Located in Pennsylvania, Ohio, and Kentucky. Give training, personal data, and recent photo in first letter.
Box 87-TP-12, Ind. & Eng. Chem., Easton, Pa.

GOOD OPPORTUNITY for well-trained young chemist, Ph.D., for special analysis and analytical research in drugs and related products. Salary commensurate with qualifications. Give education, experience, references, religious affiliation, etc.
Box 88-TP-12, Ind. & Eng. Chem., Easton, Pa.

CHEMICAL ENGINEER for Research and Market development. Permanent position requiring considerable traveling offered by manufacturer of materials and equipment in the New York-Philadelphia area. Two-four years' experience in sale or operation of process equipment is desirable but not essential. In reply, outline training, experience, draft status, and salary desired. Enclose small photograph.
Box 94-TP-12, Ind. & Eng. Chem., Easton, Pa.

SITUATION OPEN: Laboratory assistant for research and control in large pharmaceutical concern in Connecticut. Must be well equipped in organic chemistry. State academic and draft data and when available.
Box 98-TP-12, Ind. & Eng. Chem., Easton, Pa.

CHEMIST with analytical experience to assist in supervising routine chemical testing and develop analytical test methods for a chemical plant located in central New Jersey. Reply by letter stating age, training, experience, dependents, draft status, references, and salary desired.
Box 99-TP-12, Ind. & Eng. Chem., Easton, Pa.

INSTRUCTOR: Man or woman, wanted for semester beginning January; instructorships also available for next fall; general, analytical, organic. Ph.D. preferred, M.A. applicants considered. Apply immediately, giving full details including minimum salary. Chemistry Department, Smith College, Northampton, Mass.

SITUATIONS WANTED
(A.C.S. MEMBERS)

SYNTHETIC ORGANIC chemist. M.S. research and development experience in plastics. Desires organic research position (plastics or other industry) contributing directly to war effort. Young, married, responsible. Presently employed. Metropolitan location preferred.
Box 36-N-10, Ind. & Eng. Chem., Easton, Pa.

VAPOR PHASE catalytic chemist and chemical engineer with ten years' experience, mostly in research and development work with a little plant control. Also some general organic and inorganic experience. Location immaterial. Available immediately.
Box 36-T-11, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, Ph.D. Eight years' wide research experience with large concern; food products, vitamin synthesis and assays, industrial fermentations. Publications, patents. Now employed, desires position progressive organization undertaking expansion of research or setting up new department. Age 34, married. Available, reasonable notice.
Box 73-T-11, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL, ANALYTICAL Chemist. Ph.D., 1935, large mid-western university. Well trained in inorganic, organic, and physics. Excellent scholastic record; honor societies. Publications. Fifteen years' teaching experience; two and one-half years' experience research chemist with large corporation. Now Associate Professor, teaching physical, thermodynamics, electrochemistry, advanced analytical, in state supported school of technology. Desires responsible position in essential industry. American, age 38, married, one child, 3-A. Available February 1.
Box 25-N-12, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., 26, proven versatility and initiative. Synthesis sulfonamides, vitamin E, arsonic aids, explosives (nitro compounds, nitrates, nitramines). Wide experien... background physical chemistry, research surface chemistry, publications, honor societies. Single, Draft deferred, available immediately.
Box 44-N-12, Ind. & Eng. Chem., Easton, Pa.

CHEMIST: Ph.D., 1936, University of Illinois, Organic and Physiological. Six years' industrial experience including laboratory, field, and pilot-plant work. Especially familiar with soluble polymers, protein insolubilization and leather technology. Age 32, married, two children. Employed in non-war work, draft 3-A. Desires change permitting greater contribution to war effort and requiring less traveling. Location inconsequential; preference, middle west or west.
Box 46-N-12, Ind. & Eng. Chem., Easton, Pa.

RESEARCH CHEMIST, Ph.D., desires position with future. Prefers careful, scientific experimentation and can resolve problems into significant components. Fifteen years' industrial experience studying production of new inorganic compound, solubility diagrams and paper pulp bleaching. Publications and patents. Now employed. Age 43, married, three children, draft 3-A.
Box 48-N-12, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., 1941. One year post-graduate fellowship, desires research and development position in industry. Publications. Age 35, married with dependents, deferred classification in draft. Location immaterial. References.
Box 83-N-12, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, B.S. in Chemistry. Experience in biological chemistry, especially in analytical procedures. Desires something preferably in Rochester, New York, area, contributing to the war effort. Married, available immediately.
Box 12-T-12, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST: Ph.D. in February 1943 from an eastern university, desires research position. Minor in physical chemistry. Also good training in industrial emission spectroscopy. Married, age 25, draft deferred. Member Sigma Xi and Phi Lambda Upsilon. Midwest location preferred.
Box 21-T-12, Ind. & Eng. Chem., Easton, Pa.

RUBBER CHEMIST, B.S. Experienced in analysis, compounding, and physical testing of natural and synthetic rubber. Able to set up laboratory for same. Knowledge and experience in polymerisation techniques. Age 22, draft 2-A.
Box 25-T-12, Ind. & Eng. Chem., Easton, Pa.

PETROLEUM CHEMIST with ten years' experience in special lubricants, lubricant additives, solvents, soluble oils and other specialties desires position with $7500 minimum salary. Research, manufacturing, and technical sales experience.
Box 31-T-12, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. with research experience in diverse fields; now employed, but desires position more closely allied with the war effort; married; location immaterial.
Box 32-T-12, Ind. & Eng. Chem., Easton, Pa.

EXECUTIVE CHEMIST: Over twenty years' experience in manufacture of mechanical rubber goods, rubber covered tools, tanks, latex, synthetic rubber, extenders, etc. Class 3-A. At present head of own company but unable to continue because of priorities and other restrictions. Desires executive or technical position where unusual talents and ability can be used to fullest extent. Able to handle men. Familiar with labor problems.
Box 34-T-12, Ind. & Eng. Chem., Easton, Pa.

SPECIALTIES CHEMIST, Dr., age 48, extensive business, executive and research experience. Seventeen years' owner of large company over there manufacturing waxes, polishes, household specials, sanitary, cosmetics. Four years' practice in U.S.A. References. Desires responsible position with chance. Other fields considered. New York area preferred.
Box 36-T-12, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST desires research position in petroleum field. Experience in gas analysis and fractional distillation methods. Will complete Ph.D. requirements February 1, 1943; available thereafter. Teaching fellow for 2½ years. Sigma Xi, Phi Lambda Upsilon. Publication. Age 24, married, draft status 2-A.
Box 41-T-12, Ind. & Eng. Chem., Easton, Pa.

PATENT ATTORNEY seeks responsible position with chemical corporation. Age 36. Formerly employed in patent department of mid-western organic chemical corporation. Excellent qualifications. Could organize patent department.
Box 42-T-12, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, Ph.D., 1936, age 34, married, two children, draft status 3-A, now employed. Wide experience with leading companies in research, development and production of pigments, dyestuffs, intermediates, printing inks. Advantageous change desired, preferably research with large progressive company. Excellent references, publications, patents.
Box 43-T-12, Ind. & Eng. Chem., Easton, Pa.

WAR PRODUCTION work wanted by chemist, now employed in research, seeking more responsible position, Ph.D. in physical chemistry, experienced in dyes and pigments and their applications, but willing to start in new field. Citizen, age 26, Eastern location preferred.
Box 45-T-12, Ind. & Eng. Chem., Easton, Pa.

CHEMIST: Seven years' experience in toxicology, medico-legal, forensic chemistry. Analytical, interpretive, court testimony. Some research. B.A., with some graduate work. Married, draft 2-A. Prefer Middle West.
Box 47-T-12, Ind. & Eng. Chem., Easton, Pa.

(Continued on page 1699)

(Situations Wanted Continued)

CHEMICAL ENGINEER, Plastics, over sixteen years' experience research and development, plastic molding, cellulosic materials and resin extenders involving cost reduction and development of new molded parts and molding compounds. Married, age 41, draft 3-A. Member American Chemical Society, American Institute of Chemical Engineers, Society of the Plastic Industry. Desire research or development work involving new plastic products.
Box 48-T-12, Ind. & Eng. Chem., Easton, Pa.

ORGANIC RESEARCH Chemist, Ph.D., age 41, with 15 years' experience in laboratory, pilot plant and directing moderate size research groups n process development for manufacture of variety of organic chemicals—solvents, acids, esters, aldehydes, resins and others; process development, properties and use of industrial protein substances; miscellaneous research problems, desires position in research or directing small group. Moderate size organization, midwest location preferred.
Box 53-T-12, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST: B.S., December 1942. Desires position, preferably in research laboratory contributing directly to war effort. Age 22, married, industrious, and responsible. Draft classification, 2-A. Available December 9, 1942. Location unimportant.
Box 55-T-12, Ind. & Eng. Chem., Easton, Pa.

INDUSTRIAL RESEARCH Chemist desires war research or development work in plastics or colloid chemistry. B.S., Worcester Polytechnic Institute, 1934. Additional academic training in colloid and plastics chemistry. Four years' research experience on high polymers, resins, adhesives, leather processing, and rubber. Capable of operating without supervision and can produce useful ideas. Location desired, eastern seaboard or Pacific coast. Now employed, American, age 30, married, draft 2-B.
Box 58-T-12, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, WOMAN, Ph.D., 1938. Four years' experience in organic, protein and enzyme chemistry in industrial laboratory. Desires research position. Age 28, single.
Box 59-T-12, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D. Eight years' post-doctorate academic and industrial research and development; synthetic drugs, pharmaceuticals, bile acids, sex hormones, furans, metallic soaps. Publications, honorary societies. Location desired, metropolitan area. Draft status, 3-A.
Box 60-T-12, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, M.A. Broad experience in research and development; specialties, colloidal and surface chemistry. Employed mid-west, desires Eastern location. Age 41, draft 3-A.
Box 63-T-12, Ind. & Eng. Chem., Easton, Pa.

BREWING CHEMIST — BACTERIOLOGIST, organic Ph.D., Europe 1931. Excellent background, 8 years' experience in American brewing industry conducting plant control and as consultant; publications. Married, draft 3-A, seeks suitable position. Versatile linguist. Experienced inorganic analyst. Profound basic training, enabling quick adjustment to related and also other fields.
Box 64-T-12, Ind. & Eng. Chem., Easton, Pa.

DO YOU NEED An Idea Man? Food technologist, Chemical Engineer, M.S. (organic chemistry), desires research or development work in food field. 25 years' practical experience. Has worked on many food processes and products. Eager to tackle your problems.
Box 66-T-12, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST: Analytical, five years' experience in control, development and metallographic work. Now employed, desires to relocate in Newark, New Jersey, area.
Box 67-T-12, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST; A.B. Ohio State. Technical and research director Southern manufacturer of fine chemicals, especially terpenes and pharmaceuticals. Classed 2-B. Desires other "essential" work but with more opportunity to follow-thru on research and development in a permanent and responsible position. Age 32, single.
Box 70-T-12, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST: Ph.D., January 1943 from a large eastern university. Good synthetic background. Experience in heterocyclics, fatty acids. Desires work related to the war effort.
Box 71-T-12, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., 1941. Minor, physical chemistry and physics. Now employed. Desires position in war research. Thesis on hydrocarbons. Single, 26, draft 2-B, Sigma Xi, publications.
Box 75-T-12, Ind. & Eng. Chem., Easton, Pa.

ORGANIC CHEMIST, Ph.D., Columbia University. Years' experience in development work. Desires industrial research or control position preferably in middle west. Draft 3-B, age 32, now employed but available on short notice.
Box 76-T-12, Ind. & Eng. Chem., Easton, Pa.

FOOD CHEMIST, Ph.D. Biochemistry, organic, bacteriology, and food technology minors. Experience in vitamin determinations: animal, chemical, microbiological, and physical. Research on glass-packed foods. Age 26, single, draft 2-B, Protestant. American born, honor societies, scientific societies. Publications. Now employed, desires essential research position with progressive firm in vital war industry. Location unimportant. Available on reasonable notice.
Box 79-T-12, Ind. & Eng. Chem., Easton, Pa.

FERMENTATION OR FOOD INDUSTRY. Ph.D. seeks executive position. Plant and laboratory development or supervision. Alcoholic fermentation: grain, molasses, potatoes, yeast, malt products, enzymology, vitamins, bacteriology.
Box 81-T-12, Ind. & Eng. Chem., Easton, Pa.

PHYSICAL CHEMIST, Ph.D., 1940. 2½ years' experience, largely organic, research department large chemical company. Age 25 years, married, one child, draft 3-A. Prefer eastern location but will consider elsewhere.
Box 90-T-12, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, B.S. in Chemistry 1939, three years' experience as secretary doing literature searching, German translations, patent work, and Photomicrography. Seeks position in New York City.
Box 93-T-12, Ind. & Eng. Chem., Easton, Pa.

BIOCHEMIST, M.S. Seven years' research experience and process development in plant chemistry, bacteriology, mycology and plant pathology. Patents and publications. Age 35, married, class 3-A, deferred. Employed. Prefer position with opportunity for graduate study or research in war industry.
Box 95-T-12, Ind. & Eng. Chem., Easton, Pa.

HORMONE-STEROID ORGANIC Chemist, Ph.D., research or development, desires change to a more progressive firm with opportunity to exploit original novel ideas. Five years' experience in field. Superior scholastic record top midwestern universities. Age 27, American, married, draft deferred.
Box 96-T-12, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, M.A. and B.S. from two large state universities. Had graduate assistantship. Research on catalytic and electrolytic reduction. Temporarily employed but available immediately. Age 23, draft status 2-B. Location immaterial.
Box 97-T-12, Ind. & Eng. Chem., Easton, Pa.

SITUATIONS WANTED
(NONMEMBERS)

GRADUATE CHEMIST, who detests routine laboratory analysis, desires position in development work; not too good for hard work or dirty jobs; six years' varied industrial experience. Chemical background, average. Imagination and ingenuity, above average. Draft, 3-A.
Box 68-N-12, Ind. & Eng. Chem., Easton, Pa.

WOMAN CHEMIST, B.A. in chemistry, 1942. Biology, four years. Knowledge French, Spanish, typing. Location immaterial. Age 21, Protestant, single, employed but available short notice.
Box 46-T-12, Ind. & Eng. Chem., Easton, Pa.

METALLURGICAL ENGINEER: Mature executive with extensive experience in physical metallurgy, ferrous and non-ferrous including light metals, casting practice, fabrication, plant operation, and metallurgical research seeks permanent position. Industrial, institutional, and educational openings considered. Sc.D., Mass. Inst. of Technology. Now employed.
Box 52-T-12, Ind. & Eng. Chem., Easton, Pa.

BIOLOGIST, M.S., 1937. Five years' practical experience as a mycologist. Limited training in bacteriology. Woman, age 28, single. Nonmetropolitan area preferred.
Box 54-T-12, Ind. & Eng. Chem., Easton, Pa.

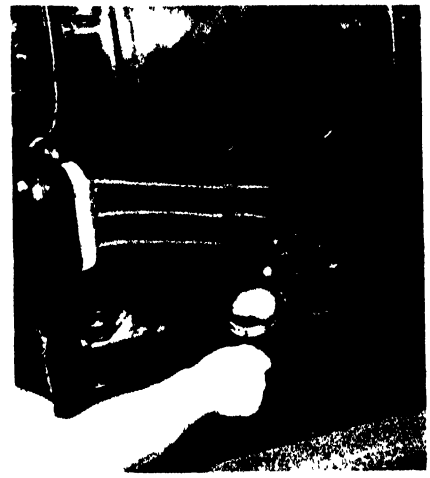
CHEMICAL ENGINEER, M.S., in 1940 from prominent mid-west University. Desires position in production or development work. 1½ years' experience, employed now in East but mid-west location preferred. Dependable and hard-working. Age 31, married, one child, draft 3-A.
Box 61-T-12, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, M.D. Age 30, 2½ years' metallurgical chemist, approximately two years' supervisor explosives laboratory. Desires either research or supervisory work in essential war industry. Release obtainable immediately. Draft status, 2-B.
Box 65-T-12, Ind. & Eng. Chem., Easton, Pa.

CHEMIST, B.S. One year of graduate organic chemistry. Two years' supervision experience in powder and explosives laboratory. Wants position research or analytical in essential work.
Box 82-T-12, Ind. & Eng. Chem., Easton, Pa.

ANALYTICAL CHEMIST, B.A., 1940. Some graduate work. 1½ years' experience in large pharmaceutical house. Desires position in organic synthesis. Eastern location preferred. Age 23, draft deferment assured. Now employed, but available on short notice.
Box 83-T-12, Ind. & Eng. Chem., Easton, Pa.

Determining Induction Motor Horsepower from Ammeter Readings



A SIMPLE method has been developed whereby loading on integral-horsepower induction motors can be determined with practical accuracy by means of a hook-on volt-ammeter. This method has been used with practical results by several plant electricians for a number of years, and has been checked for accuracy with design data of motors. It has been presented by the Industrial Department, General Electric Co., Denver, Colo.

Photoelectric Color Grader

A RAPID means of grading the color of rosin, other naval stores products, and other resins, is a photoelectric photometer developed by Robert H. Osborn, chemist at the Experiment Station research laboratories of Hercules Powder Co., Wilmington, Del. The apparatus consists of a light source, colored glass filters, and a photocell.

The Rubicon Co. of Philadelphia is the manufacturer. Hercules is making the color grader available to other laboratories through a royalty-free license.

New War Products Development Laboratories

THE Curran Corp., Malden, Mass., has opened a new War Products Development Laboratory to be located in the Processing Plant, Prospect Mills, Lawrence, Mass. The purpose of the laboratory is to put its creative chemists on the development of both offensive and defensive war chemicals.

Reclaiming Foundry Core Sand

ANNOUNCEMENT is made by Link-Belt Co., 300 West Pershing Road, Chicago, of the development of a new method of reclaiming foundry core sand.

BUSINESS OPPORTUNITIES • FOR SALE • WANTED • ETC.

MISCELLANEOUS

Five cents a word, minimum charge $2.00; display available at $10.00 per inch to be paid in advance. No discounts or allowances

MICRO-ELEMENTARY ANALYSES: C, H, N, S, P, Halogens, Methoxyl, Mol. wt., etc., U.S.P. and other official tests, Purity tests, Microinorganic assays, Spot tests, Micro-distillations, Toxicological investigations, and typical micro-chemical research work. Dr. Carl Tiedcke, 366 Fifth Avenue, New York, N. Y.

NEED EQUIPMENT? Then contact The Laboratory Exchange at New York. Write, wire or phone whatever your needs are in laboratory equipment. Your inquiry will receive immediate attention. We have served American chemistry for ten years with fine used guaranteed equipment. Reasonably priced. The Laboratory Exchange, 24 E. 21st St., New York City.

HORMONES WANTED: Will buy and contract for long term purchase all crystalline hormones, Folliculine, Gonadotropine, Testosterone esters, also extracts purified and solutions. Give full information, quantity, price, potencies, assays, etc.
Box 30-N-12, Ind. & Eng. Chem., Easton, Pa.

WANTED: One new or used Abbé refractometer. Lady Esther, Ltd., 7171 West 65th Street, Chicago, Ill.

TENSILE TESTING machine wanted immediately for war work. We will buy, or rent for the duration, a machine which will test 8" × ½" × 1/8" plastic strips. Minimum capacity, 2,000 pounds.
Box 29-T-12, Ind. & Eng. Chem., Easton, Pa.

LABORATORY SIZE Vacuum Drum Dryer wanted, new or used. State full particulars, location and price.
Box 56-T-12, Ind. & Eng. Chem., Easton, Pa.

WANTED: Mellor's Comprehensive Treatise Inorganic Theoretical Chemistry, Vols. 8–16 or complete. Journal Chemical Education, Vols. 1 and 2. Journal American Chemical Society, Vols. 1–13 or 1–25.
Box 57-T-12, Ind. & Eng. Chem., Easton, Pa.

WANTED TO BUY. Are you selling your laboratory or individual instruments? Then contact us and receive the very highest possible cash offer. We are urgently in need of all the equipment we can possibly obtain and will pay cash for immediate delivery. Write, wire or phone. The Laboratory Exchange, 24 E. 21st St., New York City, Algonquin 4-3879.

LABORATORY CALENDER Wanted: Urgently needed for use in connection with vital war work.
Box 18-T-12, Ind. & Eng. Chem., Easton, Pa.

AUTOCLAVE FOR SALE: One gallon Pfaudler, 1000 lb. per sq. inch. Direct fired, without burner. Belt driven anchor agitator, no motor. Gauge. Glass Liner, but glaze poor condition. $100.00, F.O.B., Laboratories Dr. George Piness, 672 South Westlake Avenue, Los Angeles, California.

WE OFFER: Amyl, Hexyl, Octyl, Furfuryl Alcohols. Phosphomolybdic, Phosphotungstic, Silicotungstic, Acids. Antimony, Chloride and Trifluoride. Chromium Fluoride. Cobaltous Nitrate. Barium Monoxide. Boron, Columbium, Caesium, Gallium, Germanium, Indium, Molybdenum, Rubidium, Titanium, Vanadium Metals.
Box 27-T-12, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Complete set Industrial & Engineering Chemistry, volumes 1-33; $150. Complete set Analytical Edition, volumes 1-13; $25. Journal American Chemical Society, 1904-1933, volumes 26-55, $150. All in perfect condition; mostly unbound.
Box 28-T-12, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: J. Chem. Education, volumes 1-17 inclusive, unbound, excellent condition. Any reasonable offer. M. W. Graffin, Hercules Powder Company, Wilmington, Delaware.

FOR SALE: Chemical Abstracts, complete, with all decennial indexes. Journal American Chemical Society, complete, 1907 to date. Journal Chemical Education, complete. Industrial Engineering Chemistry, and Chemical & Metallurgical Engineering, nearly complete.
Box 44-T-12, Ind. & Eng. Chem., Easton, Pa.

WE OFFER competent research service in organic chemistry. Organic syntheses. Private research laboratory. Room 206, 1007 McCartney Street, Pittsburgh, Pa.

FOR SALE: Chemical Abstracts, v. 1-32, including 3 decennial indices. Industrial and Engineering Chemistry, v. 1-30. Analytical Edition, v. 1-10. Journal American Chemical Society, v. 25-60. All bound, excellent condition. Will accept any reasonable offer.
Box 69-T-12, Ind. & Eng. Chem., Easton, Pa.

FOR SALE: Chemical Abstracts, volumes 14-27 inclusive with second decennial index, complete and in good condition, $60. Sold separately, Chemical Abstracts, $30. Decennial Index (author and subject) $35. Write Benton Owen, North Haven, Connecticut.

FOR SALE: Bound, complete Chemical Abstracts and first Decennial Index. Complete Industrial and Engineering Chemistry unbound except two volumes. Analytical Edition complete, unbound. Journal American Chemical Society, 1904-1930. Miscellaneous Bureau of Chemistry and experiment station bulletins. C. G. Church, 5256 Oakland St., Los Angeles, Calif.

FOR SALE: Abegg-Auerbach Handbuch Anorganischen Chemie, vols. 1-5, bound. Beilstein, Handbuch Organische Chemie, vols. 1-8, original German edition Kruyt, Einfuehrung Physikalische Chemie und Kolloidchemie. Lunge-Berl, Chemisch-technische Untersuchungen, 6 edition, bound. Transactions American Society Chemical Engineers, vols. 3—1940, bound. Venino, Handbuch Praeparativen Chemie., vol. 1, 1913, vol. 2, 1923. Zeitschrift Anorganische Chemie, vols. 40-53, 118-24, 178-235.
Box 92-T-12, Ind. & Eng. Chem., Easton, Pa.

FOR SALE. Immediate delivery, fully guaranteed laboratory equipment, reasonably priced. L & N PH Instruments, Zeiss Sugar Refractometer, B & L Microscopes and others, Dubosq Colorimeters, Braun UA Pulverizer, Mullen Jumbo Paper Tester, Electric Water Baths, Assay Balances, Pulp Balances, Analytical Balances, Leits Projection Microscope, International Centrifuges, Microtomes, Drying Ovens, Incubators, Vertical and Horisontal Autoclaves, Stokes Water Stills, Hoskins Furnaces, Schmidt & Haensch Precision Saccharimeters, Double Wedge for tubes to 400 mm., Large Elconap Incubator, etc. Write us your immediate requirements for laboratory equipment. Quotations are cheerfully furnished. The Laboratory Exchange, 24 E. 21st Street, New York City.

FOR SALE, Pulp Balances, only a few more are available of these standard American unused pulp balances in fine mahogany cases with drawer and sliding counterpoised door, 150 gr capacity, 1 mg sensitivity. Priced at $27.50 for immediate delivery. We suggest that you order promptly, for early delivery. The Laboratory Exchange, 24 E. 21st St., New York City.

Continuous Bleaching Process

PRODUCTION of military textiles is speeded by a new continuous bleaching process which turns cloth white in two hours at rates up to 200 yards per minute, E. I. du Pont de Nemours & Co., Inc., has announced. Processes are operating or being installed in mills in Massachusetts, Rhode Island, Delaware, Virginia, North and South Carolina, and Georgia.

"Kier" or "batch" bleaching, which requires 8 to 24 hours, is replaced by this fast, continuous bleaching with hydrogen peroxide.

This process not only hastens the bleach but allows precise control of all conditions—speed, steam, chemical absorption, and other factors—from start to finish.

Pump Tank Fire Extinguisher

THE American-LaFrance Foamite Corp., Elmira, N. Y., has designed a new pump tank with the amount of critical materials used in its manufacture reduced to a minimum. The tank produces a straight stream and not a spray, in compliance with the latest requirement of the OCD for controlling magnesium-type incendiaries. It is made in 5- and 0.4-gallon sizes.

Instrument and Control Panels

IN STEP with the effort to conserve sheet steel The Hays Corp., Michigan City, Ind., announces instrument and control panels made of Masonite reinforced with steel angles. Masonite material takes a finish comparable to steel.

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